PROPOSED NONPARAMETRIC TESTS FOR THE SIMPLE TREE ALTERNATIVE IN A MIXED DESIGN

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ABSTRACT

For the general alternative, many test statistics exist for the dependent and independent variables. However, no documented test statistics exist for simple tree alternative for the dependent variables, independent variables, and mixed designs that consider both dependent and independent variables. This research proposes six nonparametric test statistics when we have a mixed design that consists of observations from a Randomized Complete Block Design (RCBD) and a Completely Randomized Design (CRD). A simulation was conducted to compare the proposed test statistics under five conditions: changing number of treatments, varying the underlying distribution, increasing the variance between the RCBD and CRD, changing the proportions of the RCBD portion to the CRD, and changing the shifts configurations for the treatment effects.

The simulation results indicate that Approach II and Approach VI had the highest powers overall. Approach II is when equal weight $\left(\frac{1}{\sqrt{2}}\right)$ is assigned to the standardized modified Fligner-Wolfe and standardized modified Page's test statistic. While, Approach VI is when more weight, attributed to the sample size is assigned to the standardized modified Fligner-Wolfe, the CRD portion and less weight attributed to small number of blocks is assigned to the standardized modified Page's test statistic, which is the RCBD portion of the mixed design.

It was noted that, when the sample size was greater than the number of blocks and the RCBD and CRD variances are equal, Approach VI had the highest powers. On the other hand, when the variance in the CRD was greater than the variance of RCBD, Approach II had the highest powers. Also, when the number of blocks for the RCBD portion is greater than the sample size for the CRD portion in the mixed design, Approach II had the highest powers when the variance in the CRD portion was equal to the variance in the RCBD portion. On the other hand, when the variance in the CRD portion was greater than the variance in the RCBD portion Approach VI had the highest powers.

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DEDICATION

To my children Alysha and Isaac

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CHAPTER 1. GENERAL INTRODUCTION

Statistical analysis is reliant on the underlying distribution of data as well as the design used to collect the data. It is possible that a researcher starts an experiment with a Randomized Complete Block Design (RCBD), and then during the course of the experiment the need for more units arises. However, the cost of continuing with an RCBD is beyond the project budget. So, the researcher changes to a Completely Randomized Design (CRD).

A change in design creates challenges for researchers. For example, they need to find efficient ways to analyze and interpret data from two or more designs when they anticipated only a single design. In these instances, one important issue is deciding which test statistic is the most robust and whether to perform (1) a complete case analysis where we have more observations and dropping the remainder of the observations; (2) analyze the data using two or more designs and report each finding from each design separately or (3) combine the analysis of two or more designs by formulating new test statistics. In this research, we will also be assuming that the underlying distributions are unknown. Therefore, we will be concentrating on nonparametric tests.

One scenario where a research design might shift suddenly is, investigating the effects of a wellness program on the lowering the total cholesterol levels of employees at a company. This is an effort to improve employees' overall health and help control the rising insurance costs the company is facing. There is a wellness facility inside the company's premises. In order to achieve this goal the company attaches incentives to participating in the activities at the wellness facility such as small gift cards to use at various stores. Employees are asked to sign a waiver accepting the use of their data collected at the wellness facility by the company.

Initially, the researcher plans on a RCBD. The employee are matched based on their total cholesterol levels. The research study is performed to test several treatments against a control. Employees with similar total cholesterol levels form a block. Employees in each block, are then randomly assigned treatments including the control. Each employee's total cholesterol level is recorded before and after implementing the wellness program. The company is interested in whether the wellness program is effective at lowering cholesterol, without assuming an underlying distribution. The matching process of employees by total cholesterol levels is cumbersome process, so at some point the researcher switches from matching the employees by total cholesterol levels to randomly assigning treatments including a control. The portion of the data that is matched forms the RCBD portion while, the unmatched data is the CRD portion of the study. In this case we end up with a mixed design having a RCBD portion and CRD portion.

Nonparametric tests make less stringent demands on the data. This research study begins by proposing two nonparametric test statistics, the modified Page's test statistic and the Modified Fligner-Wolfe test statistic in a RCBD and a CRD, respectively. Our research proposes six nonparametric test statistics that are a weighted linear combination of the (standardized) modified Page's test statistic and the (standardized) modified Fligner-Wolfe test statistic for testing the simple tree alternative in a mixed design.

In this study we would like to test the simple tree alternative. This hypothesis is mainly used when we make the assumption that all of the treatments are at least as good as the control and we would like to test whether at least one of the treatments is better. When carrying out a research study, the researcher's intention is to use a RCBD, but before the end of the research study, for some reason beyond the researcher's control, part of the data is of CRD. That is, some of the data are groups of related subjects (blocks) in which each of the subjects is randomly assigned to one of the treatments including the control. The reason for having part of the data in CRD layout can range from say financial constraints on the part of the researcher, non-experimental research study which does not involve manipulation of the situation, circumstances or experience of the participants, voluntary opting out of study due to side effects of drugs, change of employers to mention but a few. This results in treatments being assigned to independent subjects (not in blocks) to have the study completed including data that are not necessarily repeated measurements but provide additional information.

We are interested in testing the hypothesis for the simple tree alternative

$$\mathrm{H}_0\colon \mu_1 = \mu_2 = \mu_3 = \cdots = \mu_\mathrm{k} \tag{1.1}$$

$$H_\alpha\colon \mu_1 \leq [\mu_2, \ldots, \mu_k] \text{ where at least one inequality is strict}$$

where μ_i is a location parameter (the median or mean) for population i with $i = 1,2, \ldots, k$ and k being the total number of populations. Usually population one ($i = 1$) is referred to as the control population and populations 2 through k are designated the treatment populations. We will let n_b denote the number of blocks in the RCBD portion and n_a denote the sample size for the CRD portion. The number of times each treatment appears is n where n_a+n_b= n.

In the next sections of this thesis, we will present a review of the literature on nonparametric statistical tests used in analyzing data, when the data layout is a CRD, RCBD and various mixed designs. In Chapter 3, there are descriptions of the proposed test statistics. In Chapter 4, the details on the simulation study will be given. In Chapter 5, the results obtained from the simulation study will be illustrated using tables. Finally, Chapter 6 will contain the conclusions about the proposed test statistics and when they should be used in relation to different situations.

CHAPTER 2. LITERATURE REVIEW

Nonparametric tests have fewer underlying assumption about the distribution of the data being examined. Ranks are used other than the raw data in obtaining the test statistics. In this section, we present a review of nonparametric statistical tests in which the location (medians) parameters of three or more populations are compared. Some of the test statistics are a direct generalization of the two sample case. The null hypothesis (H_0) is the general form where the samples (treatments) are assumed to have the same effect. That is the samples are assumed to come from the same population. $H_0: \mu_1 = \mu_2 = \mu_3 = \cdots = \mu_k$ where μ_i is a median of the i^{th} population. The alternative hypothesis, may take the general form which states that at least one of μ_i is different than the others or it may be of the form of an ordered alternative.

First, we present nonparametric statistical tests for analyzing data in completely randomized design (CRD) layout. Only one factor, that is, the treatment effect is investigated. The observations (X_{ij}) are random variables that are independent among samples $i = 1,2,3, \ldots, k$ and within samples $j = 1,2,3, \ldots, n_i$. Also, only scenarios where there are no ties are documented.

2.1. Kruskal Wallis

The most commonly used test statistic for CRD layout is the Kruskal-Wallis test statistic (Kruskal and Wallis,1953). This test statistic is the nonparametric equivalent of the parametric one way analysis of variance. The alternative hypothesis is at least two of the treatment effects are not equal. Therefore, we are set to test the following hypotheses

$$\mathrm{H_0}: \mu_1 = \mu_2 = \mu_3 = \cdots = \mu_k \tag{2.1}$$

$$H_\alpha: at\ least\ one\ of\ the\ two\ \mu_i's\ are\ different$$

where μ_i is a median of the i^{th} population. To compute the Kruskal-Wallis test statistic (H), all measurements (N) are sorted in ascending order and ranked. The ranks under each treatment are summed and the average rank computed. The Kruskal Wallis statistic is given by

$$\mathrm{H} = \frac{12}{\mathrm{N(N+1)}} \sum_{\mathrm{I=1}}^{\mathrm{k}} \frac{\mathrm{R_i}^2}{\mathrm{n_i}} - 3(\mathrm{N}+1) \tag{2.2}$$

R_i is the sum of the ranks assigned to observations in the i^{th} sample, n_i is the sample size of i^{th} sample and N is the combined sample size. We reject for large values H. As the number of observations n_i, gets larger the computed values of H are compared with a chi-square value with $k-1$ degrees of freedom where k is the number of treatments. Of note, is Kruskal Wallis test statistic is an extension of the Wilcoxon rank -Mann-Whitney test statistic in comparing two independent samples (Wilcoxon, 1945; Mann and Whitney, 1947). The Kruskal-Wallis test statistic is no longer distribution free when the k samples have unequal variances.

2.2. Jonckheere Terpstra

In dose response related studies, a researcher is interested in knowing when the dose is beneficial or when the dose is not beneficial or harmful by increasing or decreasing the dose level. The researcher's assumption is that as the dose level increases (decreases) the benefit of the drug also increases (decreases). The Jonckheere-Terpstra test is designed to analyze ordered data of this nature, testing the alternative hypothesis in which the order (increasing or decreasing) of the treatment effects is specified (Jonckheere, 1954; Terpstra, 1952). Hence, the hypotheses being tested are

$$\mathrm{H_0}: \mu_1 = \mu_2 = \mu_3 = \cdots = \mu_k \tag{2.3}$$

$$H_\alpha: [\mu_1 \leq \mu_2 \leq, \dots, \leq \mu_k] \text{ with at least one strict inequality}$$

where $\boldsymbol{\mu_i}$ is a median of the $\boldsymbol{i^{th}}$ sample. The Jonckheere-Terpstra (J) test procedure is performed by comparing observations in all pairs of samples. This test statistic is computed as a sum of Mann-Whitney counts. Therefore, we first estimate Mann-Whitney counts denoted by U_{uv} given by

$$U_{uv} = \sum_{i=1}^{n_u} \sum_{j=1}^{n_v} \varphi\left(X_{iu}, X_{jv}\right), 1 \leq u \leq v \leq k \tag{2.4}$$

Where the indicator function $\varphi: (a, b) \rightarrow \{0,1\}$ is defined as $\varphi(a,b) = \begin{cases} 1 & a < b \\ 0 & otherwise \end{cases}$

The Jonckheere-Terpstra test statistic is then given by

$$J = \sum_{i=1}^{v-1} \sum_{v=2}^{k} U_{uv} \tag{2.5}$$

We reject H_0 for large values of $J \geq j_\alpha$ where j_α depends on the α level of significance. As the number of observations get large, Jonckheere-Terpstra test statistic is approximately normally distributed. Also, when $k = 2$ then Jonckheere-Terpstra test statistic is equal to the one tailed Mann-Whitney test statistic.

Of note, is the Jonckheere-Terpstra test statistic has an advantage over Kruskal-Wallis test statistic when the treatment effects are actually ordered. The power of the Jonckheere-Terpstra test statistic is not affected by small violations when i and j correspond to treatment labels in the center of assumed orderings. On the contrary if when i and j correspond to treatment labels near one (1) or k, the effect of such violations can be quite substantial, especially if the magnitude of the difference is fairly large $|\mu_i - \mu_j|$. The Jonckheere-Terpstra test statistic is no longer distribution free when the k samples have unequal variances. (Hollander and Wolfe, 1999)

2.3. Mack-Wolfe

The Mack-Wolfe test statistic is intended to test the umbrella alternative that is the treatment effects are increasing up to a certain point p(peak) and there after decreasing if the treatment effects differ (Mack and Wolfe, 1981). The Mack-Wolfe test statistic has two forms when the peak is known and when the peak is unknown. Hence, the umbrella alternative is tested using the hypotheses below

$$\mathrm{H_0}: \mu_1 = \mu_2 = \mu_3 = \cdots = \mu_k \tag{2.6}$$

$$H_\alpha: [\mu_1 \le \mu_2 \le \dots \le \mu_p \ \ge \mu_{p+1} \dots \ge \mu_k\,] \text{ with at least one strict inequality}$$

where $\boldsymbol{\mu_i}$ is a median of the $\boldsymbol{i^{th}}$ sample. The Mack-Wolfe test statistic when the peak p is known is given in Daniel, 1990. It is a sum of Mann-Whitney statistics by U_{uv}

$$\mathrm{A_p} = \sum_{\mathrm{u=1}}^{\mathrm{v-1}} \sum_{\mathrm{v=2}}^{\mathrm{p}} \mathrm{U_{uv}} + \sum_{\mathrm{u=p}}^{\mathrm{v-1}} \sum_{\mathrm{v=p+1}}^{\mathrm{k}} \mathrm{U_{uv}} \tag{2.7}$$

where U_{uv} are Mann-Whitney counts for every pair of treatments with labels lesser than or equal to the hypothesized peak $1 \le u \le v \le p$ for the first part of the equation and another U_{uv} are the reverse Mann-Whitney counts for every pair of treatments with labels greater than or equal to the hypothesized peak $p \le u \le v \le k$. Mack-Wolfe test statistic is designed such that it's more effective against restricted alternatives. The null hypothesis is for large values of the test statistic. For further details see Hollander and Wolfe (1999).

Of note, is the Mack-Wolfe test statistic can be viewed as the sum of two Jonckhere-Terpstra statistics. Also, the Mack-Wolfe test is no longer distribution free when the k samples have unequal variances (Hollander and Wolfe, 1999). As the number of observations get large the Mack-Wolfe test statistic is approximately normally distributed. The exact mean and variance under the null distribution are given in Hollander and Wolfe, 1999.

2.4. Fligner-Wolfe

Investigations pertaining to response of treatment(s) compared to a control occur frequently in biological sciences among which are clinical trials, pharmacology experiments and agricultural experiments. In clinical trials, evaluation of a control/standard treatment versus a new treatment(s) is a common trend as well as a requirement by regulatory authorities as a measure of efficacy. The Fligner-Wolfe test statistic is designed for purposes as this (Fligner and Wolfe, 1982).

The Fligner-Wolfe test statistic compares the median of the control group to the medians of several other treatment groups and this is done simultaneously (Fligner and Wolfe, 1982). There are k samples with $i = 1$ denoting the control sample and the remaining $2 \leq i \leq k$ denoting treatment samples. The alternative hypothesis is quite restrictive as it stipulates that all treatment groups have population location parameters that are at least as large as the control location parameter. In the event that some treatment medians may be higher than the control median and some might be lower, then this test is not appropriate. The hypotheses we are interested in testing are given below

$$\mathrm{H_0}: \mu_1 = \mu_2 = \mu_3 = \cdots = \mu_k \qquad (2.8)$$

H_α: [$\mu_i \geq \mu_1$ $i = 2,3,\ldots,k$] with at least one strict inequality

where μ_i is a median of the i^{th} sample.

The Fligner-Wolfe test statistic procedure entails first combining all observations in the k treatments. The observations are sorted in ascending order and ranked. The Fligner-Wolfe test statistic is computed as a sum of all the ranks in the $k - 1$ treatment samples (excluding the ranks of the control group). The Fligner-Wolfe test statistic is given by

$$FW = \sum_{\substack{2 \leq i \leq k \\ 1 < j < n_i}} r_{ij} \qquad (2.9)$$

k is the number of treatments, n_i the number of observations in each treatment and r_{ij} the rank of the observation in the jth group receiving the ith treatment. We reject H_0 for large value of FW at the α level of significance where Z_α is the (1- α) 100% of the standard normal. When a researcher is interested in two populations, a control and one treatment $(k = 2)$ the Fligner-Wolfe test is equal to the two sample Wilcoxon-Rank-Sum test (Hollander and Wolfe, 1999).

The asymptotic null distribution of FW is approximately normal and the approximation is good as min (n_1, n_2) gets larger. When H_0 is true, the expected value and variance of FW under the null distribution are given by

$$E_0(FW) = \frac{n_2(N+1)}{2} \text{ and } var_0(FW) = \left\{\frac{n_1 n_2(N+1)}{12}\right\} \tag{2.10}$$

respectively where, n_1 is the size of the control population, and n_2 the number of observation in the remaining $k-1$ treatment populations $n_2 = N - n_1$. The standardized version of Fligner-Wolfe test FW^* is the following

$$FW^* \quad = \frac{FW - E_0(FW)}{(var_0(FW))^{0.5}} \tag{2.11}$$

We reject H_0 when $FW^* \geq Z_\alpha$ at the α level of significance where Z_α is the (1- α) 100% of the standard normal distribution. The Fligner-Wolfe test is no longer distribution free when the k samples have unequal variances.

Secondly, we present nonparametric statistical tests for analyzing data in a randomized complete block design (RCBD) layout. Two or more factors with different levels are examined. The RCBD has the advantage of essentially improving the capability of identifying differences between treatments of interest by allocating subjects into homogeneous subgroups called blocks allowing for comparison among subjects within subgroups. The data comprises a total of N observations, with c_{ij} observations from a combination of the i^{th} treatment j^{th} block for $i = 1,2,3, \dots, k$ and $j = 1,2,3, \dots, n$. The N observations $X_{ij1}, X_{ij2}, X_{ij3}, \dots X_{ijn_{ij}}$ where $i = 1,2,3, \dots, k$ and $j = 1,2,3, \dots n_i$ are mutually independent. Also, we only present the scenario where there are no ties and there is only one observation per cell.

The null hypothesis (H_0) when considering RCBD is similar to the general form under the CRD, where the treatments are assumed to have the same effect for the k treatments within each block. That is the samples are assumed to come from the same population. The layout of the data is such that the rows denote subjects (blocks) and the columns denote treatments. It is assumed that there is no interaction between the treatments and blocks. The alternative hypothesis, may take two forms: with restriction or no restriction (or conditions) imposed on the treatments. Different test statistics have different alternative hypotheses where different forms of restrictions are imposed similar to those discussed under CRD.

2.5. Friedman

For RCBD layout, the most common test statistic is the Friedman (1937, 1940). A parametric test that uses the RCBD layout in a two way analysis of variance F test. The Friedman test statistic aims to examine general differences of the treatment effects. For further details, about the Friedman test statistic see Daniel (1990) and Hollander and Wolfe (1999). The hypotheses to be tested are

$$\mathrm{H_0}: \mu_1 = \mu_2 = \mu_3 = \cdots = \mu_k \tag{2.12}$$

$$H_\alpha: [\mu_1, \mu_2, \dots, \mu_k\,] \text{ not all are equal}$$

where μ_i is a median of the i^{th} sample, only two factors with one level for each treatment and block combination that is $i = 1,2, \dots n$ and $j = 1,2,3, \dots, k$. The Friedman test statistic is an extension of the two sided sign test for paired data when $k = 2$. As the number of observations get larger, the null distribution of Friedman test statistic can be approximated as a chi square distribution with $k - 1$ degrees of freedom.

2.6. Page

The Page test statistic assesses the decreasing (increasing) treatment effect in a RCBD layout (Page, 1963). Page's test statistic compares the locations of several treatment groups. The observations comprise *n* mutually independent blocks of size *k*. The treatments must follow an ordinal scale pointing in the direction of the alternative hypothesis which is defined prior to the research being implemented. Observations are ranked within each block and the sum of each treatment is computed. Accordingly the hypotheses we are interested in testing are

$$\mathrm{H_0}: \mu_1 = \mu_2 = \mu_3 = \cdots = \mu_k \tag{2.13}$$

$$H_\alpha: [\mu_1 \leq \mu_2 \leq, \dots, \leq \mu_k\,] \text{ with at least one strict inequality}$$

where μ_i is a median of the i^{th} sample. Page's test statistic is given by L is computed as a weighted combination of of the sum of the ranks. Observations are ranked within each block and R_j is the sum of the ranks assigned to j. Page's test statistic is calculated as

$$L = \sum_{j=1}^{k} jR_j = R_1 + \cdots + kR_k \tag{2.14}$$

Some important notes about Page's test statistic are that Page's test statistic differs from Friedman's test statistic as prior ordering is determined before the experiment is performed. Higher power is also associated with Page's test statistic if the treatment effects are known to follow a given order. As stated in the alternative hypothesis.

The null distribution of Page's test statistic is approximately normal and the expected value and variance under the null distribution are given below

$$E_O(L) = \frac{n(k+1)^2}{4} \text{ and } var_o(L) = \frac{nk(k+1)(k^2-1)}{12} \quad (2.15)$$

respectively. The large sample approximation L^* is computed using the formula below and we reject H_0 for large values that is $L^* \geq Z_\alpha$ at the α level of significance where Z_α is the (1- α) 100% of the standard normal.

$$L^* = \frac{L - E_O(L))}{\sqrt{var_O(L)}} \mathrm{\mu_k} \quad (2.16)$$

2.7. Kim and Kim

Kim and Kim (1992) proposed a test statistic for the umbrella alternative in a RCBD layout when the peak (p) is known (Kim and Kim, 1992). The test statistic is the sum of Mack-Wolfe (1981) test statistics over all blocks. The hypotheses of interest are

$$\mathrm{H_0}: \mathrm{\mu_1} = \mathrm{\mu_2} = \mathrm{\mu_3} = \cdots = \mathrm{\mu_k} \quad (2.17)$$

$$H_\alpha: [\mu_1 \leq \mu_2 \leq \ldots \leq \mu_p \ \geq \mu_{p+1} \ldots \geq \mu_k \ ] \text{ with at least one strict inequality}$$

where μ_i is a median of the i^{th} sample. The Kim and Kim test statistic is given by

$$A = \sum_{i=1}^{b} A_{ip} \quad (2.18)$$

$$A_{ip} = \sum_{i=1}^{b} \left\{ \sum_{s=1}^{p-1} \sum_{t=s+1}^{p} U_{ist} + \sum_{s=p}^{c-1} \sum_{t=s+1}^{c} U_{ist} \right\}$$

where A_{ip} denotes the Mack-Wolfe, U_{ist} is the Mann-Whitney test statistic for the observations in cells (i, s) and(i, t) and b is the number of blocks. c is the number of treatments, p is known peak. We reject H_0 for large values of $\boldsymbol{A_{ip}}$. Kim and Kim (1992) further state that since the Mann-Whitney test statistic contained in $\boldsymbol{A_{ip}}$, is estimated from pairwise ranks, $\boldsymbol{A_{ip}}$ is distribution free.

Kim and Kim (1992) found the mean and variance under H_0 and showed the asymptotic distribution was normal. The mean and the variance are given by

$$E_0(A) = \frac{\sum_{i=1}^{b}\left\{N_{i2}^2 + N_{i2}^2 - \sum_{j=1}^{c} n_{ij}^2 + n_{ip}^2\right\}}{4} \tag{2.18}$$

and

$$Var_0(A)$$
$$= \frac{\sum_{i=1}^{b}\left\{(N_{i2}^3 + N_{i2}^3) + 3(N_{i2}^2 + N_{i2}^2) - \sum_{j=1}^{c} n_{ij}^2\left(2n_{ij} + 3\right) - n_{ip}^2\left(2n_{ip} + 3\right) + 12n_{ip}N_{i1}\, N_{j2} - 12n_{ip}^2 N_i\right\}}{72}$$

where $N_{i1} = \sum_{i=1}^{p} n_{ij}$, $N_{i2} = \sum_{j=p}^{c} n_{ij}$, $N_i = \sum_{j=1}^{c} n_{ij}$.

When $n_i = 1$ as is the focus of this research study, Magel, R., Terpstra, J., Canonizado, K., and Park, J.I. (2010) showed that the expected value and variance will be reduced to the form given below

$$E_0(A) = \frac{b(p^2 + (k - p + 1)^2 - k - 1)}{4} \tag{2.19}$$

and

$$Var_0(A) = \frac{b\{2(p^3 + (k - p + 1)^3 + 3(p^2 + (k - p + 1)^2) - 5k - 5 + 12p(k - p + 1) - 12k\}}{72}$$

The standardized version of Kim and Kim (1992) test statistic has an asymptotic normal distribution. The null hypothesis is rejected for large values that is $A^* \geq Z_\alpha$ at the α level of significance where Z_α is the (1- α) 100% of the standard normal.

$$A^* = \frac{L - E_O(A))}{(var_O(A))^{0.5}} \tag{2.20}$$

Lastly, we present nonparametric statistical tests for analyzing data in a mixed design. While there exists a lot of literature on nonparametric statistical tests for analyzing data from a single study design, not many research studies have been documented in the area of mixed designs.

2.8. Dubnicka, Blair and Hettmansperger

Statistical tests using mixed designs in nonparametric statistics have been developed by some researchers. Dubnicka, Blair and Hettmansperger (2002) developed a rank based test when data are a mixture of paired observations and independent samples (Dubnicka, Blair and Hettmansperger, 2002). Dubnicka et al. (2002) provides an illustration where a mixed design is the most robust option to perform the analysis when we have two treatments. The procedure sums the Wilcoxon signed-rank statistic and the Wilcoxon-Mann-Whitney statistic.

$$T^{+} = S^{+}(\Delta) + U^{+}(\Delta) \tag{2.21}$$

where $S^{+}(\Delta)$ is the Wilcoxon signed-rank statistic, and $U^{+}(\Delta)$ is the Wilcoxon-Mann-Whitney statistic.

Under the null distribution the mean and variance for the proposed test statistic by Dubnicka et al. (2002) is given below as

$$E_0(T^{+}) = \frac{n(n+1)}{4} + \frac{n_1 n_2}{2} \tag{2.22}$$

and

$$Var_0(T^{+}) = \frac{n(n+1)(2n+1)}{24} + \frac{n_1 n_2(n_1+n_2+1)}{12}$$

respectively. Important to note is that the expected value comprises of the sum of the mean of the Wilcoxon signed-rank statistic given by $\frac{n(n+1)}{4}$ and the mean of the Wilcoxon-Mann-Whitney statistic given by $\frac{n_1 n_2}{2}$**.** Similarly, the value $\frac{n(n+1)(2n+1)}{24}$ is the variance of the Wilcoxon signed-rank statistic, while the value $\frac{n_1 n_2(n_1+n_2+1)}{12}$ is the variance of the Wilcoxon-Mann-Whitney statistic. The values n_1 and n_2 are the sample sizes of the independent samples in the Wilcoxon-Mann-Whitney statistic, while n is the sample size for the paired data in the Wilcoxon signed-rank test. The standardized version of Dubnicka et al. (2002) is given below

$$T^{*} = \frac{E + E_0(T^{+})}{\sqrt{Var_0(T^{+})}} \tag{2.23}$$

Under H_0, T^{+} is approximately normally distributed. We reject for large values that is $T^{*} \geq Z_{\alpha}$ at the α level of significance where Z_{α} is the (1- α) 100% of the standard normal.

2.9. Magel and Fu

Magel and Fu (2014) developed a rank based test statistic when data are a mixture of paired observations and independent samples (Magel and Fu, 2014). The procedure sums the standardized Wilcoxon signed-rank statistic and the standardized Wilcoxon-Mann-Whitney statistic. The Magel et al. (2014) test statistic differs from Dubnicka et al (2002) as the Magel and Fu (2014) test statistic assigns equal weights of $\frac{1}{\sqrt{2}}$ to each of standardized test statistics. The Dubnicka et al (2002) sums the tests and then standardizes them (see section 2.10). The Magel et al (2014) test statistic is given by

$$T^{+}(0) = \frac{S^{+}(0)^{*} + U^{+}(0)^{*}}{\sqrt{2}} \quad (2.24)$$

where $\boldsymbol{S}^{+}(\mathbf{0})^{*}$ is the standardized Wilcoxon signed-rank statistic and $\boldsymbol{U}^{+}(\mathbf{0})^{*}$ is the standardized Wilcoxon-Mann-Whitney statistic. For more details on the derivation see Magel et al (2014). Noteworthy, is Magel et al. 2014 test statistic has higher powers compared to Dubnicka et al (2002).

2.10. Magel, Terpstra, Canonizado and Park

Magel, Terpstra, Canonizado and Park 2010) developed several test statistics to test for the equality of k medians when the data are a mixed design. We present one of the test statistic for a mixed design presented in Magel et al (2010) when the data are mixture of CRD, a RCBD and matched pairs design. In this case, the test statistic

$$T_2 = F + K + W^2 \quad (2.25)$$

Where, T_2 is a sum of Friedman test statistic F, Kruskal-Wallis test statistic K and the square of Wilcoxon signed-rank test statistic W^2. Under H_0, T_2 is follows an asymptotic chi squared distribution with 2k-1 degrees of freedom. Magel et al. (2010) states that T_2 is the sum of three independent tests statistics with two having asymptotic chi square distributions with 1 degree of freedom.

2.11. Magel Terpstra and Wen

Magel Terpstra and Wen (2013) developed tests for the non-decreasing alternative when the data are a mixture of CRD and a RCBD (Magel, Terpstra, and Wen, 2009). Both test statistics are a weighted combination of Page's test statistic and Jonckheere test statistic. The test statistic given below is a sum of standardized Page's test statistic and standardized Jonckheere test statistic when equal weights are assigned and the variances are assumed to be equal ($\sigma_L^2 = \sigma_{JP}^2$)

$$Z_{comb} = \frac{Z_P + Z_{JP}}{\sqrt{2}} \quad (2.26)$$

where $Z_P = \frac{L - \left[bk(k+2)^2/4\right]}{\sqrt{b(k^2-k)^2/144(k-1)}}$ is the standardized Page's test statistic and b are the number of blocks and k the number of treatments. While $Z_{JP} = \frac{J - \left[\left(N^2 - \sum_{i=1}^{k} n_i^2\right)/4\right]}{\sqrt{N^2\left(2N+3-\sum_{i=1}^{k} n_i^2(2n_i+3)\right)/72}}$ is the standardized Jonckheere test statistic. The total number of observations for the completely randomized design potion is N and n_i is the sample size of the i^{th} treatment. The asymptotic null distribution of $\boldsymbol{Z_{comb}}$ is a standard normal.

2.12. Mathisen and Magel

Mathisen and Magel (2011) developed two test statistics for the nondecreasing alternative in a mixed design comprising a RCBD portion and Balanced Incomplete Block Design (BIBD) portion (Mathisen and Magel, 2011). The proposed test statistics were a combination of Page's test statistic and a test statistic proposed by Ndungu (2011) for testing variables in a BIBD (Ndungu, 2011). The test statistics were derived using a similar method as Magel et al. (2009) and Magel et al (2010). The test statistics comprised 1) A test statistic where the test statistic was the sum of standardized Page's and standardized Ndungu (2011) test statistics, and 2) where the test statistic was the sum of Page's test statistic and Ndungu (2011) test statistic and then standardized. Mathisen et al., (2011) found, there were some scenarios when the first method was a better test than the second method, and vice versa.

2.13. Hemmer and Magel

Hemmer and Magel (2012) proposed two test statistics in a mixed design consisting of an RCBD portion and a BIBD portion for testing the alternative hypotheses that at least one inequality in the alternative hypothesis is strict (Hemmer, Magel, 2012). One of the test statistics was the sum of the standardized Kim-Kim test statistic and the standardized Hemmer et al. (2012) test statistic for the umbrella alternative in the BIBD. The other test statistic was the sum of the unstandardized test statistics from the Kim-Kim test for the RCBD portion and Hemmer et al. (2012) test statistic for the umbrella alternative in the BIBD for the BIBD portion.

With this background we shall propose six test statistics for the simple tree alternative in a mixed design consisting of a CRD portion and a RCBD portion when we have ranked data or when the distribution of the data is unknown.

CHAPTER 3. PROPOSED TESTS

The simple tree alternative consists of the following set of hypotheses

$$\mathrm{H}_0: \mu_1 = \mu_2 = \mu_3 = \cdots = \mu_k \quad (3.1)$$

$H_\alpha: \mu_1 \leq [\mu_2, \dots, \mu_k]$ with at least one strict inequality

where μ_i is a location parameter (the median or mean) for population i with $i = 1,2,3, \dots, k$ and k being the total number of populations. Usually population one ($i = 1$) is referred to as the control population and populations 2 through k are designated the treatment populations.

3.1. Modified Fligner-Wolfe Test Statistic

We will first propose a modified version of the Fligner-Wolfe test statistic for the CRD portion. These modified versions are for the simple tree alternative stated below:

$H_0: \mu_1 = \mu_2 = \cdots = \mu_k$, versus

$H_\alpha: \mu_1 \leq [\mu_2, \dots, \mu_k]$ with at least one strict inequality

In calculating the modified Fligner-Wolfe test statistic, we can think of having two populations with one population being the control ($i = 1$) and the remaining $k - 1$ populations being the combined treatment sample. We will assume that we have a sample of size n_c from the control population and a sample size n_t of the combined treatment populations. All of the observations in both the control sample and treatment sample are merged together and ranked from smallest to largest. Let the rank r_{ij} with $i =$ 1,2 and $j = 1,2,3, \dots, n_i$ denote the rank of the j^{th} observation in the i^{th} sample with i equal to 1 for the control sample and i equal to 2 for the combined treatment sample.

The modified Fligner-Wolfe test is given in (3.2)

$$T_1: FW = \sum_{\substack{i=2 \\ 1 \leq j \leq n_t}} r_{ij} \quad (3.2)$$

Note: $i = 2$ as we have two samples and only the ranks in the treatment sample are summed. The value n_t is number of observations in the sample from the treatment population, r_{ij} the rank of the j^{th} observation in the treatment sample. H_0 is rejected for a large value of FW at the α level of significance.

The null distribution for modified Fligner-Wolfe test statistic (FW) is the same as the null distribution for Fligner-Wolfe test statistic assuming two populations. The asymptotic null distribution of

FW^* is approximately normal and the approximation is good as min (n_c, n_t) gets large. The standardized Fligner-Wolfe (FW^*) is given by (3.3)

$$Z_1: FW^* = \frac{FW - E_0(FW)}{(var_0(FW))^{0.5}} \tag{3.3}$$

When H_0 true, the expected value and variance under the null distribution is are given in (3.3.1). The expected value and the variance given (3.3.1) are similar to the expected value under the null distribution for Fligner-Wolfe test statistic (see Section 2.4 and Equation 2.10).

$$E(T_1): E_0(FW) = \frac{n_t(N+1)}{2} \quad \text{and} \quad varT_1: var_0(FW) = \left\{\frac{n_c n_t(N+1)}{12}\right\} \tag{3.31}$$

respectively, where N is the total number of observations in the study, n_c is the size of the sample from the control population, and n_t the number of observations in the treatment sample from the treatment population where $n_t = N - n_c$. We reject H_0 when $FW^* \geq Z_\alpha$ at the α level of significance where Z_α is the (1- α) 100% of the standard normal distribution.

3.2. Modified Page's Test Statistic

The modified Page's test statistic is based on a control and $k-1$ treatments. This test statistic assumes a RCBD. Observations are ranked within each block. Treatment 1 denotes the control population and the treatments 2 through k are designated the treatment populations. Each block contains an observation from the control and each treatment. All observations are ranked. Let R_1denote the sum of the ranks in the control sample while (R_j) $j = 1,2,3, \dots, k$ denote the sum of the ranks for each treatment. The modified Page's test statistic is given in (3.4)

$$T_2: L_M = R_1 + 2\sum_{j=2}^{\mathrm{k}} R_j \tag{3.4}$$

R_j is the sum of the ranks for treatment j with treatment one (1) being the control.

$\boldsymbol{L_M}$ has an asymptotic normal distribution under the null hypothesis. The standardized version of L^* is computed using the formula in (3.5)

$$Z_2: L^* = \frac{L_M - E_0(L_{M0})}{(var_0(L_{M0}))^{0.5}} \tag{3.5}$$

Under the null distribution, the expected value and variance in the case of no ties are given in (3.5.1) as follows

$$E(T_2)\colon E_0(L_M) = n_b E(L_{M0}) = n_{\mathrm{b}}\left(k^2 + \frac{k-1}{2}\right) \tag{3.5.1}$$

and

$$varT_2\colon var_0(L_M) = n_{\mathrm{b}} var(L_{\mathrm{M0}}) = n_{\mathrm{b}} \frac{(k^2-1)}{12}$$

where L_M is modified Page's test statistic for one block with k treatments, and n_b is the number of blocks in the study. We reject H_0 when of $L^* \geq Z_\alpha$ at the α level of significance where Z_α is the (1- α) 100% of the standard normal distribution.

3.2.1. The Expected Value and Variance of Modified Page's Test Statistic

The expected value and variance under the null distribution for modified Page's test statistic given in Equation 3.5.1 above were derived by mathematical induction based on finding the expected value and variance for three, four and five treatments. We present the case when we have no ties and the expected value and variance under the null distribution of L_M based on the fact that all $(k!)^{n_b}$ possible rank patterns are equally likely under H_0 . Illustrated below is an excerpt of the scenarios when $k = 3,4,5$ and we have one block. First, we show three ways of arranging the ranks of three treatments with one observation from each treatment population.

Table 3.1: Three ways when $k = 3$

Treatment 1	**Treatment 2**	**Treatment 3**	L_{M0}
1	2	3	11
2	3	1	10
3	1	2	9

Using $L_{M0} = R_1 + 2\sum_{j=2}^{3} R_j = R_1 + 2(R_2 + R_3)$;

$E\big((L_{M0})\big) = \frac{11+10+9}{3} = \frac{30}{3} = 10$ and $var\big((L_{M0})\big)$=$((9-10)^2 + (10-10)^2 + (11-10)^2) = \frac{2}{3} = 0.67$

Note: To obtain the expected and variance under the null distribution we multiply the mean ($E(L_{M0})$) and variance ($var(L_{M0})$) of modified Page's test statistic (L_M) by the number of blocks.

Secondly, we show when $k = 4$ and we have one block, there are four ways of arranging the ranks of four observations (one from each populations).

Table 3.2: Four ways when $k = 4$

Treatment 1	Treatment 2	Treatment 3	Treatment 4	L_{M0}
1	2	3	4	19
2	3	4	1	18
3	4	1	2	17
4	1	2	3	16

Using $L_{M0} = R_1 + 2\sum_{j=2}^{4} R_j = R_1 + 2(R_2 + R_3 + R_4)$;

$E(L_{M0}) = 16 + 17 + 18 + 19 = \frac{70}{4} = 17.5$ and

$var(L_{M0})$=$((16 - 17.5)^2 + (17 - 17.5)^2 + (18 - 17.5)^2 + (19 - 17.5)^2) = \frac{5}{4} = 1.25$

Lastly, we show when $k = 5$ and we have one block, there are five ways of arranging the ranks of five observations (one from each populations).

Table 3.3: Five ways when $k = 5$

Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	L_{M0}
1	2	3	4	5	29
2	3	4	5	1	28
3	4	5	1	2	27
4	5	1	2	3	26
5	1	2	3	4	25

Using $L_{M0} = R_1 + 2\sum_{j=2}^{5} R_j = R_1 + 2(R_2 + R_3 + R_4 + R_5)$;

$E(L_{M0}) = 25 + 26 + 27 + 28 + 29 = \frac{135}{5} = 27$ and

$var(L_{M0})$=$((25 - 27)^2 + (26 - 27)^2 + (27 - 27)^2 + (28 - 27)^2 + (29 - 27)^2) = \frac{10}{5} = 2.0$

Table A1 in Appendix A shows the expected value and variance under the null distribution for the modified Page's test statistic for k treatments, where k=3, 4, 5, 6, 7, 8, 9, 10 for one block ($n_{\mathrm{b}} = 1$). Computation of the expected values and variance for six through 10 treatments are also shown in Appendix A.

3.3. Proposed Mixed Design Tests

We will now propose six test statistics for the mixed design consisting of a randomized complete block portion and a completely randomized design portion. The six test statistics will be a linear combination of the proposed modified versions of Fligner-Wolfe and Page's tests.

3.3.1. Approach I

This is a standardized test statistic which comprises $(T_1 + T_2)$ which is the sum of the modified Fligner-Wolfe test statistic (T_1) obtained using Equation 3.2 and modified Page's test statistic (T_2) obtained using Equation 3.4. The mean is given by $E(T_1 + T_2)$ and variance $(varT_1 + varT_2)$ which are obtained from the null distribution of the mean $E(T_1)$ and variance $varT_1$ of the modified Fligner-Wolfe test statistic in Equation 3.3.1 while the null distribution of the mean $E(T_2)$ and variance $varT_2$ for modified Page's test statistic in equation 3.5.1, respectively. The sum of the null distribution of the mean is given by $E(T_1 + T_2) = E(T_1) + E(T_2)$ while the null standard deviation is $\sqrt{(varT_1 + varT_2)}$. Approach I is then given by Equation (3.6) below

$$Z_I = \frac{(T_1 + T_2) - E(T_1 + T_2)}{\sqrt{(varT_1 + varT_2)}} \tag{3.6}$$

The asymptotic distribution of the test is used and H_0 is rejected for a large value that is $Z_I \geq Z_\alpha$ where Z_α is the (1- α) 100% of the standard normal distribution. The α value is obtained from the standard normal tables. If the test is performed at a 5% level of significance then $Z_\alpha = 1.645$. To provide insight about Approach I, Equation 3.6 is expanded as summarized below.

$$Z_I = \frac{T_1 - E(T_1)}{\sqrt{(varT_1 + varT_2)}} + \frac{T_2 - E(T_2)}{\sqrt{(varT_1 + varT_2)}}$$

$$= \frac{\sqrt{(varT_1)}}{\sqrt{(varT_1 + varT_2)}}\left(\frac{(T_1 - E(T_1))}{\sqrt{(varT_1)}}\right) + \frac{\sqrt{(varT_2)}}{\sqrt{(varT_1 + varT_2)}}\left(\frac{(T_2 - E(T_2))}{\sqrt{(varT_2)}}\right)$$

$$= \frac{\sqrt{(varT_1)}}{\sqrt{(varT_1 + varT_2)}} Z_1 + \frac{\sqrt{(varT_2)}}{\sqrt{(varT_1 + varT_2)}} Z_2$$

Note: The CRD portion has greater weight than RCBD portion as the variance for the modified Fligner-Wolfe test statistic is greater than the variance for modified Page's test statistic in Approach I.

3.3.2. Approach II

This test statistic is the sum of standardized test statistic for two tests, modified Fligner-Wolfe test statistic and modified Page's test statistic. They are each calculated separately. The modified Fligner-Wolfe test statistic is calculated as (T_1) obtained in Equation 3.2. The mean and variance for modified Fligner-Wolfe test are given by $E(T_1)$ and $varT_1$ obtained using Equation 3.3.1.

The standardized Modified Fligner-Wolfe test statistic is then given by Equation 3.7 below.

$$Z_1 = \frac{T_1 - E(T_1)}{\sqrt{(varT_1)}} \tag{3.7}$$

Similarly, the modified Page's test statistic (T_2) is calculated using Equation 3.4. The mean and variance for modified Page's test statistic are given by $E(T_2)$ and $varT_2$ obtained using Equation 3.5.1. The standardized modified Page's test statistic is then given by Equation (3.8) below

$$Z_2 = \frac{T_2 - E(T_2)}{\sqrt{(varT_2)}} \tag{3.8}$$

$\boldsymbol{Z_1}$ has an asymptotic standard normal distribution, and $\boldsymbol{Z_2}$ has an asymptotic standard normal distribution under H_0. When H_0 is true, the asymptotic distribution of $\boldsymbol{Z_1} + \boldsymbol{Z_2}$ should be a normal with mean zero (0) and variance two (2). Therefore, the asymptotic distribution of $\boldsymbol{Z_{II}}$ under H_0 is a standard normal. From this we infer that equal weight of $\frac{1}{\sqrt{2}}$ is assigned to each standardized test statistic, where Z_1 is the standardized modified Fligner-Wolfe, and Z_2 is the standardized modified Page's test statistic.

$$Z_{II} = \frac{Z_1 + Z_2}{\sqrt{2}} \tag{3.9}$$

The asymptotic distribution of the test is used and H_0 is rejected for a large value that is $Z_{II} \geq Z_\alpha$ where Z_α is the (1- α) 100% of the standard normal distribution. The α value is obtained from the standard normal tables. If the test is performed at a 5% level of significance then $Z_\alpha = 1.645$.

Also note that the motivation behind equal weight of $\frac{1}{\sqrt{2}}$ is the fact that the variance of a standard normal is one (1). The standard deviation of two standard normal distributions is the square root of the sum of the variances and thus an equal weight of $\frac{1}{\sqrt{2}}$ assigned to the standardized Modified Fligner-Wolfe test statistic and standardized modified Page's test statistic as can be noted in Equation 3.9 above.

3.3.3. Approach III

This test statistic uses the treatment size under the CRD portion and the number of blocks under the RCBD portion as weights in obtaining the test statistic. The test statistic is similar to Approach I except that it differs by the weights used. As mentioned before n_a is the sample size for each treatment under CRD portion, n_b the number of blocks in a RCBD portion and the number of times each treatment appears n is obtained as a sum of the sample size (n_a) for each treatment under CRD portion and the number of blocks (n_b) in the RCBD portion given simply as n_a+n_b= n. Weights are assigned to the Modified Fligner-Wolfe test statistic (T_1) and modified Page's test statistic (T_2) as in Equation 3.10.The test statistic for Approach III is then given by

$$\frac{n_a}{n}T_1 + \frac{n_b}{n}T_2 \tag{3.10}$$

The null distribution for the mean and the variance for test statistic given in 3.10 are obtained and used in Approach III below.

$$Z_{III} = \frac{\left(\frac{n_a}{n}T_1 + \frac{n_b}{n}T_2\right) - E\left(\frac{n_a}{n}T_1 + \frac{n_b}{n}T_2\right)}{\sqrt{Var\left(\frac{n_a}{n}T_1 + \frac{n_b}{n}T_2\right)}} = \frac{\left(\frac{n_a}{n}T_1 + \frac{n_b}{n}T_2\right) - \left(\frac{n_a}{n}E(T_1) + \frac{n_b}{n}E(T_2)\right)}{\sqrt{\frac{{n_a}^2}{n^2}VarT_1 + \frac{{n_b}^2}{n^2}VarT_2}} \tag{3.11}$$

where T_1 and T_2 are obtained using Equations 3.2 and 3.4 respectively and since T_1 and T_2 are independent, $E\left(\frac{n_a}{n}T_1 + \frac{n_b}{n}T_2\right) = \frac{n_a}{n}E(T_1) + \frac{n_b}{n}E(T_2)$ where $E(T_1)$ and $E(T_2)$ are obtained using Equation 3.3.1 and Equation 3.5.1 while $Var\left(\frac{n_a}{n}T_1 + \frac{n_b}{n}T_2\right) = \frac{{n_a}^2}{n^2}VarT_1 + \frac{{n_b}^2}{n^2}VarT_2$ where $varT_1$ and $varT_2$ are obtained using Equation 3.3.1 and Equation 3.5.1. The asymptotic distribution of the test is used and H_0 is rejected for a large value that is $Z_{III} \geq Z_\alpha$ where Z_α is the (1- α) 100% of the standard normal distribution. The α value is obtained from the standard normal tables. If the test is performed at a 5% level of significance then $Z_\alpha = 1.645$.

Note: If $n_a \geq n_b$, then the modified Fligner-Wolfe test statistic is assigned greater weight than modified Page's test statistic. If $n_a \leq n_b$, then the modified Fligner-Wolfe test statistic is assigned lesser weight than modified Page's test statistic. If $n_a = n_b$, then equal weights are assigned to both the modified Fligner-Wolfe test statistic and modified Page's test statistic then Approach III is equal to Approach I.

Similarly Approach IV follows from Approach III by reversing the weights and we obtain Equation 3.15 below. A similar concept is used as in Approach III except for the change in weights assigned to each test statistics: the modified Fligner-Wolfe test statistic (T_1) and modified Page's test statistic (T_2)

3.3.4. Approach IV

The test statistic for Approach IV is then given by

$$\frac{n_b}{n}T_1 + \frac{n_a}{n}T_2 \tag{3.12}$$

The null distribution for the mean and the variance for test statistic given in 3.14 are obtained and used in

Approach IV below.

$$Z_{IV} = \frac{\left(\frac{n_b}{n}T_1 + \frac{n_a}{n}T_2\right) - E\left(\frac{n_b}{n}T_1 + \frac{n_a}{n}T_2\right)}{\sqrt{Var\left(\frac{n_b}{n}T_1 + \frac{n_a}{n}T_2\right)}} = \frac{\left(\frac{n_b}{n}T_1 + \frac{n_a}{n}T_2\right) - \left(\frac{n_b}{n}E(T_1) + \frac{n_a}{n}E(T_2)\right)}{\sqrt{\frac{{n_b}^2}{n^2}VarT_1 + \frac{{n_a}^2}{n^2}VarT_2}} \tag{3.13}$$

where T_1 and T_2 are obtained using Equations 3.2 and 3.4 respectively and since T_1 and T_2 are independent, $E\left(\frac{n_b}{n}T_1 + \frac{n_a}{n}T_2\right) = \frac{n_b}{n}E(T_1) + \frac{n_a}{n}E(T_2)$ where $E(T_1)$ and $E(T_2)$ are obtained using Equation 3.3.1 and Equation 3.5.1 while $Var\left(\frac{n_b}{n}T_1 + \frac{n_a}{n}T_2\right) = \frac{{n_b}^2}{n^2}VarT_1 + \frac{{n_a}^2}{n^2}VarT_2$ where $varT_1$ and $varT_2$ are obtained using Equation 3.3.1 and Equation 3.5.1. The asymptotic distribution of the test is used and H_0 is rejected for a large value that is $Z_{IV} \geq Z_\alpha$ where Z_α is the (1- α) 100% of the standard normal distribution. The α value is obtained from the standard normal tables. If the test is performed at a 5% level of significance then $Z_\alpha = 1.645$.

Similarly, if $n_a \geq n_b$, then the modified Page's test statistic is assigned greater weight than the modified Fligner-Wolfe test statistic. If $n_a \leq n_b$, then the modified Page's test statistic is assigned lesser weight than the modified Fligner-Wolfe test statistic. If $n_a = n_b$, then equal weights are assigned to both the modified Fligner-Wolfe test statistic and modified Page's test statistic then Approach IV, Approach III and Approach I will be equal.

3.3.5. Approach V

This test statistic is the sum of weighted standardized test statistics for the two tests, modified Fligner-Wolfe test statistic and modified Page's test statistic. The standardized test statistics are each calculated separately. The modified Fligner-Wolfe test statistic is calculated as (Z_1) obtained in Equation 3.7. The standardized modified Page's test statistic (Z_2) is calculated using equations 3.8. Recall that n_a is the sample size for each treatment under CRD portion, n_b the number of blocks in a RCBD portion and the number of times each treatment appears, n, is obtained as a sum of the sample size n_a for each treatment under CRD portion and n_b the number of blocks in a RCBD portion given simply as n_a+n_b= n. Weights are assigned to the standardized Modified Fligner-Wolfe test statistic (Z_1) and the standardized modified Page's test statistic (Z_2) as in Equation 3.14

$$\frac{n_b}{n}Z_1 + \frac{n_a}{n}Z_2 = \frac{n_b Z_1 + n_a Z_2}{n} \tag{3.14}$$

The mean and the variance for the test statistic given in 3.14 are obtained

$E\left(\frac{n_b}{n}Z_1+\frac{n_a}{n}Z_2\right)=\frac{n_b}{n}E(Z_1)+\frac{n_a}{n}E(Z_2)$=0 since $E(Z_1)$= $E(Z_2)$=0 while the variance will be given by

$Var\left(\frac{n_b}{n}Z_1+\frac{n_a}{n}Z_2\right)$=$\left(\frac{n_b}{n}\right)^2 Var(Z_1)+\left(\frac{n_a}{n}\right)^2 Var(Z_2)=\frac{{n_a}^2}{n^2}+\frac{{n_b}^2}{n^2}$=$\frac{n_a^2+n_b^2}{n^2}$ since $Var(Z_1)=Var(Z_2)=1$

Approach V is then given by Equation 3.15 below

$$Z_V=\frac{\left(\frac{n_b}{n}Z_1+\frac{n_a}{n}Z_2\right)-E\left(\frac{n_b}{n}Z_1+\frac{n_a}{n}Z_2\right)}{\sqrt{Var\left(\frac{n_b}{n}Z_1+\frac{n_a}{n}Z_2\right)}}=\frac{\frac{n_b}{n}Z_1+\frac{n_a}{n}Z_2}{\sqrt{\frac{n_a^2+n_b^2}{n^2}}} \tag{3.15}$$

Where Z_1 is from Equation 3.7 and Z_2 is from Equation 3.8. The asymptotic distribution of the test is used and H_0 is rejected for a large value that is $Z_V \geq Z_\alpha$ where Z_α is the (1- α) 100% of the standard normal distribution. The α value is obtained from the standard normal tables. If the test is performed at a 5% level of significance then $Z_\alpha=1.645$.

It follows that if $n_a \geq n_b$, then the modified Page's test statistic is assigned greater weight than the standardized modified Fligner-Wolfe test statistic. If $n_a \leq n_b$, then the standardized modified Page's test statistic is assigned lesser weight than the modified Fligner-Wolfe test statistic. If $n_a=n_b$, then equal weights are assigned to both the standardized modified Fligner-Wolfe test statistic and the standardized modified Page's test statistic then Approach V, and Approach II will be equal.

3.3.6. Approach VI

Similarly Approach VI follows from Approach V by reversing the weights and we obtain equation 3.18 below. A similar concept is used as in Approach V except for the change in weights assigned to each standardized Modified Fligner-Wolfe test statistic (Z_1) and standardized modified Page's test statistic (Z_2). The estimate for Approach VI is given by 3.18 below

$$\frac{n_a}{n}Z_1+\frac{n_b}{n}Z_2=\frac{n_aZ_1+n_bZ_2}{n} \tag{3.16}$$

The mean and the variance for the test statistic given in 3.16 are obtained

$E\left(\frac{n_a}{n}Z_1+\frac{n_b}{n}Z_2\right)=\frac{n_a}{n}E(Z_1)+\frac{n_b}{n}E(Z_2)$=0 since $E(Z_1)$= $E(Z_2)$=0 while the variance will be given by

$Var\left(\frac{n_a}{n}Z_1+\frac{n_b}{n}Z_2\right)$=$\left(\frac{n_b}{n}\right)^2 Var(Z_1)+\left(\frac{n_a}{n}\right)^2 Var(Z_2)=\frac{{n_a}^2}{n^2}+\frac{{n_b}^2}{n^2}=\frac{n_a^2+n_b^2}{n^2}$ since $Var(Z_1)=Var(Z_2)=1$

Approach VI is then given by equation 3.17 below

$$\boldsymbol{Z_{VI}} = \frac{\left(\frac{n_a}{n} Z_1 + \frac{n_b}{n} Z_2\right) - E\left(\frac{n_a}{n} Z_1 + \frac{n_b}{n} Z_2\right)}{\sqrt{Var\left(\frac{n_a}{n} Z_1 + \frac{n_b}{n} Z_2\right)}} \tag{3.17}$$

Where Z_1 is Equation 3.7 and Z_2 is Equation 3.8. The asymptotic distribution of the test is used and H_0 is rejected for a large value that is $Z_{VI} \geq Z_\alpha$ where Z_α is the (1- α) 100% of the standard normal distribution. The α value is obtained from the standard normal tables. If the test is performed at a 5% level of significance then $Z_\alpha = 1.645$.

Similarly, if $n_a \geq n_b$, then the standardized modified Fligner-Wolfe test statistic is assigned greater weight than the standardized modified Page's test statistic. If $n_\alpha \leq n_b$, then the standardized modified Fligner-Wolfe test statistic is assigned lesser weight than the standardized modified Page's test statistic. If $n_a = n_b$, then equal weights are assigned to both the standardized modified Fligner-Wolfe test statistic and the standardized modified Page's test statistic then Approach VI, Approach V and Approach II will be equal.

In performing these six proposed approaches we do not know which test statistic performs better in terms of power and sample sizes: small and large sample scenario. Also, we would like to assess which of the test statistics among the six approaches is more robust when we vary the weights under for CRD portion and RCBD portion. In order to examine these scenarios a simulation study was conducted to compare the power of the proposed test statistics under a variety of conditions including when n_a is greater n_b, when n_a is less than n_b and when n_a is equal to n_b among other situations. The variance of the CRD portion was also considered in relation to the variance of the RCBD portion. All test statistics reject H_0 when $Z_c \geq Z_\alpha$ where $Z_c = Z_I,\ Z_{II},\ Z_{III}, Z_{IV},\ Z_V,\ Z_{VI}$ is greater than the tabulated Z_α at the α level of significance. All tests are performed at a 5% level of significance ($Z_\alpha = 1.645$).

3.4. Example

An example using hypothetical cholesterol measurement data of a mixed design is given below. Individuals are recruited to assess the impact of a program in lowering cholesterol levels. There are three treatments namely "no activity", "exercise only" and "exercise and low fat diet". We would like to test the alternative hypothesis that at least one of the treatments is more effective than the control (no activity).

$H_0: \mu_1 = \mu_2 = \cdots = \mu_k,$

In the first part of the experiment, subjects having similar cholesterol levels that needed to be reduced were place in a block. One of the subjects in the block was randomly assigned no treatment, one exercise only and one exercise and low fat diet. Cholesterol levels on the subjects were taken before beginning the program and then after three months. The change in the cholesterol levels of each subject in the experiment was measured after and before. These measurements are noted below. This was the RCBD portion. After a while, it become too tedious to find subjects with similar cholesterol levels and a CRD was applied. At this point, subjects were randomly assigned to a treatments and not matched a head of time. The change in their cholesterol levels was noted. All observations for both the RCBD and CRD portion are given below in table 3.4

Table 3.4: Hypothetical example illustrating the differences in cholesterol measurements hypothesis to be tested

Subject	No Activity	Exercise Only	Exercise and Low Fat Diet
1	1	-15	-20
2	2	-1	-13
3	3	-8	-10
4	4	-4	-11
5	5	-8	3
6	6	-7	-8
7	7	-6	-8
8	8	-5	-1
9	9	-12	-10
10	10	-13	-9
11	-20		
12	-9		
13	-13		
14	-6		
15	-7		
16		-8	
17		-15	
18		-11	
19		1	
20		-18	
21			-12
22			2
23			-1
24			-2
25			3

$H_0: \mu_1 = \mu_2 = \cdots = \mu_k,$

$H_\alpha: \mu_1 > [\mu_2, \ldots, \mu_k]$ where at least one inequality is strict

Table 3.5: Hypothetical example illustrating the ranks of the differences in cholesterol measurements

Subject	No Activity	Exercise Only	Exercise and Low Fat Diet
1	2	1	3
2	3	2	1
3	2	1	3
4	2	1	3
5	2	3	1
6	1	3	2
7	1	3	2
8	1	3	2
9	1	2	3
10	1	2	3
11	1		
12	7		
13	4		
14	10		
15	9		
16		8	
17		3	
18		6	
19		13	
20		2	
21			5
22			14
23			12
24			11
25			15

CRD Portion: Modified Fligner-Wolfe Test Statistic

$$T_1: FW = \sum_{\substack{i=2 \\ 1\le j\le n_t}} r_{ij} = 8 + 3 + 6 + \cdots + 12 + 11 + 15 = 89$$

$$E(T_1): E_0(FW) = \frac{n_t(N+1)}{2} = \frac{10(15+1)}{2} = 5x16 = 80$$

$$varT_1: var_0(FW) = \left\{\frac{n_c n_t(N+1)}{12}\right\} = \frac{5x10x(15+1)}{12} = \frac{800}{12} = 66.6667$$

$$Z_1: FW^* = \frac{FW - E_0(FW)}{(var_0(FW))^{0.5}} = \frac{89-80}{\sqrt{66.67}} = \frac{9}{8.164966} = 1.10227$$

$$p\ value = (Z_{0.05} < 1.10227) = 0.1352$$

RCBD Portion: Modified Page's Test Statistic

$$R_1 = 16; R_2 = 21; R_3 = 23;\ \mathrm{k} = 3; n_{\mathrm{b}} = 10$$

$$T_2: L = R_1 + 2\sum_{j=2}^{3} R_j = 16 + 2(21 + 23) = 16 + 88 = 104$$

$$E(T_2): E_0(L) = n_b E(L_0) = n_\mathrm{b}\left(k^2 + \tfrac{k-1}{2}\right) = 10\left(3^2 + \tfrac{(3-1)}{2}\right) = 10x10 = 100$$

$$varT_2: var_0(L) = n_\mathrm{b} var(L_0) = n_\mathrm{b}\frac{(k^2-1)}{12} = 10x\frac{(3^2-1)}{12} = 10x\frac{8}{12} = 10x0.66667 = 6.6667$$

$$Z_2: L^* = \frac{L - E_0(L)}{(var_0(L))^{0.5}} = \frac{104-100}{\sqrt{6.667}} = \frac{4}{2.5819889} = 1.54919$$

$$p\ value = (Z_{0.05} < 1.54919) = 0.06067$$

Approach I

$$Z_I = \frac{(T_1+T_2) - E(T_1+T_2)}{\sqrt{(varT_1 + varT_2)}} = \frac{(89+104)-(80+100)}{\sqrt{(66.67+6.6667)}} = \frac{193-180}{\sqrt{73.33333}} = \frac{13}{8.563488} = 1.518072$$

$$p\ value = (Z_{0.05} < 1.5181) = 0.0645$$

Approach II

$$Z_{II} = \frac{Z_1 + Z_2}{\sqrt{2}} = \frac{1.10227 + 1.54919}{1.414214} = \frac{2.65146}{1.414214} = 1.87486779$$

$$p\ value = (Z_{0.05} < 1.8749) = 0.0304$$

Approach III

$$Z_{III} = \frac{\left(\frac{n_a}{n}T_1 + \frac{n_b}{n}T_2\right) - E\left(\frac{n_a}{n}T_1 + \frac{n_b}{n}T_2\right)}{\sqrt{Var\left(\frac{n_a}{n}T_1 + \frac{n_b}{n}T_2\right)}} = \frac{\frac{5(89)+10(104)}{15} - \frac{5(80)+10(100)}{15}}{\sqrt{\frac{25(66.67)+100(6.667)}{225}}} = \frac{5.667}{3.2204} = 1.75963$$

$$p\ value = (\mathrm{Z}_{0.05} < 1.75963) = 0.0392$$

Approach IV

$$Z_{IV} = \frac{\left(\frac{n_b}{n}T_1 + \frac{n_a}{n}T_2\right) - E\left(\frac{n_b}{n}T_1 + \frac{n_a}{n}T_2\right)}{\sqrt{Var\left(\frac{n_b}{n}T_1 + \frac{n_a}{n}T_2\right)}} = \frac{\frac{10(89)+5(104)}{15} - \frac{10(80)+5(100)}{15}}{\sqrt{\frac{100(6.667)+25(66.667)}{225}}} = \frac{7.33333}{5.5111} = 1.33065$$

$$p\ value = (Z_{0.05} < 1.33065) = 0.0917$$

Approach V

$$Z_V = \frac{\left(\frac{n_b}{n}Z_1 + \frac{n_a}{n}Z_2\right) - E\left(\frac{n_b}{n}Z_1 + \frac{n_a}{n}Z_2\right)}{\sqrt{Var\left(\frac{n_b}{n}Z_1 + \frac{n_a}{n}Z_2\right)}} = \frac{\frac{10(1.10227)+5(1.54919)}{15} - \frac{10(0)+5(0)}{15}}{\sqrt{\frac{100(1)+25(1)}{225}}}$$

$$Z_V = \frac{1.251243333}{0.7454} = 1.67871909$$

$$p\ value = (Z_{0.05} < 1.6787) = 0.0466$$

Approach VI

$$Z_{VI} = \frac{\left(\frac{n_a}{n} Z_1 + \frac{n_b}{n} Z_2\right) - E\left(\frac{n_a}{n} Z_1 + \frac{n_b}{n} Z_2\right)}{\sqrt{Var\left(\frac{n_a}{n} Z_1 + \frac{n_b}{n} Z_2\right)}} = \frac{\frac{5(1.10227) + 10(1.54919)}{15} - \frac{10(0) + 5(0)}{15}}{\sqrt{\frac{100(1) + 25(1)}{225}}}$$

$$Z_{VI} = \frac{1.400216667}{0.7454} = 1.87858779$$

$$p\ value = (Z_{0.05} < 1.8786\ ) = 0.0302$$

For all six test statistics, Approach II, Approach III, and Approach VI reject H_0 a 5% level of significance and conclude that the treatments are better than the control (p values≤ 0.05) that is the program lowers cholesterol levels of the employees.

CHAPTER 4. SIMULATION

In this chapter, we describe in detail the procedures and criteria used to investigate the performance of the six proposed test statistics, the modified Fligner-Wolfe test statistic and the modified Page's test statistic, using a simulation study implemented in SAS version 9.4. These test statistics are defined in Chapter 3 of this study. The properties of the proposed test statistics were compared assuming the observations followed three underlying distributions; the normal, T with three degrees of freedom, and exponential distribution. It should be noted that the normal and T distribution are symmetric while the exponential distribution is not symmetric. The data used in this study was generated from a mixed design consisting of a CRD and RCBD portion. To generate observations from the exponential, normal and T distribution, the functions RANEXP, RANNOR and RAND were used in SAS, respectively.

For all simulations, replications of 10,000 samples were used. The initial part of the simulation study was to obtain estimates of the significance levels of the proposed test statistics described in Chapter 3. The stated alpha values for the proposed test statistics were all 0.05. This is based on the asymptotic distribution of the test statistics which were all standard normal under the null hypothesis. We estimated the alpha values by counting the number of times the null hypothesis was rejected and then divided by the number of times the samples were replicated (10,000) for each of the proposed test statistics. If the estimated alpha values were close to 0.05 the tests were compared to each other. It was appropriate to go on and compare powers of the test if the alpha values were approximately 0.05. The second part of the simulation study was to compare powers of the test statistics under various cases. For each case 10,000 samples were used. Powers were estimated in all cases by counting the number of times a test was rejected divided by 10,000.

Cases were considered when the sample sizes from CRD portion were equal to the number of blocks in RCBD, all sample sizes in the CRD portion were greater than the number of blocks in the RCBD: the number of blocks being $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{7}$ and $\frac{1}{8}$ of the sample sizes from CRD portion and when the sample sizes from CRD portion were less than the number of blocks: the sample sizes were $\frac{1}{2}$, $\frac{1}{3}$ and $\frac{1}{4}$ of the number of blocks. The number of treatments (k) examined were $k = 3, 4, 5$ where one of the k treatments was a control.

Situations were considered in which the variance of the CRD portion was equal to the variance in the RCBD portion and when the variance in the CRD portion was larger than the variance in RCBD portion. For the normal distribution, data for the RCBD portion followed a standard normal distribution: $Y_1 \sim N(0,1)$ while for the CRD portion, three cases were considered when the data values were: $Y_1 \sim N(0,1), Y_2 \sim N(0,2)$ and $Y_2 \sim N(0,3)$. That is we tested the proposed test statistics (a) when the data were a combination of RCBD portion: $Y_1 \sim N(0,1)$ and CRD portion: $Y_2 \sim N(0,1)$ (b) when the data were a combination of RCBD portion: $Y_1 \sim N(0,1)$ and CRD portion: $Y_2 \sim N(0,2)$ (c) when the data were a combination of RCBD portion: $Y_1 \sim N(0,1)$ and CRD portion: $Y_2 \sim N(0,3)$.

For the T distribution, data for the RCBD portion followed a T distribution with three degrees of freedom: $Y_1 \sim T(3)$ while for the CRD portion, three cases were considered when the data values were: $Y_2 \sim T(3)$, $Y_2 \sim T(3) * \sqrt{2}$ and $Y_2 \sim T(3) * \sqrt{3}$. That is we tested the test statistics (a) When the data were a combination of RCBD portion: $Y_1 \sim T(3)$ and CRD portion: $Y_2 \sim T(3)$. (b) When the data were a combination of RCBD portion: $Y_1 \sim T(3)$ and CRD portion: $Y_2 \sim Y_1 * \sqrt{2}$. (c) When the data were a combination of RCBD portion: $Y_1 \sim T(3)$ and CRD portion: $Y_2 \sim Y_1 * \sqrt{3}$.

Note: To obtain Y_2, the initial step was to generate data assuming a T distribution with three degrees of freedom ($T(3)$). This was followed by some manipulation were $T(3) * \sqrt{3}$ or $T(3) * \sqrt{2}$

For the exponential distribution, data for the RCBD portion followed a standard exponential distribution: $Y_1 \sim exp(1)$ while for the CRD portion, three case were considered when the data were: $Y_2 \sim exp(1), Y_2 \sim exp(\sqrt{2}) - (\sqrt{2} - 1)$ and $Y_2 \sim exp(\sqrt{3}) - (\sqrt{3} - 1)$. That is we tested the test statistics (a) When the data were a combination of RCBD portion: $Y_1 \sim exp(1)$ and CRD portion: $Y_2 \sim exp(1)$, (b) When the data were a combination of RCBD portion: $Y_1 \sim exp(1)$ and CRD portion: $Y_2 \sim exp(\sqrt{2}) - (\sqrt{2} - 1)$. (c) when the data were a combination of RCBD portion: $Y_1 \sim exp(1)$ and CRD portion: $Y_2 \sim \left(exp(\sqrt{3}) - (\sqrt{3} - 1)\right)$.

Different treatment effects were denoted by shifts in the locations for each treatment except the control. Various configuration of treatments effects were examined. Among them were: when the location parameters are equally spaced, some location parameters equal to the control and some location parameters different from the control but equal to each other, and unequal spacing between location parameters with no particular pattern. Below are the shift configurations used to assess the treatment effects. Only equal sample sizes in the CRD portion were considered per treatment while for the block portion, all blocks were complete so that each treatment appeared in every block.

Table 4.1: Location parameter configurations (treatment effects) assuming an exponential, normal and t distribution with three degrees of freedom

k=3		k=4			k=5			
d_2	d_3	d_2	d_3	d_4	d_2	d_3	d_4	d_5
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0.50	1.00	0.25	0.50	0.75	0.25	0.50	0.75	1.00
1.00	1.00	0.50	0.75	1.00	0.50	0.75	1.00	1.25
0.50	0.50	0.50	0.50	1.00	0.50	0.50	1.00	1.00
0.10	0.20	0.75	0.75	1.00	0.75	0.75	1.00	1.00
0.00	0.25	0.10	0.20	0.30	0.30	0.30	1.20	1.20
0.00	0.50	0.30	0.30	0.90	0.10	0.20	0.30	0.40
0.00	0.75	0.30	0.30	0.60	0.30	0.30	0.60	0.60
0.00	1.00	0.20	0.40	0.40	0.20	0.20	0.40	0.40
0.30	0.60	0.20	0.60	0.60	0.20	0.20	0.60	0.60
0.30	0.90	0.20	0.80	0.80	0.20	0.20	0.80	0.80
0.30	1.20	0.20	1.00	1.00	0.20	0.20	1.00	1.00
0.30	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.40	0.80	0.50	0.50	0.50	0.50	0.50	0.50	0.50
0.40	1.20	0.75	0.75	0.75	0.75	0.75	0.75	0.75
0.50	1.20	0.00	0.25	0.25	0.00	0.25	0.25	0.25
0.60	0.70	0.00	0.50	0.50	0.00	0.50	0.50	0.50
0.20	1.30	0.00	0.75	0.75	0.00	0.75	0.75	0.75
0.30	1.40	0.00	1.00	1.00	0.00	1.00	1.00	1.00
0.00	1.00	0.00	0.30	0.60	0.00	0.30	0.60	0.90
		0.00	0.90	1.20	0.00	0.60	0.90	1.20
		0.30	0.60	0.90	0.00	0.90	1.20	1.50
		0.60	0.90	1.20	0.30	0.60	0.90	1.20
		0.40	0.60	0.80	0.40	0.60	0.80	1.00
		0.60	0.80	1.00	0.60	0.80	1.00	1.20
		0.00	0.00	1.00	0.00	0.00	0.00	1.00
		0.00	0.00	3.00	0.00	0.00	0.00	3.00
		0.00	0.00	4.00	0.00	0.00	0.00	4.00
		0.00	0.00	2.00	0.00	0.00	0.00	2.00
		0.00	2.00	0.00	0.00	0.00	2.00	0.00
		2.00	0.00	0.00	0.00	2.00	0.00	0.00
		0.00	0.00	0.00	2.00	0.00	0.00	0.00
		0.00	0.00	5.00	0.00	0.00	0.00	5.00
		0.00	5.00	0.00	0.00	0.00	5.00	0.00
		5.00	0.00	0.00	0.00	5.00	0.00	0.00
		0.50	0.20	0.70	5.00	0.00	0.00	0.00
					0.70	0.20	0.60	0.30
					0.50	0.20	0.70	0.10

CHAPTER 5. RESULTS

In this chapter, we present results from the simulation study describing the properties of the test statistics described in Chapter 3. The test statistics are for analyzing data in a mixed design comprising a CRD and a RCBD portion. The tables present estimated alpha values and then estimated powers assuming the three underlying distributions; the normal, T with three degrees of freedom, and exponential distribution. In addition, the tables show results when the variance for CRD portion is equal to the variance for the RCBD portion and when the variance in for CRD portion is larger than the variance in the RCBD portion.

In the tables, among them are L* and FW* which denote the modified Page's test statistic and the modified Fligner-Wolfe test statistic, respectively. The number of treatments considered in the study is denoted by k, where k=3 denotes three treatments, k=4 denotes four treatments, and k=5 denotes five treatments. The shift configurations in the treatment effects are denoted by d2, d3, d4, and d5 for treatment 2, treatment 3, treatment 4, and treatment 5, respectively. Powers are estimated for each test statistic for different shift configurations in the location parameters. Illustrated are the effects, when the sample size for the CRD portion is equal to the number of blocks for the RCBD portion, when varying the sample sizes for the CRD portion and holding the number of blocks for the RCBD portion constant, and then varying the number of blocks for the RCBD portion and holding the sample size for the CRD portion constant.

5.1. Three Populations

5.1.1. Estimated Alpha Values

The alpha values were estimated by counting the number of times the null hypothesis was rejected and then dividing by 10,000 (the number of samples generated) for each of the proposed test statistics. Tables 5.1 through 5.3 present the estimated alpha values when the variance in the CRD portion was equal to the variance in the RCBD portion and when the study comprised three treatments. The number of blocks in the RCBD portion was fixed and small ($n_b = 5$) while the sample sizes in the CRD portion were varied. The estimated alpha values when the underlying distributions were exponential, normal and T distributions are shown. The asymptotic distribution of the test statistics are all standard normal under the null hypothesis and the stated alpha value for each test conducted was 0.05. The estimated alpha values were around 0.05 except for the modified Page's test statistic (L*) when the number of blocks for the RCBD portion is five. When the number of blocks for the RCBD portion is five, the estimated value of Page's test was below 0.05. More tables illustrating the alpha values for a fixed number of blocks ($10 \leq n_b \leq 40$) and varying the sample sizes are in Appendix B.

Table 5.1: Estimated alpha values of tests for mixed design under the exponential distribution with equal variance; k=3; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.0277	0.0495	0.0545	0.0493	0.0545	0.0545	0.0493	0.0493
10	0.0277	0.0493	0.0510	0.0514	0.0505	0.0533	0.0522	0.0502
15	0.0277	0.0507	0.0519	0.0539	0.0516	0.0543	0.0532	0.0524
20	0.0277	0.0492	0.0488	0.0489	0.0486	0.0492	0.0526	0.0483
25	0.0277	0.0513	0.0512	0.0488	0.0514	0.0517	0.0532	0.0515
30	0.0277	0.0505	0.0502	0.0501	0.0507	0.0498	0.0547	0.0509
35	0.0277	0.0486	0.0480	0.0496	0.0485	0.0482	0.0527	0.0469
40	0.0277	0.0530	0.0535	0.0495	0.0531	0.0527	0.0519	0.0524

Table 5.2: Estimated alpha values of tests for mixed design under the normal distribution with equal variance; k=3; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.0232	0.0520	0.0552	0.0490	0.0552	0.0552	0.0490	0.0490
10	0.0232	0.0498	0.0502	0.0491	0.0513	0.0513	0.0501	0.0494
15	0.0232	0.0494	0.0493	0.0512	0.0501	0.0504	0.0494	0.0517
20	0.0232	0.0501	0.0505	0.0487	0.0498	0.0504	0.0492	0.0508
25	0.0232	0.0530	0.0528	0.0503	0.0533	0.0515	0.0501	0.0530
30	0.0232	0.0473	0.0468	0.0504	0.0473	0.0479	0.0512	0.0490
35	0.0232	0.0503	0.0496	0.0468	0.0498	0.0494	0.0504	0.0498
40	0.0232	0.0527	0.0531	0.0509	0.0527	0.0536	0.0514	0.0534

Table 5.3: Estimated alpha values of tests for mixed design under the t distribution with equal variance; k =3; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.0262	0.0508	0.0544	0.0502	0.0544	0.0544	0.0502	0.0502
10	0.0262	0.0517	0.0520	0.0538	0.0529	0.0544	0.0547	0.0548
15	0.0262	0.0516	0.0510	0.0554	0.0523	0.0525	0.0548	0.0530
20	0.0262	0.0494	0.0497	0.0516	0.0491	0.0507	0.0522	0.0511
25	0.0262	0.0514	0.0513	0.0539	0.0516	0.0511	0.0555	0.0514
30	0.0262	0.0510	0.0513	0.0540	0.0511	0.0516	0.0528	0.0515
35	0.0262	0.0516	0.0506	0.0504	0.0512	0.0520	0.0558	0.0529
40	0.0262	0.0520	0.0518	0.0520	0.0520	0.0528	0.0534	0.0531

Tables 5.4 through 5.6 present the estimated alpha values when the variance in the CRD portion was greater than the variance in the RCBD portion and the study comprised three treatments. The sample size in the CRD portion was fixed and small ($n_a = 5$) while the number of blocks in the CRBD portion was varied. The estimated alpha values when underlying distributions were exponential, normal and T are shown. The alpha values for modified Page's test statistic are noted to be below 0.05 for the three underlying distribution presented. The estimated alpha values are all around 0.05 except for the estimated alpha values of the modified Page's test when the number of blocks is small and they are lesser than 0.05. More tables illustrating the alpha values for fixed sample sizes ($10 \leq n_a \leq 40$) and varying the number of blocks are in Appendix B.

Table 5.4: Estimated alpha values of tests for mixed design under the exponential distribution with variance; k=3; treatments effects: d2=0; d3=0

Fixed Sample size $n_a = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
5	0.0260	0.0491	0.0543	0.0508	0.0543	0.0543	0.0508	0.0508
10	0.0392	0.0491	0.0469	0.0491	0.0549	0.0488	0.0511	0.0488
15	0.0426	0.0491	0.0502	0.0503	0.0509	0.0509	0.0499	0.0523
20	0.0321	0.0491	0.0487	0.0443	0.0427	0.0465	0.0474	0.0450
25	0.0555	0.0491	0.0454	0.0480	0.0488	0.0499	0.0508	0.0500
30	0.0422	0.0491	0.0483	0.0485	0.0481	0.0511	0.0502	0.0461
35	0.0631	0.0491	0.0508	0.0494	0.0503	0.0486	0.0496	0.0512
40	0.0494	0.0491	0.0525	0.0491	0.0492	0.0502	0.0500	0.0499

Table 5.5: Estimated alpha values of tests for mixed design under the normal distribution with unequal variance=3; treatments effects: d2=0; d3=0

Fixed Sample size $n_a = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0268	0.0491	0.0522	0.0474	0.0522	0.0522	0.0474	0.0474
10	0.0361	0.0491	0.0445	0.0487	0.0529	0.0488	0.0485	0.0491
15	0.0417	0.0491	0.0488	0.0520	0.0539	0.0518	0.0504	0.0539
20	0.0330	0.0491	0.0558	0.0517	0.0496	0.0486	0.0492	0.0469
25	0.0561	0.0491	0.0416	0.0507	0.0471	0.0498	0.0494	0.0493
30	0.0466	0.0491	0.0497	0.0510	0.0490	0.0505	0.0503	0.0494
35	0.0583	0.0491	0.0490	0.0467	0.0472	0.0493	0.0493	0.0478
40	0.0464	0.0491	0.0519	0.0472	0.0453	0.0496	0.0488	0.0457

Table 5.6: estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=3; treatments effects: d2=0; d3=0

Fixed Sample size $n_a = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0266	0.0523	0.0564	0.0500	0.0564	0.0564	0.0500	0.0500
10	0.0394	0.0523	0.0468	0.0489	0.0536	0.0502	0.0503	0.0502
15	0.0376	0.0523	0.0500	0.0492	0.0506	0.0547	0.0512	0.0479
20	0.0367	0.0523	0.0536	0.0481	0.0495	0.0516	0.0520	0.0491
25	0.0544	0.0523	0.0453	0.0547	0.0468	0.0531	0.0517	0.0498
30	0.0492	0.0523	0.0512	0.0553	0.0517	0.0536	0.0524	0.0514
35	0.0581	0.0523	0.0546	0.0511	0.0500	0.0528	0.0529	0.0502
40	0.0495	0.0523	0.0570	0.0515	0.0488	0.0535	0.0529	0.0487

5.1.2. Estimated Powers Three Populations

Tables 5.7 through 5.12 present the power estimates when the variance for the CRD portion was equal to variance for the RCBD portion and the study comprised three treatments. We show the results when the same shift is considered for treatment 2 and treatment 3. The shift configuration used was d2=0.5, d3=0.5 when the underlying distributions were normal, T and exponential. In this case, we fixed the number of blocks ($n_b = 5$) for the RCBD portion and varied the sample size for the CRD portion. It was noted that Approach VI has the highest powers. (See Tables 5.7 through 5.9). Approach IV had relatively high powers.

We next show the results when the number of blocks for the RCBD portion is increased to 10 ($n_b = 10$), and the sample size for the CRD portion is varied for all three distributions considered with shift configuration d2=0, d3=0.75. The location parameter for treatment 1(control) is the same as treatment 2 and the shift effect on the location parameter for treatment 3 is 0.75 more than the control. We found that Approach VI has the highest powers (See Tables 5.10 through 5.12). Other shift configuration considered in this study can be found in Appendix C

Table 5.7: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Number of Blocks $n_b = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.0820	0.1505	0.1858	**0.1924**	0.1858	0.1858	**0.1924**	**0.1924**
10	0.0820	0.2111	0.2237	0.2401	0.2209	0.2366	0.2141	**0.2493**
15	0.0820	0.2646	0.2708	0.2824	0.2692	0.2832	0.2078	**0.2927**
20	0.0820	0.3217	0.3282	0.3255	0.3205	0.3398	0.2035	**0.3516**
25	0.0820	0.3604	0.3626	0.3512	0.3616	0.3743	0.1956	**0.3863**
30	0.0820	0.4149	0.4179	0.3903	0.4167	0.4287	0.1948	**0.4397**
35	0.0820	0.4475	0.4483	0.4133	0.4472	0.4632	0.1955	**0.4680**
40	0.0820	0.4976	0.4997	0.4487	0.4977	0.5104	0.1981	**0.5153**

Table 5.8: Estimated power of tests for mixed under the normal distribution with equal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.1099	0.2109	0.2754	**0.3084**	0.2754	0.2754	**0.3084**	**0.3084**
10	0.1099	0.3490	0.3697	0.4195	0.3636	0.3970	0.3513	**0.4353**
15	0.1099	0.4512	0.4648	0.4927	0.4595	0.4942	0.3376	**0.5214**
20	0.1099	0.5480	0.5554	0.5598	0.5476	0.5773	0.3243	**0.6011**
25	0.1099	0.6287	0.6352	0.6204	0.6311	0.6566	0.3101	**0.6763**
30	0.1099	0.7021	0.7059	0.6683	0.7035	0.7226	0.3008	**0.7337**
35	0.1099	0.7652	0.7660	0.7154	0.7649	0.7814	0.2887	**0.7893**
40	0.1099	0.8039	0.8063	0.7531	0.8039	0.8196	0.2837	**0.8261**

Table 5.9: Estimated power of tests for mixed under the t distribution with equal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Number of Blocks $n_b = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.0886	0.1630	0.2074	**0.2331**	0.2074	0.2074	**0.2331**	**0.2331**
10	0.0886	0.2569	0.2746	0.3095	0.2687	0.2936	0.2667	**0.3193**
15	0.0886	0.3372	0.3500	0.3677	0.3444	0.3704	0.2591	**0.3898**
20	0.0886	0.4088	0.4164	0.4197	0.4081	0.4296	0.2519	**0.4492**
25	0.0886	0.4736	0.4802	0.4671	0.4759	0.4954	0.2401	**0.5098**
30	0.0886	0.5369	0.5409	0.5109	0.5387	0.5597	0.2357	**0.5715**
35	0.0886	0.6019	0.6024	0.5527	0.6018	0.6204	0.2325	**0.6278**
40	0.0886	0.6482	0.6509	0.5942	0.6483	0.6630	0.2321	**0.6666**

Table 5.10: Estimated power of tests for mixed under the normal distribution with equal variance; k=3; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.2375	0.3100	0.3557	**0.4627**	0.3557	0.3557	**0.4627**	**0.4627**
15	0.2375	0.4184	0.4460	0.5499	0.4374	0.4571	0.5148	**0.5577**
20	0.2375	0.5096	0.5287	0.6071	0.5174	0.5379	0.5161	**0.6257**
25	0.2375	0.5797	0.5951	0.6613	0.5876	0.6128	0.5039	**0.6831**
30	0.2375	0.6555	0.6642	0.7127	0.6579	0.6809	0.4963	**0.7378**
35	0.2375	0.7266	0.7301	0.7504	0.7268	0.7440	0.4891	**0.7911**
40	0.2375	0.7714	0.7751	0.7844	0.7730	0.7896	0.4802	**0.8223**

Table 5.11: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=3; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.1593	0.2115	0.2445	**0.3190**	0.2445	0.2445	**0.3190**	**0.3190**
15	0.1593	0.2759	0.2944	0.3653	0.2874	0.3017	0.3405	**0.3728**
20	0.1593	0.3545	0.3681	0.4214	0.3594	0.3748	0.3489	**0.4396**
25	0.1593	0.4089	0.4178	0.4691	0.4128	0.4316	0.3457	**0.4864**
30	0.1593	0.4696	0.4779	0.5109	0.4746	0.4916	0.3385	**0.5412**
35	0.1593	0.5218	0.5248	0.5467	0.5218	0.5397	0.3269	**0.5842**
40	0.1593	0.5725	0.5782	0.5811	0.5741	0.5931	0.3226	**0.6276**

Table 5.12: Estimated power of tests for mixed design under the t distribution with equal variance; k=3; treatments effects: d2 d2=0.5; d3=0.5

Fixed Number of Blocks $n_b = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.1223	0.1755	0.1963	**0.2426**	0.1963	0.1963	**0.2426**	**0.2426**
15	0.1223	0.2220	0.2364	0.2819	0.2318	0.2415	0.2613	**0.2840**
20	0.1223	0.2642	0.2760	0.3179	0.2681	0.2791	0.2641	**0.3248**
25	0.1223	0.3169	0.3243	0.3542	0.3209	0.3349	0.2628	**0.3730**
30	0.1223	0.3493	0.3549	0.3797	0.3521	0.3649	0.2550	**0.4025**
35	0.1223	0.3945	0.3953	0.4130	0.3939	0.4056	0.2532	**0.4408**
40	0.1223	0.4321	0.4365	0.4434	0.4334	0.4478	0.2471	**0.4776**

Tables 5.13 through 5.18 present the power estimates when the variance for the CRD portion was larger than the variance for the RCBD portion. The power estimates of the two situations of variability considered for each distribution in the study are shown. One shift configuration is reported in this result section that is, when the same shift for treatment 2 and treatment 3 was examined. The shift configuration used was d2=0.5, d3=0.5 when the underlying distributions were normal, T and exponential. We fix the number of blocks ($n_b = 5$) for the RCBD portion and the sample size for the CRD portion is varied. It was

noted that Approach II has the highest powers in most cases (See Table 5.14, Table 5.15 and Table 5.16 and Table 5.18).

Important to note, was when the variance for the CRD portion was twice the variance for the RCBD portion, for the exponential and T distributions and the number of blocks for the RCBD portion is small and fixed ($n_b = 5$). Approach II had the highest powers when the sample size was between 5 and 25 inclusive for the CRD portion (See Table 5.13 and 5.17). Whereas, Approach VI had the highest powers when the sample size was between 30 and 40 inclusive for the CRD portion. While Approach VI was noted to have higher powers than Approach II in some instances as noted above, the relative percentage difference in the powers of Approach II compared to Approach VI was small. For Table 5.13 where the underlying distribution was exponential, the relative percentage changes in powers for the sample sizes 30, 35 and 40 were 3.1%, 2.7% and 3.4% lower for Approach II compared to Approach VI, respectively. Other tables showing similar results with other configurations are in Appendix C.

Table 5.13: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.2021	0.2456	0.3267	**0.4137**	0.3267	0.3267	**0.4137**	**0.4137**
10	0.2021	0.3830	0.4143	**0.5319**	0.4032	0.4457	0.4837	0.5139
15	0.2021	0.4972	0.5136	**0.6109**	0.5050	0.5489	0.4803	0.5957
20	0.2021	0.5933	0.6057	**0.6725**	0.5945	0.6334	0.4686	0.6670
25	0.2021	0.6673	0.6735	**0.7286**	0.6701	0.7025	0.4533	0.7248
30	0.2021	0.7368	0.7417	0.7702	0.7386	0.7636	0.4375	**0.7816**
35	0.2021	0.7987	0.8004	0.8040	0.7986	0.8188	0.4267	**0.8289**
40	0.2021	0.8381	0.8409	0.8354	0.8383	0.8544	0.4212	**0.8625**

Table 5.14: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.1979	0.2021	0.2792	**0.3694**	0.2792	0.2792	**0.3694**	**0.3694**
10	0.1979	0.3100	0.3378	**0.4720**	0.3271	0.3726	0.4449	0.4469
15	0.1979	0.3928	0.4087	**0.5327**	0.4005	0.4444	0.4443	0.4906
20	0.1979	0.4851	0.4966	**0.5972**	0.4859	0.5225	0.4386	0.5622
25	0.1979	0.5523	0.5596	**0.6440**	0.5542	0.5890	0.4257	0.6199
30	0.1979	0.6131	0.6190	**0.6897**	0.6148	0.6463	0.4187	0.6624
35	0.1979	0.6731	0.6746	**0.7244**	0.6728	0.7015	0.4133	0.7160
40	0.1979	0.7113	0.7137	**0.7489**	0.7115	0.7341	0.4116	0.7454

Table 5.15: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1101	0.1095	0.1543	**0.2098**	0.1543	0.1543	**0.2098**	**0.2098**
10	0.1101	0.1492	0.1645	**0.2584**	0.1587	0.1835	0.2529	0.2261
15	0.1101	0.1773	0.1876	**0.2764**	0.1821	0.2093	0.2465	0.2388
20	0.1101	0.2248	0.2332	**0.3106**	0.2248	0.2501	0.2470	0.2726
25	0.1101	0.2508	0.2544	**0.3411**	0.2526	0.2712	0.2478	0.2924
30	0.1101	0.2852	0.2892	**0.3663**	0.2869	0.3067	0.2458	0.3240
35	0.1101	0.3276	0.3275	**0.3970**	0.3273	0.3479	0.2533	0.3599
40	0.1101	0.3553	0.3585	**0.4130**	0.3558	0.3797	0.2550	0.3864

Table 5.16: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1089	0.0821	0.1166	**0.1729**	0.1166	0.1166	**0.1729**	**0.1729**
10	0.1089	0.1071	0.1204	**0.2041**	0.1164	0.1353	0.2146	0.1732
15	0.1089	0.1233	0.1290	**0.2171**	0.1270	0.1475	0.2181	0.1719
20	0.1089	0.1479	0.1538	**0.2462**	0.1478	0.1683	0.2249	0.1926
25	0.1089	0.1617	0.1650	**0.2611**	0.1625	0.1798	0.2232	0.1974
30	0.1089	0.1776	0.1807	**0.2797**	0.1783	0.1951	0.2285	0.2096
35	0.1089	0.1927	0.1935	**0.2857**	0.1925	0.2104	0.2296	0.2223
40	0.1089	0.2143	0.2160	**0.3012**	0.2143	0.2328	0.2289	0.2398

Table 5.17: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and RCBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.0890	0.1215	0.1567	**0.1896**	0.1567	0.1567	**0.1896**	**0.1896**
10	0.0890	0.1714	0.1837	**0.2371**	0.1804	0.2006	0.2218	0.2275
15	0.0890	0.2129	0.2209	**0.2749**	0.2178	0.2400	0.2207	0.2621
20	0.0890	0.2621	0.2679	**0.3033**	0.2610	0.2829	0.2119	0.3005
25	0.0890	0.3077	0.3125	**0.3443**	0.3086	0.3271	0.2116	0.3422
30	0.0890	0.3507	0.3530	0.3700	0.3512	0.3677	0.2118	**0.3818**
35	0.0890	0.3828	0.3831	0.3998	0.3819	0.3997	0.2148	**0.4109**
40	0.0890	0.4150	0.4168	0.4256	0.4153	0.4326	0.2177	**0.4407**

Table 5.18: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=3; treatments effects: d2=0.5; d3=0.5

Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.0869	0.1084	0.1417	**0.1752**	0.1417	0.1417	**0.1752**	**0.1752**
10	0.0869	0.1415	0.1532	**0.2105**	0.1490	0.1676	0.2038	0.1934
15	0.0869	0.1761	0.1850	**0.2487**	0.1814	0.2021	0.2053	0.2228
20	0.0869	0.2128	0.2181	**0.2651**	0.2130	0.2288	0.2001	0.2481
25	0.0869	0.2348	0.2393	**0.2886**	0.2362	0.2525	0.2014	0.2665
30	0.0869	0.2623	0.2658	**0.3097**	0.2636	0.2790	0.2052	0.2932
35	0.0869	0.2924	0.2932	**0.3309**	0.2918	0.3083	0.2070	0.3132
40	0.0869	0.3177	0.3200	**0.3541**	0.3180	0.3344	0.2054	0.3453

In Tables 5.19 through 5.27, we present the power estimates when the number of blocks in the RCBD portion is greater than the sample size in the CRD portion. We fix the sample size ($\boldsymbol{n_a = 5}$) for the CRD portion and vary the number of blocks in the RCBD portion. Tables 5.19 through 5.21 show powers when the variance of the CRD portion is equal to the variance of the RCBD portion, Approach III has the highest powers when the number of blocks for the RCBD portion is at least greater than 10. The power estimates for Approach II, and Approach VI are slightly lower than the power estimates for Approach III. The higher powers associated with Approach III can be possibly explained by the large weight attributed to the high number of blocks in RCBD portion and a very small sample size for the CRD portion in the mixed design. It should be noted however, that the estimated powers between Approach III and Approach VI are within 0.01 of each other making the difference insignificant. Other tables showing similar results with other configurations are in Appendix C.

Table 5.19: Estimated power of tests for mixed under the exponential distribution with equal variance; treatments effects: d2=0.1; d3=0.2

Fixed Sample size $n_a = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach I	II	III	IV	V	VI
5	0.0634	0.1126	0.1394	**0.1427**	0.1394	0.1394	**0.1427**	**0.1427**
10	0.1193	0.1126	0.1378	0.1756	**0.1795**	0.1292	0.1634	0.1701
15	0.1417	0.1126	0.1554	0.1920	**0.1961**	0.1317	0.1528	0.1873
20	0.1626	0.1126	0.1874	0.2155	**0.2244**	0.1301	0.1555	0.2201
25	0.2359	0.1126	0.1781	0.2204	**0.2393**	0.1303	0.1469	0.2394
30	0.2307	0.1126	0.2067	0.2502	**0.2649**	0.1334	0.1471	0.2575
35	0.2989	0.1126	0.2336	0.2678	**0.2897**	0.1328	0.1445	0.2850
40	0.2870	0.1126	0.2603	0.2853	**0.3046**	0.1356	0.1467	0.3007

Table 5.20: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=3; treatments effects: d2=0.2; d3=0.4

Fixed Sample size $n_a = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0645	0.1329	0.1636	**0.1691**	0.1636	0.1636	**0.1691**	**0.1691**
10	0.1316	0.1329	0.1584	0.2000	**0.2058**	0.1489	0.1861	0.1937
15	0.1730	0.1329	0.1945	0.2399	**0.2458**	0.1582	0.1876	0.2357
20	0.1917	0.1329	0.2220	0.2642	**0.2797**	0.1543	0.1829	0.2637
25	0.2813	0.1329	0.2274	0.2771	**0.3016**	0.1567	0.1791	0.2919
30	0.2956	0.1329	0.2528	0.3136	**0.3341**	0.1594	0.1762	0.3253
35	0.3726	0.1329	0.2926	0.3438	**0.3603**	0.1587	0.1764	0.3541
40	0.3708	0.1329	0.3279	0.3656	**0.3970**	0.1583	0.1721	0.3920

Table 5.21: Estimated power of tests for mixed under the t distribution with equal variance; k=3; treatments effects: d2=0.2; d3=0.4

Fixed Sample size $n_a = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0554	0.1067	0.1285	**0.1331**	0.1285	0.1285	**0.1331**	**0.1331**
10	0.1118	0.1067	0.1260	**0.1663**	0.1688	0.1204	0.1503	0.1637
15	0.1341	0.1067	0.1506	0.1838	**0.1897**	0.1276	0.1467	0.1836
20	0.1481	0.1067	0.1770	0.2084	**0.2169**	0.1252	0.1480	0.2056
25	0.2229	0.1067	0.1706	0.2128	**0.2302**	0.1265	0.1423	0.2275
30	0.2226	0.1067	0.1953	0.2386	**0.2545**	0.1298	0.1400	0.2482
35	0.2924	0.1067	0.2239	0.2608	**0.2802**	0.1265	0.1387	0.2759
40	0.2780	0.1067	0.2559	0.2815	**0.3004**	0.1295	0.1415	0.2958

Tables 5.22 through 5.27 show powers when the variance of the CRD portion is larger than the variance of the RCBD portion. The power estimates for Approach III are close to the power estimates for Approach VI. The relative percentage difference is trivial. This could be attributed to the small sample size ($n_a = 5$) in the CRD portion.

Table 5.22: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=3; treatments effects: d2=0.1; d3=0.2

Fixed Sample size $n_a = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0563	0.0941	0.1159	**0.1253**	0.1159	0.1159	**0.1253**	**0.1253**
10	0.1196	0.0941	0.1135	0.1540	0.1509	0.1061	0.1363	**0.1591**
15	0.1444	0.0941	0.1363	0.1718	0.1805	0.1131	0.1316	**0.1883**
20	0.1617	0.0941	0.1608	0.1937	0.2118	0.1087	0.1302	**0.2135**
25	0.2397	0.0941	0.1554	0.2022	0.2350	0.1121	0.1277	**0.2379**
30	0.2361	0.0941	0.1797	0.2298	**0.2599**	0.1132	0.1237	0.2522
35	0.3009	0.0941	0.2015	0.2446	**0.2823**	0.1098	0.1204	0.2802
40	0.2837	0.0941	0.2287	0.2560	**0.2921**	0.1140	0.1237	0.2899

Table 5.23: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=3; treatments effects: d2=0.1; d3=0.2

Fixed Sample size $n_a = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1990	0.2069	0.2863	**0.3767**	0.2863	0.2863	**0.3767**	**0.3767**
10	0.4301	0.2069	0.3277	0.5015	0.4564	0.2754	0.4064	**0.5347**
15	0.5648	0.2069	0.4166	0.5942	0.6196	0.2852	0.3915	**0.6580**
20	0.6539	0.2069	0.4980	0.6667	0.7325	0.2785	0.3751	**0.7442**
25	0.7960	0.2069	0.5436	0.7163	0.8085	0.2835	0.3603	**0.8079**
30	0.8384	0.2069	0.6152	0.7795	0.8675	0.2866	0.3515	**0.8643**
35	0.9047	0.2069	0.6850	0.8112	**0.9034**	0.2847	0.3408	0.9022
40	0.9203	0.2069	0.7434	0.8474	**0.9304**	0.2863	0.3308	0.9288

Table 5.24: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=3; treatments effects: d2=0.5; d3=1.0

Fixed Sample size $n_a = 5$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1783	0.1483	0.2279	**0.3326**	0.2279	0.2279	**0.3326**	**0.3326**
10	0.4280	0.1483	0.2664	0.4555	0.4057	0.2134	0.3511	**0.5165**
15	0.5779	0.1483	0.3565	0.5678	0.5968	0.2231	0.3363	**0.6602**
20	0.6919	0.1483	0.4493	0.6598	0.7522	0.2176	0.3119	**0.7699**
25	0.8265	0.1483	0.4938	0.7270	0.8194	0.2222	0.2996	**0.8302**
30	0.8652	0.1483	0.5818	0.7786	**0.8862**	0.2245	0.2889	0.8861
35	0.9270	0.1483	0.6572	0.8106	0.9199	0.2233	0.2783	**0.9202**
40	0.9404	0.1483	0.7323	0.8560	**0.9470**	0.2234	0.2708	0.9450

Table 5.25: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=3; treatments effects: d2=0.5; d3=1.0

Fixed Sample size$n_a = 5$; (CRD $N(0, 3)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1951	0.1135	0.1749	**0.2809**	0.1749	0.1749	**0.2809**	**0.2809**
10	0.4362	0.1135	0.2117	0.4091	0.3501	0.1652	0.2952	**0.4857**
15	0.5807	0.1135	0.2859	0.5079	0.5408	0.1692	0.2679	**0.6325**
20	0.6818	0.1135	0.3758	0.5903	0.6964	0.1653	0.2478	**0.7430**
25	0.8287	0.1135	0.4175	0.6805	0.8079	0.1691	0.2369	**0.8254**
30	0.8583	0.1135	0.5064	0.7090	0.8612	0.1734	0.2225	**0.8698**
35	0.9276	0.1135	0.5862	0.7671	0.9117	0.1696	0.2175	**0.9165**
40	0.9391	0.1135	0.6676	0.8115	0.9369	0.1697	0.2068	**0.9388**

Table 5.26: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=3; treatments effects: d2=0.5; d3=1.0

Fixed Sample size $n_a = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1366	0.1790	0.2520	**0.3099**	0.2520	0.2520	**0.3099**	**0.3099**
10	0.3157	0.1790	0.2787	0.4146	0.3892	0.2353	0.3449	**0.4327**
15	0.4326	0.1790	0.3489	0.4979	0.5164	0.2476	0.3360	**0.5369**
20	0.5135	0.1790	0.4243	0.5657	0.6194	0.2406	0.3168	**0.6195**
25	0.6718	0.1790	0.4543	0.6389	**0.6929**	0.2449	0.3073	0.6909
30	0.7120	0.1790	0.5250	0.6742	**0.7555**	0.2465	0.2974	0.7504
35	0.8018	0.1790	0.5902	0.7171	**0.8037**	0.2469	0.2922	0.8003
40	0.8292	0.1790	0.6636	0.7632	**0.8538**	0.2467	0.2861	0.8465

Table 5.27: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=3; treatments effects: d2=0.5; d3=1.0

Fixed Sample size $n_a = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1411	0.1476	0.2068	**0.2747**	0.2068	0.2068	**0.2747**	**0.2747**
10	0.3155	0.1476	0.2325	0.3785	0.3453	0.1949	0.2981	**0.4120**
15	0.4186	0.1476	0.2957	0.4518	0.4720	0.2013	0.2834	**0.5126**
20	0.5057	0.1476	0.3709	0.5208	0.5946	0.1990	0.2695	**0.6052**
25	0.6778	0.1476	0.4038	0.6096	0.6838	0.2009	0.2566	**0.6889**
30	0.7186	0.1476	0.4790	0.6428	**0.7473**	0.2053	0.2497	0.7465
35	0.8110	0.1476	0.5425	0.6887	**0.8021**	0.1997	0.2414	0.8011
40	0.8287	0.1476	0.6140	0.7290	**0.8446**	0.2027	0.2412	0.8408

We present the power estimates when the sample size ($n_a = 15$) for the CRD portion was large. Tables 5.28 through 5.30 show the results when the underlying distributions were exponential, normal, and T. The variance in the CRD portion was equal to the variance in the RCBD portion of the mixed design. This scenario shows the same shift for treatment 2 and treatment 3. The shift configurations used is d2=0.5, d3=0.5 for all three underlying distribution reported in the study. We fix the sample size ($n_a = 15$) for the CRD portion while varying the number of blocks for the RCBD portion, Approach II has the highest powers. Also noted, the power estimates for Approach VI are relatively high. Other tables showing similar results with other configurations are in Appendix C.

Table 5.28: Estimated power of tests for mixed under the exponential distribution with equal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Sample size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)									
Blocks			**Approach**						
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.5571	0.6897	0.7342	**0.8783**	0.7342	0.7342	**0.8783**	**0.8783**
20	0.6603	0.6897	0.7497	**0.9140**	0.7656	0.7372	0.9075	0.9079
25	0.7985	0.6897	0.7648	**0.9355**	0.8033	0.7356	0.9174	0.9296
30	0.8312	0.6897	0.7783	**0.9524**	0.8382	0.7369	0.9181	0.9456
35	0.9065	0.6897	0.7903	**0.9654**	0.8695	0.7360	0.9163	0.9629
40	0.9145	0.6897	0.8017	**0.9760**	0.9034	0.7353	0.9168	0.9710

Table 5.29: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=3; treatments effects d2=0.5; d3=0.5

Fixed Sample size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.3380	0.4540	0.4962	**0.6479**	0.4962	0.4962	**0.6479**	**0.6479**
20	0.3969	0.4540	0.5091	**0.6969**	0.5255	0.4973	0.6894	0.6907
25	0.5497	0.4540	0.5235	**0.7417**	0.5649	0.4956	0.7115	0.7300
30	0.5766	0.4540	0.5355	**0.7851**	0.6049	0.4941	0.7201	0.7673
35	0.6802	0.4540	0.5500	**0.8105**	0.6444	0.4951	0.7168	0.7932
40	0.6991	0.4540	0.5645	**0.8389**	0.6966	0.4961	0.7151	0.8215

Table 5.30: Estimated power of tests for mixed under the t distribution with equal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Sample size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.2481	0.3344	0.3672	**0.4942**	0.3672	0.3672	**0.4942**	**0.4942**
20	0.2976	0.3344	0.3787	**0.5371**	0.3892	0.3684	0.5322	0.5324
25	0.4207	0.3344	0.3899	**0.5839**	0.4209	0.3692	0.5510	0.5697
30	0.4318	0.3344	0.3983	**0.6061**	0.4536	0.3690	0.5469	0.6005
35	0.5302	0.3344	0.4111	**0.6526**	0.4877	0.3674	0.5520	0.6363
40	0.5373	0.3344	0.4192	**0.6783**	0.5324	0.3675	0.5535	0.6640

Tables 5.31 through 5.36 present the power estimates when the variance in the CRD portion was larger than the variance in the RCBD portion of the mixed design. Power estimates of the three underlying distributions; the exponential, normal, and T, with the two forms of variability are reported. The same shift configuration for treatment 2 and treatment 3 are considered that is d2=0.5, d3=0.5 for all three underlying distribution reported in the study. The sample size ($n_a = 15$) for the CRD portion is fixed while varying the number of blocks for the RCBD portion. Approach VI has the highest powers. Also noted, the

power estimates for Approach II were relatively high. Regardless of shift configuration, whether the variance in the CRD portion was twice or thrice the variance of the RCBD portion, and the number of blocks for the RCBD portion is greater than or equal to the sample size in the CRD portion, Approach VI had the highest powers. When the sample size was fixed ($n_a = 20$) similar conclusions are drawn. The reader may refer Appendix C for further tables of power results.

When the variance in the CRD portion is equal the variance in the RCBD portion, Approach II had the highest powers (See Tables 5.28 through 5.30) whereas when the variance for the CRD portion was larger than the variance for the RCBD portion, Approach VI has the highest powers (See Tables 5.31 through 5.36).

Table 5.31: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Sample size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)									
Sample Size	**L***	**FW***	**Approach**						
			I	**II**	**III**	**IV**	**V**	**VI**
15	0.5688	0.4979	0.5510	**0.7906**	0.5510	0.5510	**0.7906**	**0.7906**
20	0.5688	0.5996	0.6288	0.8359	0.6242	0.6440	0.8292	**0.8306**
25	0.5688	0.6737	0.6937	0.8726	0.6862	0.7076	0.8466	**0.8615**
30	0.5688	0.7417	0.7560	0.9048	0.7501	0.7724	0.8576	**0.8910**
35	0.5688	0.7991	0.8068	0.9212	0.8013	0.8190	0.8510	**0.9081**
40	0.5688	0.8306	0.8381	0.9338	0.8342	0.8506	0.8483	**0.9205**

Table 5.32: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Sample size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks	**L***	**FW***	**Approach**					
			I	**II**	**III**	**IV**	**V**	**VI**
15	0.5611	0.4073	0.4552	**0.7437**	0.4552	0.4552	**0.7437**	**0.7437**
20	0.6510	0.4073	0.4727	0.7992	0.4951	0.4567	0.7702	**0.8155**
25	0.7919	0.4073	0.4926	0.8444	0.5475	0.4541	0.7784	**0.8662**
30	0.8362	0.4073	0.5115	0.8790	0.6092	0.4605	0.7777	**0.9072**
35	0.9012	0.4073	0.5317	0.9017	0.6713	0.4552	0.7671	**0.9297**
40	0.9247	0.4073	0.5488	0.9312	0.7349	0.4584	0.7640	**0.9585**

Table 5.33: Estimated Power of Tests for Mixed Design under the Normal Distribution with unequal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Sample size $n_a = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.3354	0.1872	0.2183	**0.4361**	0.2183	0.2183	**0.4361**	**0.4361**
20	0.4009	0.1872	0.2285	0.4926	0.2407	0.2187	0.4583	**0.5189**
25	0.5441	0.1872	0.2389	0.5370	0.2733	0.2176	0.4542	**0.5769**
30	0.5845	0.1872	0.2494	0.5867	0.3134	0.2205	0.4513	**0.6474**
35	0.6896	0.1872	0.2635	0.6361	0.3549	0.2185	0.4459	**0.7052**
40	0.6974	0.1872	0.2707	0.6643	0.4103	0.2177	0.4429	**0.7420**

Table 5.34: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Sample size $n_a = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.3342	0.1200	0.1433	**0.3592**	0.1433	0.1433	**0.3592**	**0.3592**
20	0.3972	0.1200	0.1519	0.4085	0.1610	0.1444	0.3646	**0.4450**
25	0.5499	0.1200	0.1588	0.4616	0.1843	0.1426	0.3594	**0.5271**
30	0.5746	0.1200	0.1655	0.5099	0.2195	0.1445	0.3516	**0.5972**
35	0.6736	0.1200	0.1763	0.5466	0.2569	0.1443	0.3414	**0.6481**
40	0.6952	0.1200	0.1890	0.5915	0.3095	0.1438	0.3334	**0.7093**

Table 5.35: Estimated powers of tests for mixed design under the t distribution with Unequal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Sample size $n_a = 15$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.2462	0.2125	0.2380	**0.3825**	0.2380	0.2380	**0.3825**	**0.3825**
20	0.2926	0.2125	0.2456	0.4311	0.2545	0.2370	0.4096	**0.4427**
25	0.4182	0.2125	0.2551	0.4772	0.2789	0.2388	0.4226	**0.4927**
30	0.4372	0.2125	0.2666	0.5113	0.3180	0.2382	0.4193	**0.5396**
35	0.5288	0.2125	0.2761	0.5390	0.3500	0.2400	0.4145	**0.5689**
40	0.5464	0.2125	0.2859	0.5788	0.3928	0.2381	0.4161	**0.6231**

Table 5.36: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Sample size $n_a = 15$; (CRD $(T(3) * \sqrt{3})$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.2493	0.1767	0.1976	**0.3512**	0.1976	0.1976	**0.3512**	**0.3512**
20	0.2995	0.1767	0.2071	0.4010	0.2154	0.1994	0.3735	**0.4197**
25	0.4260	0.1767	0.2147	0.4411	0.2421	0.1977	0.3802	**0.4702**
30	0.4383	0.1767	0.2225	0.4728	0.2719	0.2007	0.3748	**0.5124**
35	0.5279	0.1767	0.2306	0.5042	0.2997	0.2000	0.3656	**0.5529**
40	0.5455	0.1767	0.2407	0.5374	0.3410	0.1996	0.3619	**0.6025**

We present the power estimates when the number of blocks for the RCBD portion is large ($n_b = 20$). Tables 5.37 through 5.39 show the results when the underlying distributions were exponential, normal, and T. The variance in the CRD portion was equal to the variance in the RCBD portion of the mixed design. This scenario shows the same shift for treatment 2 and treatment 3. The shift configuration used is d2=0.5, d3=0.5 for all three underlying distribution reported in the study. We fix the number of blocks ($n_b = 20$) for the RCBD portion and varied the sample size for CRD portion. Approach VI has the highest powers. Also noted, the power estimates for Approach II are relatively high.

Table 5.37: Estimated power of tests for mixed under the exponential distribution with equal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Number of Blocks $n_b = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size	L*	Approach FW*	I	II	III	IV	V	VI
20	0.2196	0.3171	0.3338	**0.4570**	0.3338	0.3338	**0.4570**	**0.4570**
25	0.2196	0.3682	0.3838	0.4882	0.3809	0.3865	0.4743	**0.4910**
30	0.2196	0.4158	0.4281	0.5185	0.4249	0.4344	0.4813	**0.5278**
35	0.2196	0.4602	0.4675	0.5495	0.4633	0.4761	0.4866	**0.5665**
40	0.2196	0.5006	0.5081	0.5785	0.5038	0.5158	0.4921	**0.5951**

Table 5.38: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	Approach FW*	I	II	III	IV	V	VI
20	0.3992	0.5505	0.5774	**0.7535**	0.5774	0.5774	**0.7535**	**0.7535**
25	0.3992	0.6311	0.6539	0.8027	0.6491	0.6598	0.7885	**0.8083**
30	0.3992	0.6969	0.7146	0.8317	0.7107	0.7229	0.7957	**0.8407**
35	0.3992	0.7570	0.7657	0.8629	0.7624	0.7761	0.8033	**0.8735**
40	0.3992	0.8056	0.8143	0.8839	0.8105	0.8221	0.7985	**0.8998**

Table 5.39: Estimated power of tests for mixed under the t distribution with equal variance; k=3; treatments effects: d2=0.5; d3=0.5

Fixed Number of Blocks $n_b = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	Approach FW*	I	II	III	IV	V	VI
20	0.2937	0.4189	0.4400	**0.5966**	0.4400	0.4400	**0.5966**	**0.5966**
25	0.2937	0.4677	0.4885	0.6353	0.4838	0.4938	0.6165	**0.6403**
30	0.2937	0.5636	0.5793	0.6882	0.5750	0.5870	0.6483	**0.7030**
35	0.2937	0.6028	0.6135	0.7134	0.6097	0.6211	0.6422	**0.7336**
40	0.2937	0.6514	0.6613	0.7518	0.6556	0.6711	0.6453	**0.7673**

Tables 5.40 through 5.45 present the power estimates when the variance in the CRD portion was larger than the variance in the RCBD portion of the mixed design. Power estimates of the three underlying distributions; exponential, normal, and T, with the two forms of variability are reported. The same shift configuration for treatment 1 and treatment 2 are considered that is, d2=0, d3=1 when the underlying distribution were normal and T while no pattern configuration d2=0.6, d3=0.1 was examined when the underlying distribution was exponential. The number of blocks ($n_b = 20$) for the RCBD portion is fixed while varying the sample size for the CRD portion. Approach II has the highest powers. Also noted, the power estimates for Approach VI were relatively high. Whether the variance in the CRD portion was twice or thrice the variance of the RCBD portion and the sample size for CRD portion was greater than or equal the number of blocks, Approach II had the highest powers. When the number of blocks, for the RCBD portion was fixed ($n_b = 15$) a similar conclusion is drawn. The reader can refer to Appendix B2 for further tables of power results.

When the variance in the CRD portion is equal the variance in the RCBD portion, Approach VI had the highest powers (See Tables 5.37 through 5.39). When the variance for the CRD portion was larger than the variance for the RCBD portion, Approach II has the highest powers (See Tables 5.40 through 5.45).

Table 5.40: Estimated powers of tests for mixed design under the exponential distribution with unequal variance=3; treatments effects: d2=0.6; d3=0.1

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.3918	0.3822	0.4088	**0.6375**	0.4088	0.4088	**0.6375**	**0.6375**
25	0.3918	0.4369	0.4602	**0.6748**	0.4569	0.4671	0.6697	0.6692
30	0.3918	0.4899	0.5068	**0.7138**	0.5026	0.5166	0.6951	0.7021
35	0.3918	0.5333	0.5462	**0.7356**	0.5402	0.5592	0.6968	0.7191
40	0.3918	0.5785	0.5910	**0.7625**	0.5840	0.6002	0.6984	0.7456

Table 5.41: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=3; treatments effects: d2=0.6; d3=0.1

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.3879	0.3010	0.3256	**0.5685**	0.3256	0.3256	**0.5685**	**0.5685**
25	0.3879	0.3538	0.3729	**0.6153**	0.3690	0.3787	0.6186	0.6053
30	0.3879	0.3920	0.4083	**0.6420**	0.4042	0.4194	0.6340	0.6227
35	0.3879	0.4400	0.4525	**0.6763**	0.4465	0.4634	0.6486	0.6418
40	0.3879	0.4686	0.4795	**0.6931**	0.4733	0.4902	0.6500	0.6542

Table 5.42: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=3; treatments effects: d2=0; d3=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.3497	0.2108	0.2302	**0.4824**	0.2302	0.2302	**0.4824**	**0.4824**
25	0.3497	0.2407	0.2598	**0.5162**	0.2555	0.2642	0.5264	0.4977
30	0.3497	0.2748	0.2940	**0.5498**	0.2893	0.3043	0.5560	0.5103
35	0.3497	0.3146	0.3233	**0.5789**	0.3202	0.3337	0.5763	0.5348
40	0.3497	0.3375	0.3474	**0.5966**	0.3430	0.3597	0.5803	0.5370

Table 5.43: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=3; treatments effects: d2=0; d3=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.3903	0.1465	0.1627	**0.4386**	0.1627	0.1627	**0.4386**	**0.4386**
25	0.3903	0.1642	0.1798	**0.4538**	0.1757	0.1825	0.4747	0.4267
30	0.3903	0.1810	0.1925	**0.4683**	0.1894	0.2001	0.4997	0.4165
35	0.3903	0.1924	0.2016	**0.4870**	0.1976	0.2106	0.5187	0.4109
40	0.3903	0.2102	0.2193	**0.5030**	0.2146	0.2304	0.5307	0.4153

Table 5.44: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=3; treatments effects: d2=0; d3=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.2605	0.2464	0.2655	**0.4463**	0.2655	0.2655	**0.4463**	**0.4463**
25	0.2605	0.2950	0.3142	**0.4970**	0.3102	0.3177	0.4956	0.4899
30	0.2605	0.3347	0.3486	**0.5195**	0.3448	0.3572	0.5045	0.5080
35	0.2605	0.3619	0.3683	**0.5429**	0.3654	0.3795	0.5062	0.5236
40	0.2605	0.4063	0.4159	**0.5694**	0.4104	0.4253	0.5123	0.5588

Table 5.45: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=3; treatments effects: d2=0; d3=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.2600	0.1976	0.2129	**0.4015**	0.2129	0.2129	**0.4015**	**0.4015**
25	0.2600	0.2288	0.2434	**0.4293**	0.2404	0.2470	0.4301	0.4163
30	0.2600	0.2578	0.2703	**0.4511**	0.2670	0.2764	0.4451	0.4297
35	0.2600	0.2919	0.2988	**0.4824**	0.2960	0.3076	0.4626	0.4532
40	0.2600	0.3032	0.3118	**0.4907**	0.3067	0.3212	0.4592	0.4549

5.2. Four Populations

5.2.1. Estimated Alpha Values

Tables 5.46 through 5.48 present the estimated alpha values when the study comprised of four treatments, when the variance in the CRD portion was equal to the variance in the RCBD portion, the number of blocks for the RCBD portion was five ($n_b = 5$) and the sample size for the CRD portion was varied in the mixed design. The alpha values for all test statistics were approximately 0.05 for all three underlying distributions presented. More tables presenting alpha values can be found in the Appendix D.

Table 5.46: Estimated alpha values of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.0553	0.0520	0.0511	0.0510	0.0511	0.0511	0.0510	0.0510
10	0.0553	0.0539	0.0521	0.0514	0.0539	0.0520	0.0503	0.0492
15	0.0553	0.0485	0.0487	0.0455	0.0481	0.0456	0.0514	0.0459
20	0.0553	0.0490	0.0505	0.0497	0.0498	0.0516	0.0533	0.0492
25	0.0553	0.0491	0.0495	0.0497	0.0493	0.0486	0.0511	0.0481
30	0.0553	0.0488	0.0486	0.0488	0.0486	0.0487	0.0502	0.0485
35	0.0553	0.0464	0.0469	0.0476	0.0466	0.0475	0.0506	0.0478
40	0.0553	0.0532	0.0542	0.0514	0.0533	0.0534	0.0523	0.0544

Table 5.47: Estimated alpha values of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.0553	0.0479	0.0480	0.0492	0.0480	0.0480	0.0492	0.0492
10	0.0553	0.0474	0.0465	0.0504	0.0479	0.0468	0.0522	0.0510
15	0.0553	0.0497	0.0491	0.0506	0.0490	0.0492	0.0509	0.0512
20	0.0553	0.0506	0.0509	0.0494	0.0508	0.0520	0.0511	0.0509
25	0.0553	0.0487	0.0494	0.0499	0.0490	0.0496	0.0496	0.0494
30	0.0553	0.0492	0.0494	0.0486	0.0491	0.0491	0.0506	0.0486
35	0.0553	0.0482	0.0482	0.0477	0.0482	0.0466	0.0511	0.0466
40	0.0553	0.0512	0.0510	0.0493	0.0512	0.0515	0.0530	0.0509

Table 5.48: Estimated alpha values of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
			Approach					
Sample Size	L*	FW*	I	II	III	IV	V	VI
5	0.0565	0.0485	0.0482	0.0484	0.0482	0.0482	0.0484	0.0484
10	0.0565	0.0531	0.0508	0.0482	0.0530	0.0494	0.0503	0.0504
15	0.0565	0.0474	0.0463	0.0485	0.0470	0.0469	0.0508	0.0481
20	0.0565	0.0488	0.0492	0.0531	0.0494	0.0498	0.0527	0.0489
25	0.0565	0.0475	0.0482	0.0511	0.0478	0.0487	0.0530	0.0492
30	0.0565	0.0481	0.0483	0.0493	0.0482	0.0490	0.0531	0.0490
35	0.0565	0.0487	0.0491	0.0523	0.0488	0.0485	0.0533	0.0496
40	0.0565	0.0473	0.0475	0.0489	0.0473	0.0472	0.0524	0.0471

Tables 5.49 through 5.56 present the estimated alpha values when the study comprised of four treatments, the variance in the CRD portion was greater than the variance in the RCBD portion, the number of blocks for the RCBD portion was five ($n_b = 5$), and the sample size for the CRD portion was varied in the mixed design. The alpha values for all test statistics were at least 0.05 for all three underlying distributions presented. More tables presenting alpha values can be found in the Appendix D.

Table 5.49: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
			Approach					
Sample Size	L*	FW*	I	II	III	IV	V	VI
5	0.0551	0.0501	0.0496	0.0513	0.0496	0.0496	0.0513	0.0513
10	0.0551	0.0494	0.0492	0.0539	0.0498	0.0499	0.0526	0.0524
15	0.0551	0.0539	0.0525	0.0482	0.0527	0.0515	0.0491	0.0490
20	0.0551	0.0484	0.0490	0.0483	0.0488	0.0471	0.0510	0.0473
25	0.0551	0.0496	0.0503	0.0492	0.0497	0.0518	0.0494	0.0506
30	0.0551	0.0525	0.0526	0.0497	0.0525	0.0520	0.0524	0.0516
35	0.0551	0.0479	0.0483	0.0484	0.0480	0.0479	0.0504	0.0481
40	0.0551	0.0486	0.0485	0.0450	0.0486	0.0489	0.0499	0.0486

Table 5.50: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)									
Sample Size			Approach						
	L*	FW*	I	II	III	IV	V	VI
5	0.0508	0.0508	0.0481	0.0484	0.0481	0.0481	0.0484	0.0484
10	0.0508	0.0497	0.0493	0.0523	0.0505	0.0498	0.0484	0.0515
15	0.0508	0.0533	0.0529	0.0513	0.0524	0.0509	0.0488	0.0515
20	0.0508	0.0496	0.0512	0.0481	0.0505	0.0497	0.0487	0.0490
25	0.0508	0.0535	0.0543	0.0509	0.0539	0.0545	0.0509	0.0539
30	0.0508	0.0485	0.0489	0.0501	0.0485	0.0486	0.0472	0.0484
35	0.0508	0.0486	0.0487	0.0483	0.0486	0.0483	0.0485	0.0488
40	0.0508	0.0490	0.0490	0.0485	0.0491	0.0505	0.0478	0.0511

Table 5.51: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0547	0.0468	0.0463	0.0488	0.0463	0.0463	0.0488	0.0488
10	0.0547	0.0529	0.0513	0.0473	0.0538	0.0507	0.0484	0.0490
15	0.0547	0.0521	0.0517	0.0511	0.0512	0.0508	0.0496	0.0508
20	0.0547	0.0498	0.0502	0.0500	0.0504	0.0503	0.0513	0.0494
25	0.0547	0.0520	0.0523	0.0541	0.0525	0.0522	0.0518	0.0522
30	0.0547	0.0514	0.0511	0.0503	0.0513	0.0506	0.0502	0.0501
35	0.0547	0.0494	0.0500	0.0492	0.0494	0.0501	0.0515	0.0497
40	0.0547	0.0510	0.0513	0.0499	0.0510	0.0501	0.0514	0.0494

Table 5.52: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0551	0.0510	0.0512	0.0510	0.0512	0.0512	0.0510	0.0510
10	0.0551	0.0524	0.0519	0.0498	0.0526	0.0516	0.0508	0.0507
15	0.0551	0.0502	0.0494	0.0497	0.0492	0.0493	0.0509	0.0495
20	0.0551	0.0519	0.0535	0.0504	0.0527	0.0533	0.0504	0.0526
25	0.0551	0.0471	0.0476	0.0482	0.0474	0.0494	0.0504	0.0481
30	0.0551	0.0526	0.0531	0.0528	0.0526	0.0529	0.0485	0.0528
35	0.0551	0.0515	0.0516	0.0480	0.0517	0.0509	0.0520	0.0510
40	0.0551	0.0472	0.0476	0.0526	0.0472	0.0478	0.0519	0.0478

Table 5.53: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
5	0.0523	0.0558	0.0528	0.0474	0.0528	0.0528	0.0474	0.0474
10	0.0523	0.0534	0.0525	0.0509	0.0538	0.0520	0.0509	0.0533
15	0.0523	0.0489	0.0479	0.0478	0.0481	0.0476	0.0472	0.0482
20	0.0523	0.0495	0.0502	0.0473	0.0502	0.0508	0.0492	0.0497
25	0.0523	0.0498	0.0506	0.0495	0.0501	0.0514	0.0489	0.0500
30	0.0523	0.0527	0.0528	0.0512	0.0528	0.0519	0.0482	0.0525
35	0.0523	0.0486	0.0487	0.0487	0.0486	0.0495	0.0509	0.0495
40	0.0523	0.0479	0.0483	0.0476	0.0480	0.0476	0.0483	0.0483

Table 5.54: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
5	0.0551	0.0510	0.0512	0.0510	0.0512	0.0512	0.0510	0.0510
10	0.0551	0.0524	0.0519	0.0498	0.0526	0.0516	0.0508	0.0507
15	0.0551	0.0502	0.0494	0.0497	0.0492	0.0493	0.0509	0.0495
20	0.0551	0.0519	0.0535	0.0504	0.0527	0.0533	0.0504	0.0526
25	0.0551	0.0471	0.0476	0.0482	0.0474	0.0494	0.0504	0.0481
30	0.0551	0.0526	0.0531	0.0528	0.0526	0.0529	0.0485	0.0528
35	0.0551	0.0515	0.0516	0.0480	0.0517	0.0509	0.0520	0.0510
40	0.0551	0.0472	0.0476	0.0526	0.0472	0.0478	0.0519	0.0478

Tables 5.55 through 5.57 present the estimated alpha values when the study comprised four treatments, the variance in the CRD portion was equal to the variance in the RCBD portion, the sample size was five ($n_a = 5$) for the CRD portion, and the number of blocks for the RCBD portion were varied.in the mixed design. The alpha values for all test statistics were at least 0.05 for all three underlying distributions presented. More tables presenting alpha values can be found in the Appendix D.

Table 5.55: Estimated alpha values of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed sample size $n_a = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
5	0.0565	0.0520	0.0511	0.0499	0.0511	0.0511	0.0499	0.0499
10	0.0590	0.0520	0.0486	0.0480	0.0496	0.0509	0.0495	0.0468
15	0.0496	0.0520	0.0483	0.0508	0.0507	0.0547	0.0517	0.0473
20	0.0457	0.0520	0.0480	0.0500	0.0508	0.0546	0.0520	0.0527
25	0.0548	0.0520	0.0557	0.0501	0.0515	0.0533	0.0522	0.0512
30	0.0425	0.0520	0.0542	0.0503	0.0526	0.0543	0.0533	0.0505
35	0.0494	0.0520	0.0552	0.0516	0.0517	0.0519	0.0524	0.0507
40	0.0522	0.0520	0.0559	0.0520	0.0509	0.0543	0.0541	0.0516

Table 5.56: Estimated alpha values of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed sample size $n_a = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.0553	0.0456	0.0443	0.0499	0.0443	0.0443	0.0499	0.0499
10	0.0609	0.0456	0.0455	0.0528	0.0516	0.0464	0.0491	0.0517
15	0.0511	0.0456	0.0442	0.0480	0.0483	0.0493	0.0468	0.0487
20	0.0430	0.0456	0.0445	0.0484	0.0484	0.0489	0.0472	0.0488
25	0.0540	0.0456	0.0503	0.0499	0.0504	0.0457	0.0461	0.0490
30	0.0458	0.0456	0.0529	0.0494	0.0534	0.0463	0.0471	0.0524
35	0.0494	0.0456	0.0541	0.0527	0.0540	0.0482	0.0489	0.0526
40	0.0497	0.0456	0.0490	0.0500	0.0470	0.0460	0.0463	0.0479

Table 5.57: Estimated alpha values of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed sample size $n_a = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.0561	0.0468	0.0462	0.0490	0.0462	0.0462	0.0490	0.0490
10	0.0564	0.0468	0.0457	0.0520	0.0507	0.0468	0.0496	0.0509
15	0.0558	0.0468	0.0472	0.0518	0.0492	0.0510	0.0509	0.0519
20	0.0458	0.0468	0.0475	0.0517	0.0511	0.0492	0.0491	0.0523
25	0.0515	0.0468	0.0491	0.0463	0.0464	0.0491	0.0487	0.0467
30	0.0439	0.0468	0.0536	0.0507	0.0502	0.0483	0.0495	0.0512
35	0.0493	0.0468	0.0533	0.0531	0.0535	0.0473	0.0488	0.0530
40	0.0515	0.0468	0.0482	0.0472	0.0511	0.0472	0.0474	0.0503

Tables 5.58 through 5.63 present the alpha values when the study comprised four treatments, the variance in the CRD portion was greater than the variance in the RCBD portion, the sample size was five ($n_a = 5$), while the number of blocks for the CRD portion were varied.. The alpha values for all test statistics were at least 0.05 for all three underlying distributions presented. More tables presenting alpha values can be found in the Appendix D.

Table 5.58: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 5$; $(\mathbf{CRD}\ exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	201V	VI
5	0.0550	0.0482	0.0495	0.0498	0.0495	0.0495	0.0498	0.0498
10	0.0611	0.0482	0.0472	0.0514	0.0503	0.0482	0.0493	0.0508
15	0.0522	0.0482	0.0476	0.0492	0.0487	0.0516	0.0496	0.0471
20	0.0469	0.0482	0.0463	0.0498	0.0511	0.0495	0.0500	0.0513
25	0.0508	0.0482	0.0555	0.0508	0.0494	0.0516	0.0522	0.0457
30	0.0417	0.0482	0.0511	0.0488	0.0498	0.0493	0.0488	0.0498
35	0.0485	0.0482	0.0522	0.0472	0.0504	0.0494	0.0492	0.0519
40	0.0523	0.0482	0.0536	0.0533	0.0490	0.0494	0.0500	0.0487

Table 5.59: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0565	0.0482	0.0470	0.0487	0.0470	0.0470	0.0487	0.0487
10	0.0572	0.0482	0.0452	0.0463	0.0482	0.0474	0.0467	0.0475
15	0.0539	0.0482	0.0457	0.0481	0.0479	0.0494	0.0489	0.0496
20	0.0465	0.0482	0.0480	0.0513	0.0493	0.0501	0.0501	0.0540
25	0.0512	0.0482	0.0557	0.0495	0.0506	0.0512	0.0517	0.0494
30	0.0402	0.0482	0.0537	0.0494	0.0512	0.0496	0.0511	0.0486
35	0.0483	0.0482	0.0496	0.0473	0.0473	0.0497	0.0502	0.0482
40	0.0512	0.0482	0.0504	0.0498	0.0488	0.0491	0.0506	0.0492

Table 5.60: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0534	0.0473	0.0485	0.0511	0.0485	0.0485	0.0511	0.0511
10	0.0612	0.0473	0.0457	0.0490	0.0493	0.0473	0.0489	0.0490
15	0.0511	0.0473	0.0462	0.0480	0.0474	0.0493	0.0487	0.0472
20	0.0472	0.0473	0.0468	0.0505	0.0522	0.0512	0.0503	0.0541
25	0.0539	0.0473	0.0530	0.0512	0.0516	0.0475	0.0483	0.0515
30	0.0447	0.0473	0.0499	0.0484	0.0518	0.0482	0.0484	0.0513
35	0.0461	0.0473	0.0535	0.0489	0.0482	0.0490	0.0500	0.0478
40	0.0488	0.0473	0.0469	0.0443	0.0461	0.0492	0.0491	0.0466

Table 5.61: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample size $n_a = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0564	0.0473	0.0490	0.0512	0.0490	0.0490	0.0512	0.0512
10	0.0612	0.0473	0.0439	0.0459	0.0476	0.0474	0.0467	0.0479
15	0.0521	0.0473	0.0472	0.0482	0.0482	0.0508	0.0498	0.0486
20	0.0488	0.0473	0.0452	0.0502	0.0496	0.0493	0.0491	0.0520
25	0.0503	0.0473	0.0508	0.0463	0.0486	0.0476	0.0477	0.0465
30	0.0444	0.0473	0.0512	0.0491	0.0529	0.0496	0.0492	0.0514
35	0.0457	0.0473	0.0479	0.0465	0.0468	0.0483	0.0481	0.0482
40	0.0498	0.0473	0.0510	0.0499	0.0475	0.0489	0.0487	0.0486

Table 5.62: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0557	0.0492	0.0483	0.0517	0.0483	0.0483	0.0517	0.0517
10	0.0610	0.0492	0.0490	0.0514	0.0517	0.0497	0.0508	0.0518
15	0.0502	0.0492	0.0457	0.0466	0.0462	0.0518	0.0494	0.0481
20	0.0428	0.0492	0.0456	0.0518	0.0512	0.0499	0.0495	0.0490
25	0.0522	0.0492	0.0540	0.0514	0.0501	0.0506	0.0508	0.0490
30	0.0433	0.0492	0.0552	0.0505	0.0497	0.0525	0.0519	0.0498
35	0.0497	0.0492	0.0555	0.0531	0.0511	0.0509	0.0513	0.0515
40	0.0488	0.0492	0.0484	0.0482	0.0477	0.0501	0.0505	0.0475

Table 5.63: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0564	0.0473	0.0490	0.0512	0.0490	0.0490	0.0512	0.0512
10	0.0612	0.0473	0.0439	0.0459	0.0476	0.0474	0.0467	0.0479
15	0.0521	0.0473	0.0472	0.0482	0.0482	0.0508	0.0498	0.0486
20	0.0488	0.0473	0.0452	0.0502	0.0496	0.0493	0.0491	0.0520
25	0.0503	0.0473	0.0508	0.0463	0.0486	0.0476	0.0477	0.0465
30	0.0444	0.0473	0.0512	0.0491	0.0529	0.0496	0.0492	0.0514
35	0.0457	0.0473	0.0479	0.0465	0.0468	0.0483	0.0481	0.0482
40	0.0498	0.0473	0.0510	0.0499	0.0475	0.0489	0.0487	0.0486

5.2.2. Estimated Power Four Populations

We present the power estimates when there are four treatments in the study, the variance in the CRD portion is equal to the variance in the RCBD portion, and the sample size for the CRD portion is greater than or equal to number of blocks for the RCBD portion. The shift configuration d2=0.5; d3=0.2; d4=0.7 is applied to the location parameters of treatment 2, treatment 3 and treatment 4 respectively, when the underlying distribution is exponential and the shift configuration d2=0.7; d3=0.2; d4=0.6 is applied to the location parameters when the underlying distributions were normal and T. Tables 5.64 through 5.66 show that when the number of blocks $(n_b = 5)$ for the RCBD is equal to the sample size $(n_a = 5)$, Approach II, Approach V and Approach VI have the highest powers. As the sample size for the CRD portion is increased, and the number of blocks for the RCBD portion is fixed $(n_b = 5)$, Approach VI has the highest powers. Approach IV has relatively high powers.

Table 5.64: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.3233	0.3430	0.4149	**0.4947**	0.4149	0.4149	**0.4947**	**0.4947**
10	0.3233	0.5320	0.5570	0.6312	0.5483	0.5786	0.5461	**0.6406**
15	0.3233	0.6809	0.6940	0.7270	0.6840	0.7149	0.5306	**0.7514**
20	0.3233	0.7716	0.7824	0.7893	0.7759	0.8065	0.5133	**0.8240**
25	0.3233	0.8430	0.8473	0.8416	0.8437	0.8612	0.4955	**0.8740**
30	0.3233	0.8929	0.8974	0.8784	0.8936	0.9100	0.4785	**0.9194**
35	0.3233	0.9341	0.9353	0.9073	0.9344	0.9431	0.4713	**0.9475**
40	0.3233	0.9553	0.9564	0.9332	0.9553	0.9624	0.4630	**0.9653**

Table 5.65: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.7; d3=0.2; d4=0.6

Fixed Number of Blocks $n_b = 5$ (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.2188	0.2170	0.2691	**0.3328**	0.2691	0.2691	**0.3328**	**0.3328**
10	0.2188	0.3670	0.3850	0.4435	0.3779	0.4053	0.3811	**0.4545**
15	0.2188	0.4833	0.4939	0.5354	0.4855	0.5167	0.3710	**0.5549**
20	0.2188	0.5831	0.5952	0.6060	0.5879	0.6205	0.3607	**0.6426**
25	0.2188	0.6609	0.6689	0.6602	0.6639	0.6917	0.3455	**0.7114**
30	0.2188	0.7343	0.7386	0.7109	0.7347	0.7561	0.3329	**0.7693**
35	0.2188	0.7932	0.7974	0.7513	0.7940	0.8137	0.3299	**0.8223**
40	0.2188	0.8412	0.8433	0.7946	0.8415	0.8572	0.3278	**0.8627**

Table 5.66: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.7; d3=0.2; d4=0.6

Fixed Number of Blocks $n_b = 5$; (CRD $T(3)$ and CRBD $T(3)$)									
Sample Size	**L***	**FW***	**Approach**						
			I	**II**	**III**	**IV**	**V**	**VI**
5	0.1678	0.1842	0.2146	**0.2551**	0.2146	0.2146	**0.2551**	**0.2551**
10	0.1678	0.2730	0.2882	0.3324	0.2831	0.3029	0.2828	**0.3419**
15	0.1678	0.3724	0.3798	0.4065	0.3728	0.3955	0.2773	**0.4248**
20	0.1678	0.4369	0.4478	0.4566	0.4424	0.4674	0.2642	**0.4822**
25	0.1678	0.5137	0.5195	0.5094	0.5153	0.5386	0.2572	**0.5504**
30	0.1678	0.5750	0.5803	0.5503	0.5757	0.5948	0.2496	**0.6100**
35	0.1678	0.6458	0.6496	0.5968	0.6469	0.6643	0.2496	**0.6726**
40	0.1678	0.6806	0.6841	0.6248	0.6808	0.6979	0.2390	**0.7046**

We consider four treatments in the study, the variance in the CRD portion is greater than the variance in the RCBD portion, and the sample size for the CRD portion is greater than or equal to number of blocks for the RCBD portion. The shift configuration d2=0.5; d3=0.2; d4=0.7 is applied to the location parameters of treatment 2, treatment 3 and treatment 4 respectively, when the underlying distributions were exponential, normal and T. It can be noted, in Tables 5.68 through 5.73 that when the number of blocks for the RCBD portion is five($n_b = 5$) and equal to the sample size for the CRD portion ($n_a = 5$), Approach II, Approach V and Approach VI have the same and highest powers.

When the underlying distribution was exponential and the variance for the CRD portion was twice the variance of RCBD portion it was found that as sample size for the CRD portion increases ($10 \leq n_a \leq 25$) and the number of blocks for the RCBD portion was fixed ($n_b = 5$), Approach II has the highest powers. As the sample size is further increased ($30 \leq n_a \leq 40$), and the number of blocks were fixed ($n_b = 5$), Approach VI has the highest powers (See table 5.67). The relative percentage increase in the power of Approach VI relative to Approach II was 0.67%, 2.42% and 2.27% for sample sizes 30, 35 and 40 respectively. This relative percentage increase is trivial. Table 5.68 shows the power estimates when the underlying distribution was exponential, and the variance in the CRD portion was three times the variance in RCBD portion. Approach II had the highest powers as the sample size for the CRD portion increased and the number of blocks for the RCBD was fixed ($n_b = 5$)

In general Approach II had the highest powers when the variance in the CRD portion is greater than the variance in the RCBD portion and the sample size for the CRD portion was greater than or equal to number of blocks (See Tables 5.67 through 5.72). Approach VI has relatively high powers except in Table 5.67 where Approach IV had relatively high powers and close to Approach VI.

Table 5.67: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 5$; CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$									
Sample Size	**L***	**FW***	**Approach**						
			I	**II**	**III**	**IV**	**V**	**VI**
5	0.3242	0.2479	0.3145	**0.4266**	0.3145	0.3145	**0.4266**	**0.4266**
10	0.3242	0.3760	0.4021	**0.5173**	0.3916	0.4246	0.4741	0.4997
15	0.3242	0.4902	0.5050	**0.6069**	0.4923	0.5301	0.4702	0.5862
20	0.3242	0.5735	0.5883	**0.6669**	0.5785	0.6185	0.4636	0.6518
25	0.3242	0.6501	0.6587	**0.7165**	0.6524	0.6848	0.4514	0.7126
30	0.3242	0.7207	0.7271	0.7600	0.7213	0.7480	0.4482	**0.7651**
35	0.3242	0.7774	0.7816	0.7929	0.7778	0.8010	0.4397	**0.8121**
40	0.3242	0.8146	0.8177	0.8247	0.8152	0.8335	0.4296	**0.8434**

Table 5.68: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size	**L***	**FW***	**Approach**					
			I	**II**	**III**	**IV**	**V**	**VI**
5	0.1391	0.0956	0.1077	**0.1417**	0.1077	0.1077	**0.1417**	**0.1417**
10	0.1391	0.1188	0.1226	**0.1629**	0.1221	0.1290	0.1598	0.1517
15	0.1391	0.1442	0.1472	**0.1822**	0.1443	0.1541	0.1630	0.1727
20	0.1391	0.1678	0.1716	**0.2009**	0.1695	0.1779	0.1589	0.1875
25	0.1391	0.1744	0.1782	**0.2062**	0.1751	0.1880	0.1581	0.1958
30	0.1391	0.1938	0.1962	**0.2227**	0.1941	0.2023	0.1559	0.2121
35	0.1391	0.2091	0.2107	**0.2426**	0.2095	0.2148	0.1525	0.2213
40	0.1391	0.2282	0.2302	**0.2519**	0.2283	0.2404	0.1536	0.2448

Table 5.69: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5**; d3=0**.2**; d4=0**.7

Fixed Number of Blocks $n_b = 5$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)									
Sample Size	**L***	**FW***	**Approach**						
			I	**II**	**III**	**IV**	**V**	**VI**
5	0.1996	0.0842	0.1106	**0.1789**	0.1106	0.1106	**0.1789**	**0.1789**
10	0.1996	0.1103	0.1190	**0.2069**	0.1149	0.1284	0.2172	0.1715
15	0.1996	0.1340	0.1394	**0.2233**	0.1347	0.1497	0.2234	0.1790
20	0.1996	0.1414	0.1461	**0.2397**	0.1433	0.1606	0.2216	0.1829
25	0.1996	0.1621	0.1666	**0.2572**	0.1636	0.1817	0.2213	0.1962
30	0.1996	0.1740	0.1770	**0.2776**	0.1742	0.1916	0.2193	0.2045
35	0.1996	0.1911	0.1948	**0.2892**	0.1916	0.2086	0.2147	0.2218
40	0.1996	0.2126	0.2153	**0.3050**	0.2129	0.2303	0.2110	0.2402

Table 5.70: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2039	0.1097	0.1412	**0.2085**	0.1412	0.1412	**0.2085**	**0.2085**
10	0.2039	0.1501	0.1616	**0.2528**	0.1567	0.1763	0.2528	0.2255
15	0.2039	0.1880	0.1964	**0.2933**	0.1891	0.2149	0.2544	0.2535
20	0.2039	0.2186	0.2278	**0.3179**	0.2227	0.2477	0.2501	0.2722
25	0.2039	0.2427	0.2496	**0.3399**	0.2447	0.2691	0.2434	0.2891
30	0.2039	0.2833	0.2883	**0.3711**	0.2842	0.3060	0.2428	0.3209
35	0.2039	0.3148	0.3192	**0.3933**	0.3154	0.3346	0.2361	0.3467
40	0.2039	0.3381	0.3421	**0.4156**	0.3382	0.3590	0.2319	0.3692

Table 5.71: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1625	0.0916	0.1116	**0.1642**	0.1116	0.1116	**0.1642**	**0.1642**
10	0.1625	0.1142	0.1224	**0.1903**	0.1207	0.1322	0.1901	0.1650
15	0.1625	0.1456	0.1510	**0.2080**	0.1457	0.1604	0.1936	0.1852
20	0.1625	0.1562	0.1628	**0.2284**	0.1590	0.1749	0.1952	0.1914
25	0.1625	0.1714	0.1760	**0.2390**	0.1725	0.1872	0.1861	0.1997
30	0.1625	0.2016	0.2055	**0.2674**	0.2020	0.2153	0.1826	0.2276
35	0.1625	0.2177	0.2215	**0.2814**	0.2184	0.2332	0.1802	0.2441
40	0.1625	0.2369	0.2403	**0.2957**	0.2370	0.2527	0.1742	0.2609

Table 5.72: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1663	0.0890	0.1073	**0.1541**	0.1073	0.1073	**0.1541**	**0.1541**
10	0.1663	0.1051	0.1123	**0.1715**	0.1089	0.1209	0.1803	0.1536
15	0.1663	0.1200	0.1251	**0.1922**	0.1208	0.1340	0.1864	0.1588
20	0.1663	0.1341	0.1411	**0.2057**	0.1371	0.1526	0.1857	0.1682
25	0.1663	0.1426	0.1458	**0.2153**	0.1434	0.1593	0.1801	0.1729
30	0.1663	0.1631	0.1657	**0.2272**	0.1632	0.1765	0.1807	0.1849
35	0.1663	0.1736	0.1758	**0.2426**	0.1740	0.1857	0.1800	0.1952
40	0.1663	0.1884	0.1910	**0.2570**	0.1885	0.2019	0.1735	0.2090

We present the power estimates when we have four treatments in the study, the variance in the CRD portion is equal to the variance in the RCBD portion and the number of blocks for the RCBD portion are greater than or equal to sample size for the CRD portion. The shift configuration d2=0.5; d3=0.2; d4=0.7 is applied to the location parameters when the underlying distribution is exponential and the shift configuration d2=0.7; d3=0.2; d4=0.6 is applied to the location parameters when the underlying distributions are normal and T. Tables 5.73 through 5.75 show that when the sample size for the CRD portion $(n_a = 5)$ is equal to the number of blocks for the RCBD $(n_b = 5)$ Approach II, Approach V and Approach VI have the highest powers.

When the number of blocks for the RCBD portion, was lesser than or equal 15 Approach II had the higher powers relative to Approach VI however, when the number blocks increases to greater than or equal to 20, Approach VI has higher power compared to Approach II. This is similar to what was noted when powers were examined for three treatments (K=3) in the study. Generally for all three underlying distributions reported in this study, while the number of blocks for the RCBD portion were greater than 10 and the sample size for the CRD portion was fixed $(n_a = 5)$, Approach III has the highest powers. Approach VI has relatively high powers.

Table 5.73: Estimated power of tests for mixed under the exponential distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample size $n_a = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
5	0.3173	0.3477	0.4218	**0.4937**	0.4218	0.4218	**0.4937**	**0.4937**
10	0.5076	0.3477	0.4900	**0.6234**	0.5858	0.4265	0.5591	0.6175
15	0.6034	0.3477	0.5581	0.7004	**0.7076**	0.4400	0.5494	0.6946
20	0.6790	0.3477	0.6195	0.7658	**0.7947**	0.4396	0.5292	0.7694
25	0.7973	0.3477	0.7010	0.8194	**0.8517**	0.4386	0.5191	0.8323
30	0.8185	0.3477	0.7497	0.8511	**0.8844**	0.4372	0.5055	0.8677
35	0.8805	0.3477	0.7950	0.8763	**0.9140**	0.4377	0.4974	0.9050
40	0.9237	0.3477	0.8322	0.9080	**0.9431**	0.4380	0.4861	0.9388

Table 5.74: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.7; d3=0.2; d4=0.6

Fixed Sample size $n_a = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2188	0.2249	0.2753	**0.3448**	0.2753	0.2753	**0.3448**	**0.3448**
10	0.3561	0.2249	0.3302	**0.4341**	0.4090	0.2826	0.3852	0.4254
15	0.4264	0.2249	0.3855	0.5171	**0.5229**	0.2922	0.3823	0.5070
20	0.4834	0.2249	0.4419	0.5865	**0.6078**	0.2931	0.3666	0.5822
25	0.6049	0.2249	0.5196	0.6342	**0.6701**	0.2935	0.3551	0.6462
30	0.6270	0.2249	0.5707	0.6751	**0.7210**	0.2898	0.3473	0.6985
35	0.7077	0.2249	0.6152	0.7212	**0.7651**	0.2909	0.3424	0.7514
40	0.7635	0.2249	0.6531	0.7503	**0.8000**	0.2868	0.3255	0.7864

Table 5.75: Estimated power of tests for mixed under the t distribution with equal variance; k=4; treatments effects: d2=0.7; d3=0.2; d4=0.6

Fixed Sample size $n_a = 5$; (CRD $T(3)$ and CRBD $T(3)$)									
Blocks			**Approach**						
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.1692	0.1587	0.1976	**0.2480**	0.1976	0.1976	**0.2480**	**0.2480**
10	0.2661	0.1587	0.2342	**0.3294**	0.3034	0.1982	0.2821	0.3210
15	0.3258	0.1587	0.2815	0.3893	**0.3945**	0.2110	0.2780	0.3832
20	0.3646	0.1587	0.3255	0.4483	**0.4684**	0.2108	0.2656	0.4464
25	0.4552	0.1587	0.3903	0.4906	**0.5164**	0.2077	0.2517	0.4920
30	0.4748	0.1587	0.4362	0.5374	**0.5728**	0.2042	0.2473	0.5469
35	0.5496	0.1587	0.4816	0.5731	**0.6124**	0.2059	0.2453	0.5954
40	0.6066	0.1587	0.5111	0.6023	**0.6432**	0.2056	0.2368	0.6315

We present the power estimates when we have four treatments in the study, the variance in the CRD portion is greater than the variance in the RCBD portion and the number of blocks for the RCBD portion was greater than or equal to sample size for the CRD portion. The shift configuration d2=0.5; d3=0.2; d4=0.7 was applied to the location parameters of treatment 2, treatment 3, and treatment 4 respectively, when the underlying distributions were exponential, normal and T. Tables 5.76 through 5.81 show that when the sample size for the CRD portion is five ($n_a = 5$) and equal to the number of blocks for the RCBD portion ($n_b = 5$), Approach II, Approach V and Approach VI have the highest powers.

When the underlying distribution was exponential and the variance for the CRD portion was twice the variance of RCBD portion, it was found that when the number of blocks for the RCBD portion was $n_b \leq 15$, and the sample size for the CRD portion was fixed ($n_a = 5$), Approach VI has the highest powers. As the number of blocks for the RCBD portion increased ($20 \leq n_a \leq 40$) and the sample size for the CRD portion was fixed($n_a = 5$), Approach III had the highest powers (See Table 5.76). This relative percentage difference between Approach III and Approach VI is negligible. Table 5.77 shows the power estimates when the underlying distribution was exponential, and the variance in the CRD portion was three times the variance for the RCBD portion. Approach VI has the highest powers as the number of blocks for the RCBD portion increased ($n_b \leq 30$) and the sample size for the CRD portion was fixed ($n_a = 5$).

Overall the power estimates for Approach VI and Approach III are very close when the variance in the CRD portion is greater than the variance in the RCBD portion and the number of blocks for the RCBD portion is greater than or equal to the sample size for the CRD portion (See Tables 5.76 through 5.81).

Approach VI has the highest powers for small number of blocks while Approach III has the highest powers when the mixed design had more blocks for the RCBD portion and a smaller sample size for the CRD portion.

Table 5.76: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 5$; $(\mathbf{CRD}\ exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.3243	0.2485	0.3173	**0.4230**	0.3173	0.3173	**0.4230**	**0.4230**
10	0.5048	0.2485	0.3866	0.5415	0.4896	0.3219	0.4552	**0.5568**
15	0.6132	0.2485	0.4629	0.6435	0.6558	0.3368	0.4516	**0.6754**
20	0.6835	0.2485	0.5264	0.7044	**0.7577**	0.3344	0.4297	0.7548
25	0.7829	0.2485	0.6146	0.7570	**0.8211**	0.3326	0.4099	0.8098
30	0.8234	0.2485	0.6730	0.8051	**0.8730**	0.3326	0.4019	0.8636
35	0.8785	0.2485	0.7277	0.8421	**0.9045**	0.3314	0.3969	0.8990
40	0.9186	0.2485	0.7619	0.8668	**0.9317**	0.3321	0.3800	0.9283

Table 5.77: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1461	0.0976	0.1134	**0.1466**	0.1134	0.1134	**0.1466**	**0.1466**
10	0.1981	0.0976	0.1282	0.1800	0.1625	0.1140	0.1504	**0.1911**
15	0.2078	0.0976	0.1461	0.1992	0.2035	0.1195	0.1467	**0.2153**
20	0.2322	0.0976	0.1618	0.2257	0.2490	0.1188	0.1418	**0.2573**
25	0.3000	0.0976	0.2013	0.2585	**0.3014**	0.1202	0.1344	0.3009
30	0.2882	0.0976	0.2162	0.2718	**0.3256**	0.1168	0.1350	0.3192
35	0.3335	0.0976	0.2374	0.2955	**0.3536**	0.1172	0.1304	0.3520
40	0.3727	0.0976	0.2528	0.3091	**0.3785**	0.1182	0.1301	0.3745

Table 5.78: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; **d3=0**.2; **d4=0**.7

Fixed Sample Size $n_a = 5$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2031	0.0865	0.1131	0.1842	0.1131	0.1131	0.1842	**0.1842**
10	0.3201	0.0865	0.1454	0.2553	0.2135	0.1162	0.1911	**0.2939**
15	0.3883	0.0865	0.1792	0.3084	0.3213	0.1233	0.1748	**0.3880**
20	0.4420	0.0865	0.2154	0.3684	**0.4358**	0.1205	0.1620	0.4747
25	0.5581	0.0865	0.2782	0.4192	**0.5358**	0.1203	0.1549	0.5545
30	0.5765	0.0865	0.3195	0.4666	**0.6104**	0.1181	0.1493	0.6153
35	0.6479	0.0865	0.3567	0.4970	**0.6577**	0.1198	0.1476	0.6621
40	0.7166	0.0865	0.4032	0.5400	**0.7145**	0.1191	0.1413	0.7189

Table 5.79: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample size $n_a = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
5	0.1969	0.1052	0.1403	0.2076	0.1403	0.1403	0.2076	**0.2076**
10	0.3208	0.1052	0.1730	0.2842	0.2408	0.1400	0.2170	**0.3165**
15	0.3980	0.1052	0.2093	0.3454	0.3605	0.1482	0.2060	**0.4118**
20	0.4312	0.1052	0.2444	0.3982	**0.4600**	0.1473	0.1947	0.4785
25	0.5493	0.1052	0.3170	0.4518	**0.5448**	0.1463	0.1857	0.5512
30	0.5692	0.1052	0.3612	0.4968	**0.6197**	0.1467	0.1812	0.6169
35	0.6585	0.1052	0.4116	0.5422	**0.6765**	0.1451	0.1800	0.6757
40	0.7223	0.1052	0.4525	0.5819	**0.7268**	0.1459	0.1715	0.7259

Table 5.80: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 5$ (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1582	0.1242	0.1510	0.1953	0.1510	0.1510	0.1953	**0.1953**
10	0.2491	0.1242	0.1803	0.2552	0.2317	0.1547	0.2142	**0.2636**
15	0.2927	0.1242	0.2075	0.3062	0.3148	0.1648	0.2077	**0.3233**
20	0.3257	0.1242	0.2376	0.3438	**0.3793**	0.1609	0.2012	0.3776
25	0.4243	0.1242	0.2972	0.3865	**0.4426**	0.1600	0.1951	0.4349
30	0.4272	0.1242	0.3300	0.4211	**0.4926**	0.1601	0.1910	0.4834
35	0.5026	0.1242	0.3664	0.4628	**0.5389**	0.1583	0.1864	0.5279
40	0.5637	0.1242	0.4001	0.4909	**0.5780**	0.1622	0.1798	0.5742

Table 5.81: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 5$ (CRD $(T(3) * \sqrt{3})$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1582	0.1242	0.1510	0.1953	0.1510	0.1510	0.1953	**0.1953**
10	0.2491	0.1242	0.1803	0.2552	0.2317	0.1547	0.2142	**0.2636**
15	0.2927	0.1242	0.2075	0.3062	0.3148	0.1648	0.2077	**0.3233**
20	0.3257	0.1242	0.2376	0.3438	**0.3793**	0.1609	0.2012	0.3776
25	0.4243	0.1242	0.2972	0.3865	**0.4426**	0.1600	0.1951	0.4349
30	0.4272	0.1242	0.3300	0.4211	**0.4926**	0.1601	0.1910	0.4834
35	0.5026	0.1242	0.3664	0.4628	**0.5389**	0.1583	0.1864	0.5279
40	0.5637	0.1242	0.4001	0.4909	**0.5780**	0.1622	0.1798	0.5742

We present the power estimates when there are four treatments in the study, the variance in the CRD portion is equal to the variance in the RCBD portion and the sample size for the CRD portion is greater than or equal to number of blocks for the RCBD portion. The shift configuration d2=0; d3=0; d4=0.45 is applied to the location parameters of treatment 2, treatment 3 and treatment 4 respectively when the underlying distribution is exponential and the shift configuration d2=0; d3=0; d4=2.0 is applied to the location parameters when the underlying distributions were normal and T.

Tables 5.82 through 5.84 show that when the number of blocks for the RCBD portion ($n_b = 10$) were equal to the sample size for the CRD portion ($n_a = 10$), Approach II, Approach V and Approach VI had the highest powers. As the sample size for the CRD portion increased and the number of blocks for the RCBD portion is fixed ($n_b = 10$), Approach VI had the highest powers. Approach IV has relatively high powers.

Table 5.82: Estimated alpha values of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed number of Blocks $n_b = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.1487	0.1452	0.1602	**0.1895**	0.1602	0.1602	**0.1895**	**0.1895**
15	0.1487	0.1793	0.1841	0.2201	0.1833	0.1892	0.2076	**0.2214**
20	0.1487	0.2033	0.2090	0.2388	0.2066	0.2174	0.2073	**0.2440**
25	0.1487	0.2360	0.2405	0.2662	0.2391	0.2473	0.2062	**0.2768**
30	0.1487	0.2615	0.2644	0.2766	0.2626	0.2710	0.2010	**0.2973**
35	0.1487	0.2925	0.2953	0.3065	0.2931	0.3025	0.1981	**0.3220**
40	0.1487	0.3132	0.3148	0.3193	0.3141	0.3229	0.1977	**0.3454**

Table 5.83: Estimated alpha values of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed number of Blocks $n_b = 10$; (CRD $N(0, 1)$ and RCBD $N(0, 1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.3341	0.3555	0.4123	**0.5533**	0.4123	0.4123	**0.5533**	**0.5533**
15	0.3341	0.4965	0.5238	0.6717	0.5178	0.5453	0.6254	**0.6777**
20	0.3341	0.6189	0.6421	0.7438	0.6319	0.6614	0.6285	**0.7576**
25	0.3341	0.7101	0.7239	0.7949	0.7164	0.7461	0.6142	**0.8202**
30	0.3341	0.7820	0.7919	0.8378	0.7850	0.8084	0.6027	**0.8652**
35	0.3341	0.8502	0.8556	0.8743	0.8515	0.8681	0.5912	**0.9060**
40	0.3341	0.8955	0.8993	0.9025	0.8965	0.9092	0.5817	**0.9330**

Table 5.84: Estimated alpha values of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed number of Blocks $n_b = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.2720	0.2750	0.3217	**0.4359**	0.3217	0.3217	**0.4359**	**0.4359**
15	0.2720	0.3774	0.3974	0.5133	0.3930	0.4150	0.4758	**0.5241**
20	0.2720	0.4654	0.4847	0.5788	0.4768	0.5027	0.4851	**0.5996**
25	0.2720	0.5574	0.5687	0.6499	0.5636	0.5862	0.4836	**0.6681**
30	0.2720	0.6328	0.6428	0.6926	0.6363	0.6597	0.4669	**0.7202**
35	0.2720	0.6986	0.7064	0.7379	0.7007	0.7213	0.4518	**0.7709**
40	0.2720	0.7620	0.7676	0.7761	0.7634	0.7804	0.4449	**0.8210**

We present the power estimates when there are four treatments in the study, the variance in the CRD portion is greater than the variance in the RCBD portion and the sample size for the CRD portion is greater than or equal to number of blocks for the RCBD portion. The shift configuration d2=0; d3=0; d4=0.45 is applied to the location parameters of treatment 2, treatment 3 and treatment 4 respectively when the underlying distribution was exponential and the shift configuration d2=0; d3=0; d4=2.0 was applied to the location parameters when the underlying distributions were normal and T.

Tables 5.85 through 5.90 show that when the number of blocks for the RCBD portion ($n_b = 10$) is equal to the sample size for the CRD portion ($n_a = 10$), Approach II, Approach V and Approach VI have the highest powers. As the sample size for the CRD portion increased and the number of blocks for the RCBD portion was fixed ($n_b = 10$), Approach II had the highest powers when the underlying distributions were exponential and normal. When the underlying distribution was T, Approach V had the highest powers. Approach VI had relatively high power for the exponential and normal distribution while Approach II had relatively high powers for the t distribution.

Table 5.85: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.1470	0.1215	0.1340	**0.1656**	0.1340	0.1340	**0.1656**	**0.1656**
15	0.1470	0.1331	0.1359	**0.1776**	0.1360	0.1414	0.1726	0.1747
20	0.1470	0.1542	0.1587	**0.2044**	0.1567	0.1631	0.1828	0.1986
25	0.1470	0.1756	0.1789	**0.2143**	0.1776	0.1844	0.1787	0.2133
30	0.1470	0.1962	0.1988	**0.2267**	0.1970	0.2060	0.1797	0.2302
35	0.1470	0.2120	0.2150	**0.2404**	0.2126	0.2222	0.1746	0.2432
40	0.1470	0.2187	0.2209	**0.2503**	0.2196	0.2259	0.1721	0.2458

Table 5.86: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.1496	0.1155	0.1315	**0.1655**	0.1315	0.1315	**0.1655**	**0.1655**
15	0.1496	0.1315	0.1341	**0.1859**	0.1335	0.1392	0.1819	0.1784
20	0.1496	0.1533	0.1585	**0.2029**	0.1567	0.1658	0.1820	0.1975
25	0.1496	0.1735	0.1776	**0.2135**	0.1762	0.1841	0.1820	0.2099
30	0.1496	0.1861	0.1886	**0.2261**	0.1869	0.1953	0.1790	0.2197
35	0.1496	0.2058	0.2085	**0.2411**	0.2073	0.2148	0.1765	0.2389
40	0.1496	0.2166	0.2187	**0.2552**	0.2174	0.2251	0.1774	0.2481

Table 5.87: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.3318	0.1953	0.2375	**0.3976**	0.2375	0.2375	**0.3976**	**0.3976**
15	0.3318	0.2521	0.2703	**0.4567**	0.2659	0.2873	0.4552	0.4314
20	0.3318	0.3019	0.3195	**0.5085**	0.3125	0.3368	0.4718	0.4674
25	0.3318	0.3587	0.3724	**0.5503**	0.3655	0.3908	0.4710	0.4985
30	0.3318	0.4113	0.4237	**0.5974**	0.4154	0.4450	0.4734	0.5420
35	0.3318	0.4576	0.4645	**0.6242**	0.4603	0.4863	0.4619	0.5680
40	0.3318	0.5003	0.5071	**0.6551**	0.5021	0.5283	0.4577	0.6030

Table 5.88: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.3351	0.1301	0.1620	**0.3195**	0.1620	0.1620	**0.3195**	**0.3195**
15	0.3351	0.1694	0.1843	**0.3658**	0.1809	0.1961	0.3818	0.3339
20	0.3351	0.1952	0.2113	**0.3995**	0.2052	0.2238	0.4037	0.3448
25	0.3351	0.2258	0.2364	**0.4333**	0.2312	0.2537	0.4105	0.3587
30	0.3351	0.2436	0.2520	**0.4498**	0.2469	0.2696	0.4052	0.3632
35	0.3351	0.2776	0.2849	**0.4807**	0.2800	0.3032	0.4084	0.3788
40	0.3351	0.3018	0.3082	**0.5066**	0.3030	0.3278	0.4010	0.4051

Table 5. 89: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.2716	0.0510	0.0645	**0.1631**	0.0645	0.0645	**0.1631**	**0.1631**
15	0.2716	0.0489	0.0542	0.1639	0.0530	0.0593	**0.1958**	0.1328
20	0.2716	0.0492	0.0530	0.1571	0.0510	0.0571	**0.2049**	0.1085
25	0.2716	0.0519	0.0546	0.1625	0.0532	0.0591	**0.2185**	0.0970
30	0.2716	0.0471	0.0502	0.1627	0.0479	0.0551	**0.2212**	0.0894
35	0.2716	0.0487	0.0508	0.1579	0.0493	0.0558	**0.2268**	0.0806
40	0.2716	0.0498	0.0518	0.1631	0.0504	0.0558	**0.2330**	0.0786

Table 5.90: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.2

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.2748	0.0509	0.0654	**0.1593**	0.0654	0.0654	**0.1593**	**0.1593**
15	0.2748	0.0531	0.0588	0.1570	0.0579	0.0626	**0.1860**	0.1283
20	0.2748	0.0514	0.0560	0.1615	0.0538	0.0611	**0.2081**	0.1131
25	0.2748	0.0533	0.0559	0.1637	0.0544	0.0610	**0.2218**	0.1002
30	0.2748	0.0516	0.0537	0.1590	0.0523	0.0573	**0.2271**	0.0875
35	0.2748	0.0483	0.0501	0.1580	0.0488	0.0549	**0.2280**	0.0825
40	0.2748	0.0521	0.0539	0.1672	0.0527	0.0584	**0.2347**	0.0864

We present the power estimates when there are four treatments in the study, the variance in the CRD portion is equal to the variance in the RCBD portion and the number of blocks for the RCBD portion is greater than or equal to the sample size for the CRD portion. The shift configuration d2=0; d3=0; d4=0.45 was applied to the location parameters of treatment 2, treatment 3 and treatment 4 respectively when the underlying distribution was exponential and the shift configuration d2=0; d3=0; d4=2.0 was applied to the location parameters when the underlying distributions were normal and T. It can be noted, in Tables 5.91 through 5.93 that when the sample size ($n_a = 10$) for the CRD portion is equal to the number of blocks for the RCBD portion ($n_b = 10$) , Approach II, Approach V and Approach VI have the highest powers. As the number of blocks for the RCBD portion increased and the sample size for the CRD portion was fixed ($n_a = 10$), Approach II had the highest powers. Approach VI has relatively high powers and the relative difference between the powers of Approach II and Approach VI was very small.

Table 5.91: Estimated alpha values of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Sample Size $n_a = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach I	II	III	IV	V	VI
10	0.1490	0.1460	0.1602	**0.1830**	0.1602	0.1602	**0.1830**	**0.1830**
15	0.1664	0.1460	0.1634	**0.2097**	0.1715	0.1557	0.2012	0.2066
20	0.1593	0.1460	0.1655	**0.2282**	0.1869	0.1578	0.2061	0.2258
25	0.2078	0.1460	0.1792	**0.2493**	0.2110	0.1578	0.2077	0.2441
30	0.2042	0.1460	0.1864	**0.2692**	0.2412	0.1583	0.2059	0.2675
35	0.2423	0.1460	0.1869	0.2839	0.2615	0.1581	0.2065	**0.2895**
40	0.2756	0.1460	0.2000	0.2982	0.2885	0.1578	0.2019	**0.3024**

Table 5.92: Estimated alpha values of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0.2

Fixed Sample Size $n_a = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
10	0.3341	0.3494	0.4137	**0.5665**	0.4137	0.4137	**0.5665**	**0.5665**
15	0.4240	0.3494	0.4322	**0.6489**	0.4741	0.4042	0.6214	0.6365
20	0.5047	0.3494	0.4578	**0.7227**	0.5510	0.4069	0.6364	0.7140
25	0.6253	0.3494	0.5020	**0.7686**	0.6458	0.4068	0.6323	0.7589
30	0.6608	0.3494	0.5241	**0.8120**	0.7343	0.4056	0.6229	0.8080
35	0.7514	0.3494	0.5470	**0.8500**	0.8110	0.4079	0.6154	0.8478
40	0.8156	0.3494	0.5814	**0.8775**	0.8627	0.4081	0.5988	**0.8776**

Table 5.93: Estimated alpha values of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0.2

Fixed Sample Size $n_a = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2735	0.2875	0.3299	**0.4406**	0.3299	0.3299	**0.4406**	**0.4406**
15	0.3337	0.2875	0.3468	**0.5139**	0.3750	0.3250	0.4900	0.5005
20	0.3834	0.2875	0.3649	**0.5794**	0.4354	0.3293	0.5026	0.5644
25	0.4995	0.2875	0.3944	**0.6203**	0.5062	0.3289	0.4932	0.6119
30	0.5223	0.2875	0.4103	**0.6700**	0.5956	0.3270	0.4914	0.6686
35	0.6063	0.2875	0.4281	**0.7103**	0.6642	0.3272	0.4823	0.7065
40	0.6764	0.2875	0.4603	**0.7423**	0.7252	0.3277	0.4753	**0.7487**

We present the power estimates when there are four treatments in the study, the variance in the CRD portion is greater than the variance in the RCBD portion and the number of blocks for the RCBD portion is greater than or equal to the sample size for the CRD portion. The shift configuration d2=0; d3=0; d4=0.45 was applied to the location parameters of treatment 2, treatment 3 and treatment 4 respectively when the underlying distribution was exponential and the shift configuration d2=0; d3=0; d4=2.0 was applied to the location parameters when the underlying distributions were normal and T. It can be noted, in Tables 5.94 through 5.99 that when the sample size for the CRD portion is $(n_a = 10)$ is equal to the number of blocks for the RCBD portion$(n_b = 10)$ Approach II, Approach V and Approach VI have the highest powers. As the number of blocks for the RCBD portion increased and the sample size for the CRD was fixed $(n_a = 10)$, Approach VI had the highest powers. Approach II has relatively high powers.

Table 5.94: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.2

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.1500	0.1209	0.1332	**0.1681**	0.1332	0.1332	**0.1681**	**0.1681**
15	0.1592	0.1209	0.1351	0.1856	0.1439	0.1304	0.1745	**0.1884**
20	0.1680	0.1209	0.1390	0.2125	0.1571	0.1311	0.1809	**0.2177**
25	0.2103	0.1209	0.1526	0.2201	0.1821	0.1319	0.1784	**0.2280**
30	0.2015	0.1209	0.1521	0.2392	0.2101	0.1305	0.1736	**0.2505**
35	0.2426	0.1209	0.1579	0.2580	0.2373	0.1316	0.1742	**0.2764**
40	0.2732	0.1209	0.1642	0.2714	0.2606	0.1333	0.1667	**0.2958**

Table 5.95: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.2

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2135	0.1324	0.1517	**0.2245**	0.1517	0.1517	**0.2245**	**0.2245**
15	0.2495	0.1324	0.1597	0.2661	0.1739	0.1502	0.2410	**0.2771**
20	0.2656	0.1324	0.1666	0.2922	0.1973	0.1502	0.2363	**0.3189**
25	0.3344	0.1324	0.1830	0.3175	0.2401	0.1504	0.2341	**0.3519**
30	0.3337	0.1324	0.1835	0.3500	0.2870	0.1480	0.2261	**0.3931**
35	0.3877	0.1324	0.1947	0.3749	0.3333	0.1495	0.2230	**0.4220**
40	0.4383	0.1324	0.2091	0.4014	0.3855	0.1506	0.2156	**0.4629**

Table 5.96: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.2

Fixed Sample Size $n_a = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.3413	0.1952	0.2420	**0.4038**	0.2420	0.2420	**0.4038**	**0.4038**
15	0.4323	0.1952	0.2582	0.4862	0.2881	0.2340	0.4360	**0.5178**
20	0.4926	0.1952	0.2724	0.5559	0.3465	0.2358	0.4338	**0.6067**
25	0.6304	0.1952	0.3047	0.6254	0.4447	0.2376	0.4281	**0.6877**
30	0.6715	0.1952	0.3266	0.6772	0.5495	0.2363	0.4159	**0.7592**
35	0.7535	0.1952	0.3423	0.7184	0.6401	0.2354	0.4041	**0.8080**
40	0.8236	0.1952	0.3736	0.7595	0.7323	0.2382	0.3902	**0.8480**

Table 5.97: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.3291	0.1298	0.1619	**0.3246**	0.1619	0.1619	**0.3246**	**0.3246**
15	0.4349	0.1298	0.1760	0.4128	0.2024	0.1595	0.3494	**0.4563**
20	0.4939	0.1298	0.1911	0.4864	0.2634	0.1582	0.3490	**0.5626**
25	0.6292	0.1298	0.2171	0.5358	0.3486	0.1600	0.3333	**0.6426**
30	0.6684	0.1298	0.2374	0.5999	0.4580	0.1578	0.3207	**0.7223**
35	0.7488	0.1298	0.2524	0.6480	0.5546	0.1594	0.3064	**0.7820**
40	0.8209	0.1298	0.2797	0.6872	0.6543	0.1607	0.2966	**0.8340**

Table 5.98: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2653	0.1882	0.2182	**0.3245**	0.2182	0.2182	**0.3245**	**0.3245**
15	0.3254	0.1882	0.2322	0.3902	0.2542	0.2162	0.3552	**0.4017**
20	0.3598	0.1882	0.2443	0.4340	0.2965	0.2175	0.3534	**0.4584**
25	0.4594	0.1882	0.2670	0.4721	0.3603	0.2185	0.3490	**0.5085**
30	0.4774	0.1882	0.2806	0.5200	0.4359	0.2167	0.3424	**0.5646**
35	0.5460	0.1882	0.2935	0.5610	0.5037	0.2169	0.3367	**0.6099**
40	0.6134	0.1882	0.3180	0.5976	0.5733	0.2169	0.3297	**0.6549**

Table 5.99: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.2

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2700	0.1725	0.2092	**0.3276**	0.2092	0.2092	**0.3276**	**0.3276**
15	0.3389	0.1725	0.2207	0.4037	0.2482	0.2041	0.3610	**0.4190**
20	0.3829	0.1725	0.2373	0.4590	0.3020	0.2062	0.3668	**0.4887**
25	0.4979	0.1725	0.2619	0.5151	0.3747	0.2083	0.3606	**0.5575**
30	0.5096	0.1725	0.2754	0.5626	0.4607	0.2044	0.3492	**0.6108**
35	0.6178	0.1725	0.2930	0.6093	0.5410	0.2069	0.3482	**0.6775**
40	0.6764	0.1725	0.3200	0.6367	0.6130	0.2080	0.3339	**0.7136**

We present the power estimates when there are four treatments in the study, the variance in the CRD portion is equal to the variance in the RCBD portion and the sample size for the CRD portion is greater than or equal to the number of blocks for the RCBD portion. The shift configuration d2=0.1; d3=0.2; d4=0.2 is applied to the location parameters of treatment 2, treatment 3 and treatment 4 respectively when the underlying distribution was exponential and the shift configuration d2=1.0; d3=0.5;

d4=0.5 was applied to the location parameters when the underlying distributions were normal and T. Tables 5.100 through 5.102, show that when the sample size for the CRD portion ($n_a = 20$) is equal to the number of blocks for the RCBD portion($n_b = 20$) , Approach II, Approach V and Approach VI have the highest powers. As the sample size for the CRD portion increased and the number of blocks for the RCBD was fixed ($n_b = 20$), Approach VI had the highest powers. Approach II had relatively high powers.

Table 5.100: Estimated alpha values of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed number of Blocks $n_a = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.2225	0.2764	0.2931	**0.3953**	0.2931	0.2931	**0.3953**	**0.3953**
25	0.2225	0.3145	0.3247	0.4269	0.3227	0.3281	0.4189	**0.4305**
30	0.2225	0.3623	0.3738	0.4625	0.3700	0.3791	0.4305	**0.4714**
35	0.2225	0.3954	0.4023	0.4876	0.3998	0.4079	0.4337	**0.4945**
40	0.2225	0.4253	0.4317	0.5053	0.4286	0.4377	0.4292	**0.5156**

Table 5.101: Estimated alpha values of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=1; d3=0.5; d4=0.5

Fixed number of Blocks $n_a = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.7034	0.7996	0.8302	**0.9548**	0.8302	0.8302	**0.9548**	**0.9548**
25	0.7034	0.8674	0.8865	0.9706	0.8831	0.8915	0.9657	**0.9724**
30	0.7034	0.9178	0.9275	0.9828	0.9243	0.9328	0.9723	**0.9847**
35	0.7034	0.9476	0.9526	0.9860	0.9510	0.9555	0.9713	**0.9885**
40	0.7034	0.9707	0.9739	0.9916	0.9725	0.9759	0.9712	**0.9944**

Table 5.102: Estimated alpha values of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.1; d3=0.5; d4=0.5

Fixed number of Blocks $n_a = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.5345	0.6323	0.6717	**0.8506**	0.6717	0.6717	**0.8506**	**0.8506**
25	0.5345	0.7191	0.7435	0.8891	0.7391	0.7476	0.8765	**0.8899**
30	0.5345	0.7857	0.8033	0.9076	0.7986	0.8108	0.8818	**0.9131**
35	0.5345	0.8412	0.8507	0.9357	0.8464	0.8582	0.8896	**0.9403**
40	0.5345	0.8787	0.8851	0.9496	0.8823	0.8904	0.8897	**0.9538**

We present the power estimates when there are four treatments in the study, the variance in the CRD portion is greater than the variance in the RCBD portion and the sample size for the CRD portion is greater than or equal to the number of blocks in the RCBD portion. The shift configuration d2=0.1; d3=0.2; d4=0.2 is applied to the location parameters of treatment 2, treatment 3 and treatment 4 respectively, when the underlying distribution was exponential and the shift configuration d2=1.0; d3=0.5; d4=0.5 was applied to the location parameters when the underlying distributions were normal and T. Tables 5.103 through 5.108, show that when the sample size for the CRD portion $(n_a = 20)$ is equal to the number of blocks for the RCBD portion$(n_b = 20)$, Approach II, Approach V and Approach VI have the highest powers. As the sample size for the CRD portion increased and the number of blocks for the RCBD portion was fixed $(n_a = 20)$, Approach II had the highest powers. Approach VI has relatively high powers.

Table 5.103: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample		**Approach**						
Size	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.2142	0.1926	0.2066	**0.3201**	0.2066	0.2066	**0.3201**	**0.3201**
25	0.2142	0.2162	0.2274	**0.3409**	0.2255	0.2308	0.3378	0.3373
30	0.2142	0.2359	0.2438	**0.3632**	0.2413	0.2496	0.3508	0.3560
35	0.2142	0.2603	0.2667	**0.3796**	0.2635	0.2716	0.3548	0.3685
40	0.2142	0.2885	0.2951	**0.3909**	0.2920	0.3006	0.3556	0.3854

Table 5.104: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample		**Approach**						
Size	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.2226	0.1585	0.1694	**0.2881**	0.1694	0.1694	**0.2881**	**0.2881**
25	0.2226	0.1695	0.1792	**0.3084**	0.1773	0.1812	0.3097	0.2999
30	0.2226	0.1963	0.2043	**0.3271**	0.2016	0.2073	0.3261	0.3119
35	0.2226	0.2090	0.2154	**0.3433**	0.2125	0.2199	0.3321	0.3208
40	0.2226	0.2311	0.2368	**0.3618**	0.2339	0.2425	0.3381	0.3329

Table 5.105: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample		**Approach**						
Size	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.6928	0.3473	0.3928	**0.7860**	0.3928	0.3928	**0.7860**	**0.7860**
25	0.6928	0.4066	0.4389	**0.8218**	0.4333	0.4481	0.8344	0.7995
30	0.6928	0.4491	0.4768	**0.8444**	0.4666	0.4888	0.8565	0.8076
35	0.6928	0.5063	0.5291	**0.8614**	0.5197	0.5445	0.8654	0.8084
40	0.6928	0.5447	0.5617	**0.8777**	0.5547	0.5820	0.8723	0.8205

Table 5.106: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0, 3)$ and RCBD $N(0, 1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.6994	0.2107	0.2462	**0.6904**	0.2462	0.2462	**0.6904**	**0.6904**
25	0.6994	0.2301	0.2573	**0.7150**	0.2524	0.2644	0.7440	0.6738
30	0.6994	0.2660	0.2878	**0.7429**	0.2806	0.3000	0.7815	0.6661
35	0.6994	0.2945	0.3150	**0.7600**	0.3062	0.3287	0.8006	0.6580
40	0.6994	0.3211	0.3372	**0.7752**	0.3289	0.3532	0.8068	0.6511

Table 5.107: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.5289	0.2722	0.3072	**0.6402**	0.3072	0.3072	**0.6402**	**0.6402**
25	0.5289	0.3275	0.3558	**0.6806**	0.3505	0.3627	0.6935	0.6608
30	0.5289	0.3653	0.3871	**0.7107**	0.3801	0.3979	0.7207	0.6718
35	0.5289	0.4128	0.4288	**0.7331**	0.4216	0.4430	0.7315	0.6798
40	0.5289	0.4513	0.4643	**0.7601**	0.4582	0.4775	0.7425	0.6966

Table 5.108: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.5280	0.2221	0.2540	**0.5902**	0.2540	0.2540	**0.5902**	**0.5902**
25	0.5280	0.2539	0.2773	**0.6177**	0.2737	0.2826	0.6403	0.5872
30	0.5280	0.2905	0.3075	**0.6476**	0.3012	0.3160	0.6735	0.5917
35	0.5280	0.3123	0.3275	**0.6618**	0.3211	0.3403	0.6759	0.5924
40	0.5280	0.3358	0.3471	**0.6814**	0.3409	0.3609	0.6867	0.5923

We present the power estimates when there are four treatments in the study, the variance in the CRD portion is equal to the variance in the RCBD portion and the number of blocks are greater than or equal to sample size. The shift configuration d2=0.1; d3=0.2; d4=0.2 is applied to the location parameters of treatment 2, treatment 3, and treatment 4, respectively when the underlying distribution was exponential and the shift configuration d2=1.0; d3=0.5; d4=0.5 is applied to the location parameters when the underlying distributions were normal and T. It can be noted, in Tables 5.109 through 5.111 that when the sample size for the CRD portion $(n_a = 20)$ is equal to the number of blocks for the RCBD portion $(n_b = 20)$ Approach II, Approach V and Approach VI have the highest powers. As the number of blocks for the RCBD portion increased and the number sample size for the CRD portion was fixed ($n_a = 20$), Approach II had the highest powers. Approach VI has relatively high power.

Table 5.109: Estimated alpha values of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Sample Size $n_a = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)									
Blocks			**Approach**						
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.2224	0.2698	0.2863	**0.3871**	0.2863	0.2863	**0.3871**	**0.3871**
25	0.2849	0.2698	0.2942	**0.4119**	0.2981	0.2881	0.4075	0.4111
30	0.2860	0.2698	0.2987	**0.4502**	0.3116	0.2901	0.4335	0.4438
35	0.3343	0.2698	0.3033	**0.4720**	0.3231	0.2885	0.4368	0.4667
40	0.3728	0.2698	0.3078	**0.4987**	0.3400	0.2905	0.4443	0.4848

Table 5.110: Estimated alpha values of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.7034	0.7942	0.8256	**0.9542**	0.8256	0.8256	**0.9542**	**0.9542**
25	0.8001	0.7942	0.8348	**0.9658**	0.8423	0.8251	0.9661	0.9657
30	0.8431	0.7942	0.8410	**0.9771**	0.8621	0.8266	0.9712	0.9762
35	0.8980	0.7942	0.8486	**0.9847**	0.8794	0.8273	0.9752	0.9839
40	0.9361	0.7942	0.8552	**0.9901**	0.9017	0.8277	0.9742	0.9890

Table 5.111: Estimated alpha values of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.5286	0.6303	0.6662	**0.8506**	0.6662	0.6662	**0.8506**	**0.8506**
25	0.6533	0.6303	0.6792	**0.8797**	0.6876	0.6690	0.8768	0.8788
30	0.6846	0.6303	0.6855	**0.9027**	0.7091	0.6682	0.8864	0.9022
35	0.7564	0.6303	0.6968	**0.9264**	0.7328	0.6674	0.8951	0.9210
40	0.8203	0.6303	0.7045	0.9392	0.7633	0.6683	0.8947	**0.9377**

We present the power estimates when there are four treatments in the study, the variance in the CRD portion is greater than the variance in the RCBD portion and the number of blocks in the RCBD portion is greater than or equal to the sample size for the CRD portion. The shift configuration d2=0.1; d3=0.2; d4=0.2 is applied to the location parameters of treatment 2, treatment 3 and treatment 4 respectively when the underlying distribution was exponential and the shift configuration d2=1.0; d3=0.5; d4=0.5 is applied to the location parameters when the underlying distributions were normal and T. It can be noted, in Tables 5.112 through 5.117 that when the sample size for the CRD portion ($n_a = 20$) is equal to the number of blocks for the RCBD portion$(n_b = 20)$, Approach II, Approach V and Approach VI have the highest powers. As the number of blocks for the RCBD portion increased and the sample size for the CRD portion was fixed $(n_a = 20)$, Approach VI has the highest powers. Approach II has relatively high powers.

Table 5.112: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.2262	0.1973	0.2108	**0.3205**	0.2108	0.2108	**0.3205**	**0.3205**
25	0.2881	0.1973	0.2168	0.3520	0.2204	0.2121	0.3435	**0.3571**
30	0.2840	0.1973	0.2180	0.3797	0.2302	0.2111	0.3524	**0.3868**
35	0.3380	0.1973	0.2258	0.4023	0.2420	0.2134	0.3567	**0.4187**
40	0.3741	0.1973	0.2276	0.4233	0.2550	0.2138	0.3522	**0.4434**

Table 5.113: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.2208	0.1566	0.1691	**0.2856**	0.1691	0.1691	**0.2856**	**0.2856**
25	0.2977	0.1566	0.1744	0.3285	0.1774	0.1707	0.3114	**0.3359**
30	0.2854	0.1566	0.1746	0.3354	0.1817	0.1676	0.3067	**0.3544**
35	0.3341	0.1566	0.1810	0.3645	0.1954	0.1698	0.3080	**0.3906**
40	0.3772	0.1566	0.1819	0.3879	0.2084	0.1687	0.3092	**0.4211**

Table 5.114: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.7027	0.3398	0.3849	**0.7927**	0.3849	0.3849	**0.7927**	**0.7927**
25	0.8021	0.3398	0.3992	0.8352	0.4131	0.3867	0.8016	**0.8558**
30	0.8440	0.3398	0.4086	0.8766	0.4452	0.3860	0.8166	**0.9055**
35	0.9022	0.3398	0.4245	0.9041	0.4814	0.3851	0.8110	**0.9376**
40	0.9399	0.3398	0.4328	0.9272	0.5276	0.3865	0.8073	**0.9581**

Table 5.115: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.4981	0.1941	0.2248	**0.5525**	0.2248	0.2248	**0.5525**	**0.5525**
25	0.6294	0.1941	0.2327	0.6176	0.2396	0.2242	0.5734	**0.6479**
30	0.6542	0.1941	0.2381	0.6654	0.2571	0.2244	0.5751	**0.7213**
35	0.7578	0.1941	0.2497	0.7178	0.2847	0.2234	0.5718	**0.7927**
40	0.8263	0.1941	0.2529	0.7533	0.3143	0.2248	0.5686	**0.8431**

Table 5.116: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.5274	0.4128	0.4515	**0.7335**	0.4515	0.4515	**0.7335**	**0.7335**
25	0.6535	0.4128	0.4659	0.7858	0.4758	0.4545	0.7652	**0.7935**
30	0.6744	0.4128	0.4724	0.8176	0.4992	0.4550	0.7745	**0.8308**
35	0.7569	0.4128	0.4851	0.8522	0.5317	0.4549	0.7792	**0.8696**
40	0.8151	0.4128	0.4901	0.8746	0.5628	0.4533	0.7782	**0.8983**

Table 5.117: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.5377	0.3156	0.3484	**0.6739**	0.3484	0.3484	**0.6739**	**0.6739**
25	0.6528	0.3156	0.3603	0.7232	0.3690	0.3505	0.6984	**0.7394**
30	0.6729	0.3156	0.3697	0.7601	0.3988	0.3518	0.6992	**0.7926**
35	0.7537	0.3156	0.3794	0.7958	0.4236	0.3479	0.6979	**0.8312**
40	0.8178	0.3156	0.3876	0.8340	0.4619	0.3512	0.6989	**0.8744**

5.3. Five Populations

5.3.1. Estimated Alpha Values

Tables 5.118 through 5.120 present the alpha values when the study comprised of five treatments, the variance in the CRD portion was equal to the variance in the RCBD portion, the number of blocks for the RCBD portion was five ($n_b = 5$) and the sample size for the CRD portion was varied in the mixed design. The alpha values for all test statistics were at least 0.05 for all three underlying distributions presented except for the modified Page's test statistic (**L*)** where the alpha values were lesser than 0.05. The reader may refer to Appendix F for further tables of alpha values.

Table 5.118: Estimated alpha values of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed number of Blocks $n_b = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.0439	0.0451	0.0500	0.0527	0.0500	0.0500	0.0527	0.0527
10	0.0439	0.0535	0.0515	0.0535	0.0529	0.0524	0.0538	0.0542
15	0.0439	0.0518	0.0524	0.0540	0.0517	0.0531	0.0536	0.0528
20	0.0439	0.0487	0.0494	0.0550	0.0483	0.0504	0.0536	0.0524
25	0.0439	0.0444	0.0446	0.0508	0.0442	0.0443	0.0550	0.0466
30	0.0439	0.0484	0.0482	0.0502	0.0484	0.0482	0.0542	0.0479
35	0.0439	0.0477	0.0471	0.0480	0.0477	0.0472	0.0542	0.0470
40	0.0439	0.0521	0.0523	0.0518	0.0520	0.0521	0.0535	0.0522

Table 5.119: Estimated alpha values of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed number of Blocks $n_b = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.0399	0.0499	0.0549	0.0531	0.0549	0.0549	0.0531	0.0531
10	0.0399	0.0499	0.0481	0.0483	0.0496	0.0501	0.0491	0.0482
15	0.0399	0.0517	0.0515	0.0514	0.0523	0.0513	0.0509	0.0544
20	0.0399	0.0511	0.0509	0.0506	0.0506	0.0508	0.0516	0.0509
25	0.0399	0.0519	0.0517	0.0502	0.0520	0.0523	0.0497	0.0513
30	0.0399	0.0519	0.0520	0.0539	0.0521	0.0529	0.0511	0.0521
35	0.0399	0.0548	0.0544	0.0516	0.0547	0.0553	0.0501	0.0556
40	0.0399	0.0477	0.0476	0.0469	0.0477	0.0483	0.0500	0.0488

Table 5.120: Estimated alpha values of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed number of Blocks $n_b = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.0407	0.0501	0.0532	0.0490	0.0532	0.0532	0.0490	0.0490
10	0.0407	0.0497	0.0477	0.0500	0.0499	0.0486	0.0492	0.0478
15	0.0407	0.0483	0.0478	0.0496	0.0477	0.0488	0.0529	0.0500
20	0.0407	0.0522	0.0524	0.0496	0.0523	0.0512	0.0518	0.0518
25	0.0407	0.0511	0.0509	0.0506	0.0512	0.0510	0.0505	0.0514
30	0.0407	0.0552	0.0554	0.0531	0.0554	0.0543	0.0508	0.0534
35	0.0407	0.0486	0.0484	0.0479	0.0484	0.0471	0.0489	0.0473
40	0.0407	0.0497	0.0498	0.0505	0.0497	0.0510	0.0505	0.0519

Tables 5.121 through 5.126 present the alpha values when the study comprised of five treatments, the variance in the CRD portion was greater than the variance in the RCBD portion, the number of blocks for the RCBD portion was five ($n_b = 5$) and the sample size for the CRD portion was varied in the mixed design. The alpha values for all test statistics were at least 0.05 for all three underlying distributions presented except for the modified Page's test statistic (**L***) where the alpha values were lesser than 0.05. This finding is the same as what was found when the study comprised three treatments. The reader may refer to Appendix F for further tables of alpha values.

Table 5.121: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.0432	0.0513	0.0579	0.0529	0.0579	0.0579	0.0529	0.0529
10	0.0432	0.0496	0.0485	0.0546	0.0494	0.0509	0.0514	0.0522
15	0.0432	0.0485	0.0495	0.0507	0.0489	0.0486	0.0514	0.0499
20	0.0432	0.0513	0.0519	0.0505	0.0512	0.0517	0.0524	0.0518
25	0.0432	0.0509	0.0513	0.0480	0.0510	0.0511	0.0511	0.0514
30	0.0432	0.0502	0.0505	0.0503	0.0503	0.0505	0.0521	0.0510
35	0.0432	0.0512	0.0514	0.0506	0.0510	0.0507	0.0528	0.0496
40	0.0432	0.0513	0.0511	0.0522	0.0512	0.0510	0.0529	0.0503

Table 5.122: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.0406	0.0502	0.0552	0.0518	0.0552	0.0552	0.0518	0.0518
10	0.0406	0.0528	0.0497	0.0540	0.0521	0.0520	0.0520	0.0501
15	0.0406	0.0464	0.0465	0.0518	0.0471	0.0450	0.0521	0.0479
20	0.0406	0.0492	0.0499	0.0476	0.0494	0.0489	0.0477	0.0479
25	0.0406	0.0487	0.0487	0.0490	0.0489	0.0495	0.0496	0.0507
30	0.0406	0.0488	0.0481	0.0497	0.0489	0.0485	0.0513	0.0483
35	0.0406	0.0511	0.0510	0.0498	0.0511	0.0498	0.0500	0.0501
40	0.0406	0.0484	0.0483	0.0484	0.0483	0.0487	0.0497	0.0483

Table 5.123: Estimated alpha values of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.0236	0.0483	0.0503	0.0465	0.0503	0.0503	0.0465	0.0465
10	0.0236	0.0485	0.0471	0.0491	0.0487	0.0490	0.0507	0.0496
15	0.0236	0.0539	0.0538	0.0490	0.0547	0.0534	0.0489	0.0533
20	0.0236	0.0504	0.0510	0.0491	0.0500	0.0505	0.0501	0.0502
25	0.0236	0.0490	0.0490	0.0457	0.0491	0.0492	0.0492	0.0498
30	0.0236	0.0498	0.0494	0.0474	0.0498	0.0493	0.0504	0.0489
35	0.0236	0.0525	0.0519	0.0493	0.0524	0.0522	0.0490	0.0525
40	0.0236	0.0493	0.0494	0.0496	0.0493	0.0486	0.0518	0.0478

Table 5.124: Estimated alpha values of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
5	0.0430	0.0501	0.0542	0.0511	0.0542	0.0542	0.0511	0.0511
10	0.0430	0.0515	0.0500	0.0519	0.0519	0.0518	0.0530	0.0501
15	0.0430	0.0524	0.0528	0.0490	0.0527	0.0520	0.0510	0.0512
20	0.0430	0.0511	0.0502	0.0518	0.0501	0.0484	0.0527	0.0497
25	0.0430	0.0470	0.0468	0.0490	0.0469	0.0471	0.0525	0.0467
30	0.0430	0.0490	0.0491	0.0499	0.0495	0.0497	0.0530	0.0490
35	0.0430	0.0508	0.0500	0.0527	0.0504	0.0501	0.0540	0.0503
40	0.0430	0.0508	0.0504	0.0479	0.0508	0.0514	0.0516	0.0502

Table 5.125: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
5	0.0385	0.0467	0.0511	0.0495	0.0511	0.0511	0.0495	0.0495
10	0.0385	0.0498	0.0476	0.0489	0.0489	0.0494	0.0484	0.0496
15	0.0385	0.0493	0.0486	0.0503	0.0494	0.0488	0.0504	0.0519
20	0.0385	0.0517	0.0516	0.0500	0.0516	0.0500	0.0501	0.0514
25	0.0385	0.0512	0.0518	0.0504	0.0512	0.0522	0.0498	0.0517
30	0.0385	0.0524	0.0519	0.0465	0.0524	0.0506	0.0473	0.0505
35	0.0385	0.0500	0.0494	0.0483	0.0499	0.0501	0.0481	0.0504
40	0.0385	0.0497	0.0500	0.0508	0.0496	0.0500	0.0501	0.0498

Table 5.126: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
5	0.0439	0.0451	0.0500	0.0527	0.0500	0.0500	0.0527	0.0527
10	0.0439	0.0535	0.0515	0.0535	0.0529	0.0524	0.0538	0.0542
15	0.0439	0.0518	0.0524	0.0540	0.0517	0.0531	0.0536	0.0528
20	0.0439	0.0487	0.0494	0.0550	0.0483	0.0504	0.0536	0.0524
25	0.0439	0.0444	0.0446	0.0508	0.0442	0.0443	0.0550	0.0466
30	0.0439	0.0484	0.0482	0.0502	0.0484	0.0482	0.0542	0.0479
35	0.0439	0.0477	0.0471	0.0480	0.0477	0.0472	0.0542	0.0470
40	0.0439	0.0521	0.0523	0.0518	0.0520	0.0521	0.0535	0.0522

Tables 5.127 through 5.129 present the alpha values when the study comprised of five treatments, the variance in the CRD portion was equal to the variance in the RCBD portion, the sample size for the CRD portion was five ($n_a = 5$) and the number of blocks in the RCBD portion was varied .The alpha values for all test statistics were at least 0.05 for all three underlying distributions presented except

for the modified Page's test statistic (**L***) where the alpha values were lesser than 0.05 when the number of blocks for the RCBD portion in the mixed design was five ($n_b = 5$). The reader may refer to Appendix F for further tables of alpha values.

Table 5.127: Estimated alpha values of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0419	0.0474	0.0506	0.0471	0.0506	0.0506	0.0471	0.0471
10	0.0470	0.0474	0.0495	0.0516	0.0497	0.0522	0.0500	0.0509
15	0.0401	0.0474	0.0502	0.0492	0.0479	0.0488	0.0487	0.0488
20	0.0467	0.0474	0.0467	0.0471	0.0476	0.0490	0.0488	0.0489
25	0.0527	0.0474	0.0529	0.0506	0.0508	0.0512	0.0498	0.0519
30	0.0502	0.0474	0.0484	0.0496	0.0471	0.0504	0.0501	0.0477
35	0.0573	0.0474	0.0504	0.0487	0.0513	0.0497	0.0511	0.0524
40	0.0515	0.0474	0.0479	0.0528	0.0474	0.0491	0.0488	0.0486

Table 5.128: Estimated alpha values of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0393	0.0464	0.0488	0.0482	0.0488	0.0488	0.0482	0.0482
10	0.0493	0.0464	0.0472	0.0510	0.0473	0.0499	0.0488	0.0522
15	0.0450	0.0464	0.0482	0.0525	0.0519	0.0481	0.0470	0.0528
20	0.0486	0.0464	0.0477	0.0487	0.0469	0.0483	0.0475	0.0479
25	0.0500	0.0464	0.0490	0.0465	0.0502	0.0473	0.0465	0.0495
30	0.0552	0.0464	0.0506	0.0525	0.0527	0.0513	0.0498	0.0528
35	0.0527	0.0464	0.0498	0.0485	0.0463	0.0482	0.0492	0.0469
40	0.0512	0.0464	0.0463	0.0492	0.0483	0.0480	0.0479	0.0493

Table 5.129: Estimated alpha values of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0397	0.0464	0.0495	0.0485	0.0495	0.0495	0.0485	0.0485
10	0.0501	0.0464	0.0481	0.0516	0.0487	0.0506	0.0497	0.0514
15	0.0396	0.0464	0.0493	0.0482	0.0481	0.0471	0.0470	0.0469
20	0.0514	0.0464	0.0461	0.0494	0.0485	0.0484	0.0482	0.0512
25	0.0542	0.0464	0.0528	0.0526	0.0557	0.0499	0.0501	0.0530
30	0.0546	0.0464	0.0498	0.0541	0.0514	0.0494	0.0505	0.0523
35	0.0484	0.0464	0.0512	0.0464	0.0457	0.0470	0.0484	0.0461
40	0.0531	0.0464	0.0486	0.0507	0.0500	0.0475	0.0489	0.0506

Tables 5.130 through 5.135 present the alpha values when the study comprised of five treatments, the variance in the CRD portion was greater than the variance in the RCBD portion, the sample size for the CRD portion was five ($n_a = 5$) and the number of blocks in the RCBD portion was varied .The alpha values for all test statistics were at least 0.05 for all three underlying distribution presented except for the modified Page's test statistic (**L*)** where the alpha values were lesser than 0.05 when the number of blocks for the RCBD portion in the mixed design was five ($n_b = 5$) and in some cases when the number of blocks for the RCBD portion is10 (see Table 130 and Table 132).

Table 5.130: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0431	0.0497	0.0532	0.0500	0.0532	0.0532	0.0500	0.0500
10	0.0440	0.0497	0.0509	0.0505	0.0507	0.0534	0.0518	0.0498
15	0.0444	0.0497	0.0547	0.0519	0.0507	0.0521	0.0527	0.0521
20	0.0457	0.0497	0.0529	0.0512	0.0490	0.0523	0.0528	0.0493
25	0.0577	0.0497	0.0551	0.0525	0.0557	0.0514	0.0520	0.0552
30	0.0542	0.0497	0.0525	0.0513	0.0504	0.0523	0.0515	0.0512
35	0.0525	0.0497	0.0535	0.0513	0.0512	0.0511	0.0524	0.0502
40	0.0510	0.0497	0.0519	0.0505	0.0475	0.0506	0.0508	0.0477

Table 5.131: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0411	0.0525	0.0554	0.0518	0.0554	0.0554	0.0518	0.0518
10	0.0455	0.0525	0.0512	0.0547	0.0534	0.0553	0.0538	0.0528
15	0.0434	0.0525	0.0576	0.0510	0.0510	0.0524	0.0553	0.0521
20	0.0451	0.0525	0.0514	0.0524	0.0494	0.0525	0.0520	0.0503
25	0.0506	0.0525	0.0547	0.0499	0.0507	0.0543	0.0533	0.0493
30	0.0555	0.0525	0.0547	0.0549	0.0525	0.0564	0.0554	0.0539
35	0.0520	0.0525	0.0554	0.0530	0.0499	0.0537	0.0545	0.0495
40	0.0588	0.0525	0.0546	0.0566	0.0539	0.0548	0.0544	0.0543

Table 5.132: Estimated alpha values of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed sample size $n_a = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0238	0.0477	0.0537	0.0498	0.0537	0.0537	0.0498	0.0498
10	0.0409	0.0477	0.0442	0.0467	0.0523	0.0470	0.0489	0.0502
15	0.0415	0.0477	0.0483	0.0490	0.0503	0.0498	0.0484	0.0505
20	0.0355	0.0477	0.0539	0.0509	0.0519	0.0476	0.0504	0.0510
25	0.0566	0.0477	0.0451	0.0459	0.0479	0.0496	0.0501	0.0504
30	0.0427	0.0477	0.0470	0.0469	0.0438	0.0496	0.0481	0.0449
35	0.0600	0.0477	0.0544	0.0529	0.0510	0.0487	0.0496	0.0506
40	0.0507	0.0477	0.0536	0.0497	0.0517	0.0501	0.0504	0.0503

Table 5.133: Estimated alpha values of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed sample size $n_a = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0412	0.0506	0.0563	0.0532	0.0563	0.0563	0.0532	0.0532
10	0.0487	0.0506	0.0520	0.0497	0.0505	0.0549	0.0510	0.0507
15	0.0438	0.0506	0.0554	0.0522	0.0504	0.0532	0.0532	0.0504
20	0.0442	0.0506	0.0512	0.0511	0.0487	0.0528	0.0540	0.0474
25	0.0533	0.0506	0.0579	0.0523	0.0537	0.0542	0.0546	0.0518
30	0.0534	0.0506	0.0509	0.0544	0.0522	0.0529	0.0538	0.0517
35	0.0559	0.0506	0.0539	0.0496	0.0496	0.0523	0.0536	0.0495
40	0.0508	0.0506	0.0527	0.0519	0.0482	0.0538	0.0541	0.0483

Table 5.134: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0412	0.0514	0.0549	0.0510	0.0549	0.0549	0.0510	0.0510
10	0.0456	0.0514	0.0499	0.0481	0.0497	0.0532	0.0510	0.0469
15	0.0409	0.0514	0.0573	0.0544	0.0539	0.0522	0.0544	0.0529
20	0.0497	0.0514	0.0529	0.0529	0.0513	0.0533	0.0563	0.0528
25	0.0498	0.0514	0.0537	0.0494	0.0510	0.0531	0.0531	0.0489
30	0.0527	0.0514	0.0520	0.0547	0.0506	0.0526	0.0524	0.0508
35	0.0526	0.0514	0.0537	0.0502	0.0509	0.0520	0.0534	0.0507
40	0.0490	0.0514	0.0504	0.0512	0.0447	0.0518	0.0526	0.0459

Table 5.135: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 5$; (CRD $(T(3) * \sqrt{3})$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.0419	0.0474	0.0506	0.0471	0.0506	0.0506	0.0471	0.0471
10	0.0470	0.0474	0.0495	0.0516	0.0497	0.0522	0.0500	0.0509
15	0.0401	0.0474	0.0502	0.0492	0.0479	0.0488	0.0487	0.0488
20	0.0467	0.0474	0.0467	0.0471	0.0476	0.0490	0.0488	0.0489
25	0.0527	0.0474	0.0529	0.0506	0.0508	0.0512	0.0498	0.0519
30	0.0502	0.0474	0.0484	0.0496	0.0471	0.0504	0.0501	0.0477
35	0.0573	0.0474	0.0504	0.0487	0.0513	0.0497	0.0511	0.0524
40	0.0515	0.0474	0.0479	0.0528	0.0474	0.0491	0.0488	0.0486

5.3.2. Estimated Power Five Populations

We present the power estimates when there are five treatments in the study, the variance in the CRD portion is equal to the variance in the RCBD portion, and the sample size for the CRD portion is greater than or equal to number of blocks for the RCBD portion. The shift configuration: d2=0.1; d3=0.2; d4=0.3; d5=0.4 is applied to the location parameters of treatment 2, treatment 3, treatment 4, and treatment 5, respectively when the underlying distribution is exponential and the shift configuration: d2=0.25; d3=0.5; d4=0.75; d5=1.0 is applied to the location parameters when the underlying distributions were normal and T. It can be noted, in Tables 5.136 through 5.138 that when the number of blocks in the RCBD portion was 5 $(n_b = 5)$ and equal to the sample size for the CRD portion $(n_a = 5)$, Approach II, Approach V and Approach VI have the highest powers.

As the sample size for the CRD portion increased and the number of blocks for the RCBD portion is fixed $(n_b = 5)$, Approach VI has the highest powers. Approach IV has relatively high powers. These findings are similar to what was found when the shift configurations applied to the location parameters did not have a particular pattern in the case when the study comprised four treatments and when the study comprised three treatments.

Table 5.136: Estimated alpha values of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed number of Blocks $n_b = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1581	0.1983	0.2437	**0.2801**	0.2437	0.2437	**0.2801**	**0.2801**
10	0.1581	0.3006	0.3087	0.3450	0.3058	0.3253	0.2990	**0.3556**
15	0.1581	0.3728	0.3841	0.4116	0.3779	0.4012	0.2946	**0.4281**
20	0.1581	0.4539	0.4612	0.4698	0.4545	0.4770	0.2871	**0.4991**
25	0.1581	0.5223	0.5257	0.5150	0.5229	0.5388	0.2803	**0.5544**
30	0.1581	0.5718	0.5746	0.5568	0.5732	0.5906	0.2709	**0.6034**
35	0.1581	0.6232	0.6251	0.5918	0.6232	0.6429	0.2657	**0.6523**
40	0.1581	0.6764	0.6790	0.6276	0.6768	0.6921	0.2586	**0.6993**

Table 5.137: Estimated alpha values of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.25; d3=0.5; d4=0.75; d5=1

Fixed number of Blocks $n_b = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.2393	0.2984	0.3958	**0.4736**	0.3958	0.3958	**0.4736**	**0.4736**
10	0.2393	0.5091	0.5336	0.6149	0.5238	0.5665	0.5223	**0.6286**
15	0.2393	0.6633	0.6813	0.7204	0.6705	0.7070	0.5129	**0.7486**
20	0.2393	0.7754	0.7853	0.7948	0.7765	0.8061	0.4872	**0.8307**
25	0.2393	0.8451	0.8493	0.8401	0.8458	0.8656	0.4714	**0.8805**
30	0.2393	0.8995	0.9021	0.8808	0.9001	0.9140	0.4601	**0.9230**
35	0.2393	0.9359	0.9365	0.9117	0.9359	0.9472	0.4451	**0.9519**
40	0.2393	0.9637	0.9644	0.9380	0.9638	0.9691	0.4387	**0.9719**

Table 5.138: Estimated alpha values of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.25; d3=0.5; d4=0.75; d5=1

Fixed number of Blocks $n_b = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1871	0.2081	0.2755	**0.3427**	0.2755	0.2755	**0.3427**	**0.3427**
10	0.1871	0.3389	0.3568	0.4404	0.3490	0.3828	0.3793	**0.4401**
15	0.1871	0.4498	0.4654	0.5210	0.4563	0.4876	0.3768	**0.5295**
20	0.1871	0.5411	0.5532	0.5894	0.5426	0.5723	0.3577	**0.6062**
25	0.1871	0.6214	0.6288	0.6449	0.6233	0.6536	0.3473	**0.6736**
30	0.1871	0.6897	0.6934	0.6944	0.6909	0.7127	0.3382	**0.7319**
35	0.1871	0.7440	0.7456	0.7285	0.7439	0.7638	0.3323	**0.7769**
40	0.1871	0.8023	0.8043	0.7742	0.8027	0.8168	0.3252	**0.8231**

We consider five treatments in the study, the variance in the CRD portion is greater than the variance in the RCBD portion, and the sample size for the CRD portion is greater than or equal to number of blocks in RCBD portion. The shift configuration: d2=0.1; d3=0.2; d4=0.3; d5=0.4 is applied to the location parameters of treatment 2, treatment 3, treatment 4, and treatment 5, respectively when the underlying distribution is exponential and the shift configuration: d2=0.25; d3=0.5; d4=0.75; d5=1.0 is applied to the location parameters when the underlying distributions were normal and T. Tables 5.139 through 5.144 show that when the number of blocks for the RCBD portion $(n_b = 5)$ is equal to the sample size $(n_a = 5)$, Approach II, Approach V and Approach VI have the same and highest powers.

When the underlying distribution was exponential and the variance for the CRD portion was twice the variance of RCBD portion it was found that Approach VI has the highest powers (See Table 5.139). On the contrary, when the underlying distribution was exponential and the variance for the CRD portion was three times the variance of RCBD portion and for the normal and T distributions, Approach II has the highest powers (See Tables 139 through 5.144). The relative percentage increase in the powers of Approach II relative to Approach VI were small.

Table 5.139: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1647	0.1542	0.1994	**0.2423**	0.1994	0.1994	**0.2423**	**0.2423**
10	0.1647	0.2156	0.2245	0.2898	0.2218	0.2438	0.2674	**0.2784**
15	0.1647	0.2538	0.2621	0.3180	0.2587	0.2766	0.2649	**0.3067**
20	0.1647	0.3149	0.3203	0.3687	0.3156	0.3366	0.2609	**0.3610**
25	0.1647	0.3496	0.3547	0.3947	0.3503	0.3722	0.2568	**0.3897**
30	0.1647	0.3924	0.3970	0.4271	0.3933	0.4157	0.2512	**0.4309**
35	0.1647	0.4389	0.4399	0.4630	0.4386	0.4570	0.2495	**0.4681**
40	0.1647	0.4661	0.4682	0.4840	0.4665	0.4842	0.2460	**0.4947**

Table 5.140: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1686	0.1389	0.1756	**0.2265**	0.1756	0.1756	**0.2265**	**0.2265**
10	0.1686	0.1776	0.1864	**0.2636**	0.1829	0.2022	0.2542	0.2397
15	0.1686	0.2091	0.2166	**0.2932**	0.2124	0.2328	0.2554	0.2662
20	0.1686	0.2462	0.2522	**0.3190**	0.2466	0.2655	0.2530	0.2899
25	0.1686	0.2863	0.2913	**0.3508**	0.2872	0.3062	0.2499	0.3263
30	0.1686	0.3119	0.3146	**0.3797**	0.3129	0.3325	0.2460	0.3474
35	0.1686	0.3555	0.3575	**0.3995**	0.3555	0.3739	0.2432	0.3861
40	0.1686	0.3682	0.3706	**0.4150**	0.3682	0.3842	0.2409	0.3947

Table 5.141: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.5; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.2449	0.1469	0.2149	**0.3194**	0.2149	0.2149	**0.3194**	**0.3194**
10	0.2449	0.2167	0.2339	**0.3873**	0.2287	0.2622	0.3786	0.3418
15	0.2449	0.2644	0.2821	**0.4378**	0.2706	0.3114	0.3828	0.3734
20	0.2449	0.3269	0.3352	**0.4788**	0.3276	0.3605	0.3782	0.4075
25	0.2449	0.3707	0.3768	**0.5216**	0.3721	0.4095	0.3702	0.4423
30	0.2449	0.4421	0.4490	**0.5677**	0.4444	0.4787	0.3674	0.5084
35	0.2449	0.4858	0.4902	**0.5965**	0.4862	0.5164	0.3642	0.5359
40	0.2449	0.5222	0.5254	**0.6256**	0.5223	0.5531	0.3575	0.5703

Table 5.142: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.5; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0, 3)$ and RCBD $N(0, 1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.2318	0.1022	0.1579	**0.2646**	0.1579	0.1579	**0.2646**	**0.2646**
10	0.2318	0.1422	0.1555	**0.3053**	0.1493	0.1769	0.3191	0.2506
15	0.2318	0.1714	0.1831	**0.3405**	0.1764	0.2037	0.3342	0.2579
20	0.2318	0.1978	0.2052	**0.3614**	0.1982	0.2269	0.3263	0.2675
25	0.2318	0.2259	0.2331	**0.3947**	0.2275	0.2566	0.3268	0.2881
30	0.2318	0.2590	0.2649	**0.4236**	0.2604	0.2905	0.3249	0.3172
35	0.2318	0.2876	0.2903	**0.4453**	0.2875	0.3158	0.3222	0.3344
40	0.2318	0.3134	0.3151	**0.4714**	0.3136	0.3383	0.3196	0.3524

Table 5.143: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.5; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1793	0.1440	0.1990	**0.2682**	0.1990	0.1990	**0.2682**	**0.2682**
10	0.1793	0.2237	0.2370	**0.3431**	0.2310	0.2604	0.3168	0.3211
15	0.1793	0.2900	0.3037	**0.3993**	0.2964	0.3277	0.3165	0.3664
20	0.1793	0.3473	0.3537	**0.4453**	0.3479	0.3746	0.3088	0.4087
25	0.1793	0.4080	0.4147	**0.4858**	0.4092	0.4391	0.2992	0.4607
30	0.1793	0.4470	0.4514	**0.5172**	0.4490	0.4747	0.2922	0.4946
35	0.1793	0.5042	0.5057	**0.5603**	0.5040	0.5275	0.2897	0.5436
40	0.1793	0.5462	0.5497	**0.5873**	0.5466	0.5692	0.2834	0.5819

Table 5.144: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.5; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample			**Approach**					
Size	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.1937	0.1195	0.1714	**0.2526**	0.1714	0.1714	**0.2526**	**0.2526**
10	0.1937	0.1751	0.1883	**0.3061**	0.1836	0.2095	0.2984	0.2702
15	0.1937	0.2187	0.2298	**0.3526**	0.2241	0.2534	0.3048	0.2997
20	0.1937	0.2715	0.2808	**0.3871**	0.2730	0.3017	0.3023	0.3385
25	0.1937	0.3069	0.3138	**0.4230**	0.3081	0.3394	0.2983	0.3648
30	0.1937	0.3395	0.3441	**0.4572**	0.3403	0.3706	0.2941	0.3924
35	0.1937	0.3842	0.3874	**0.4819**	0.3846	0.4082	0.2896	0.4281
40	0.1937	0.4226	0.4258	**0.5065**	0.4228	0.4481	0.2878	0.4619

We present the power estimates when there are five treatments in the study, the variance in the CRD portion is equal to the variance in the RCBD portion and the number of blocks in the RCBD portion are greater than or equal to sample size for the CRD portion. The shift configuration: d2=0.1; d3=0.2; d4=0.3; d5=0.4 is applied to the location parameters of treatment 2, treatment 3, treatment 4, and treatment 5, respectively, when the underlying distribution is exponential and the shift configuration: d2=0.25; d3=0.5; d4=0.75; d5=1.0 is applied to the location parameters when the underlying distributions were normal and T. Of note, is in Tables 5.145 through 5.147, when the number of blocks $(n_b = 5)$ is equal to the sample size $(n_a = 5)$, Approach II, Approach V and Approach VI have the highest powers.

When the number of blocks in the RCBD portion is greater than or equal to 15 and the sample size in the CRD portion is fixed $(n_a = 5)$, Approach III has the highest powers. Approach VI has relatively high powers. These findings are similar to what was found when the shift configurations applied to the location parameters did not have a particular pattern in the case when the study comprised four treatments and in the case when the study comprised three treatments.

Table 5.145: Estimated alpha values of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Sample Size $n_a = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
			Approach					
Blocks	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.1571	0.2058	0.2502	**0.2794**	0.2502	0.2502	**0.2794**	**0.2794**
10	0.2651	0.2058	0.2794	**0.3556**	0.3285	0.2522	0.3191	**0.3496**
15	0.3016	0.2058	0.3206	0.3983	**0.4007**	0.2483	0.3059	0.3970
20	0.3961	0.2058	0.3503	0.4529	**0.4693**	0.2490	0.2994	0.4552
25	0.4793	0.2058	0.4012	0.4962	**0.5328**	0.2527	0.2916	0.5125
30	0.5399	0.2058	0.4360	0.5370	**0.5843**	0.2557	0.2899	0.5668
35	0.5806	0.2058	0.4782	0.5691	**0.6183**	0.2507	0.2840	0.6016
40	0.6246	0.2058	0.5048	0.5946	**0.6504**	0.2528	0.2789	0.6417

Table 5.146: Estimated alpha values of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.25; d3=0.5; d4=0.75; d5=1

Fixed Sample Size $n_a = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
5	0.2343	0.3093	0.4060	**0.4807**	0.4060	0.4060	**0.4807**	**0.4807**
10	0.4368	0.3093	0.4736	0.6101	0.5621	0.4137	0.5409	**0.6019**
15	0.5527	0.3093	0.5543	0.6966	**0.7043**	0.4040	0.5272	0.7013
20	0.6949	0.3093	0.6147	0.7667	**0.7938**	0.4104	0.5142	0.7734
25	0.7922	0.3093	0.6937	0.8289	**0.8596**	0.4101	0.4964	0.8355
30	0.8580	0.3093	0.7374	0.8601	**0.8976**	0.4117	0.4867	0.8854
35	0.9016	0.3093	0.8008	0.8900	**0.9294**	0.4101	0.4766	0.9179
40	0.9281	0.3093	0.8297	0.9136	**0.9463**	0.4108	0.4682	0.9407

Table 5.147: Estimated alpha values of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.25; d3=0.5; d4=0.75; d5=1

Fixed Sample Size $n_a = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1816	0.2111	0.2745	**0.3342**	0.2745	0.2745	**0.3342**	**0.3342**
10	0.3225	0.2111	0.3190	0.4317	0.3878	0.2799	0.3726	**0.4322**
15	0.4182	0.2111	0.3900	0.5160	0.5225	0.2739	0.3648	**0.5284**
20	0.5394	0.2111	0.4384	0.5862	**0.6226**	0.2763	0.3565	0.6109
25	0.6307	0.2111	0.5028	0.6347	**0.6945**	0.2804	0.3460	0.6743
30	0.7085	0.2111	0.5496	0.6922	**0.7544**	0.2812	0.3321	0.7396
35	0.7721	0.2111	0.6070	0.7303	**0.7958**	0.2787	0.3296	0.7856
40	0.8039	0.2111	0.6490	0.7644	**0.8312**	0.2789	0.3210	0.8224

We consider five treatments in the study, the variance in the CRD portion is greater than the variance in the RCBD portion and the number of blocks for the RCBD portion is greater than or equal to the sample size for the CRD portion. The shift configuration: d2=0.1; d3=0.2; d4=0.3; d5=0.4 is applied to the location parameters of treatment 2, treatment 3 ,treatment 4, and treatment 5, respectively when the underlying distribution was exponential and the shift configuration: d2=0.25; d3=0.5; d4=0.75; d5=1.0 is applied to the location parameters when the underlying distributions were normal and T. Tables 5.150 through 5.155 show that when the number of blocks for the RCBD portion was five $(n_b = 5)$ and equal to the sample size for the CRD portion $(n_a = 5)$, Approach II, Approach V and Approach VI have the highest powers.

When the underlying distributions were normal and T, and the variance for the CRD portion was three times the variance of RCBD portion it was found that Approach VI has the highest powers (See Table 5.153 and Table 5.155). On the contrary, when the underlying distribution was exponential, irrespective of the magnitude of variability in the CRD portion of the mixed design, when the number of blocks for the RCBD portion is lesser than or equal 25 and the sample size for the CRD portion was small ($n_a = 5$), and fixed, Approach VI has the highest powers (See Table 5.151 and Table 5.153).

On the other hand, when the underlying distributions were normal or T and the variance in the CRD portion was twice the variance in the RCBD in the mixed design, and the number of blocks for the RCBD portion was lesser than or equal to 30, Approach VI had the highest powers(See Table 5.150 and Table 5.152). The relative percentage increase in the powers of Approach III relative to Approach VI were small.

Table 5.148: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Sample Size $n_a = 5$; $(\mathbf{CRD}\ exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1))$								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1700	0.1542	0.1941	**0.2413**	0.1941	0.1941	**0.2413**	**0.2413**
10	0.2552	0.1542	0.2188	0.2945	0.2607	0.1948	0.2507	**0.3116**
15	0.3119	0.1542	0.2668	0.3528	0.3579	0.1939	0.2511	**0.3793**
20	0.3954	0.1542	0.2904	0.3933	0.4290	0.1966	0.2400	**0.4328**
25	0.4715	0.1542	0.3383	0.4393	**0.4978**	0.1962	0.2324	0.4919
30	0.5331	0.1542	0.3677	0.4799	**0.5456**	0.1994	0.2314	0.5421
35	0.5773	0.1542	0.4139	0.5111	**0.5953**	0.1965	0.2285	0.5880
40	0.6278	0.1542	0.4376	0.5404	**0.6384**	0.1949	0.2213	0.6361

Table 5.149: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1612	0.1281	0.1655	**0.2175**	0.1655	0.1655	**0.2175**	**0.2175**
10	0.2531	0.1281	0.1900	0.2731	0.2376	0.1684	0.2272	**0.2970**
15	0.3069	0.1281	0.2356	0.3292	0.3335	0.1653	0.2198	**0.3632**
20	0.4046	0.1281	0.2662	0.3814	0.4193	0.1659	0.2139	**0.4354**
25	0.4630	0.1281	0.3064	0.4125	**0.4848**	0.1664	0.2023	0.4805
30	0.5295	0.1281	0.3376	0.4552	**0.5412**	0.1671	0.1966	0.5438
35	0.5653	0.1281	0.3787	0.4896	**0.5770**	0.1667	0.1945	0.5729
40	0.6197	0.1281	0.4085	0.5239	**0.6296**	0.1652	0.1892	**0.6303**

Table 5.150: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.5; d4=0.75; d5=1.0

Fixed Sample Size $n_a = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2442	0.1397	0.2074	**0.3192**	0.2074	0.2074	**0.3192**	**0.3192**
10	0.4412	0.1397	0.2627	0.4381	0.3605	0.2098	0.3371	**0.4908**
15	0.5511	0.1397	0.3401	0.5427	0.5574	0.2045	0.3151	**0.6249**
20	0.6937	0.1397	0.4025	0.6157	0.6974	0.2083	0.2993	**0.7322**
25	0.8013	0.1397	0.4826	0.6900	0.8109	0.2078	0.2826	**0.8154**
30	0.8618	0.1397	0.5454	0.7499	0.8665	0.2058	0.2706	**0.8711**
35	0.9008	0.1397	0.6181	0.7902	**0.9055**	0.2058	0.2634	0.9044
40	0.9289	0.1397	0.6651	0.8211	**0.9302**	0.2062	0.2535	0.9309

Table 5.151: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.5; d4=0.75; d5=1.0

Fixed Sample Size $n_a = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2503	0.1002	0.1529	**0.2649**	0.1529	0.1529	**0.2649**	**0.2649**
10	0.4381	0.1002	0.2016	0.3770	0.2931	0.1570	0.2699	**0.4510**
15	0.5536	0.1002	0.2682	0.4719	0.4884	0.1521	0.2444	**0.5982**
20	0.7047	0.1002	0.3317	0.5604	0.6654	0.1534	0.2307	**0.7203**
25	0.7880	0.1002	0.4041	0.6223	0.7707	0.1528	0.2149	**0.7922**
30	0.8593	0.1002	0.4652	0.6861	0.8487	0.1555	0.2079	**0.8569**
35	0.9018	0.1002	0.5370	0.7341	0.8941	0.1517	0.1982	**0.8975**
40	0.9272	0.1002	0.5933	0.7769	0.9257	0.1516	0.1905	**0.9279**

Table 5.152: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.5; d4=0.75; d5=1.0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1846	0.1419	0.1983	**0.2731**	0.1983	0.1983	**0.2731**	**0.2731**
10	0.3269	0.1419	0.2373	0.3749	0.3165	0.2005	0.2950	**0.3996**
15	0.4160	0.1419	0.3044	0.4437	0.4561	0.1933	0.2793	**0.4973**
20	0.5358	0.1419	0.3403	0.5087	0.5670	0.1992	0.2654	**0.5815**
25	0.6376	0.1419	0.4171	0.5722	0.6684	0.1971	0.2550	**0.6598**
30	0.7134	0.1419	0.4541	0.6201	**0.7252**	0.1977	0.2461	**0.7252**
35	0.7706	0.1419	0.5270	0.6718	**0.7806**	0.1964	0.2418	0.7764
40	0.8171	0.1419	0.5705	0.7130	**0.8276**	0.1967	0.2310	0.8258

Table 5.153: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.5; d4=0.75; d5=1.0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.1818	0.1142	0.1651	**0.2437**	0.1651	0.1651	**0.2437**	**0.2437**
10	0.3250	0.1142	0.1991	0.3281	0.2693	0.1653	0.2535	**0.3640**
15	0.4017	0.1142	0.2564	0.4024	0.4127	0.1588	0.2360	**0.4697**
20	0.5439	0.1142	0.3089	0.4789	0.5433	0.1608	0.2270	**0.5726**
25	0.6358	0.1142	0.3739	0.5277	0.6424	0.1632	0.2164	**0.6495**
30	0.7083	0.1142	0.4168	0.5865	0.7067	0.1641	0.2069	**0.7121**
35	0.7630	0.1142	0.4849	0.6328	0.7694	0.1603	0.2023	**0.7680**
40	0.8053	0.1142	0.5189	0.6734	0.8117	0.1634	0.1994	**0.8129**

We present the power estimates when there are five treatments in the study, the variance in the CRD portion is equal to the variance in the RCBD portion and the sample size for the CRD portion is greater than or equal to number of blocks for the RCBD portion. The shift configuration: d2=0.2; d3=0.2; d4=0.4; d5=0.4 is applied to the location parameters of treatment 2, treatment 3, treatment 4, and treatment 5, respectively, when the underlying distribution is exponential and the shift configuration: d2=0.5; d3=0.5; d4=1.0; d5=1.0 is applied to the location parameters when the underlying distributions were normal and T. It can be noted, in Tables 5.154 through 5.156, when the number of blocks for the RCBD portion is 10 $(n_b = 10)$ and equal to the sample size for the CRD portion $(n_a = 10)$, Approach II, Approach V and Approach VI have the highest powers.

As the sample size for the CRD portion increased and the number of blocks in the RCBD portion is fixed $(n_b = 10)$, Approach VI has the highest powers. Approach II has relatively high powers when the underlying distributions were exponential and normal. Approach IV had relatively high powers when the underlying distribution was T. These findings are similar to what was found when the shift configurations applied to the location parameters did not have a particular pattern in the case when the study comprised four treatments and in case when the study comprised three treatments.

Table 5.154: Estimated alpha values of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed number of Blocks $n_b = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)									
Sample			Approach						
Size	L*	FW*	I	II	III	IV	V	VI
10	0.2154	0.2409	0.2626	**0.3434**	0.2626	0.2626	**0.3434**	**0.3434**
15	0.2154	0.3036	0.3210	0.3921	0.3169	0.3287	0.3768	**0.3977**
20	0.2154	0.3613	0.3704	0.4425	0.3666	0.3805	0.3816	**0.4467**
25	0.2154	0.4081	0.4151	0.4756	0.4115	0.4269	0.3726	**0.4807**
30	0.2154	0.4614	0.4681	0.5124	0.4643	0.4795	0.3671	**0.5266**
35	0.2154	0.5075	0.5114	0.5440	0.5086	0.5249	0.3630	**0.5692**
40	0.2154	0.5534	0.5568	0.5781	0.5536	0.5681	0.3561	**0.6069**

Table 5.155: Estimated alpha values of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed number of Blocks $n_b = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.5678	0.6433	0.7084	**0.8681**	0.7084	0.7084	**0.8681**	**0.8681**
15	0.5678	0.7936	0.8234	0.9244	0.8156	0.8359	0.8997	**0.9293**
20	0.5678	0.8898	0.9015	0.9549	0.8963	0.9154	0.9051	**0.9632**
25	0.5678	0.9472	0.9518	0.9757	0.9486	0.9578	0.9015	**0.9824**
30	0.5678	0.9688	0.9723	0.9838	0.9706	0.9764	0.8894	**0.9878**
35	0.5678	0.9851	0.9858	0.9911	0.9852	0.9886	0.8841	**0.9938**
40	0.5678	0.9939	0.9946	0.9959	0.9942	0.9956	0.8729	**0.9974**

Table 5.156: Estimated alpha values of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed number of Blocks $n_b = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.4244	0.4883	0.5436	**0.7136**	0.5436	0.5436	**0.7136**	**0.7136**
15	0.4244	0.6293	0.6616	0.7910	0.6516	0.6792	0.7567	**0.7987**
20	0.4244	0.7552	0.7709	0.8601	0.7634	0.7887	0.7666	**0.8677**
25	0.4244	0.8248	0.8326	0.8905	0.8276	0.8467	0.7568	**0.9025**
30	0.4244	0.8785	0.8850	0.9196	0.8814	0.8956	0.7461	**0.9345**
35	0.4244	0.9236	0.9261	0.9456	0.9243	0.9333	0.7344	**0.9579**
40	0.4244	0.9527	0.9547	0.9585	0.9532	0.9603	0.7252	**0.9733**

We consider five treatments in the study, the variance in the CRD portion is greater than the variance in the RCBD portion and the sample size for the CRD portion is greater than or equal to number of blocks for the RCBD portion. The shift configuration: d2=0.2; d3=0.2; d4=0.4; d5=0.4 is applied to the location parameters of treatment 2, treatment 3 , treatment 4, and treatment 5, respectively when the underlying distribution is exponential and the shift configuration: d2=0.5; d3=0.5; d4=1.0; d5=1.0 is applied to the location parameters when the underlying distributions were normal and T. Tables 5.157 through 5.162 show that when the number of blocks for the RCBD portion was 10 ($n_b = 10$) and equal to the sample size for the CRD portion ($n_a = 10$), Approach II, Approach V and Approach VI have the highest powers. In addition, irrespective of underlying distribution Approach II has the highest powers

Table 5.157: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.3166	0.2527	0.2867	**0.4331**	0.2867	0.2867	**0.4331**	**0.4331**
15	0.3166	0.3241	0.3488	**0.4887**	0.3429	0.3594	0.4812	0.4806
20	0.3166	0.3853	0.3973	**0.5354**	0.3924	0.4113	0.4924	0.5172
25	0.3166	0.4358	0.4466	**0.5722**	0.4400	0.4625	0.4912	0.5536
30	0.3166	0.4851	0.4922	**0.6109**	0.4883	0.5129	0.4859	0.5895
35	0.3166	0.5385	0.5439	**0.6507**	0.5395	0.5639	0.4807	0.6335
40	0.3166	0.5772	0.5825	**0.6727**	0.5780	0.5983	0.4777	0.6573

Table 5.158: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.2610	0.1707	0.1919	**0.3193**	0.1919	0.1919	**0.3193**	**0.3193**
15	0.2610	0.2065	0.2223	**0.3597**	0.2172	0.2313	0.3572	0.3421
20	0.2610	0.2404	0.2509	**0.3852**	0.2477	0.2634	0.3699	0.3585
25	0.2610	0.2759	0.2854	**0.4141**	0.2796	0.2962	0.3739	0.3741
30	0.2610	0.3220	0.3287	**0.4534**	0.3252	0.3419	0.3718	0.4133
35	0.2610	0.3437	0.3488	**0.4684**	0.3446	0.3629	0.3686	0.4278
40	0.2610	0.3746	0.3792	**0.4872**	0.3756	0.3938	0.3635	0.4490

Table 5.159: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.5710	0.2719	0.3352	**0.6506**	0.3352	0.3352	**0.6506**	**0.6506**
15	0.5710	0.3505	0.3905	**0.7121**	0.3791	0.4099	0.7313	0.6628
20	0.5710	0.4100	0.4350	**0.7460**	0.4234	0.4658	0.7432	0.6718
25	0.5710	0.4870	0.5077	**0.7928**	0.4948	0.5325	0.7529	0.6989
30	0.5710	0.5466	0.5599	**0.8205**	0.5513	0.5907	0.7535	0.7276
35	0.5710	0.6064	0.6164	**0.8456**	0.6094	0.6426	0.7520	0.7530
40	0.5710	0.6613	0.6712	**0.8701**	0.6633	0.6966	0.7468	0.7842

Table 5.160: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.5635	0.1733	0.2205	**0.5459**	0.2205	0.2205	**0.5459**	**0.5459**
15	0.5635	0.2121	0.2435	**0.5979**	0.2326	0.2617	0.6460	0.5242
20	0.5635	0.2443	0.2668	**0.6225**	0.2564	0.2911	0.6644	0.5051
25	0.5635	0.2882	0.3076	**0.6662**	0.2961	0.3329	0.6860	0.5160
30	0.5635	0.3240	0.3402	**0.6895**	0.3303	0.3673	0.6858	0.5239
35	0.5635	0.3572	0.3668	**0.7118**	0.3593	0.3946	0.6874	0.5285
40	0.5635	0.3884	0.3982	**0.7329**	0.3902	0.4245	0.6905	0.5471

Table 5.161: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.4241	0.3181	0.3688	**0.5978**	0.3688	0.3688	**0.5978**	**0.5978**
15	0.4241	0.4117	0.4439	**0.6651**	0.4335	0.4611	0.6569	0.6429
20	0.4241	0.4995	0.5173	**0.7166**	0.5086	0.5379	0.6698	0.6859
25	0.4241	0.5837	0.5980	**0.7677**	0.5892	0.6194	0.6688	0.7396
30	0.4241	0.6395	0.6527	**0.8045**	0.6443	0.6764	0.6657	0.7666
35	0.4241	0.7083	0.7162	**0.8314**	0.7100	0.7350	0.6571	0.8074
40	0.4241	0.7454	0.7531	**0.8607**	0.7472	0.7696	0.6461	0.8340

Table 5.162: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.4192	0.2464	0.2902	**0.5321**	0.2902	0.2902	**0.5321**	**0.5321**
15	0.4192	0.3154	0.3475	**0.5903**	0.3408	0.3637	0.5943	0.5607
20	0.4192	0.3997	0.4179	**0.6533**	0.4103	0.4388	0.6221	0.6063
25	0.4192	0.4440	0.4581	**0.6803**	0.4493	0.4835	0.6154	0.6207
30	0.4192	0.5057	0.5171	**0.7248**	0.5102	0.5443	0.6184	0.6560
35	0.4192	0.5697	0.5778	**0.7521**	0.5721	0.6012	0.6089	0.6901
40	0.4192	0.6038	0.6114	**0.7825**	0.6061	0.6322	0.6056	0.7165

We present the power estimates when there are five treatments in the study, the variance in the CRD portion was equal to the variance in the RCBD portion and the number of blocks in the RCBD portion are greater than or equal to sample size for the CRD portion. The shift configuration: d2=0.2; d3=0.2; d4=0.4; d5=0.4 is applied to the location parameters of treatment 2, treatment 3, treatment 4, and treatment 5, respectively when the underlying distribution is exponential and the shift configuration: d2=0.5; d3=0.5; d4=1.0; d5=1.0 is applied to the location parameters when the underlying distributions were normal and T. Tables 5.163 through 5.165 show that when the number of blocks for the RCBD portion was 10 ($n_b = 10$) and equal to the sample size for the CRD portion ($n_a = 10$), Approach II, Approach V and Approach VI have the highest powers.

When the number of blocks in the RCBD portion are lesser than or equal to 25 and the sample size in the CRD portion is fixed ($n_a = 10$), Approach II has the highest powers. When the number of blocks for the RCBD portion are greater than or equal to 30 and the sample size for the CRD portion was fixed ($n_a = 10$), Approach VI has the highest powers for the exponential and normal distributions while when the underlying distribution was T Approach II has highest power regardless of number of blocks. Of note, is the relative percentage difference in the powers between Approach II and Approach VI was small

Ultimately, regardless of shift configuration, the variance in the CRD portion is equal to the variance in the RCBD portion and the number of blocks for the RCBD portion are greater than or equal to the sample size for the CRD portion we recommend using Approach II although Approach VI had the highest powers when the number of blocks for the RCBD portion are greater than or equal to 25 while the sample size in the CRD portion was fixed. This is because the relative percentage difference between the powers of Approach II and Approach VI is very small.

Table 5.163: Estimated alpha values of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Sample Size $n_a = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.2129	0.2442	0.2666	**0.3440**	0.2666	0.2666	**0.3440**	**0.3440**
15	0.2456	0.2442	0.2827	**0.3880**	0.3002	0.2683	0.3730	0.3810
20	0.3130	0.2442	0.2962	**0.4250**	0.3415	0.2675	0.3828	0.4212
25	0.3836	0.2442	0.3071	**0.4593**	0.3821	0.2690	0.3737	0.4585
30	0.4255	0.2442	0.3160	0.4902	0.4398	0.2675	0.3745	**0.4909**
35	0.4694	0.2442	0.3320	0.5198	0.4860	0.2696	0.3688	**0.5282**
40	0.5061	0.2442	0.3500	0.5533	0.5392	0.2712	0.3649	**0.5613**

Table 5.164: Estimated alpha values of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=1; d3=0.5; d4=0.5

Fixed Sample Size $n_a = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.5633	0.6531	0.7160	**0.8708**	0.7160	0.7160	**0.8708**	**0.8708**
15	0.7001	0.6531	0.7480	**0.9211**	0.7908	0.7175	0.9053	0.9152
20	0.8347	0.6531	0.7776	**0.9533**	0.8616	0.7180	0.9130	0.9485
25	0.9066	0.6531	0.8069	**0.9731**	0.9223	0.7215	0.9126	0.9690
30	0.9490	0.6531	0.8291	0.9812	0.9585	0.7212	0.9062	**0.9817**
35	0.9679	0.6531	0.8532	0.9896	0.9807	0.7217	0.9011	**0.9895**
40	0.9818	0.6531	0.8743	0.9923	0.9901	0.7210	0.8946	**0.9929**

Table 5.165: Estimated alpha values of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.1; d3=0.5; d4=0.5

Fixed Sample Size $n_a = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.1807	0.1759	0.2334	**0.3084**	0.2334	0.2334	**0.3084**	**0.3084**
15	0.4231	0.4868	0.5442	**0.7104**	0.5442	0.5442	0.7104	0.7104
20	0.5323	0.4868	0.5762	**0.7839**	0.6150	0.5480	0.7602	0.7819
25	0.6871	0.4868	0.6111	**0.8410**	0.7039	0.5491	0.7729	0.8363
30	0.7611	0.4868	0.6437	**0.8741**	0.7824	0.5512	0.7704	0.8709
35	0.8305	0.4868	0.6602	**0.9059**	0.8495	0.5522	0.7658	0.9057
40	0.8788	0.4868	0.6874	**0.9336**	0.9049	0.5496	0.7545	0.9291

We consider five treatments in the study, the variance in the CRD portion is greater than the variance in the RCBD portion and the number of blocks in the RCBD portion is greater than or equal to the sample size for the CRD portion. The shift configuration: d2=0.2; d3=0.2; d4=0.4; d5=0.4 is applied to the location parameters of treatment 2, treatment 3 , treatment 4, and treatment 5, respectively when the underlying distribution is exponential and the shift configuration: d2=0.5; d3=0.5; d4=1.0; d5=1.0 is applied to the location parameters when the underlying distributions were normal and T. Tables 5.166 through 5.171 show that when the number of blocks for the RCBD portion was 10 $(n_b = 10)$ and equal to the sample size for the CRD portion $(n_a = 10)$, Approach II, Approach V and Approach VI have the highest powers. Approach VI has the highest powers when we fix the sample size for the CRD portion $(n_a = 10)$ and varied the number of blocks for the RCBD portion

Table 5.166: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
10	0.3121	0.1662	0.1919	**0.3524**	0.1919	0.1919	**0.3524**	**0.3524**
15	0.3821	0.1662	0.2071	0.4156	0.2303	0.1930	0.3623	**0.4443**
20	0.4879	0.1662	0.2289	0.4775	0.2943	0.1938	0.3597	**0.5274**
25	0.5659	0.1662	0.2445	0.5178	0.3589	0.1957	0.3458	**0.5909**
30	0.6475	0.1662	0.2578	0.5751	0.4536	0.1951	0.3382	**0.6732**
35	0.6922	0.1662	0.2773	0.6101	0.5313	0.1965	0.3271	**0.7097**
40	0.7342	0.1662	0.2964	0.6466	0.6182	0.1945	0.3195	**0.7459**

Table 5.167: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2586	0.1764	0.1990	**0.3237**	0.1990	0.1990	**0.3237**	**0.3237**
15	0.3057	0.1764	0.2189	0.3729	0.2373	0.2045	0.3412	**0.3934**
20	0.3934	0.1764	0.2289	0.4248	0.2898	0.2010	0.3404	**0.4529**
25	0.4674	0.1764	0.2485	0.4631	0.3465	0.2046	0.3360	**0.5053**
30	0.5188	0.1764	0.2564	0.4941	0.4087	0.2039	0.3239	**0.5544**
35	0.5820	0.1764	0.2755	0.5489	0.4862	0.2010	0.3215	**0.6133**
40	0.6195	0.1764	0.2923	0.5758	0.5520	0.2043	0.3088	**0.6528**

Table 5.168: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.5529	0.2654	0.3259	**0.6394**	0.3259	0.3259	0**.6394**	**0.6394**
15	0.7020	0.2654	0.3640	0.7520	0.4138	0.3306	0.6687	**0.7920**
20	0.8260	0.2654	0.4021	0.8205	0.5383	0.3291	0.6618	**0.8726**
25	0.9095	0.2654	0.4442	0.8751	0.6728	0.3341	0.6518	**0.9299**
30	0.9457	0.2654	0.4679	0.9129	0.7933	0.3352	0.6220	**0.9621**
35	0.9693	0.2654	0.5069	0.9399	0.8848	0.3312	0.6071	**0.9781**
40	0.9808	0.2654	0.5473	0.9565	0.9411	0.3328	0.5903	**0.9870**

Table 5.169: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.5645	0.1675	0.2151	**0.5501**	0.2151	0.2151	**0.5501**	**0.5501**
15	0.6944	0.1675	0.2434	0.6560	0.2870	0.2162	0.5509	**0.7240**
20	0.8295	0.1675	0.2772	0.7358	0.4033	0.2156	0.5333	**0.8362**
25	0.9040	0.1675	0.3096	0.8094	0.5362	0.2167	0.5126	**0.9056**
30	0.9454	0.1675	0.3387	0.8578	0.6857	0.2185	0.4935	**0.9474**
35	0.9688	0.1675	0.3759	0.8944	0.8086	0.2174	0.4731	**0.9704**
40	0.9827	0.1675	0.4085	0.9229	0.8977	0.2175	0.4503	**0.9835**

Table 5.170: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.4161	0.3150	0.3705	**0.5842**	0.3705	0.3705	**0.5842**	**0.5842**
15	0.5248	0.3150	0.4016	0.6711	0.4420	0.3733	0.6247	**0.6941**
20	0.6705	0.3150	0.4324	0.7416	0.5367	0.3713	0.6254	**0.7789**
25	0.7692	0.3150	0.4681	0.8038	0.6363	0.3753	0.6213	**0.8393**
30	0.8398	0.3150	0.4903	0.8447	0.7357	0.3769	0.6083	**0.8811**
35	0.8791	0.3150	0.5153	0.8732	0.8197	0.3761	0.5946	**0.9110**
40	0.9145	0.3150	0.5482	0.9003	0.8792	0.3766	0.5825	**0.9365**

Table 5.171: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.4186	0.2472	0.2918	**0.5295**	0.2918	0.2918	**0.5295**	**0.5295**
15	0.5351	0.2472	0.3203	0.6219	0.3594	0.2953	0.5595	**0.6583**
20	0.6773	0.2472	0.3492	0.6997	0.4563	0.2949	0.5569	**0.7481**
25	0.7626	0.2472	0.3834	0.7494	0.5602	0.2971	0.5425	**0.8087**
30	0.8387	0.2472	0.4026	0.8014	0.6754	0.2978	0.5303	**0.8732**
35	0.8829	0.2472	0.4301	0.8403	0.7716	0.2972	0.5111	**0.9070**
40	0.9175	0.2472	0.4663	0.8728	0.8480	0.2974	0.4987	**0.9322**

We present the power estimates when there are five treatments in the study, the variance in the CRD portion is equal to the variance in the RCBD portion and the sample size for the CRD portion is greater than or equal to number of blocks for the RCBD portion. The shift configuration: d2=0; d3=0.25; d4=0.25; d5=0.25 is applied to the location parameters of treatment 2, treatment 3 , treatment 4, and treatment 5, respectively when the underlying distribution is exponential and the shift configuration: d2=0;

d3=0.75; d4=0.75; d5=0.75 is applied to the location parameters when the underlying distributions were normal and T. Tables 5.172 through 5.174 show that when the number of blocks for the RCBD portion was 15 ($n_b = 15$) and equal to the sample size ($n_a = 15$), Approach II, Approach V and Approach VI have the highest powers. As the sample size for the CRD portion increased and the number of blocks for the RCBD portion is fixed ($n_b = 15$), Approach VI has the highest powers. Approach II has relatively high powers.

Table 5.172: Estimated alpha values of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed number of Blocks $n_b = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.2214	0.2690	0.2904	**0.3930**	0.2904	0.2904	**0.3930**	**0.3930**
20	0.2214	0.3164	0.3260	0.4310	0.3240	0.3327	0.4164	**0.4368**
25	0.2214	0.3654	0.3758	0.4661	0.3716	0.3814	0.4246	**0.4674**
30	0.2214	0.4106	0.4192	0.4963	0.4147	0.4259	0.4244	**0.5009**
35	0.2214	0.4604	0.4652	0.5344	0.4622	0.4743	0.4258	**0.5442**
40	0.2214	0.5025	0.5075	0.5658	0.5047	0.5162	0.4187	**0.5786**

Table 5.173: Estimated alpha values of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed number of Blocks $n_b = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.4767	0.5793	0.6281	**0.8136**	0.6281	0.6281	**0.8136**	**0.8136**
20	0.4767	0.6897	0.7143	0.8619	0.7095	0.7242	0.8433	**0.8672**
25	0.4767	0.7798	0.7967	0.8982	0.7896	0.8047	0.8569	**0.9041**
30	0.4767	0.8404	0.8524	0.9277	0.8463	0.8617	0.8606	**0.9346**
35	0.4767	0.8926	0.8987	0.9485	0.8954	0.9047	0.8609	**0.9567**
40	0.4767	0.9232	0.9279	0.9607	0.9245	0.9337	0.8469	**0.9682**

Table 5.174: Estimated alpha values of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.3463	0.4378	0.4784	**0.6468**	0.4784	0.4784	**0.6468**	**0.6468**
20	0.3463	0.5325	0.5557	0.7038	0.5507	0.5646	0.6853	**0.7090**
25	0.3463	0.6196	0.6354	0.7527	0.6292	0.6462	0.7001	**0.7623**
30	0.3463	0.6825	0.6950	0.7942	0.6897	0.7075	0.7033	**0.8072**
35	0.3463	0.7418	0.7509	0.8296	0.7449	0.7629	0.6985	**0.8413**
40	0.3463	0.7976	0.8028	0.8563	0.8000	0.8129	0.6899	**0.8752**

We consider five treatments in the study, the variance in the CRD portion is greater than the variance in the RCBD portion and the sample size is greater than or equal to number of blocks. The shift configuration: d2=0; d3=0.25; d4=0.25; d5=0.25 is applied to the location parameters of treatment 2, treatment 3 , treatment 4, and treatment 5, respectively when the underlying distribution is exponential and the shift configuration: d2=0; d3=0.75; d4=0.75; d5=0.75 is applied to the location parameters when the underlying distributions were normal and T. Tables 5.176 through 5.181 show that when the number of blocks for the RCBD portion is was 15 ($n_b = 15$) and equal to the sample size for the CRD portion ($n_a = 15$), Approach II, Approach V and Approach VI have the highest powers. As the sample size for the CRD portion increases and the number of blocks for the RCBD is fixed Approach II has the highest powers. Approach VI has relatively high powers.

Table 5.175: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.2245	0.1948	0.2142	**0.3257**	0.2142	0.2142	**0.3257**	**0.3257**
20	0.2245	0.2157	0.2257	**0.3510**	0.2234	0.2318	0.3520	0.3441
25	0.2245	0.2557	0.2648	**0.3815**	0.2609	0.2705	0.3693	0.3694
30	0.2245	0.2805	0.2877	**0.3981**	0.2840	0.2940	0.3679	0.3864
35	0.2245	0.3101	0.3140	**0.4223**	0.3113	0.3216	0.3726	0.4059
40	0.2245	0.3278	0.3317	**0.4359**	0.3291	0.3397	0.3692	0.4143

Table 5.176: Estimated Alpha Values of Tests for Mixed Design under the Exponential distribution with unequal variance; k=5; Treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.3068	0.2182	0.2444	**0.4177**	0.2444	0.2444	**0.4177**	**0.4177**
20	0.3068	0.2557	0.2703	**0.4587**	0.2667	0.2775	0.4617	0.4429
25	0.3068	0.2877	0.3017	**0.4848**	0.2956	0.3109	0.4733	0.4569
30	0.3068	0.3148	0.3241	**0.5052**	0.3206	0.3361	0.4816	0.4696
35	0.3068	0.3542	0.3613	**0.5401**	0.3570	0.3720	0.4844	0.4975
40	0.3068	0.3912	0.3986	**0.5618**	0.3937	0.4112	0.4888	0.5191

Table 5.177: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.4766	0.2391	0.2808	**0.5834**	0.2808	0.2808	**0.5834**	**0.5834**
20	0.4766	0.2905	0.3181	**0.6278**	0.3102	0.3300	0.6439	0.5969
25	0.4766	0.3369	0.3557	**0.6619**	0.3477	0.3692	0.6712	0.6032
30	0.4766	0.3804	0.3963	**0.6927**	0.3883	0.4132	0.6860	0.6219
35	0.4766	0.4182	0.4294	**0.7199**	0.4238	0.4482	0.6877	0.6379
40	0.4766	0.4566	0.4665	**0.7437**	0.4604	0.4857	0.6904	0.6540

Table 5.178: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.4727	0.1530	0.1827	**0.4924**	0.1827	0.1827	**0.4924**	**0.4924**
20	0.4727	0.1806	0.2017	**0.5187**	0.1969	0.2101	0.5529	0.4744
25	0.4727	0.2070	0.2243	**0.5451**	0.2177	0.2360	0.5839	0.4634
30	0.4727	0.2201	0.2370	**0.5668**	0.2288	0.2506	0.6012	0.4566
35	0.4727	0.2493	0.2586	**0.5905**	0.2539	0.2752	0.6187	0.4561
40	0.4727	0.2677	0.2758	**0.6041**	0.2711	0.2916	0.6164	0.4602

Table 5.179: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.3573	0.2844	0.3176	**0.5277**	0.3176	0.3176	**0.5277**	**0.5277**
20	0.3573	0.3454	0.3650	**0.5843**	0.3615	0.3750	0.5859	0.5693
25	0.3573	0.4025	0.4201	**0.6307**	0.4128	0.4316	0.6069	0.6070
30	0.3573	0.4374	0.4539	**0.6529**	0.4466	0.4670	0.6111	0.6237
35	0.3573	0.4964	0.5058	**0.6931**	0.4999	0.5208	0.6106	0.6631
40	0.3573	0.5567	0.5645	**0.7223**	0.5599	0.5791	0.6117	0.6945

Table 5.180: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $(T(3) * \sqrt{3})$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.3647	0.2170	0.2487	**0.4843**	0.2487	0.2487	**0.4843**	**0.4843**
20	0.3647	0.2660	0.2845	**0.5161**	0.2793	0.2920	0.5263	0.4931
25	0.3647	0.3050	0.3224	**0.5635**	0.3145	0.3324	0.5615	0.5187
30	0.3647	0.3331	0.3486	**0.5858**	0.3408	0.3625	0.5587	0.5262
35	0.3647	0.3857	0.3957	**0.6163**	0.3902	0.4095	0.5679	0.5564
40	0.3647	0.4166	0.4263	**0.6447**	0.4200	0.4407	0.5653	0.5778

We present the power estimates when there are five treatments in the study, the variance in the CRD portion is equal to the variance in the RCBD portion and the number of blocks for the RCBD portion are greater than or equal to sample size for CRD portion. The shift configuration: d2=0; d3=0.25; d4=0.25; d5=0.25 is applied to the location parameters of treatment 2, treatment 3, treatment 4, and treatment 5, respectively when the underlying distribution is exponential and the shift configuration: d2=0; d3=0.75; d4=0.75; d5=0.75 is applied to the location parameters when the underlying distributions were normal and

T. Tables 5.182 through 5.184 that when the number of blocks $(n_b = 15)$ is equal to the sample size $(n_a = 15)$, Approach II, Approach V and Approach VI have the highest powers. As the number of blocks in the RCBD portion increased and the sample size for the CRD portion is fixed $(n_a = 15)$, Approach II has the highest powers. Approach VI has relatively high power.

Table 5.181: Estimated alpha values of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Sample Size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.2091	0.2693	0.2899	**0.3863**	0.2899	0.2899	**0.3863**	**0.3863**
20	0.2718	0.2693	0.2958	**0.4112**	0.3049	0.2890	0.4089	0.4084
25	0.3360	0.2693	0.3068	**0.4610**	0.3275	0.2918	0.4338	0.4537
30	0.3779	0.2693	0.3154	**0.4844**	0.3524	0.2913	0.4322	0.4784
35	0.4241	0.2693	0.3229	**0.5144**	0.3801	0.2914	0.4360	0.5092
40	0.4485	0.2693	0.3256	**0.5427**	0.4101	0.2909	0.4295	0.5375

Table 5.182: Estimated alpha values of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.4806	0.5801	0.6262	**0.8073**	0.6262	0.6262	**0.8073**	**0.8073**
20	0.6114	0.5801	0.6420	**0.8582**	0.6614	0.6277	0.8511	0.8532
25	0.7184	0.5801	0.6565	**0.8955**	0.6975	0.6277	0.8648	0.8906
30	0.7844	0.5801	0.6729	**0.9149**	0.7454	0.6285	0.8660	0.9083
35	0.8416	0.5801	0.6884	**0.9389**	0.7917	0.6283	0.8663	0.9341
40	0.8806	0.5801	0.6959	**0.9543**	0.8376	0.6279	0.8650	0.9513

Table 5.183: Estimated alpha values of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.3477	0.4293	0.4704	**0.6455**	0.4704	0.4704	**0.6455**	**0.6455**
20	0.4610	0.4293	0.4835	**0.7000**	0.5001	0.4698	0.6893	0.6980
25	0.5631	0.4293	0.4972	**0.7468**	0.5347	0.4687	0.7073	0.7418
30	0.6329	0.4293	0.5112	**0.7855**	0.5786	0.4695	0.7145	0.7809
35	0.6920	0.4293	0.5255	**0.8190**	0.6268	0.4700	0.7080	0.8153
40	0.7345	0.4293	0.5330	**0.8414**	0.6708	0.4694	0.7000	0.8394

We consider five treatments in the study, the variance in the CRD portion is greater than the variance in the RCBD portion and the number of blocks in the RCBD portion are greater than or equal to the sample size for the CRD portion. The shift configuration: d2=0; d3=0.25; d4=0.25; d5=0.25 is applied to the location parameters of treatment 2, treatment 3 , treatment 4, and treatment 5, respectively when the underlying distribution is exponential and the shift configuration: d2=0; d3=0.75; d4=0.75; d5=0.75 is applied to the location parameters when the underlying distributions were normal and T. Tables 5.185 through 5.190 show that when the number of blocks for the RCBD portion is 15 ($n_b = 15$) and equal to the sample size for the CRD portion ($n_a = 15$), Approach II, Approach V and Approach VI have the highest powers. Overall Approach VI has the highest powers when we fix the sample size for the CRD portion ($n_a = 15$) and varied the number of blocks for RCBD portion.

Table 5.184: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2132	0.1872	0.2049	**0.3159**	0.2049	0.2049	**0.3159**	**0.3159**
20	0.2918	0.1872	0.2109	0.3603	0.2170	0.2046	0.3419	**0.3688**
25	0.3350	0.1872	0.2172	0.3889	0.2381	0.2048	0.3487	**0.4022**
30	0.3787	0.1872	0.2237	0.4051	0.2606	0.2051	0.3387	**0.4294**
35	0.4160	0.1872	0.2313	0.4438	0.2848	0.2048	0.3417	**0.4674**
40	0.4566	0.1872	0.2329	0.4763	0.3162	0.2053	0.3389	**0.5027**

Table 5.185: Estimated alpha values of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3068	0.2127	0.2413	**0.4290**	0.2413	0.2413	**0.4290**	**0.4290**
20	0.4013	0.2127	0.2489	0.4746	0.2599	0.2393	0.4447	**0.4892**
25	0.4789	0.2127	0.2555	0.5188	0.2839	0.2385	0.4514	**0.5482**
30	0.5406	0.2127	0.2670	0.5611	0.3217	0.2389	0.4517	**0.5997**
35	0.5831	0.2127	0.2776	0.5874	0.3586	0.2407	0.4400	**0.6379**
40	0.6353	0.2127	0.2824	0.6252	0.3991	0.2390	0.4317	**0.6840**

Table 5.186: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 15$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4779	0.2266	0.2670	**0.5819**	0.2670	0.2670	**0.5819**	**0.5819**
20	0.6161	0.2266	0.2844	0.6539	0.3013	0.2685	0.6052	**0.6831**
25	0.7098	0.2266	0.2976	0.7085	0.3452	0.2682	0.6024	**0.7610**
30	0.7821	0.2266	0.3108	0.7552	0.3947	0.2673	0.5953	**0.8185**
35	0.8441	0.2266	0.3295	0.8007	0.4608	0.2692	0.5895	**0.8698**
40	0.8791	0.2266	0.3384	0.8324	0.5247	0.2675	0.5728	**0.9037**

Table 5.187: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
15	0.4856	0.1487	0.1800	**0.4971**	0.1800	0.1800	**0.4971**	**0.4971**
20	0.6182	0.1487	0.1899	0.5672	0.2058	0.1787	0.5100	**0.6136**
25	0.7212	0.1487	0.2040	0.6276	0.2394	0.1805	0.4972	**0.7132**
30	0.7823	0.1487	0.2112	0.6887	0.2808	0.1807	0.4846	**0.7828**
35	0.8398	0.1487	0.2262	0.7366	0.3392	0.1801	0.4725	**0.8390**
40	0.8770	0.1487	0.2331	0.7775	0.4067	0.1803	0.4549	**0.8845**

Table 5.188: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3609	0.2777	0.3131	**0.5416**	0.3131	0.3131	**0.5416**	**0.5416**
20	0.4638	0.2777	0.3260	0.5915	0.3400	0.3131	0.5657	**0.6041**
25	0.5428	0.2777	0.3349	0.6466	0.3723	0.3111	0.5779	**0.6634**
30	0.6281	0.2777	0.3523	0.6853	0.4220	0.3164	0.5754	**0.7148**
35	0.6857	0.2777	0.3663	0.7240	0.4702	0.3126	0.5667	**0.7621**
40	0.7383	0.2777	0.3702	0.7682	0.5277	0.3138	0.5631	**0.8051**

Table 5.189: Estimated alpha values of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3561	0.2159	0.2490	**0.4793**	0.2490	0.2490	**0.4793**	**0.4793**
20	0.4669	0.2159	0.2580	0.5342	0.2714	0.2485	0.5049	**0.5574**
25	0.5626	0.2159	0.2714	0.5982	0.3064	0.2508	0.5125	**0.6343**
30	0.6309	0.2159	0.2835	0.6388	0.3479	0.2533	0.5084	**0.6882**
35	0.6864	0.2159	0.2889	0.6742	0.3985	0.2490	0.4955	**0.7308**
40	0.7335	0.2159	0.3013	0.7161	0.4527	0.2511	0.4894	**0.7766**

CHAPTER 6. CONCLUSIONS

6.1. Three Population Simulations Conclusion

While the study comprised of three treatments, where treatment 1 was the control, regardless of differences in variability between the CRD and RCBD observations, number of blocks in the RCBD portion and sample size in the CRD portion in the mixed design, alpha values for all test statistics were approximately 0.05 for the exponential, normal and T distributions except for the modified Page's test statistic (L*) when the number of blocks for the RCBD portion was five, the alpha values were slightly below 0.05. In addition, while the sample size for the CRD portion was equal to the number of blocks for the RCBD portion, Approach II, Approach V and Approach VI had the highest powers. Recall that when the sample size for the CRD portion is equal to the number of blocks for the RCBD portion, Approach II, Approach V and Approach VI are equivalent. Approach II is when equal weight $\left(\frac{1}{\sqrt{2}}\right)$ was assigned to the standardized modified Fligner-Wolfe and standardized modified Page's test statistic.

When the number of blocks for the RCBD portion was small (five), and the sample size for the CRD portion was varied $(n_a \geq 5)$ in the mixed design, regardless of the shift configuration applied to the location parameters or distribution (exponential, normal and T), Approach VI had the highest powers when the variance in the CRD portion was equal to the variance in the RCBD portion. Approach IV also, had relatively high powers. Approach VI is when more weight, attributed to the sample size is assigned the standardized modified Fligner-Wolfe the CRD portion and less weight attributed to small number of blocks is assigned to the standardized modified Page's test statistic which is the RCBD portion of the mixed design.

On the other hand, we observed that for the exponential and T distribution, when the variance for the CRD portion was twice the variance for the RCBD portion, and the mixed design comprised five blocks, and the sample size was between 5 and 25 inclusive, Approach II had the highest powers while Approach VI had the highest powers when the sample size was between 30 and 40 inclusive. Also, Approach VI was noted to have higher powers than Approach II in some instances although, the relative percentage difference in the powers of Approach II relative and Approach VI was negligible. Overall, when the variance in the CRD portion was greater than the variance in the RCBD portion Approach II had the highest powers.

Likewise we considered a situation when the sample size for the CRD portion was five and kept constant, and the number of blocks for the RCBD portion were varied $(n_b \geq 5)$ in the mixed design, regardless of shift configuration applied to the location parameters or distribution (exponential, normal and T) and the number of blocks for the RCBD portion was greater than or equal to 10, Approach III had the highest powers when the variance in the CRD portion was equal to the variance in the RCBD portion. The power estimates for Approach II, and Approach VI were slightly lower than the power estimates for Approach III.

On the other hand, when the variance in the CRD portion was larger than the variance in the RCBD portion, there were varied deduction. Approach III had the highest powers for large number of blocks that is, at least 30 blocks while Approach VI had the highest powers for the smaller number of blocks that is, lesser than or equal to 30. The power estimates for Approach III are close to the power estimates for Approach VI and the relative percentage difference was negligible.

When the mixed design comprised, a sample size for the CRD portion of at least 15, regardless of shift configuration applied to the location parameters, distribution (exponential, normal and T) and the number of blocks was15 for the RCBD portion, we conclude that, when the variance in the CRD portion and the RCBD portion was equal, Approach VI had the highest powers. Of note, was Approach II had relatively high powers. On the other hand, when the variance in the CRD portion is greater than the variance in the RCBD portion, Approach II had the highest powers.

When the mixed design comprised at least 15 blocks, for the RCBD portion and a sample size for the CRD portion was fixed at 15, regardless of shift configuration applied to the location parameters or distribution (exponential, normal and T), Approach II had the highest powers overall when the variance in the CRD portion and the RCBD portion was equal. Approach VI had relatively high powers. On the other hand, when the variance in the CRD portion was greater than the variance in the RCBD portion, Approach VI had the highest powers.

6.2. Four Population Simulations Conclusion

While the study comprised four treatments, where treatment 1 was the control, regardless of differences in variability between the CRD and RCBD observations, number of blocks in the RCBD portion and sample size in the CRD portion in the mixed design, alpha values for all test statistics were at approximately 0.05 for the exponential, normal and T distributions. In addition when the sample size in the CRD portion was equal to the number of blocks for the RCBD portion, Approach II, Approach V and Approach VI, had the highest powers. Recall, Approach II is when equal weight $\left(\frac{1}{\sqrt{2}}\right)$ was assigned to the standardized modified Fligner-Wolfe and standardized modified Page's test statistic.

When the number of blocks in the RCBD portion was small (five) and the sample size for the CRD portion was at least five, in the mixed design, regardless of the distribution (exponential, normal and T), shift configuration applied to the treatments, Approach VI had the highest powers when the variance in the RCBD portion and the CRD portion was equal. On the other hand, we observed that for the exponential distribution, when the variance for the CRD portion was twice the variance of RCBD portion and the sample size for the CRD portion increased $(10 \leq n_a \leq 25)$ and we had five blocks for the RCBD portion in the mixed design, Approach II had the highest powers. As the sample size in the CRD portion continued to increase $(30 \leq n_a \leq 40)$, Approach VI has the highest powers. The relative percentage difference in the powers of Approach VI relative to Approach II was very small. Furthermore, for the exponential distribution, when the variance in the CRD portion was three times the variance in RCBD portion, Approach II had the highest powers as the sample size in the CRD portion increased.

Similarly, while the sample size in the CRD portion was small (five) and held constant and the number of blocks for the RCBD portion was lesser than or equal to 15, in the mixed design, regardless of shift configurations, Approach II had the highest powers when the variance in the CRD portion and the RCBD portion was equal. Generally for all three underlying distributions reported in this study, while the number of blocks for the RCBD portion was greater than 10 and the sample size for the CRD portion was fixed and small $(n_a = 5)$, Approach III has the highest powers. Approach VI has relatively high powers.

When the mixed design comprised, a sample size for the CRD portion of at least 15, regardless of shift configuration applied to the location parameters, distribution (exponential, normal and T) and the number of blocks was15 for the RCBD portion, we conclude that, when the variance in the CRD portion and the RCBD portion was equal, Approach VI had the highest powers. Of note, was Approach II had relatively high powers. On the other hand, when the variance in the CRD portion is greater than the variance in the RCBD portion, Approach II had the highest powers.

When the mixed design comprised at least 15 blocks, for the RCBD portion and a sample size for the CRD portion was fixed at 15, regardless of shift configuration applied to the location parameters or distribution (exponential, normal and T), Approach II had the highest powers overall when the variance in the CRD portion and the RCBD portion was equal. Approach VI had relatively high powers. On the other hand, when the variance in the CRD portion was greater than the variance in the RCBD portion, Approach VI had the highest powers.

6.3. Five Population Simulations Conclusion

The alpha values were approximately 0.05 for all tests statistics when the study comprised five treatments, regardless of underlying distributions (the exponential, normal and T), difference in variability between the CRD and RCBD observations, the sample size for the CRD portion and number of blocks for the RCBD portion in the mixed design. The only exception was the modified Page's test statistic (**L*)** were the alpha values were lesser than 0.05. Also, when the number of blocks in the RCBD portion were equal to the sample size in the CRD portion, Approach II, Approach V and Approach VI had the highest powers. Recall, Approach II is when equal weight $\left(\frac{1}{\sqrt{2}}\right)$ was assigned to the standardized modified Fligner-Wolfe and standardized modified Page's test statistic. Similar deductions were made while the study comprised of three and four treatments.

When the sample size for the CRD portion was at least five, and the variance in the CRD portion was equal to the variance in the RCBD portion, regardless of shift configuration applied to the location parameters or distribution (exponential, normal and T), Approach VI had the highest powers overall. On the other hand, when the variance in the CRD portion was greater than the variance in the RCBD portion, Approach II had the highest powers. A similar deduction was made when the study comprised three and four treatments.

When the mixed design comprised of at least five blocks for the RCBD portion, and the sample size for the CRD portion was five, regardless of shift configuration applied to the location parameters or distribution (exponential, normal and T), Approach III has the highest powers when the variance in the

CRD portion was equal to the variance in the RCBD portion. Of note, was Approach VI has relatively high powers. On the other hand, when the variance in the CRD portion was three times than the variance in the RCBD portion, while the underlying distributions were normal and T, Approach VI has the highest powers. Also, when the underlying distribution was exponential, and the variability in the CRD portion was greater than the variability in the RCBD portion of the mixed design with the number of blocks for the RCBD portion lesser than or equal 25 and the sample size for the CRD portion was five, Approach VI had the highest powers.

When the sample size for the CRD portion was at least 10 and the number of blocks for the RCBD portion was10, regardless of shift configuration applied to the location parameters or distribution (exponential, normal and T), Approach VI had the highest powers when the variance in the CRD portion and the RCBD portion was equal. On the other hand, when the variance in the CRD portion was greater than the variance in the RCBD portion, regardless of difference in variability between the CRD and RCBD observations, Approach II had the highest powers. Similar deduction was made when the study comprised three and four treatments.

When the number of blocks was fixed at 15 and the sample size for the CRD portion was at least 15, the variance in the CRD portion was equal to the variance in the RCBD portion, regardless of shift configuration applied to the location parameters or distribution (exponential, normal and T), Approach VI had the highest powers. Approach II had relatively high powers. On the other hand, when the variance in the CRD portion is greater than the variance in the RCBD portion, Approach II had the highest powers. In some instances Approach VI had relatively high powers, although the relative difference between the powers of Approach II and Approach VI was small.

When the number of blocks for the RCBD portion was at least 15, the sample size for the CRD portion was fixed at 15, regardless of shift configuration applied to the location parameters or distribution (exponential, normal and T) Approach II had the highest powers when the variance in the CRD portion was equal to the variance in the RCBD portion. Approach VI has relatively high powers. On the other hand, when the variance in the CRD portion was greater than the variance in the RCBD portion, Approach VI had the highest powers.

6.4. Conclusion

We proposed eight nonparametric tests for the simple tree alternative. Six of the eight nonparametric tests were introduced for the mixed design comprising a CRD portion and a RCBD portion. The asymptotic distribution of the test statistics could be used when the sample sizes and/or number of blocks are as low as five (5) since the estimated alpha values of all tests of the mixed design were 0.05. The simulation study entailed the sample sizes for the CRD portion and/or number of blocks for the RCBD portion to be at least five.

Regardless of the difference in variability between the RCBD and CRD observations in the mixed design, alpha values for all test statistics were approximately 0.05, with the exception of the standardized modified Page's test statistic (L*) in some instances where the alpha values were slightly below 0.05.

We conclude that, when the underlying distribution is unknown, and the sample size for the CRD portion was equal to the number of blocks for the RCBD portion, Approach II, Approach V, and approach VI have the equal powers in addition to being the highest powers.

Overall, when the variance in the CRD portion and the RCBD portion is equal, Approach VI has the highest powers when the mixed design comprised, the sample size for the CRD portion is at least greater than the number of blocks for the RCBD portion.

On the other hand, when the variance in the CRD portion is greater than the variance in the RCBD portion, Approach II has the highest powers.

Also, when the variance in the CRD portion and the RCBD portion was equal, Approach II has the highest powers when the mixed design comprised at least 15 blocks, for the RCBD portion and a sample size for the CRD portion was fixed at 15.

On the other hand, when the variance in the CRD portion is greater than the variance in the RCBD portion, Approach VI has the highest powers.

Recall, Approach VI is when more weight, attributed to the sample size is assigned the standardized modified Fligner-Wolfe the CRD portion and less weight attributed to small number of blocks is assigned to the standardized modified Page's test statistic which is the RCBD portion of the mixed design while, Approach II are when equal weight $\left(\frac{1}{\sqrt{2}}\right)$ is assigned to the standardized modified Fligner-Wolfe and standardized Page's test statistic.

REFERENCES

1. Daniel, W.W. (1990). Applied Nonparametric Statistics. 2nd Edition. PWS-Kent Publishing Company, Boston.
2. Dubnicka, S. R., Blair, R. C. and Hettmansperger, T. P. (2002). Rank-based procedures for mixed paired and two-sample designs. Journal of Modern Applied Statistical Methods Vol. 1: Issue 1, Article 6: 32-41.
3. Friedman, M. (1937). The Use of Ranks to Avoid the Assumption of Normality Implicit in the Analysis of Variance, Journal of the American Statistical Association, 32, 675-701.
4. Friedman, M. (1940). A Comparison of Alternative Tests of Significance for the Problem of m rankings, Annals of Mathematical Statistics, 11, 86-92.
5. Hemmer M.T, Magel R (2012) Nonparametric Test for the Umbrella Alternative in the Randomized Complete Block and Balanced Incomplete Block Mixed Design. MS North Dakota State University.
6. Hollander M, Wolfe DA (1999) Nonparametric Statistical Methods. (2ndedn), John Wiley and Sons, New York, USA.
7. Jonckheere, A.R. (1954). A Distribution-Free k-Sample Test against Ordered Alternatives, Biometrika, 41, 133-145.
8. Kim, D.H. and Kim, Y.C. (1992). Distribution-Free Tests for Umbrella Alternatives in a Randomized Block Design. Journal of Nonparametric Statistics, 1, 277-285.
9. Kruskal, W. H. (1952). A nonparametric test for the several sample problem. Annals of Mathematical Statistics, 23, 525-540.
10. Kruskal, W.H. and Wallis, W.A. (1953). Use of Ranks in One-Criterion Variance Analysis, Journal of the American Statistical Association, 47, 583-621.
11. Mack, G.A. and Wolfe, D.A. (1981). K-Sample Rank Tests for Umbrella Alternatives. Journal of the American Statistical Association, 76, 175-181.
12. Magel R, Cao L, Ndungu A (2012) Comparing the Durbin, Wilcoxon Signed-RankTest, and a Proposed Test in a Balanced Incomplete Block Design. The International Journal of Science in Society 3: 1-16.

13. Magel R and Fu R (2014) A Proposed Test for a Mixed Two-Sample Design. Journal of statistical Theory and Practice ,8:221-237

14. Magel and Ndungu (2013) Nonparametric Tests for Ordering in Completely Randomized and Randomized Block Mixed Designs., Journal of Biometrics and Biostatistics 20 4:4

15. Magel, R., Terpstra, J., and Wen, J. (2009). Proposed Tests for the Nondecreasing Alternative in a Mixed Design, Journal of Statistics and Management Systems, 12, 963-977. 61

16. Magel, R., Terpstra, J., Canonizado, K., and Park, J.I. (2010). Nonparametric Tests for Mixed Designs. Communication in Statistics – Simulation and Computation, 39, 1228-1250.

17. Mann H.B and Whitney D.R (1947) On a Test of Whether One of Two Random Variables is Stochastically Larger than the Other. Annals of Mathematical statistics 18: 50-60.

18. Mathisen D and Magel R (2011) A Comparison of Nonparametric Test Statistics for Nondecreasing Treatment Effects Over a Mixed Model Design, MS. North Dakota State University.

19. Ndungu, A. (2011). A Nonparametric Test for the Non-Decreasing Alternative in an Incomplete Block Design, Master's Thesis for North Dakota State University, Statistics Department.

20. Page, E.B. (1963). Ordered Hypotheses for Multiple Treatments: A Significance Test for Linear Ranks, Journal of the American Statistical Association, 58, 216-230.

21. Terpstra, T.J. (1952). The Asymptotic Normality and Consistency of Kendall's Test Against Trend, When Ties Are Present in One Ranking, Indag.Math., 14, 327-333.

22. Terpstra, Jeffrey & Magel, Rhonda (2003) A new nonparametric test for the ordered alternative problem. Journal of Nonparametric Statistics Volume 15, Issue 3, Page's 289-301

23. Wilcoxon, F. (1945). Individual Comparisons by Ranking Methods, Biometrics, 1, 80-83.

APPENDIX A. COMPUTED EXPECTED VALUES AND VARIANCES FOR THREE TO 10 POPULATIONS FOR MODIFIED PAGE'S TEST STATISTIC FOR ONE BLOCK

Table A1: An illustration of the expectation and variance for three to 10 treatments for modified page's test statistic for one block.

Number of Treatments	Expectation $(E(L_{M0}))$	Variance $(Var(L_{M0}))$
3	10.0	0.6667
4	17.5	1.2500
5	27.0	2.0000
6	38.5	2.9167
7	52.0	4.0000
8	67.5	5.2500
9	85.0	6.6667
10	104.5	8.2500

Table A2: Six ways when $k = 6$

Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6	L_{M0}
1	2	3	4	5	6	41
2	3	4	5	6	1	40
3	4	5	6	1	2	39
4	5	6	1	2	3	38
5	6	1	2	3	4	37
6	1	2	3	4	5	36

$L_{MO} = R_1 + 2\sum_{J=2}^{6} R_j = R_1 + 2(R_2 + R_3 + R_4 + R_5 + R_6)$; $E(L_{M0}) = \frac{41+40+39+38+37+36}{6} = \frac{231}{6} = 38.5$ and

$Var(L_{M0}) = ((41-38.5)^2 + (40-38.5)^2 + (39-38.5)^2 + (38-38.5)^2 + (37-38.5)^2 + (36-38.5)^2) = \frac{17.5}{6} = 2.9167$

Table A3: Seven ways when $k = 7$

Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6	Treatment 7	L_{M0}
1	2	3	4	5	6	7	55
2	3	4	5	6	7	1	54
3	4	5	6	7	1	2	53
4	5	6	7	1	2	3	52
5	6	7	1	2	3	4	51
6	7	1	2	3	4	5	50
7	1	2	3	4	5	6	49

$L_{M0} = R_1 + 2\sum_{J=2}^{7} R_j = R_1 + 2(R_2 + R_3 + R_4 + R_5 + R_6 + R_7)$; $E(L_{M0}) = \frac{55+54+53+52+51+50+49}{7} = \frac{364}{7} = 52$

and $Var(L_{M0}) = ((55-52)^2 + (54-52)^2 + (53-52)^2 + (52-52)^2 + (51-52)^2 + (50-52)^2 + (49-52)^2) = \frac{28}{7} = 4.0$

Table A4: Eight ways when $k = 8$

Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6	Treatment 7	Treatment 8	L_{M0}
1	2	3	4	5	6	7	8	71
2	3	4	5	6	7	8	1	70
3	4	5	6	7	8	1	2	69
4	5	6	7	8	1	2	3	68
5	6	7	8	1	2	3	4	67
6	7	8	1	2	3	4	5	66
7	8	1	2	3	4	5	6	65
8	1	2	3	4	5	6	7	64

$L_{M0} = R_1 + 2\sum_{j=2}^{8} R_j = R_1 + 2(R_2 + R_3 + R_4 + R_5 + R_6 + R_7 + R_8)$;

$E(L_{M0}) = \frac{71+70+69+68+67+66+65+64}{8} = \frac{540}{8} = 67.5$ and

$$Var(L_{M0}) = ((71-67.5)^2 + (70-67.5)^2 + (69-67.5)^2 + (68-67.5)^2 + (67-67.5)^2 + (66-67.5)^2 + (65-67.5)^2 + (64-67.5)^2) = \frac{42}{8} = 5.25$$

Table A5: Nine ways when $k = 9$

Treatment 1	Treatment 2	Treatment 3	Treatment 4	Treatment 5	Treatment 6	Treatment 7	Treatment 8	Treatment 9	L_{M0}
1	2	3	4	5	6	7	8	9	89
2	3	4	5	6	7	8	9	1	88
3	4	5	6	7	8	9	1	2	87
4	5	6	7	8	9	1	2	3	86
5	6	7	8	9	1	2	3	4	85
6	7	8	9	1	2	3	4	5	84
7	8	9	1	2	3	4	5	6	83
8	9	1	2	3	4	5	6	7	82
9	1	2	3	4	5	6	7	8	81

Using $L_{M0} = R_1 + 2\sum_{j=2}^{9} R_j = R_1 + 2(R_2 + R_3 + R_4 + R_5 + R_6 + R_7 + R_8 + R_9)$;

$E(L_{M0}) = \frac{89+88+87+86+85+84+83+82+81}{9} = \frac{765}{9} = 85$ and

$$Var(L_{M0}) = ((89-85)^2 + (88-85)^2 + (87-85)^2 + (86-85)^2 + (85-85)^2 + (84-85)^2 + (83-85)^2 + (82-85)^2 + (81-85)^2) = \frac{60}{9} = 6.67$$

Table A6: Ten ways when $k = 10$

Treatment 1	**Treatment 2**	**Treatment 3**	**Treatment 4**	**Treatment 5**	**Treatment 6**	**Treatment 7**	**Treatment 8**	**Treatment 9**	**Treatment 10**	L_{M0}
1	2	3	4	5	6	7	8	9	10	109
2	3	4	5	6	7	8	9	10	1	108
3	4	5	6	7	8	9	10	1	2	107
4	5	6	7	8	9	10	1	2	3	106
5	6	7	8	9	10	1	2	3	4	105
6	7	8	9	10	1	2	3	4	5	104
7	8	9	10	1	2	3	4	5	6	103
8	9	10	1	2	3	4	5	6	7	102
9	10	1	2	3	4	5	6	7	8	101
10	1	2	3	4	5	6	7	8	9	100

Using $L_{M0} = R_1 + 2\sum_{J=2}^{10} R_j = R_1 + 2(R_2 + R_3 + R_4 + R_5 + R_6 + R_7 + R_8 + R_9 + R_{10})$;

$E(L_{M0}) = \frac{109+108+107+106+105+104+103+102+101+100}{10} = \frac{1045}{10} = 104.5$ and

$$Var(L_{M0}) = ((109-104.5)^2 + (108-104.5)^2 + (107-104.5)^2 + (106-104.5)^2 + (105-104.5)^2 + (104-104.5)^2 + (103-104.5)^2$$
$$+ (102-104.5)^2 + (101-104.5)^2 + (100-104.5)^2) = \frac{82.5}{10} = 8.25$$

APPENDIX B. ESTIMATED ALPHA VALUES THREE POPULATIONS

Table B1: estimated alpha levels of test for mixed design under the exponential distribution with equal variance; treatments effects: d2=0; d3=0

Fixed number of Blocks $n_b = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.0384	0.0505	0.0521	0.0523	0.0521	0.0521	0.0523	0.0523
15	0.0384	0.0515	0.0513	0.0468	0.0514	0.0512	0.0470	0.0487
20	0.0384	0.0531	0.0534	0.0510	0.0523	0.0526	0.0500	0.0512
25	0.0384	0.0512	0.0515	0.0514	0.0514	0.0512	0.0472	0.0512
30	0.0384	0.0495	0.0493	0.0483	0.0496	0.0502	0.0482	0.0484
35	0.0384	0.0521	0.0519	0.0493	0.0519	0.0516	0.0484	0.0509
40	0.0384	0.0494	0.0496	0.0507	0.0495	0.0497	0.0479	0.0505

Table B2: estimated alpha levels of test for mixed design under the normal distribution with equal variance; treatments effects: d2=0; d3=0

Fixed number of Blocks $n_b = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.0378	0.0470	0.0491	0.0484	0.0491	0.0491	0.0484	0.0484
15	0.0378	0.0466	0.0476	0.0486	0.0470	0.0474	0.0506	0.0482
20	0.0378	0.0496	0.0489	0.0488	0.0490	0.0480	0.0486	0.0502
25	0.0378	0.0469	0.0473	0.0461	0.0470	0.0480	0.0486	0.0473
30	0.0378	0.0491	0.0489	0.0518	0.0492	0.0488	0.0491	0.0512
35	0.0378	0.0440	0.0437	0.0445	0.0439	0.0436	0.0493	0.0429
40	0.0378	0.0480	0.0484	0.0476	0.0483	0.0491	0.0487	0.0486

Table B3: Estimated alpha levels of test for mixed design under the t distribution with equal variance; treatments effects: d2=0; d3=0

Fixed number of Blocks $n_b = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.0398	0.0465	0.0465	0.0483	0.0465	0.0465	0.0483	0.0483
15	0.0398	0.0487	0.0499	0.0508	0.0496	0.0492	0.0518	0.0489
20	0.0398	0.0492	0.0492	0.0507	0.0488	0.0480	0.0522	0.0496
25	0.0398	0.0479	0.0478	0.0473	0.0484	0.0480	0.0507	0.0472
30	0.0398	0.0493	0.0490	0.0463	0.0496	0.0481	0.0496	0.0464
35	0.0398	0.0481	0.0470	0.0491	0.0474	0.0463	0.0492	0.0458
40	0.0398	0.0514	0.0512	0.0530	0.0512	0.0514	0.0518	0.0520

Table B4: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.0434	0.0494	0.0520	0.0547	0.0520	0.0520	0.0547	0.0547
15	0.0434	0.0490	0.0493	0.0544	0.0493	0.0494	0.0550	0.0541
20	0.0434	0.0484	0.0483	0.0510	0.0477	0.0476	0.0554	0.0499
25	0.0434	0.0506	0.0517	0.0521	0.0508	0.0516	0.0551	0.0528
30	0.0434	0.0490	0.0500	0.0546	0.0495	0.0517	0.0541	0.0517
35	0.0434	0.0498	0.0493	0.0508	0.0494	0.0504	0.0523	0.0502
40	0.0434	0.0499	0.0501	0.0527	0.0499	0.0505	0.0522	0.0515

Table B5: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ D and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.0384	0.0458	0.0474	0.0501	0.0474	0.0474	0.0501	0.0501
15	0.0384	0.0512	0.0521	0.0502	0.0515	0.0509	0.0496	0.0508
20	0.0384	0.0514	0.0522	0.0465	0.0514	0.0508	0.0470	0.0502
25	0.0384	0.0437	0.0430	0.0428	0.0435	0.0429	0.0457	0.0443
30	0.0384	0.0502	0.0506	0.0482	0.0507	0.0510	0.0457	0.0499
35	0.0384	0.0472	0.0458	0.0462	0.0466	0.0465	0.0472	0.0460
40	0.0384	0.0502	0.0503	0.0474	0.0504	0.0509	0.0477	0.0497

Table B6: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.0411	0.0483	0.0476	0.0512	0.0476	0.0476	0.0512	0.0512
15	0.0411	0.0485	0.0489	0.0510	0.0485	0.0487	0.0532	0.0494
20	0.0411	0.0499	0.0501	0.0499	0.0497	0.0498	0.0517	0.0486
25	0.0411	0.0524	0.0525	0.0564	0.0528	0.0527	0.0528	0.0572
30	0.0411	0.0512	0.0508	0.0551	0.0512	0.0518	0.0540	0.0532
35	0.0411	0.0499	0.0492	0.0511	0.0495	0.0488	0.0535	0.0484
40	0.0411	0.0507	0.0511	0.0503	0.0508	0.0512	0.0505	0.0500

Table B7: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.0384	0.0496	0.0512	0.0484	0.0512	0.0512	0.0484	0.0484
15	0.0384	0.0515	0.0530	0.0493	0.0524	0.0530	0.0500	0.0509
20	0.0384	0.0491	0.0485	0.0531	0.0484	0.0478	0.0494	0.0519
25	0.0384	0.0507	0.0508	0.0478	0.0510	0.0512	0.0489	0.0498
30	0.0384	0.0493	0.0492	0.0507	0.0498	0.0500	0.0496	0.0502
35	0.0384	0.0497	0.0498	0.0478	0.0493	0.0505	0.0470	0.0488
40	0.0384	0.0493	0.0489	0.0489	0.0490	0.0493	0.0483	0.0478

Table B8: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sampl e Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.0402	0.0482	0.0511	0.0482	0.0511	0.0511	0.0482	0.0482
15	0.0402	0.0521	0.0517	0.0495	0.0513	0.0511	0.0511	0.0505
20	0.0402	0.0506	0.0511	0.0508	0.0502	0.0497	0.0508	0.0520
25	0.0402	0.0495	0.0500	0.0484	0.0498	0.0495	0.0495	0.0464
30	0.0402	0.0500	0.0502	0.0503	0.0504	0.0511	0.0499	0.0511
35	0.0402	0.0493	0.0484	0.0494	0.0490	0.0475	0.0508	0.0493
40	0.0402	0.0499	0.0500	0.0530	0.0498	0.0509	0.0512	0.0521

Table B9: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.0384	0.0526	0.0534	0.0513	0.0534	0.0534	0.0513	0.0513
15	0.0384	0.0488	0.0489	0.0486	0.0484	0.0484	0.0495	0.0501
20	0.0384	0.0549	0.0551	0.0478	0.0542	0.0527	0.0495	0.0486
25	0.0384	0.0477	0.0480	0.0493	0.0478	0.0482	0.0489	0.0479
30	0.0384	0.0524	0.0523	0.0473	0.0527	0.0520	0.0473	0.0512
35	0.0384	0.0497	0.0496	0.0485	0.0496	0.0502	0.0483	0.0485
40	0.0384	0.0465	0.0461	0.0455	0.0465	0.0454	0.0467	0.0460

Table B10: Estimated alpha levels of test for mixed design under the exponential distribution with equal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0400	0.0502	0.0519	0.0465	0.0519	0.0519	0.0465	0.0465
15	0.0376	0.0502	0.0512	0.0473	0.0507	0.0510	0.0498	0.0478
20	0.0373	0.0502	0.0530	0.0517	0.0522	0.0501	0.0544	0.0505
25	0.0530	0.0502	0.0518	0.0505	0.0490	0.0509	0.0505	0.0489
30	0.0466	0.0502	0.0513	0.0517	0.0533	0.0517	0.0541	0.0483
35	0.0577	0.0502	0.0501	0.0511	0.0516	0.0520	0.0523	0.0438
40	0.0502	0.0502	0.0529	0.0512	0.0523	0.0525	0.0537	0.0508

Table B11: Estimated alpha levels of test for mixed design under the normal distribution with equal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0367	0.0492	0.0514	0.0494	0.0514	0.0514	0.0494	0.0494
15	0.0354	0.0492	0.0507	0.0480	0.0487	0.0492	0.0484	0.0469
20	0.0361	0.0492	0.0506	0.0487	0.0476	0.0482	0.0482	0.0502
25	0.0568	0.0492	0.0508	0.0478	0.0466	0.0490	0.0474	0.0501
30	0.0458	0.0492	0.0462	0.0508	0.0484	0.0494	0.0480	0.0505
35	0.0606	0.0492	0.0483	0.0485	0.0482	0.0495	0.0498	0.0495
40	0.0565	0.0492	0.0497	0.0529	0.0526	0.0510	0.0500	0.0550

Table B12: Estimated alpha levels of test for mixed design under the t distribution with equal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0391	0.0501	0.0525	0.0532	0.0525	0.0525	0.0532	0.0532
15	0.0413	0.0501	0.0526	0.0526	0.0515	0.0517	0.0529	0.0515
20	0.0346	0.0501	0.0531	0.0483	0.0502	0.0496	0.0503	0.0446
25	0.0530	0.0501	0.0549	0.0509	0.0498	0.0511	0.0524	0.0476
30	0.0473	0.0501	0.0505	0.0511	0.0505	0.0498	0.0514	0.0492
35	0.0565	0.0501	0.0506	0.0515	0.0508	0.0516	0.0532	0.0474
40	0.0506	0.0501	0.0505	0.0496	0.0503	0.0510	0.0509	0.0492

Table B13: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0424	0.0499	0.0514	0.0499	0.0514	0.0514	0.0499	0.0499
15	0.0440	0.0499	0.0516	0.0505	0.0498	0.0505	0.0490	0.0516
20	0.0386	0.0499	0.0529	0.0525	0.0495	0.0510	0.0501	0.0520
25	0.0533	0.0499	0.0504	0.0479	0.0479	0.0489	0.0489	0.0461
30	0.0475	0.0499	0.0489	0.0508	0.0484	0.0508	0.0504	0.0513
35	0.0593	0.0499	0.0492	0.0485	0.0482	0.0498	0.0509	0.0480
40	0.0462	0.0499	0.0468	0.0475	0.0481	0.0511	0.0474	0.0458

Table B14: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0421	0.0531	0.0553	0.0508	0.0553	0.0553	0.0508	0.0508
15	0.0405	0.0531	0.0527	0.0480	0.0509	0.0531	0.0492	0.0492
20	0.0376	0.0531	0.0556	0.0537	0.0530	0.0521	0.0540	0.0535
25	0.0548	0.0531	0.0551	0.0498	0.0509	0.0532	0.0517	0.0507
30	0.0483	0.0531	0.0513	0.0516	0.0493	0.0528	0.0515	0.0518
35	0.0611	0.0531	0.0516	0.0527	0.0529	0.0531	0.0526	0.0500
40	0.0509	0.0531	0.0525	0.0494	0.0498	0.0545	0.0533	0.0517

Table B15: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0403	0.0457	0.0460	0.0489	0.0460	0.0460	0.0489	0.0489
15	0.0397	0.0457	0.0471	0.0494	0.0469	0.0461	0.0472	0.0506
20	0.0389	0.0457	0.0474	0.0490	0.0451	0.0444	0.0457	0.0515
25	0.0582	0.0457	0.0484	0.0507	0.0510	0.0476	0.0498	0.0512
30	0.0478	0.0457	0.0458	0.0495	0.0478	0.0462	0.0484	0.0502
35	0.0588	0.0457	0.0458	0.0489	0.0485	0.0461	0.0475	0.0503
40	0.0506	0.0457	0.0470	0.0519	0.0516	0.0463	0.0478	0.0499

Table B16: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0389	0.0506	0.0518	0.0512	0.0518	0.0518	0.0512	0.0512
15	0.0399	0.0506	0.0522	0.0527	0.0512	0.0517	0.0519	0.0515
20	0.0423	0.0506	0.0530	0.0503	0.0488	0.0497	0.0482	0.0504
25	0.0566	0.0506	0.0527	0.0518	0.0522	0.0505	0.0513	0.0516
30	0.0473	0.0506	0.0469	0.0459	0.0480	0.0503	0.0483	0.0506
35	0.0631	0.0506	0.0497	0.0521	0.0503	0.0510	0.0520	0.0531
40	0.0496	0.0506	0.0480	0.0491	0.0499	0.0508	0.0481	0.0484

Table B17: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0400	0.0490	0.0500	0.0493	0.0500	0.0500	0.0493	0.0493
15	0.0389	0.0490	0.0501	0.0505	0.0482	0.0489	0.0504	0.0498
20	0.0357	0.0490	0.0503	0.0458	0.0475	0.0486	0.0470	0.0462
25	0.0535	0.0490	0.0505	0.0511	0.0528	0.0495	0.0515	0.0493
30	0.0465	0.0490	0.0476	0.0486	0.0486	0.0487	0.0495	0.0520
35	0.0578	0.0490	0.0496	0.0469	0.0464	0.0486	0.0496	0.0456
40	0.0486	0.0490	0.0495	0.0485	0.0491	0.0498	0.0506	0.0488

Table B18: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0403	0.0496	0.0505	0.0506	0.0505	0.0505	0.0506	0.0506
15	0.0407	0.0496	0.0502	0.0501	0.0484	0.0492	0.0490	0.0517
20	0.0421	0.0496	0.0513	0.0506	0.0478	0.0489	0.0499	0.0531
25	0.0520	0.0496	0.0495	0.0496	0.0498	0.0484	0.0482	0.0482
30	0.0481	0.0496	0.0476	0.0492	0.0497	0.0500	0.0483	0.0486
35	0.0625	0.0496	0.0480	0.0495	0.0493	0.0497	0.0493	0.0499
40	0.0502	0.0496	0.0495	0.0507	0.0498	0.0508	0.0508	0.0501

Table B19: Estimated alpha levels of test for mixed design under the exponential distribution with equal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0406	0.0524	0.0529	0.0497	0.0529	0.0529	0.0497	0.0497
20	0.0406	0.0549	0.0533	0.0552	0.0542	0.0540	0.0558	0.0558
25	0.0406	0.0506	0.0516	0.0506	0.0515	0.0518	0.0490	0.0496
30	0.0406	0.0453	0.0458	0.0508	0.0457	0.0463	0.0522	0.0464
35	0.0406	0.0500	0.0495	0.0519	0.0500	0.0495	0.0509	0.0510
40	0.0406	0.0485	0.0489	0.0514	0.0484	0.0478	0.0491	0.0492

Table B20: Estimated alpha levels of test for mixed design under the normal distribution with equal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks$n_b = 15$; (CRD $N(0, 1)$ and RCBD $N(0, 1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0394	0.0537	0.0520	0.0509	0.0520	0.0520	0.0509	0.0509
20	0.0394	0.0532	0.0519	0.0507	0.0527	0.0526	0.0505	0.0516
25	0.0394	0.0495	0.0495	0.0474	0.0494	0.0498	0.0496	0.0476
30	0.0394	0.0487	0.0494	0.0508	0.0496	0.0496	0.0502	0.0508
35	0.0394	0.0510	0.0500	0.0487	0.0506	0.0501	0.0498	0.0475
40	0.0394	0.0560	0.0560	0.0509	0.0560	0.0553	0.0490	0.0534

Table B21: Estimated alpha levels of test for mixed design under the t distribution with equal variance; treatments effects: d2=0; d3=0

Fixed number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0432	0.0464	0.0465	0.0470	0.0465	0.0465	0.0470	0.0470
20	0.0432	0.0528	0.0516	0.0523	0.0529	0.0524	0.0532	0.0520
25	0.0432	0.0472	0.0475	0.0486	0.0474	0.0472	0.0500	0.0475
30	0.0432	0.0480	0.0488	0.0516	0.0488	0.0488	0.0541	0.0504
35	0.0432	0.0524	0.0512	0.0508	0.0517	0.0520	0.0524	0.0502
40	0.0432	0.0481	0.0485	0.0490	0.0485	0.0487	0.0520	0.0479

Table B22: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0444	0.0538	0.0536	0.0530	0.0536	0.0536	0.0530	0.0530
20	0.0444	0.0503	0.0488	0.0520	0.0500	0.0500	0.0526	0.0509
25	0.0444	0.0524	0.0519	0.0514	0.0523	0.0519	0.0536	0.0507
30	0.0444	0.0536	0.0530	0.0538	0.0533	0.0531	0.0513	0.0526
35	0.0444	0.0510	0.0499	0.0535	0.0503	0.0511	0.0544	0.0505
40	0.0444	0.0461	0.0461	0.0513	0.0459	0.0462	0.0508	0.0494

Table B23: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0436	0.0527	0.0533	0.0522	0.0533	0.0533	0.0522	0.0522
20	0.0436	0.0486	0.0480	0.0516	0.0484	0.0481	0.0531	0.0489
25	0.0436	0.0499	0.0509	0.0517	0.0504	0.0511	0.0520	0.0511
30	0.0436	0.0524	0.0520	0.0527	0.0521	0.0518	0.0538	0.0536
35	0.0436	0.0466	0.0456	0.0486	0.0460	0.0461	0.0526	0.0471
40	0.0436	0.0498	0.0495	0.0498	0.0498	0.0505	0.0517	0.0506

Table B24: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0447	0.0485	0.0494	0.0547	0.0494	0.0494	0.0547	0.0547
20	0.0447	0.0536	0.0523	0.0510	0.0529	0.0532	0.0527	0.0515
25	0.0447	0.0494	0.0495	0.0514	0.0496	0.0495	0.0541	0.0508
30	0.0447	0.0507	0.0505	0.0539	0.0506	0.0506	0.0535	0.0520
35	0.0447	0.0506	0.0496	0.0517	0.0498	0.0499	0.0525	0.0497
40	0.0447	0.0516	0.0517	0.0517	0.0515	0.0517	0.0541	0.0521

Table B25: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0, 3)$ and RCBD $N(0, 1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0442	0.0525	0.0540	0.0521	0.0540	0.0540	0.0521	0.0521
20	0.0442	0.0539	0.0535	0.0561	0.0542	0.0544	0.0564	0.0560
25	0.0442	0.0462	0.0465	0.0490	0.0463	0.0474	0.0488	0.0489
30	0.0442	0.0511	0.0518	0.0496	0.0518	0.0519	0.0530	0.0510
35	0.0442	0.0523	0.0519	0.0516	0.0519	0.0522	0.0519	0.0515
40	0.0442	0.0466	0.0461	0.0511	0.0465	0.0459	0.0523	0.0471

Table B26: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 15$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0436	0.0527	0.0533	0.0522	0.0533	0.0533	0.0522	0.0522
20	0.0436	0.0486	0.0480	0.0516	0.0484	0.0481	0.0531	0.0489
25	0.0436	0.0499	0.0509	0.0517	0.0504	0.0511	0.0520	0.0511
30	0.0436	0.0524	0.0520	0.0527	0.0521	0.0518	0.0538	0.0536
35	0.0436	0.0466	0.0456	0.0486	0.0460	0.0461	0.0526	0.0471
40	0.0436	0.0498	0.0495	0.0498	0.0498	0.0505	0.0517	0.0506

Table B27: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.0440	0.0468	0.0483	0.0511	0.0483	0.0483	0.0511	0.0511
20	0.0440	0.0486	0.0477	0.0506	0.0487	0.0487	0.0509	0.0497
25	0.0440	0.0517	0.0512	0.0539	0.0518	0.0515	0.0541	0.0527
30	0.0440	0.0482	0.0486	0.0516	0.0490	0.0482	0.0533	0.0475
35	0.0440	0.0563	0.0559	0.0552	0.0559	0.0564	0.0569	0.0565
40	0.0440	0.0491	0.0495	0.0545	0.0494	0.0504	0.0576	0.0532

Table B28: Estimated alpha levels of test for mixed design under the exponential distribution with equal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.0387	0.0447	0.0466	0.0506	0.0466	0.0466	0.0506	0.0506
20	0.0412	0.0447	0.0468	0.0504	0.0472	0.0467	0.0491	0.0502
25	0.0546	0.0447	0.0461	0.0455	0.0457	0.0448	0.0455	0.0454
30	0.0499	0.0447	0.0463	0.0503	0.0467	0.0463	0.0473	0.0489
35	0.0617	0.0447	0.0458	0.0476	0.0465	0.0456	0.0462	0.0506
40	0.0507	0.0447	0.0485	0.0487	0.0476	0.0459	0.0479	0.0483

Table B29: Estimated alpha levels of test for mixed design under the normal distribution with equal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.0399	0.0484	0.0491	0.0478	0.0491	0.0491	0.0478	0.0478
20	0.0364	0.0484	0.0494	0.0495	0.0489	0.0498	0.0488	0.0487
25	0.0583	0.0484	0.0492	0.0524	0.0485	0.0487	0.0495	0.0530
30	0.0474	0.0484	0.0504	0.0498	0.0527	0.0503	0.0535	0.0519
35	0.0603	0.0484	0.0493	0.0487	0.0485	0.0491	0.0487	0.0497
40	0.0468	0.0484	0.0493	0.0461	0.0504	0.0488	0.0507	0.0479

Table B30: Estimated alpha levels of test for mixed design under the t distribution with equal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.0399	0.0520	0.0513	0.0492	0.0513	0.0513	0.0492	0.0492
20	0.0402	0.0520	0.0519	0.0531	0.0526	0.0520	0.0543	0.0538
25	0.0534	0.0520	0.0520	0.0479	0.0509	0.0518	0.0494	0.0481
30	0.0437	0.0520	0.0523	0.0463	0.0527	0.0522	0.0502	0.0448
35	0.0602	0.0520	0.0524	0.0512	0.0517	0.0530	0.0531	0.0501
40	0.0503	0.0520	0.0533	0.0504	0.0517	0.0515	0.0518	0.0516

Table B31: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0375	0.0480	0.0482	0.0479	0.0482	0.0482	0.0479	0.0479
20	0.0392	0.0480	0.0485	0.0499	0.0485	0.0488	0.0504	0.0496
25	0.0544	0.0480	0.0487	0.0509	0.0486	0.0480	0.0509	0.0507
30	0.0473	0.0480	0.0487	0.0499	0.0491	0.0487	0.0495	0.0509
35	0.0621	0.0480	0.0492	0.0477	0.0501	0.0485	0.0508	0.0504
40	0.0472	0.0480	0.0482	0.0459	0.0462	0.0481	0.0467	0.0446

Table B32: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0387	0.0500	0.0517	0.0489	0.0517	0.0517	0.0489	0.0489
20	0.0372	0.0500	0.0508	0.0489	0.0497	0.0505	0.0496	0.0468
25	0.0575	0.0500	0.0513	0.0517	0.0501	0.0502	0.0506	0.0535
30	0.0481	0.0500	0.0507	0.0476	0.0502	0.0503	0.0463	0.0496
35	0.0626	0.0500	0.0516	0.0488	0.0497	0.0497	0.0495	0.0491
40	0.0497	0.0500	0.0518	0.0496	0.0493	0.0505	0.0500	0.0487

Table B33: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0381	0.0468	0.0477	0.0461	0.0477	0.0477	0.0461	0.0461
20	0.0360	0.0468	0.0471	0.0471	0.0475	0.0481	0.0467	0.0483
25	0.0561	0.0468	0.0494	0.0484	0.0480	0.0486	0.0482	0.0485
30	0.0457	0.0468	0.0494	0.0465	0.0489	0.0489	0.0455	0.0465
35	0.0576	0.0468	0.0498	0.0466	0.0478	0.0487	0.0461	0.0472
40	0.0497	0.0468	0.0499	0.0485	0.0473	0.0486	0.0482	0.0512

Table B34: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0437	0.0484	0.0491	0.0506	0.0491	0.0491	0.0506	0.0506
20	0.0371	0.0484	0.0501	0.0507	0.0502	0.0496	0.0499	0.0496
25	0.0571	0.0484	0.0510	0.0499	0.0507	0.0503	0.0497	0.0508
30	0.0465	0.0484	0.0498	0.0484	0.0493	0.0497	0.0472	0.0480
35	0.0614	0.0484	0.0498	0.0465	0.0484	0.0494	0.0486	0.0482
40	0.0512	0.0484	0.0503	0.0494	0.0493	0.0489	0.0500	0.0481

Table B35: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0387	0.0500	0.0517	0.0489	0.0517	0.0517	0.0489	0.0489
20	0.0372	0.0500	0.0508	0.0489	0.0497	0.0505	0.0496	0.0468
25	0.0575	0.0500	0.0513	0.0517	0.0501	0.0502	0.0506	0.0535
30	0.0481	0.0500	0.0507	0.0476	0.0502	0.0503	0.0463	0.0496
35	0.0626	0.0500	0.0516	0.0488	0.0497	0.0497	0.0495	0.0491
40	0.0497	0.0500	0.0518	0.0496	0.0493	0.0505	0.0500	0.0487

Table B36: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0429	0.0511	0.0517	0.0521	0.0517	0.0517	0.0521	0.0521
20	0.0368	0.0511	0.0498	0.0532	0.0501	0.0506	0.0532	0.0519
25	0.0552	0.0511	0.0531	0.0495	0.0518	0.0523	0.0493	0.0513
30	0.0426	0.0511	0.0512	0.0486	0.0515	0.0518	0.0488	0.0485
35	0.0614	0.0511	0.0513	0.0487	0.0507	0.0516	0.0513	0.0506
40	0.0489	0.0511	0.0514	0.0502	0.0508	0.0517	0.0508	0.0509

Table B37: Estimated alpha levels of test for mixed design under the exponential distribution with equal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
20	0.0363	0.0553	0.0529	0.0505	0.0529	0.0529	0.0505	0.0505
25	0.0363	0.0464	0.0474	0.0483	0.0472	0.0475	0.0486	0.0479
30	0.0363	0.0483	0.0485	0.0491	0.0486	0.0483	0.0502	0.0492
35	0.0363	0.0504	0.0503	0.0551	0.0505	0.0509	0.0527	0.0532
40	0.0363	0.0511	0.0505	0.0505	0.0505	0.0515	0.0489	0.0497

Table B38: Estimated alpha levels of test for mixed design under the normal distribution with equal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
20	0.0365	0.0488	0.0487	0.0523	0.0487	0.0487	0.0523	0.0523
25	0.0365	0.0539	0.0531	0.0514	0.0536	0.0530	0.0516	0.0510
30	0.0365	0.0507	0.0505	0.0528	0.0512	0.0504	0.0511	0.0505
35	0.0365	0.0488	0.0485	0.0477	0.0487	0.0490	0.0484	0.0485
40	0.0365	0.0532	0.0528	0.0502	0.0528	0.0524	0.0481	0.0535

Table B39: Estimated alpha levels of test for mixed design under the t distribution with equal variance; treatments effects: d2=0; d3=0

Fixed number of Blocks $n_b = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
20	0.0369	0.0539	0.0520	0.0486	0.0520	0.0520	0.0486	0.0486
25	0.0369	0.0458	0.0458	0.0489	0.0457	0.0461	0.0484	0.0485
30	0.0369	0.0508	0.0506	0.0498	0.0512	0.0515	0.0497	0.0484
35	0.0369	0.0506	0.0499	0.0544	0.0505	0.0500	0.0546	0.0515
40	0.0369	0.0515	0.0515	0.0498	0.0518	0.0519	0.0497	0.0516

Table B40: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
20	0.0379	0.0517	0.0510	0.0470	0.0510	0.0510	0.0470	0.0470
25	0.0379	0.0497	0.0486	0.0489	0.0485	0.0486	0.0480	0.0509
30	0.0379	0.0535	0.0533	0.0495	0.0539	0.0538	0.0494	0.0502
35	0.0379	0.0519	0.0519	0.0517	0.0520	0.0518	0.0504	0.0515
40	0.0379	0.0520	0.0533	0.0513	0.0527	0.0523	0.0509	0.0512

Table B41: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
20	0.0359	0.0483	0.0471	0.0460	0.0471	0.0471	0.0460	0.0460
25	0.0359	0.0462	0.0467	0.0506	0.0468	0.0472	0.0495	0.0503
30	0.0359	0.0490	0.0489	0.0458	0.0491	0.0488	0.0473	0.0486
35	0.0359	0.0489	0.0477	0.0465	0.0481	0.0487	0.0484	0.0473
40	0.0359	0.0508	0.0505	0.0510	0.0503	0.0513	0.0482	0.0516

Table B42: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
20	0.0390	0.0493	0.0488	0.0524	0.0488	0.0488	0.0524	0.0524
25	0.0390	0.0466	0.0473	0.0500	0.0472	0.0468	0.0513	0.0492
30	0.0390	0.0468	0.0465	0.0542	0.0467	0.0470	0.0525	0.0516
35	0.0390	0.0510	0.0502	0.0539	0.0508	0.0515	0.0542	0.0530
40	0.0390	0.0526	0.0529	0.0576	0.0527	0.0533	0.0557	0.0571

Table B43: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
20	0.0389	0.0512	0.0481	0.0513	0.0481	0.0481	0.0513	0.0513
25	0.0389	0.0515	0.0512	0.0526	0.0509	0.0513	0.0519	0.0528
30	0.0389	0.0522	0.0518	0.0533	0.0522	0.0519	0.0522	0.0525
35	0.0389	0.0499	0.0494	0.0505	0.0493	0.0497	0.0494	0.0505
40	0.0389	0.0528	0.0529	0.0508	0.0530	0.0529	0.0515	0.0510

Table B44: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
20	0.0375	0.0526	0.0514	0.0513	0.0514	0.0514	0.0513	0.0513
25	0.0375	0.0520	0.0527	0.0486	0.0523	0.0528	0.0506	0.0499
30	0.0375	0.0513	0.0514	0.0521	0.0517	0.0519	0.0527	0.0540
35	0.0375	0.0477	0.0464	0.0483	0.0469	0.0466	0.0497	0.0469
40	0.0375	0.0517	0.0524	0.0523	0.0520	0.0524	0.0508	0.0525

Table B45: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
20	0.0360	0.0506	0.0485	0.0500	0.0485	0.0485	0.0500	0.0500
25	0.0360	0.0484	0.0482	0.0476	0.0482	0.0479	0.0474	0.0478
30	0.0360	0.0491	0.0495	0.0482	0.0495	0.0504	0.0500	0.0483
35	0.0360	0.0477	0.0475	0.0497	0.0476	0.0483	0.0512	0.0493
40	0.0360	0.0540	0.0542	0.0511	0.0537	0.0546	0.0501	0.0519

Table B46: Estimated alpha levels of test for mixed design under the exponential distribution with equal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0361	0.0539	0.0505	0.0536	0.0505	0.0505	0.0536	0.0536
25	0.0531	0.0539	0.0515	0.0525	0.0523	0.0517	0.0526	0.0510
30	0.0468	0.0539	0.0517	0.0491	0.0526	0.0524	0.0487	0.0500
35	0.0591	0.0539	0.0511	0.0498	0.0515	0.0525	0.0476	0.0472
40	0.0499	0.0539	0.0521	0.0488	0.0522	0.0533	0.0503	0.0493

Table B47: Estimated alpha levels of test for mixed design under the normal distribution with equal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0423	0.0485	0.0485	0.0517	0.0485	0.0485	0.0517	0.0517
25	0.0559	0.0485	0.0473	0.0508	0.0479	0.0478	0.0502	0.0493
30	0.0501	0.0485	0.0475	0.0501	0.0475	0.0475	0.0480	0.0516
35	0.0584	0.0485	0.0473	0.0474	0.0481	0.0476	0.0497	0.0453
40	0.0482	0.0485	0.0479	0.0480	0.0478	0.0493	0.0471	0.0504

Table B48: Estimated alpha levels of test for mixed design under the t distribution with equal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0359	0.0523	0.0512	0.0490	0.0512	0.0512	0.0490	0.0490
25	0.0542	0.0523	0.0507	0.0495	0.0511	0.0517	0.0505	0.0495
30	0.0464	0.0523	0.0513	0.0519	0.0526	0.0518	0.0520	0.0507
35	0.0588	0.0523	0.0514	0.0503	0.0521	0.0520	0.0513	0.0502
40	0.0453	0.0523	0.0498	0.0487	0.0501	0.0512	0.0513	0.0490

Table B49: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0380	0.0537	0.0515	0.0521	0.0515	0.0515	0.0521	0.0521
25	0.0560	0.0537	0.0516	0.0468	0.0525	0.0520	0.0454	0.0468
30	0.0468	0.0537	0.0536	0.0502	0.0549	0.0536	0.0517	0.0512
35	0.0583	0.0537	0.0511	0.0491	0.0504	0.0522	0.0501	0.0502
40	0.0510	0.0537	0.0520	0.0511	0.0528	0.0534	0.0510	0.0508

Table B50: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0360	0.0522	0.0501	0.0512	0.0501	0.0501	0.0512	0.0512
25	0.0571	0.0522	0.0509	0.0485	0.0514	0.0515	0.0497	0.0493
30	0.0463	0.0522	0.0510	0.0477	0.0513	0.0515	0.0476	0.0484
35	0.0598	0.0522	0.0505	0.0502	0.0514	0.0514	0.0499	0.0496
40	0.0472	0.0522	0.0508	0.0475	0.0498	0.0518	0.0491	0.0501

Table B51: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0349	0.0552	0.0528	0.0512	0.0528	0.0528	0.0512	0.0512
25	0.0531	0.0552	0.0530	0.0525	0.0537	0.0533	0.0514	0.0519
30	0.0444	0.0552	0.0539	0.0534	0.0539	0.0540	0.0531	0.0518
35	0.0591	0.0552	0.0527	0.0529	0.0534	0.0536	0.0519	0.0514
40	0.0476	0.0552	0.0518	0.0522	0.0525	0.0534	0.0522	0.0522

Table B52: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0405	0.0545	0.0539	0.0513	0.0539	0.0539	0.0513	0.0513
25	0.0523	0.0545	0.0527	0.0500	0.0536	0.0542	0.0513	0.0491
30	0.0479	0.0545	0.0523	0.0511	0.0521	0.0533	0.0514	0.0508
35	0.0641	0.0545	0.0537	0.0528	0.0539	0.0536	0.0534	0.0516
40	0.0509	0.0545	0.0535	0.0516	0.0533	0.0540	0.0522	0.0499

Table B53: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 20$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0349	0.0507	0.0499	0.0511	0.0499	0.0499	0.0511	0.0511
25	0.0585	0.0507	0.0502	0.0501	0.0511	0.0506	0.0512	0.0507
30	0.0449	0.0507	0.0507	0.0496	0.0529	0.0505	0.0516	0.0478
35	0.0581	0.0507	0.0502	0.0502	0.0498	0.0504	0.0481	0.0482
40	0.0533	0.0507	0.0506	0.0510	0.0500	0.0513	0.0488	0.0518

Table B54: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 20$; (CRD $(T(3) * \sqrt{3})$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0362	0.0532	0.0522	0.0512	0.0522	0.0522	0.0512	0.0512
25	0.0565	0.0532	0.0525	0.0510	0.0527	0.0527	0.0530	0.0506
30	0.0464	0.0532	0.0518	0.0505	0.0522	0.0521	0.0499	0.0521
35	0.0584	0.0532	0.0511	0.0475	0.0507	0.0518	0.0494	0.0493
40	0.0504	0.0532	0.0521	0.0553	0.0515	0.0525	0.0530	0.0532

APPENDIX C. ESTIMATED POWERS THREE POPULATIONS

Table C1: Estimated power of tests for mixed design under the exponential distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed number of Blocks $n_b = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach						
			I	II	III	IV	V	VI
5	0.0992	0.1940	0.2518	0.2829	0.2518	0.2518	0.2829	**0.2829**
10	0.0992	0.3152	0.3394	0.3845	0.3312	0.3668	0.3247	**0.3990**
15	0.0992	0.4254	0.4386	0.4642	0.4327	0.4664	0.3140	**0.4878**
20	0.0992	0.5168	0.5255	0.5295	0.5169	0.5442	0.3008	**0.5675**
25	0.0992	0.5929	0.6011	0.5867	0.5959	0.6207	0.2808	**0.6403**
30	0.0992	0.6632	0.6661	0.6343	0.6645	0.6860	0.2706	**0.7005**
35	0.0992	0.7197	0.7204	0.6726	0.7195	0.7380	0.2663	**0.7469**
40	0.0992	0.7719	0.7743	0.7138	0.7721	0.7882	0.2617	**0.7945**

Table C2: Estimated power of tests for mixed design under the normal distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed number of Blocks $n_b = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)									
Sample Size	L*	FW*	Approach						
			I	II	III	IV	V	VI
5	0.0707	0.1377	0.1783	0.1963	0.1783	0.1783	0.1963	**0.1963**
10	0.0707	0.2152	0.2346	0.2605	0.2277	0.2523	0.2257	**0.2700**
15	0.0707	0.2901	0.2980	0.3164	0.2961	0.3144	0.2214	**0.3294**
20	0.0707	0.3538	0.3609	0.3599	0.3529	0.3750	0.2091	**0.3887**
25	0.0707	0.4058	0.4100	0.4070	0.4079	0.4287	0.2039	**0.4449**
30	0.0707	0.4760	0.4790	0.4435	0.4774	0.4953	0.2024	**0.5087**
35	0.0707	0.5321	0.5331	0.4841	0.5316	0.5488	0.2009	**0.5562**
40	0.0707	0.5677	0.5700	0.5086	0.5677	0.5837	0.2002	**0.5910**

Table C3: Estimated power of tests for mixed design under the t distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed number of Blocks $n_b = 5$; (CRD $T(3)$ and CRBD $T(3)$)									
Sample Size	L*	FW*	Approach						
			I	II	III	IV	V	VI
5	0.0568	0.1200	0.1525	0.1589	0.1525	0.1525	0.1589	**0.1589**
10	0.0568	0.1717	0.1825	0.2021	0.1808	0.1946	0.1770	**0.2082**
15	0.0568	0.2187	0.2252	0.2386	0.2235	0.2399	0.1730	**0.2488**
20	0.0568	0.2735	0.2785	0.2824	0.2725	0.2873	0.1666	**0.2983**
25	0.0568	0.3056	0.3085	0.2966	0.3067	0.3167	0.1633	**0.3254**
30	0.0568	0.3483	0.3509	0.3325	0.3497	0.3618	0.1638	**0.3679**
35	0.0568	0.3914	0.3908	0.3589	0.3908	0.4052	0.1646	**0.4116**
40	0.0568	0.4269	0.4287	0.3872	0.4272	0.4400	0.1685	**0.4469**

Table C4: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)									
Sample Size	**L***	**FW***	**Approach I**	**Approach II**	**Approach III**	**Approach IV**	**Approach V**	**Approach VI**
5	0.0999	0.1530	0.1994	**0.2388**	0.1994	0.1994	**0.2388**	**0.2388**
10	0.0999	0.2327	0.2521	0.3154	0.2459	0.2761	0.2783	**0.3133**
15	0.0999	0.2999	0.3120	0.3695	0.3069	0.3371	0.2714	**0.3684**
20	0.0999	0.3708	0.3797	0.4229	0.3701	0.4015	0.2584	**0.4266**
25	0.0999	0.4233	0.4289	0.4587	0.4261	0.4478	0.2536	**0.4680**
30	0.0999	0.4780	0.4817	0.4998	0.4794	0.5006	0.2479	**0.5191**
35	0.0999	0.5296	0.5298	0.5403	0.5292	0.5512	0.2466	**0.5646**
40	0.0999	0.5765	0.5784	0.5689	0.5767	0.5977	0.2495	**0.6061**

Table C5: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size	**L***	**FW***	**Approach I**	**Approach II**	**Approach III**	**Approach IV**	**Approach V**	**Approach VI**
5	0.1050	0.1331	0.1845	0**.2252**	0.1845	0.1845	**0.2252**	**0.2252**
10	0.1050	0.1932	0.2087	0.2819	0.2030	0.2274	0.2623	**0.2651**
15	0.1050	0.2555	0.2652	0.3352	0.2614	0.2846	0.2648	**0.3114**
20	0.1050	0.2999	0.3081	0.3758	0.2997	0.3282	0.2557	**0.3539**
25	0.1050	0.3438	0.3499	0.4074	0.3460	0.3719	0.2518	**0.3911**
30	0.1050	0.3850	0.3888	0.4371	0.3862	0.4105	0.2499	**0.4271**
35	0.1050	0.4257	0.4273	0.4698	0.4255	0.4511	0.2520	**0.4635**
40	0.1050	0.4703	0.4740	0.4934	0.4705	0.4923	0.2507	**0.5020**

Table C6: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 5$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample Size	**L***	**FW***	**Approach I**	**Approach II**	**Approach III**	**Approach IV**	**Approach V**	**Approach VI**
5	0.0723	0.0871	0.1208	**0.1454**	0.1208	**0.1208**	**0.1454**	**0.1454**
10	0.0723	0.1219	0.1331	**0.1800**	0.1296	0.1455	0.1739	0.1668
15	0.0723	0.1357	0.1425	**0.1926**	0.1397	0.1563	0.1722	0.1758
20	0.0723	0.1667	0.1718	**0.2163**	0.1662	0.1789	0.1711	0.1940
25	0.0723	0.1826	0.1866	**0.2322**	0.1842	0.1991	0.1718	0.2128
30	0.0723	0.1968	0.1994	**0.2478**	0.1976	0.2100	0.1734	0.2194
35	0.0723	0.2202	0.2201	**0.2604**	0.2199	0.2317	0.1783	0.2389
40	0.0723	0.2364	0.2374	**0.2726**	0.2366	0.2486	0.1787	0.2558

Table C7: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
5	0.0751	0.0747	0.1017	**0.1299**	0.1017	0.1017	**0.1299**	**0.1299**
10	0.0751	0.0893	0.0973	**0.1533**	0.0944	0.1079	0.1506	0.1333
15	0.0751	0.0991	0.1045	**0.1551**	0.1022	0.1155	0.1539	0.1332
20	0.0751	0.1132	0.1169	**0.1692**	0.1128	0.1264	0.1534	0.1413
25	0.0751	0.1146	0.1176	**0.1761**	0.1158	0.1283	0.1531	0.1392
30	0.0751	0.1324	0.1346	**0.1929**	0.1332	0.1423	0.1625	0.1514
35	0.0751	0.1476	0.1474	**0.1978**	0.1472	0.1571	0.1599	0.1627
40	0.0751	0.1510	0.1523	**0.2088**	0.1513	0.1637	0.1665	0.1692

Table C8: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 5$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
5	0.0599	0.0937	0.1175	0.1364	0.1175	0.1175	0.1364	**0.1364**
10	0.0599	0.1243	0.1319	0.1601	0.1298	0.1444	0.1483	**0.1586**
15	0.0599	0.1497	0.1559	0.1847	0.1540	0.1678	0.1489	**0.1788**
20	0.0599	0.1881	0.1911	0.2130	0.1871	0.1988	0.1480	**0.2074**
25	0.0599	0.2085	0.2111	0.2252	0.2101	0.2219	0.1479	**0.2322**
30	0.0599	0.2328	0.2347	0.2491	0.2340	0.2447	0.1467	**0.2536**
35	0.0599	0.2578	0.2572	0.2624	0.2571	0.2681	0.1485	**0.2742**
40	0.0599	0.2847	0.2863	0.2915	0.2848	0.2966	0.1532	**0.3010**

Table C9: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 5$; (CRD $(T(3) * \sqrt{3})$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
5	0.0572	0.0833	0.1090	0.1223	0.1090	0.1090	0.1223	**0.1223**
10	0.0572	0.1119	0.1189	0.1485	0.1179	0.1292	0.1435	**0.1435**
15	0.0572	0.1270	0.1320	0.1686	0.1305	0.1435	0.1442	**0.1576**
20	0.0572	0.1553	0.1584	0.1806	0.1548	0.1657	0.1405	**0.1756**
25	0.0572	0.1726	0.1733	0.1928	0.1732	0.1809	0.1448	**0.1881**
30	0.0572	0.1865	0.1879	0.2088	0.1874	0.1949	0.1425	**0.2041**
35	0.0572	0.2028	0.2024	0.2206	0.2024	0.2104	0.1480	**0.2146**
40	0.0572	0.2204	0.2216	0.2336	0.2204	0.2308	0.1476	**0.2342**

Table C10: Estimated power of tests for mixed design under the exponential distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)									
Blocks			**Approach**						
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.0970	0.1974	0.2534	**0.2863**	0.2534	0.2534	0.2863	**0.2863**
10	0.2254	0.1974	0.2715	**0.3632**	0.3536	0.2426	0.3207	**0.3540**
15	0.3048	0.1974	0.3348	0.4312	**0.4428**	0.2536	0.3192	0.4254
20	0.3687	0.1974	0.3920	0.4853	**0.5154**	0.2461	0.3117	0.4863
25	0.5208	0.1974	0.4138	0.5260	**0.5665**	0.2530	0.3019	0.5479
30	0.5414	0.1974	0.4696	0.5826	**0.6125**	0.2542	0.2936	0.5949
35	0.6590	0.1974	0.5285	0.6273	**0.6719**	0.2507	0.2891	0.6570
40	0.6667	0.1974	0.5876	0.6607	**0.7093**	0.2524	0.2859	0.6985

Table C11: Estimated power of tests for mixed design under the normal distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.0692	0.1388	0.1775	**0.1959**	0.1775	0.1775	0.1959	0.1959
10	0.1591	0.1388	0.1860	0.2526	**0.2532**	0.1668	0.2257	0.2469
15	0.2069	0.1388	0.2250	0.2936	**0.3004**	0.1725	0.2173	0.2899
20	0.2388	0.1388	0.2691	0.3269	**0.3436**	0.1687	0.2126	0.3292
25	0.3564	0.1388	0.2755	0.3495	**0.3841**	0.1723	0.2075	0.3731
30	0.3720	0.1388	0.3188	0.4034	**0.4327**	0.1746	0.1986	0.4163
35	0.4654	0.1388	0.3606	0.4329	**0.4651**	0.1728	0.1987	0.4531
40	0.4691	0.1388	0.4040	0.4615	**0.5056**	0.1732	0.1946	0.4970

Table C12: Estimated power of tests for mixed design under the t distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.0574	0.1195	0.1514	0.1561	**0.1514**	0.1514	0.1561	0.1561
10	0.1357	0.1195	0.1498	0.1981	**0.2002**	0.1394	0.1806	0.1977
15	0.1656	0.1195	0.1846	0.2308	**0.2377**	0.1477	0.1780	0.2289
20	0.1880	0.1195	0.2104	0.2561	**0.2654**	0.1393	0.1716	0.2615
25	0.2781	0.1195	0.2075	0.2601	**0.2907**	0.1448	0.1665	0.2840
30	0.2774	0.1195	0.2395	0.2979	**0.3187**	0.1471	0.1626	0.3092
35	0.3584	0.1195	0.2757	0.3290	**0.3522**	0.1429	0.1597	0.3427
40	0.3519	0.1195	0.3112	0.3472	**0.3823**	0.1465	0.1602	0.3726

Table C13: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 5$; $(\mathbf{CRD}\ exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1))$									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
5	0.0993	0.1508	0.2042	0.2393	0.2042	0.2042	0.2393	**0.2393**
10	0.2232	0.1508	0.2200	0.3145	0.3018	0.1891	0.2681	**0.3180**
15	0.3153	0.1508	0.2714	0.3828	0.3952	0.1985	0.2592	**0.4058**
20	0.3653	0.1508	0.3263	0.4278	**0.4690**	0.1901	0.2469	0.4655
25	0.5133	0.1508	0.3470	0.4698	**0.5375**	0.1970	0.2455	0.5322
30	0.5386	0.1508	0.4068	0.5295	**0.5949**	0.2003	0.2385	0.5823
35	0.6610	0.1508	0.4606	0.5666	**0.6546**	0.1989	0.2332	0.6509
40	0.6642	0.1508	0.5149	0.6030	**0.6928**	0.1990	0.2256	0.6864

Table C14: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0978	0.1329	0.1807	0.2127	0.1807	0.1807	0.2127	**0.2127**
10	0.2255	0.1329	0.1953	0.2905	0.2741	0.1684	0.2398	**0.3058**
15	0.3103	0.1329	0.2464	0.3540	0.3708	0.1808	0.2337	**0.3871**
20	0.3706	0.1329	0.3006	0.4066	**0.4580**	0.1740	0.2290	0.4680
25	0.5157	0.1329	0.3168	0.4409	**0.5221**	0.1768	0.2177	0.5245
30	0.5431	0.1329	0.3703	0.4986	**0.5876**	0.1805	0.2163	0.5800
35	0.6520	0.1329	0.4254	0.5332	**0.6402**	0.1784	0.2056	0.6369
40	0.6698	0.1329	0.4813	0.5755	**0.6901**	0.1795	0.2031	0.6877

Table C15: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 5$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0725	0.0838	0.1176	0.1421	0.1176	0.1176	0.1421	**0.1421**
10	0.1551	0.0838	0.1220	0.1863	0.1768	0.1068	0.1532	**0.2024**
15	0.2019	0.0838	0.1512	0.2202	0.2300	0.1103	0.1477	**0.2498**
20	0.2420	0.0838	0.1866	0.2555	0.2941	0.1061	0.1428	**0.3021**
25	0.3572	0.0838	0.1966	0.3066	0.3436	0.1133	0.1387	**0.3509**
30	0.3749	0.0838	0.2349	0.3174	0.3914	0.1138	0.1354	**0.3955**
35	0.4690	0.0838	0.2672	0.3468	0.4410	0.1111	0.1308	**0.4404**
40	0.4772	0.0838	0.3130	0.3744	0.4798	0.1145	0.1301	**0.4847**

Table C16 Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)									
Blocks			**Approach**						
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.0665	0.0768	0.1019	0.1291	0.1019	0.1019	0.1291	**0.1291**
10	0.1605	0.0768	0.1072	0.1694	0.1569	0.0931	0.1343	**0.1933**
15	0.2094	0.0768	0.1355	0.2039	0.2143	0.0998	0.1314	**0.2479**
20	0.2412	0.0768	0.1655	0.2367	0.2723	0.0954	0.1229	**0.2967**
25	0.3582	0.0768	0.1773	0.2824	0.3311	0.1002	0.1221	**0.3449**
30	0.3779	0.0768	0.2087	0.3004	0.3879	0.1010	0.1185	**0.3952**
35	0.4642	0.0768	0.2469	0.3252	0.4279	0.1003	0.1173	**0.4342**
40	0.4762	0.0768	0.2824	0.3511	0.4791	0.0994	0.1142	**0.4819**

Table C17: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.0594	0.0927	0.1174	0.1285	0.1174	0.1174	0.1285	**0.1285**
10	0.1216	0.0927	0.1237	0.1678	0.1687	0.1131	0.1512	**0.1704**
15	0.1639	0.0927	0.1449	0.1983	0.2040	0.1154	0.1424	**0.2133**
20	0.1854	0.0927	0.1788	0.2252	0.2436	0.1113	0.1391	**0.2449**
25	0.2738	0.0927	0.1777	0.2626	**0.2758**	0.1148	0.1377	0.2700
30	0.2779	0.0927	0.2106	0.2715	**0.3076**	0.1171	0.1322	0.3055
35	0.3635	0.0927	0.2413	0.2939	**0.3477**	0.1149	0.1310	0.3421
40	0.3634	0.0927	0.2777	0.3172	**0.3764**	0.1175	0.1322	0.3738

Table C18: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.0670	0.0869	0.1110	0.1332	0.1110	0.1110	0.1332	**0.1332**
10	0.1248	0.0869	0.1096	0.1576	0.1518	0.1029	0.1360	**0.1642**
15	0.1621	0.0869	0.1369	0.1870	0.1957	0.1080	0.1332	**0.2092**
20	0.1827	0.0869	0.1648	0.2170	0.2428	0.1035	0.1283	**0.2437**
25	0.2647	0.0869	0.1617	0.2403	0.2557	0.1062	0.1242	**0.2589**
30	0.2782	0.0869	0.1919	0.2519	0.3009	0.1081	0.1220	**0.3025**
35	0.3549	0.0869	0.2190	0.2704	**0.3333**	0.1044	0.1188	0.3321
40	0.3563	0.0869	0.2527	0.2960	**0.3686**	0.1064	0.1178	0.3661

Table C19: Estimated power of tests for mixed design under the exponential distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.3106	0.4198	0.4591	0.6092	0.4591	0.4591	0.6092	**0.6092**
20	0.3106	0.5207	0.5387	0.6773	0.5362	0.5509	0.6518	**0.6822**
25	0.3106	0.5939	0.6142	0.7258	0.6068	0.6256	0.6630	**0.7362**
30	0.3106	0.6604	0.6720	0.7557	0.6664	0.6833	0.6622	**0.7749**
35	0.3106	0.7295	0.7368	0.8031	0.7317	0.7493	0.6571	**0.8262**
40	0.3106	0.7705	0.7773	0.8275	0.7724	0.7881	0.6503	**0.8506**

Table C20: Estimated power of tests for mixed design under the normal distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.2049	0.2753	0.3028	0.4152	0.3028	0.3028	0.4152	**0.4152**
20	0.2049	0.3554	0.3694	0.4760	0.3687	0.3778	0.4570	**0.4839**
25	0.2049	0.4064	0.4221	0.5214	0.4164	0.4323	0.4645	**0.5303**
30	0.2049	0.4726	0.4819	0.5668	0.4780	0.4913	0.4681	**0.5841**
35	0.2049	0.5211	0.5268	0.5981	0.5227	0.5378	0.4620	**0.6157**
40	0.2049	0.5773	0.5847	0.6366	0.5808	0.5960	0.4583	**0.6594**

Table C21: Estimated power of tests for mixed design under the t distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.1633	0.2244	0.2451	0.3248	0.2451	0.2451	0.3248	**0.3248**
20	0.1633	0.2671	0.2772	0.3594	0.2761	0.2838	0.3456	**0.3678**
25	0.1633	0.3130	0.3232	0.3969	0.3202	0.3306	0.3535	**0.4067**
30	0.1633	0.3570	0.3657	0.4285	0.3616	0.3734	0.3525	**0.4422**
35	0.1633	0.3959	0.3999	0.4532	0.3972	0.4095	0.3522	**0.4763**
40	0.1633	0.4224	0.4272	0.4762	0.4239	0.4358	0.3406	**0.4972**

Table C22: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.3029	0.2983	0.3345	**0.5153**	0.3345	0.3345	0.5153	0.5153
20	0.3029	0.3685	0.3861	**0.5607**	0.3836	0.3970	0.5544	0.5587
25	0.3029	0.4175	0.4369	**0.6093**	0.4298	0.4480	0.5732	0.5958
30	0.3029	0.4859	0.4990	**0.6501**	0.4940	0.5121	0.5831	0.6422
35	0.3029	0.5334	0.5409	**0.6795**	0.5358	0.5556	0.5794	0.6708
40	0.3029	0.5796	0.5880	**0.7137**	0.5836	0.6014	0.5724	0.7052

Table C23: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.3073	0.2508	0.2787	**0.4674**	0.2787	0.2787	0.4674	0.4674
20	0.3073	0.3033	0.3215	**0.5087**	0.3188	0.3310	0.5066	0.4986
25	0.3073	0.3541	0.3718	**0.5516**	0.3667	0.3828	0.5274	0.5324
30	0.3073	0.3836	0.3980	**0.5785**	0.3916	0.4107	0.5297	0.5483
35	0.3073	0.4430	0.4500	**0.6185**	0.4458	0.4630	0.5390	0.5848
40	0.3073	0.4632	0.4706	**0.6361**	0.4656	0.4836	0.5280	0.5976

Table C24: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.2115	0.1323	0.1470	**0.2771**	0.1470	0.1470	0.2771	0.2771
20	0.2115	0.1580	0.1659	**0.3006**	0.1650	0.1716	0.3067	0.2820
25	0.2115	0.1891	0.1982	**0.3289**	0.1949	0.2041	0.3337	0.3037
30	0.2115	0.2008	0.2090	**0.3477**	0.2050	0.2173	0.3384	0.3159
35	0.2115	0.2155	0.2215	**0.3620**	0.2176	0.2295	0.3367	0.3187
40	0.2115	0.2465	0.2515	**0.3789**	0.2485	0.2617	0.3415	0.3389

Table C25: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.2062	0.1002	0.1154	**0.2326**	0.1154	0.1154	0.2326	0.2326
20	0.2062	0.1131	0.1209	**0.2474**	0.1200	0.1249	0.2601	0.2259
25	0.2062	0.1243	0.1314	**0.2660**	0.1295	0.1361	0.2829	0.2292
30	0.2062	0.1332	0.1383	**0.2733**	0.1353	0.1458	0.2889	0.2299
35	0.2062	0.1433	0.1467	**0.2797**	0.1448	0.1531	0.2918	0.2274
40	0.2062	0.1490	0.1531	**0.2963**	0.1501	0.1616	0.2965	0.2356

Table C26: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.1579	0.1545	0.1703	**0.2587**	0.1703	0.1703	0.2587	0.2587
20	0.1579	0.1834	0.1910	**0.2787**	0.1913	0.1959	0.2790	0.2743
25	0.1579	0.2032	0.2114	**0.3054**	0.2083	0.2182	0.2903	0.2967
30	0.1579	0.2304	0.2367	**0.3269**	0.2337	0.2426	0.2884	0.3196
35	0.1579	0.2645	0.2678	**0.3523**	0.2652	0.2767	0.2957	0.3423
40	0.1579	0.2752	0.2807	**0.3666**	0.2772	0.2881	0.2922	0.3547

Table C27: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.0758	0.0644	0.0666	**0.2326**	0.1154	0.1154	0.2326	0.2326
20	0.0758	0.0655	0.0655	**0.2474**	0.1200	0.1249	0.2601	0.2259
25	0.0758	0.0723	0.0754	**0.2660**	0.1295	0.1361	0.2829	0.2292
30	0.0758	0.0673	0.0682	**0.2733**	0.1353	0.1458	0.2889	0.2299
35	0.0758	0.0707	0.0713	**0.2797**	0.1448	0.1531	0.2918	0.2274
40	0.0758	0.0792	0.0792	**0.2963**	0.1501	0.1616	0.2965	0.2356

Table C28: Estimated power of tests for mixed design under the exponential distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach I	II	III	IV	V	VI
15	0.3017	0.4118	0.4507	**0.6005**	0.4507	0.4507	0.6005	0.6005
20	0.3614	0.4118	0.4682	**0.6520**	0.4798	0.4536	0.6464	0.6466
25	0.5112	0.4118	0.4785	**0.7027**	0.5155	0.4517	0.6678	0.6877
30	0.5450	0.4118	0.4908	**0.7392**	0.5570	0.4541	0.6695	0.7272
35	0.6542	0.4118	0.5020	**0.7696**	0.5983	0.4533	0.6677	0.7614
40	0.6712	0.4118	0.5180	**0.8070**	0.6490	0.4525	0.6721	0.8009

Table C29: Estimated power of tests for mixed design under the normal distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks	L*	FW*	Approach I	II	III	IV	V	VI
15	0.2113	0.2806	0.3091	**0.4241**	0.3091	0.3091	0.4241	0.4241
20	0.2394	0.2806	0.3177	**0.4688**	0.3276	0.3093	0.4667	0.4565
25	0.3555	0.2806	0.3275	**0.5038**	0.3543	0.3081	0.4760	0.4894
30	0.3760	0.2806	0.3382	**0.5462**	0.3894	0.3085	0.4824	0.5274
35	0.4697	0.2806	0.3467	**0.5748**	0.4205	0.3079	0.4831	0.5599
40	0.4746	0.2806	0.3575	**0.6066**	0.4603	0.3099	0.4805	0.5902

Table C30: Estimated power of tests for mixed design under the t distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks	L*	FW*	Approach I	II	III	IV	V	VI
15	0.1683	0.2280	0.2460	**0.3240**	0.2460	0.2460	0.3240	0.3240
20	0.1800	0.2280	0.2525	**0.3581**	0.2584	0.2473	0.3513	0.3525
25	0.2733	0.2280	0.2571	**0.3851**	0.2777	0.2452	0.3570	0.3687
30	0.2778	0.2280	0.2654	**0.4155**	0.3047	0.2490	0.3698	0.4000
35	0.3671	0.2280	0.2747	**0.4420**	0.3286	0.2490	0.3728	0.4300
40	0.3611	0.2280	0.2795	**0.4663**	0.3515	0.2467	0.3688	0.4550

Table C31: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3074	0.3003	0.3303	0.5070	0.3303	0.3303	0.5070	**0.5070**
20	0.3646	0.3003	0.3434	0.5715	0.3566	0.3334	0.5517	**0.5772**
25	0.5156	0.3003	0.3545	0.6211	0.3914	0.3312	0.5615	**0.6322**
30	0.5461	0.3003	0.3628	0.6607	0.4290	0.3313	0.5609	**0.6774**
35	0.6523	0.3003	0.3780	0.6928	0.4698	0.3338	0.5532	**0.7194**
40	0.6651	0.3003	0.3900	0.7198	0.5273	0.3308	0.5531	**0.7547**

Table C32: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3020	0.2480	0.2775	0.4543	0.2775	0.2775	0.4543	**0.4543**
20	0.3675	0.2480	0.2892	0.5204	0.3014	0.2800	0.4953	**0.5333**
25	0.5106	0.2480	0.3018	0.5664	0.3327	0.2777	0.5015	**0.5883**
30	0.5437	0.2480	0.3099	0.6114	0.3721	0.2782	0.4957	**0.6497**
35	0.6519	0.2480	0.3198	0.6446	0.4073	0.2797	0.4881	**0.6961**
40	0.6712	0.2480	0.3329	0.6866	0.4634	0.2784	0.4880	**0.7405**

Table C33: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2038	0.1345	0.1532	0.2803	0.1532	0.1532	0.2803	**0.2803**
20	0.2413	0.1345	0.1578	0.3249	0.1665	0.1515	0.3018	**0.3411**
25	0.3695	0.1345	0.1638	0.3558	0.1829	0.1510	0.2986	**0.3859**
30	0.3692	0.1345	0.1705	0.3869	0.2073	0.1528	0.2987	**0.4307**
35	0.4623	0.1345	0.1773	0.4099	0.2313	0.1511	0.2862	**0.4665**
40	0.4752	0.1345	0.1832	0.4446	0.2666	0.1514	0.2853	**0.5137**

Table C34: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2022	0.1003	0.1130	0.2275	0.1130	0.1130	0.2275	**0.2275**
20	0.2436	0.1003	0.1207	0.2680	0.1266	0.1160	0.2445	**0.2915**
25	0.3625	0.1003	0.1248	0.3072	0.1406	0.1148	0.2452	**0.3465**
30	0.3682	0.1003	0.1308	0.3288	0.1609	0.1158	0.2362	**0.3840**
35	0.4692	0.1003	0.1363	0.3600	0.1855	0.1148	0.2338	**0.4447**
40	0.4730	0.1003	0.1429	0.3948	0.2176	0.1150	0.2349	**0.4851**

Table C35: Estimated Power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.1662	0.1533	0.1702	0.2625	0.1702	0.1702	0.2625	**0.2625**
20	0.1762	0.1533	0.1761	0.2800	0.1816	0.1704	0.2715	**0.2839**
25	0.2753	0.1533	0.1824	0.3102	0.1988	0.1703	0.2777	**0.3208**
30	0.2780	0.1533	0.1889	0.3404	0.2189	0.1723	0.2828	**0.3519**
35	0.3650	0.1533	0.1928	0.3625	0.2376	0.1716	0.2820	**0.3865**
40	0.3528	0.1533	0.1977	0.3869	0.2625	0.1708	0.2745	**0.4118**

Table C36: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2022	0.1003	0.1130	0.2275	0.1130	0.1130	0.2275	**0.2275**
20	0.2436	0.1003	0.1207	0.2680	0.1266	0.1160	0.2445	**0.2915**
25	0.3625	0.1003	0.1248	0.3072	0.1406	0.1148	0.2452	**0.3465**
30	0.3682	0.1003	0.1308	0.3288	0.1609	0.1158	0.2362	**0.3840**
35	0.4692	0.1003	0.1363	0.3600	0.1855	0.1148	0.2338	**0.4447**
40	0.4730	0.1003	0.1429	0.3948	0.2176	0.1150	0.2349	**0.4851**

Table C37: Estimated power of tests for mixed design under the exponential distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.3713	0.5138	0.5421	0.7144	0.5421	0.5421	0.7144	**0.7144**
25	0.3713	0.5923	0.6163	0.7641	0.6116	0.6199	0.7467	**0.7696**
30	0.3713	0.6697	0.6848	0.8081	0.6807	0.6935	0.7663	**0.8170**
35	0.3713	0.7305	0.7381	0.8401	0.7338	0.7480	0.7719	**0.8535**
40	0.3713	0.7688	0.7791	0.8600	0.7738	0.7883	0.7647	**0.8753**

Table C38: Estimated power of tests for mixed design under the normal distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.2470	0.3588	0.3783	0.5209	0.3783	0.3783	0.5209	**0.5209**
25	0.2470	0.4038	0.4208	0.5566	0.4170	0.4247	0.5444	**0.5622**
30	0.2470	0.4647	0.4789	0.6079	0.4751	0.4871	0.5665	**0.6206**
35	0.2470	0.5246	0.5336	0.6384	0.5303	0.5428	0.5673	**0.6572**
40	0.2470	0.5731	0.5808	0.6689	0.5762	0.5897	0.5648	**0.6879**

Table C39: Estimated power of tests for mixed design under the t distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed number of Blocks $n_b = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.1812	0.2815	0.2930	0.3941	0.2930	0.2930	0.3941	**0.3941**
25	0.1812	0.3080	0.3225	0.4288	0.3196	0.3251	0.4171	**0.4349**
30	0.1812	0.3541	0.3663	0.4553	0.3635	0.3741	0.4275	**0.4656**
35	0.1812	0.3920	0.3966	0.4826	0.3947	0.4042	0.4267	**0.4991**
40	0.1812	0.4282	0.4351	0.5140	0.4308	0.4425	0.4219	**0.5306**

Table C40: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.3747	0.3762	0.4026	**0.6260**	0.4026	0.4026	0.6260	0.6260
25	0.3747	0.4153	0.4391	**0.6668**	0.4340	0.4457	0.6639	0.6617
30	0.3747	0.4907	0.5100	**0.7023**	0.5051	0.5203	0.6846	0.6998
35	0.3747	0.5453	0.5567	**0.7389**	0.5504	0.5672	0.6968	0.7244
40	0.3747	0.5752	0.5854	**0.7579**	0.5800	0.5966	0.6914	0.7427

Table C41: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.1219	0.2992	0.3236	**0.5667**	0.3236	0.3236	0.5667	0.5667
25	0.1219	0.3404	0.3653	**0.6134**	0.3598	0.3699	0.6109	0.6002
30	0.1219	0.3911	0.4074	**0.6326**	0.4026	0.4167	0.6299	0.6164
35	0.1219	0.4420	0.4526	**0.6719**	0.4482	0.4627	0.6455	0.6428
40	0.1219	0.4721	0.4835	**0.6949**	0.4768	0.4966	0.6493	0.6598

Table C42: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.2378	0.1601	0.1726	**0.3429**	0.1726	0.1726	0.3429	0.3429
25	0.2378	0.1840	0.1976	**0.3648**	0.1944	0.2000	0.3722	0.3529
30	0.2378	0.1928	0.2019	**0.3752**	0.1998	0.2075	0.3826	0.3519
35	0.2378	0.2204	0.2269	**0.4040**	0.2242	0.2356	0.4008	0.3674
40	0.2378	0.2353	0.2441	**0.4144**	0.2391	0.2531	0.4027	0.3752

Table C43: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.2441	0.1164	0.1275	**0.2957**	0.1275	0.1275	0.2957	0.2957
25	0.2441	0.1260	0.1373	**0.3020**	0.1353	0.1404	0.3168	0.2827
30	0.2441	0.1331	0.1406	**0.3212**	0.1386	0.1459	0.3369	0.2841
35	0.2441	0.1429	0.1488	**0.3236**	0.1458	0.1535	0.3452	0.2752
40	0.2441	0.1551	0.1598	**0.3357**	0.1569	0.1658	0.3533	0.2778

Table C44: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
20	0.1874	0.1874	0.1977	**0.3144**	0.1977	0.1977	**0.3144**	**0.3144**
25	0.1874	0.2046	0.2141	**0.3321**	0.2122	0.2173	0.3325	0.3282
30	0.1874	0.2380	0.2456	**0.3624**	0.2442	0.2511	0.3531	0.3527
35	0.1874	0.2578	0.2644	**0.3866**	0.2616	0.2721	0.3561	0.3731
40	0.1874	0.2774	0.2848	**0.4030**	0.2797	0.2904	0.3586	0.3857

Table C45: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.1802	0.1520	0.1606	**0.2762**	0.1606	0.1606	**0.2762**	**0.2762**
25	0.1802	0.1655	0.1746	**0.2966**	0.1731	0.1769	0.2983	0.2861
30	0.1802	0.1786	0.1877	**0.3086**	0.1847	0.1935	0.3040	0.2932
35	0.1802	0.2026	0.2091	**0.3316**	0.2072	0.2144	0.3192	0.3092
40	0.1802	0.2195	0.2260	**0.3454**	0.2212	0.2314	0.3217	0.3243

Table C46: Estimated power of tests for mixed design under the exponential distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.3689	0.5004	0.5289	**0.7155**	0.5289	0.5289	0.7155	0.7155
25	0.5222	0.5004	0.5353	**0.7568**	0.5474	0.5302	0.7537	0.7528
30	0.5440	0.5004	0.5456	**0.7927**	0.5740	0.5319	0.7693	0.7890
35	0.6508	0.5004	0.5529	**0.8122**	0.5957	0.5321	0.7720	0.8024
40	0.6675	0.5004	0.5618	**0.8408**	0.6212	0.5326	0.7778	0.8311

Table C47: Estimated power of tests for mixed design under the normal distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.2375	0.3498	0.3686	**0.5211**	0.3686	0.3686	0.5211	0.5211
25	0.3532	0.3498	0.3779	**0.5497**	0.3887	0.3732	0.5484	0.5423
30	0.3706	0.3498	0.3826	**0.5862**	0.4046	0.3719	0.5668	0.5742
35	0.4796	0.3498	0.3885	**0.6265**	0.4237	0.3714	0.5807	0.6138
40	0.4772	0.3498	0.3968	**0.6501**	0.4421	0.3742	0.5833	0.6317

Table C48: Estimated power of tests for mixed design under the t distribution with equal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.1824	0.2763	0.2908	0.3926	0.2908	0.2908	0.3926	0.3926
25	0.2721	0.2763	0.2921	0.4260	0.3000	0.2908	0.4251	0.4213
30	0.2769	0.2763	0.2984	0.4430	0.3134	0.2912	0.4278	0.4346
35	0.3619	0.2763	0.3054	0.4836	0.3300	0.2929	0.4460	0.4728
40	0.3500	0.2763	0.3076	0.4967	0.3414	0.2934	0.4425	0.4837

Table C49: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.3682	0.3649	0.3911	0.6202	0.3911	0.3911	**0.6202**	**0.6202**
25	0.5155	0.3649	0.4009	0.6648	0.4146	0.3940	0.6521	**0.6704**
30	0.5458	0.3649	0.4078	0.7064	0.4350	0.3928	0.6691	**0.7157**
35	0.6587	0.3649	0.4147	0.7457	0.4540	0.3930	0.6713	**0.7573**
40	0.6699	0.3649	0.4231	0.7769	0.4869	0.3953	0.6715	**0.7902**

Table C50: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.3694	0.2943	0.3195	**0.5627**	0.3195	0.3195	**0.5627**	**0.5627**
25	0.5147	0.2943	0.3295	0.6111	0.3406	0.3232	0.5843	**0.6227**
30	0.5403	0.2943	0.3362	0.6553	0.3621	0.3215	0.6026	**0.6781**
35	0.6554	0.2943	0.3437	0.6936	0.3843	0.3247	0.6097	**0.7210**
40	0.6640	0.2943	0.3508	0.7247	0.4108	0.3234	0.6036	**0.7604**

Table C51: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.2413	0.1553	0.1667	**0.3376**	0.1667	0.1667	**0.3376**	**0.3376**
25	0.3641	0.1553	0.1720	0.3768	0.1792	0.1702	0.3538	**0.3932**
30	0.3761	0.1553	0.1767	0.4099	0.1930	0.1694	0.3565	**0.4387**
35	0.4657	0.1553	0.1803	0.4377	0.2034	0.1688	0.3530	**0.4825**
40	0.4707	0.1553	0.1844	0.4716	0.2200	0.1701	0.3514	**0.5240**

Table C52: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.2369	0.1126	0.1218	0.2858	0.1218	0.1218	0.2858	**0.2858**
25	0.3595	0.1126	0.1241	0.3211	0.1308	0.1218	0.2986	**0.3426**
30	0.3710	0.1126	0.1290	0.3567	0.1411	0.1211	0.3018	**0.3970**
35	0.4665	0.1126	0.1317	0.3808	0.1525	0.1217	0.2909	**0.4409**
40	0.4744	0.1126	0.1358	0.4069	0.1644	0.1233	0.2925	**0.4839**

Table C53: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.1810	0.1833	0.1927	0.3114	0.1927	0.1927	0.3114	**0.3114**
25	0.2839	0.1833	0.1980	0.3415	0.2052	0.1958	0.3329	**0.3487**
30	0.2785	0.1833	0.2026	0.3711	0.2167	0.1956	0.3418	**0.3768**
35	0.3559	0.1833	0.2050	0.3911	0.2239	0.1960	0.3364	**0.4027**
40	0.3511	0.1833	0.2117	0.4144	0.2379	0.1981	0.3399	**0.4302**

Table C54: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0; d3=0.75

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.1879	0.1469	0.1548	0.2790	0.1548	0.1548	0.2790	**0.2790**
25	0.2698	0.1469	0.1596	0.2973	0.1649	0.1578	0.2830	**0.3056**
30	0.2739	0.1469	0.1614	0.3275	0.1750	0.1569	0.2973	**0.3448**
35	0.3587	0.1469	0.1653	0.3540	0.1834	0.1563	0.2973	**0.3800**
40	0.3562	0.1469	0.1689	0.3795	0.1949	0.1582	0.2926	**0.4087**

Table C55: Estimated power of tests for mixed design under the exponential distribution with equal variance; treatments effects: d2=0.1; d3=0.2

Fixed Number of Blocks $n_b = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.0578	0.1151	0.1425	0.1513	0.1425	0.1425	0.1513	**0.1513**
10	0.0578	0.1552	0.1661	0.1782	0.1640	0.1759	0.1605	**0.1830**
15	0.0578	0.1946	0.1995	0.2045	0.1982	0.2080	0.1563	**0.2171**
20	0.0578	0.2258	0.2291	0.2269	0.2239	0.2371	0.1526	**0.2460**
25	0.0578	0.2635	0.2668	0.2551	0.2645	0.2723	0.1492	**0.2792**
30	0.0578	0.2868	0.2894	0.2761	0.2877	0.2973	0.1496	**0.3054**
35	0.0578	0.3227	0.3213	0.2962	0.3215	0.3323	0.1520	**0.3375**
40	0.0578	0.3557	0.3577	0.3145	0.3558	0.3657	0.1534	**0.3685**

Table C56: Estimated power of tests for mixed design under the normal distribution with equal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1852	0.3271	0.4342	0.5028	0.4342	0.4342	0.5028	**0.5028**
10	0.1852	0.5649	0.6046	0.6637	0.5883	0.6393	0.5700	**0.6863**
15	0.1852	0.7316	0.7468	0.7703	0.7386	0.7759	0.5474	**0.8077**
20	0.1852	0.8333	0.8400	0.8388	0.8337	0.8579	0.5312	**0.8751**
25	0.1852	0.8951	0.8984	0.8871	0.8967	0.9109	0.5066	**0.9214**
30	0.1852	0.9428	0.9449	0.9178	0.9436	0.9525	0.4819	**0.9571**
35	0.1852	0.9689	0.9696	0.9461	0.9689	0.9741	0.4554	**0.9763**
40	0.1852	0.9793	0.9799	0.9589	0.9793	0.9842	0.4302	**0.9854**

Table C57: Estimated power of tests for mixed design under the t distribution with equal variance; treatments effects: d2=0.5; d3=1.0

Fixed number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1340	0.2585	0.3411	0.3824	0.3411	0.3411	0.3824	**0.3824**
10	0.1340	0.4212	0.4523	0.5076	0.4419	0.4805	0.4216	**0.5292**
15	0.1340	0.5486	0.5650	0.5976	0.5579	0.5997	0.4068	**0.6304**
20	0.1340	0.6810	0.6895	0.6795	0.6808	0.7084	0.3936	**0.7327**
25	0.1340	0.7596	0.7653	0.7416	0.7617	0.7814	0.3706	**0.7959**
30	0.1340	0.8227	0.8265	0.7890	0.8241	0.8416	0.3520	**0.8526**
35	0.1340	0.8750	0.8758	0.8286	0.8748	0.8898	0.3346	**0.8951**
40	0.1340	0.9067	0.9085	0.8631	0.9069	0.9175	0.3265	**0.9217**

Table C58: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0.1; d3=0.2

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.0593	0.0939	0.1158	**0.1289**	0.1158	0.1158	**0.1289**	**0.1289**
10	0.0593	0.1232	0.1288	**0.1471**	0.1283	0.1357	0.1375	0.1478
15	0.0593	0.1451	0.1506	**0.1693**	0.1491	0.1592	0.1444	0.1658
20	0.0593	0.1597	0.1628	**0.1809**	0.1587	0.1683	0.1396	0.1780
25	0.0593	0.1788	0.1808	**0.1941**	0.1796	0.1846	0.1415	0.1918
30	0.0593	0.1960	0.1985	0.2084	0.1976	0.2026	0.1382	**0.2105**
35	0.0593	0.2263	0.2259	0.2275	0.2259	0.2354	0.1447	**0.2404**
40	0.0593	0.2357	0.2368	0.2390	0.2357	0.2441	0.1472	**0.2481**

Table C59: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0.1; d3=0.2

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.0617	0.0849	0.1041	**0.1204**	0.1041	0.1041	**0.1204**	**0.1204**
10	0.0617	0.1032	0.1091	**0.1402**	0.1084	0.1180	0.1344	0.1319
15	0.0617	0.1167	0.1204	**0.1497**	0.1195	0.1304	0.1379	0.1385
20	0.0617	0.1384	0.1407	**0.1658**	0.1381	0.1461	0.1337	0.1547
25	0.0617	0.1518	0.1534	**0.1719**	0.1523	0.1576	0.1343	0.1636
30	0.0617	0.1692	0.1699	**0.1893**	0.1697	0.1774	0.1349	0.1819
35	0.0617	0.1793	0.1792	**0.1941**	0.1788	0.1886	0.1376	0.1910
40	0.0617	0.1880	0.1896	**0.2065**	0.1880	0.1966	0.1408	0.2017

Table C60: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.1858	0.1481	0.2227	**0.3252**	0.2227	0.2227	**0.3252**	**0.3252**
10	0.1858	0.2384	0.2661	**0.4190**	0.2556	0.2954	0.4102	0.3747
15	0.1858	0.3025	0.3183	**0.4804**	0.3108	0.3558	0.4146	0.4114
20	0.1858	0.3680	0.3790	**0.5221**	0.3679	0.4134	0.4058	0.4539
25	0.1858	0.4265	0.4344	**0.5736**	0.4284	0.4648	0.4003	0.4993
30	0.1858	0.4873	0.4939	**0.6149**	0.4891	0.5275	0.3944	0.5556
35	0.1858	0.5500	0.5542	**0.6601**	0.5498	0.5879	0.3948	0.6033
40	0.1858	0.5934	0.5962	**0.6866**	0.5935	0.6289	0.3969	0.6446

Table C61: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1850	0.1109	0.1721	**0.2769**	0.1721	0.1721	**0.2769**	**0.2769**
10	0.1850	0.1494	0.1757	**0.3232**	0.1650	0.2012	0.3502	0.2665
15	0.1850	0.1911	0.2059	**0.3733**	0.1981	0.2362	0.3631	0.2879
20	0.1850	0.2287	0.2392	**0.4028**	0.2294	0.2656	0.3649	0.3052
25	0.1850	0.2605	0.2657	**0.4383**	0.2624	0.2906	0.3652	0.3216
30	0.1850	0.2785	0.2863	**0.4551**	0.2805	0.3144	0.3633	0.3411
35	0.1850	0.3202	0.3227	**0.4881**	0.3201	0.3525	0.3725	0.3729
40	0.1850	0.3372	0.3412	**0.5118**	0.3377	0.3707	0.3767	0.3869

Table C62: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1380	0.1711	0.2369	0.3013	0.2369	0.2369	0.3013	**0.3013**
10	0.1380	0.2811	0.3044	0.4010	0.2964	0.3315	0.3718	**0.3830**
15	0.1380	0.3561	0.3720	0.4697	0.3653	0.4046	0.3633	**0.4488**
20	0.1380	0.4448	0.4566	0.5292	0.4450	0.4826	0.3494	**0.5163**
25	0.1380	0.5195	0.5266	0.5845	0.5217	0.5479	0.3400	**0.5717**
30	0.1380	0.5790	0.5840	0.6239	0.5806	0.6097	0.3317	**0.6297**
35	0.1380	0.6304	0.6325	0.6640	0.6304	0.6574	0.3271	**0.6709**
40	0.1380	0.6883	0.6916	0.6954	0.6889	0.7114	0.3254	**0.7225**

Table C63: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1352	0.1441	0.2039	0.2702	0.2039	0.2039	0.2702	**0.2702**
10	0.1352	0.2128	0.2352	0.3464	0.2275	0.2604	0.3267	**0.3185**
15	0.1352	0.2821	0.2966	0.3995	0.2897	0.3257	0.3266	**0.3685**
20	0.1352	0.3411	0.3508	0.4541	0.3413	0.3771	0.3202	**0.4141**
25	0.1352	0.4032	0.4099	0.4865	0.4054	0.4333	0.3136	**0.4567**
30	0.1352	0.4478	0.4534	0.5242	0.4500	0.4777	0.3125	**0.4951**
35	0.1352	0.5024	0.5034	0.5688	0.5016	0.5311	0.3146	**0.5445**
40	0.1352	0.5453	0.5487	0.5969	0.5456	0.5715	0.3159	**0.5849**

Table C64: Estimated power of tests for mixed design under the exponential distribution with equal variance; treatments effects: d2=0.1; d3=0.2

Fixed Sample Size $n_a = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0602	0.1206	0.1424	**0.1510**	0.1424	0.1424	**0.1510**	**0.1510**
10	0.1199	0.1206	0.1426	0.1798	**0.1830**	0.1362	0.1655	0.1757
15	0.1389	0.1206	0.1628	0.1908	**0.1954**	0.1406	0.1597	0.1858
20	0.1537	0.1206	0.1861	0.2124	**0.2236**	0.1367	0.1582	0.2119
25	0.2325	0.1206	0.1840	0.2270	**0.2434**	0.1401	0.1567	0.2355
30	0.2341	0.1206	0.2080	0.2534	**0.2656**	0.1424	0.1526	0.2578
35	0.3024	0.1206	0.2326	0.2699	**0.2862**	0.1402	0.1536	0.2808
40	0.2889	0.1206	0.2631	0.2876	**0.3073**	0.1423	0.1538	0.3031

Table C65: Estimated power of tests for mixed design under the normal distribution with equal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1819	0.3301	0.4373	**0.5019**	0.4373	0.4373	0.5019	0.5019
10	0.4277	0.3301	0.4889	**0.6469**	0.6264	0.4234	0.5774	0.6288
15	0.5882	0.3301	0.5890	0.7371	**0.7506**	0.4400	0.5591	0.7311
20	0.6870	0.3301	0.6799	0.8056	**0.8347**	0.4321	0.5540	0.8067
25	0.8283	0.3301	0.7149	0.8393	**0.8767**	0.4374	0.5348	0.8620
30	0.8614	0.3301	0.7805	0.8877	**0.9120**	0.4444	0.5219	0.8989
35	0.9209	0.3301	0.8331	0.9122	**0.9396**	0.4347	0.5109	0.9298
40	0.9392	0.3301	0.8808	0.9363	**0.9565**	0.4404	0.5020	0.9532

Table C66: Estimated power of tests for mixed design under the t distribution with equal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1369	0.2503	0.3279	**0.3743**	0.3279	0.3279	**0.3743**	**0.3743**
10	0.3187	0.2503	0.3615	**0.4904**	0.4758	0.3154	0.4306	0.4809
15	0.4243	0.2503	0.4355	0.5621	**0.5740**	0.3260	0.4163	0.5598
20	0.5143	0.2503	0.5174	0.6364	**0.6714**	0.3210	0.4084	0.6474
25	0.6782	0.2503	0.5435	0.6741	**0.7319**	0.3246	0.3978	0.7150
30	0.7089	0.2503	0.6066	0.7400	**0.7800**	0.3303	0.3873	0.7605
35	0.8044	0.2503	0.6777	0.7777	**0.8199**	0.3251	0.3787	0.8088
40	0.8289	0.2503	0.7377	0.8150	**0.8625**	0.3270	0.3734	0.8545

Table C67: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0.1; d3=0.2

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0563	0.0941	0.1159	**0.1253**	0.1159	0.1159	**0.1253**	**0.1253**
10	0.1196	0.0941	0.1135	0.1540	0.1509	0.1061	0.1363	**0.1591**
15	0.1444	0.0941	0.1363	0.1718	0.1805	0.1131	0.1316	**0.1883**
20	0.1617	0.0941	0.1608	0.1937	0.2118	0.1087	0.1302	**0.2135**
25	0.2397	0.0941	0.1554	0.2022	0.2350	0.1121	0.1277	**0.2379**
30	0.2361	0.0941	0.1797	0.2298	**0.2599**	0.1132	0.1237	0.2522
35	0.3009	0.0941	0.2015	0.2446	**0.2823**	0.1098	0.1204	0.2802
40	0.2837	0.0941	0.2287	0.2560	**0.2921**	0.1140	0.1237	0.2899

Table C68: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0.1; d3=0.2

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.0601	0.0860	0.1057	**0.1200**	0.1057	0.1057	**0.1200**	**0.1200**
10	0.1186	0.0860	0.1055	0.1469	0.1423	0.0995	0.1252	**0.1559**
15	0.1419	0.0860	0.1220	0.1628	0.1689	0.1016	0.1198	**0.1772**
20	0.1596	0.0860	0.1468	0.1843	0.2037	0.0996	0.1186	**0.2040**
25	0.2354	0.0860	0.1477	0.1903	0.2279	0.1024	0.1172	**0.2309**
30	0.2294	0.0860	0.1622	0.2122	0.2476	0.1042	0.1112	**0.2481**
35	0.2860	0.0860	0.1842	0.2250	**0.2639**	0.1004	0.1113	0.2628
40	0.2851	0.0860	0.2172	0.2500	**0.2944**	0.1043	0.1131	0.2930

Table C69: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 5$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1783	0.1483	0.2279	0.3326	0.2279	0.2279	0.3326	**0.3326**
10	0.4280	0.1483	0.2664	0.4555	0.4057	0.2134	0.3511	**0.5165**
15	0.5779	0.1483	0.3565	0.5678	0.5968	0.2231	0.3363	**0.6602**
20	0.6919	0.1483	0.4493	0.6598	0.7522	0.2176	0.3119	**0.7699**
25	0.8265	0.1483	0.4938	0.7270	0.8194	0.2222	0.2996	**0.8302**
30	0.8652	0.1483	0.5818	0.7786	**0.8862**	0.2245	0.2889	0.8861
35	0.9270	0.1483	0.6572	0.8106	**0.9199**	0.2233	0.2783	0.9202
40	0.9404	0.1483	0.7323	0.8560	**0.9470**	0.2234	0.2708	0.9450

Table C70: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1951	0.1135	0.1749	**0.2809**	0.1749	0.1749	**0.2809**	**0.2809**
10	0.4362	0.1135	0.2117	0.4091	0.3501	0.1652	0.2952	**0.4857**
15	0.5807	0.1135	0.2859	0.5079	0.5408	0.1692	0.2679	**0.6325**
20	0.6818	0.1135	0.3758	0.5903	0.6964	0.1653	0.2478	**0.7430**
25	0.8287	0.1135	0.4175	0.6805	0.8079	0.1691	0.2369	**0.8254**
30	0.8583	0.1135	0.5064	0.7090	0.8612	0.1734	0.2225	**0.8698**
35	0.9276	0.1135	0.5862	0.7671	0.9117	0.1696	0.2175	**0.9165**
40	0.9391	0.1135	0.6676	0.8115	0.9369	0.1697	0.2068	**0.9388**

Table C71: Estimated Power of Tests for Mixed Design under the T Distribution with Unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1366	0.1790	0.2520	**0.3099**	0.2520	0.2520	**0.3099**	**0.3099**
10	0.3157	0.1790	0.2787	0.4146	**0.3892**	0.2353	0.3449	**0.4327**
15	0.4326	0.1790	0.3489	0.4979	**0.5164**	0.2476	0.3360	**0.5369**
20	0.5135	0.1790	0.4243	0.5657	**0.6194**	0.2406	0.3168	**0.6195**
25	0.6718	0.1790	0.4543	0.6389	**0.6929**	0.2449	0.3073	0.6909
30	0.7120	0.1790	0.5250	0.6742	**0.7555**	0.2465	0.2974	0.7504
35	0.8018	0.1790	0.5902	0.7171	**0.8037**	0.2469	0.2922	0.8003
40	0.8292	0.1790	0.6636	0.7632	**0.8538**	0.2467	0.2861	0.8465

Table C72: Estimated Power of Tests for Mixed Design under the T Distribution with Unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1411	0.1476	0.2068	**0.2747**	0.2068	0.2068	**0.2747**	**0.2747**
10	0.3155	0.1476	0.2325	**0.3785**	0.3453	0.1949	0.2981	0.4120
15	0.4186	0.1476	0.2957	0.4518	**0.4720**	0.2013	0.2834	0.5126
20	0.5057	0.1476	0.3709	0.5208	**0.5946**	0.1990	0.2695	0.6052
25	0.6778	0.1476	0.4038	0.6096	**0.6838**	0.2009	0.2566	0.6889
30	0.7186	0.1476	0.4790	0.6428	**0.7473**	0.2053	0.2497	0.7465
35	0.8110	0.1476	0.5425	0.6887	**0.8021**	0.1997	0.2414	0.8011
40	0.8287	0.1476	0.6140	0.7290	**0.8446**	0.2027	0.2412	0.8408

Table C73: Estimated power of tests for mixed design under the exponential distribution with equal variance; treatments effects: d2=0.1; d3=0.2

Fixed Number of Blocks $n_b = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.1237	0.1577	0.1737	0.2163	0.1737	0.1737	0.2163	**0.2163**
15	0.1237	0.1983	0.2106	0.2520	0.2063	0.2139	0.2369	**0.2521**
20	0.1237	0.2274	0.2342	0.2655	0.2293	0.2349	0.2338	**0.2725**
25	0.1237	0.2542	0.2595	0.2899	0.2566	0.2648	0.2283	**0.2975**
30	0.1237	0.2908	0.2943	0.3141	0.2925	0.3048	0.2228	**0.3323**
35	0.1237	0.3215	0.3223	0.3363	0.3208	0.3324	0.2184	**0.3586**
40	0.1237	0.3488	0.3525	0.3496	0.3498	0.3598	0.2200	**0.3783**

Table C74: Estimated power of tests for mixed design under the normal distribution with equal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.4275	0.5619	0.6328	0.7852	0.6328	0.6328	0.7852	**0.7852**
15	0.4275	0.7208	0.7569	0.8595	0.7456	0.7703	0.8219	**0.8683**
20	0.4275	0.8324	0.8496	0.9084	0.8404	0.8599	0.8261	**0.9192**
25	0.4275	0.8985	0.9057	0.9385	0.9014	0.9156	0.8148	**0.9502**
30	0.4275	0.9464	0.9503	0.9617	0.9484	0.9565	0.8063	**0.9756**
35	0.4275	0.9667	0.9685	0.9731	0.9675	0.9731	0.7915	**0.9853**
40	0.4275	0.9811	0.9826	0.9817	0.9818	0.9851	0.7844	**0.9909**

Table C75: Estimated power of tests for mixed design under the t distribution with equal variance; treatments effects: d2=0.5; d3=1.0

Fixed number of Blocks $n_b = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.3082	0.4217	0.4811	0.6086	0.4811	0.4811	0.6086	**0.6086**
15	0.3082	0.5579	0.5877	0.7001	0.5776	0.5997	0.6570	**0.7111**
20	0.3082	0.6814	0.7023	0.7743	0.6905	0.7152	0.6683	**0.7940**
25	0.3082	0.7614	0.7714	0.8187	0.7658	0.7879	0.6534	**0.8450**
30	0.3082	0.8175	0.8250	0.8584	0.8207	0.8388	0.6442	**0.8834**
35	0.3082	0.8728	0.8754	0.8881	0.8734	0.8867	0.6316	**0.9178**
40	0.3082	0.9138	0.9168	0.9121	0.9151	0.9253	0.6239	**0.9413**

Table C76: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0.1; d3=0.2

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.1155	0.1210	0.1354	**0.1737**	0.1354	0.1354	0.1737	0.1737
15	0.1155	0.1452	0.1507	**0.1985**	0.1492	0.1535	0.1954	0.1965
20	0.1155	0.1616	0.1676	**0.2101**	0.1639	0.1712	0.1933	0.2061
25	0.1155	0.1786	0.1827	**0.2233**	0.1808	0.1883	0.1929	0.2190
30	0.1155	0.1927	0.1965	**0.2397**	0.1941	0.2034	0.1897	0.2354
35	0.1155	0.2220	0.2231	**0.2566**	0.2219	0.2304	0.1892	0.2516
40	0.1155	0.2310	0.2338	**0.2661**	0.2322	0.2415	0.1853	0.2624

Table C77: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0.1; d3=0.2

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.1148	0.1049	0.1186	**0.1614**	0.1186	0.1186	**0.1614**	**0.1614**
15	0.1148	0.1210	0.1274	**0.1697**	0.1261	0.1292	0.1688	0.1610
20	0.1148	0.1412	0.1466	**0.1917**	0.1425	0.1488	0.1808	0.1850
25	0.1148	0.1476	0.1499	**0.1948**	0.1492	0.1536	0.1746	0.1832
30	0.1148	0.1652	0.1689	**0.2154**	0.1681	0.1738	0.1782	0.2025
35	0.1148	0.1812	0.1813	**0.2191**	0.1804	0.1880	0.1726	0.2080
40	0.1148	0.1949	0.1975	**0.2320**	0.1958	0.2039	0.1782	0.2243

Table C78: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0.5; d3=1.0;

Fixed Number of Blocks $n_b = 10$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.4332	0.2305	0.2906	**0.5531**	0.2906	0.2906	**0.5531**	**0.5531**
15	0.4332	0.2995	0.3347	**0.6079**	0.3232	0.3507	0.6250	0.5696
20	0.4332	0.3714	0.3946	**0.6530**	0.3816	0.4147	0.6441	0.5867
25	0.4332	0.4301	0.4503	**0.7036**	0.4385	0.4778	0.6566	0.6217
30	0.4332	0.4846	0.4999	**0.7342**	0.4909	0.5282	0.6527	0.6490
35	0.4332	0.5442	0.5526	**0.7700**	0.5452	0.5813	0.6531	0.6844
40	0.4332	0.5898	0.5975	**0.7940**	0.5921	0.6258	0.6449	0.7119

Table C79: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.4295	0.1480	0.1945	**0.4511**	0.1945	0.1945	**0.4511**	**0.4511**
15	0.4295	0.1868	0.2183	0.5083	0.2080	0.2321	0.5437	**0.4523**
20	0.4295	0.2203	0.2407	0.5244	0.2291	0.2557	0.5662	**0.4298**
25	0.4295	0.2535	0.2724	0.5623	0.2627	0.2975	0.5777	**0.4410**
30	0.4295	0.2859	0.2973	0.5898	0.2908	0.3217	0.5830	**0.4536**
35	0.4295	0.3161	0.3238	0.6146	0.3173	0.3509	0.5807	**0.4661**
40	0.4295	0.3470	0.3559	0.6409	0.3497	0.3830	0.5829	**0.4818**

Table C80: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.3115	0.2685	0.3222	**0.4978**	0.3222	0.3222	**0.4978**	**0.4978**
15	0.3115	0.3570	0.3857	**0.5657**	0.3772	0.3990	0.5512	0.5517
20	0.3115	0.4393	0.4618	**0.6249**	0.4502	0.4761	0.5612	0.6067
25	0.3115	0.5196	0.5347	**0.6704**	0.5265	0.5557	0.5648	0.6545
30	0.3115	0.5809	0.5915	**0.7141**	0.5861	0.6152	0.5582	0.6919
35	0.3115	0.6293	0.6352	**0.7481**	0.6310	0.6566	0.5510	0.7273
40	0.3115	0.6768	0.6833	**0.7717**	0.6788	0.7038	0.5414	0.7611

Table C81: Estimated Power of Tests for Mixed Design under the T Distribution with Unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.3080	0.2114	0.2614	**0.4342**	0.2614	0.2614	**0.4342**	**0.4342**
15	0.3080	0.2789	0.3069	0.5039	0.2989	0.3190	0.5015	**0.4801**
20	0.3080	0.3479	0.3661	0.5501	0.3560	0.3813	0.5181	**0.5146**
25	0.3080	0.3910	0.4055	0.5911	0.3981	0.4259	0.5164	**0.5393**
30	0.3080	0.4490	0.4599	0.6248	0.4535	0.4808	0.5175	**0.5737**
35	0.3080	0.5016	0.5069	0.6597	0.5020	0.5289	0.5111	**0.6074**
40	0.3080	0.5365	0.5441	0.6815	0.5394	0.5638	0.5042	**0.6340**

Table C82: Estimated power of tests for mixed design under the exponential distribution with equal variance; treatments effects: d2=0.1; d3=0.2

Fixed Sample Size $n_a = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.1151	0.1633	0.1801	**0.2150**	0.1801	0.1801	**0.2150**	**0.2150**
15	0.1426	0.1633	0.1892	**0.2333**	0.1972	0.1792	0.2304	0.2281
20	0.1502	0.1633	0.1992	**0.2555**	0.2142	0.1785	0.2323	0.2441
25	0.2357	0.1633	0.2069	**0.2800**	0.2435	0.1813	0.2385	0.2655
30	0.2387	0.1633	0.2054	**0.3047**	0.2717	0.1809	0.2373	0.2959
35	0.2999	0.1633	0.2147	**0.3162**	0.2979	0.1793	0.2362	0.3137
40	0.2844	0.1633	0.2229	**0.3293**	0.3256	0.1801	0.2301	0.3284

Table C83: Estimated power of tests for mixed design under the normal distribution with equal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.4293	0.5606	0.6337	**0.7801**	0.6337	0.6337	**0.7801**	**0.7801**
15	0.5799	0.5606	0.6706	**0.8483**	0.7058	0.6344	0.8328	0.8381
20	0.6776	0.5606	0.6998	**0.8966**	0.7828	0.6299	0.8427	0.8813
25	0.8280	0.5606	0.7345	**0.9234**	0.8546	0.6343	0.8390	0.9180
30	0.8625	0.5606	0.7454	**0.9485**	0.9066	0.6370	0.8311	0.9447
35	0.9310	0.5606	0.7763	**0.9655**	0.9495	0.6347	0.8288	0.9627
40	0.9417	0.5606	0.8018	**0.9733**	0.9694	0.6361	0.8209	0.9731

Table C84: Estimated power of tests for mixed design under the t distribution with equal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.3081	0.4300	0.4884	**0.6135**	0.4884	0.4884	**0.6135**	**0.6135**
15	0.4363	0.4300	0.5219	**0.6936**	0.5504	0.4918	0.6772	0.6877
20	0.5067	0.4300	0.5511	**0.7574**	0.6235	0.4845	0.6938	0.7421
25	0.6706	0.4300	0.5753	**0.8009**	0.7034	0.4899	0.6872	0.7883
30	0.7060	0.4300	0.5858	**0.8363**	0.7769	0.4880	0.6780	0.8239
35	0.8134	0.4300	0.6128	**0.8669**	0.8361	0.4881	0.6728	0.8651
40	0.8234	0.4300	0.6455	**0.8926**	0.8852	0.4918	0.6666	0.8834

Table C85: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0.1; d3=0.2

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.1152	0.1142	0.1281	0.1739	0.1281	0.1281	**0.1739**	**0.1739**
15	0.1399	0.1142	0.1349	0.1884	0.1413	0.1268	0.1794	**0.1935**
20	0.1607	0.1142	0.1446	0.2165	0.1611	0.1270	0.1839	**0.2252**
25	0.2317	0.1142	0.1504	0.2320	0.1842	0.1282	0.1804	**0.2445**
30	0.2287	0.1142	0.1500	0.2481	0.2199	0.1279	0.1828	**0.2674**
35	0.2965	0.1142	0.1583	0.2641	0.2449	0.1277	0.1753	**0.2918**
40	0.2905	0.1142	0.1649	0.2827	0.2769	0.1291	0.1726	**0.3128**

Table C86: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0.1; d3=0.2

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.1208	0.1065	0.1196	**0.1681**	0.1196	0.1196	**0.1681**	**0.1681**
15	0.1468	0.1065	0.1242	0.1855	0.1292	0.1173	0.1703	**0.1948**
20	0.1649	0.1065	0.1333	0.2067	0.1489	0.1173	0.1715	**0.2227**
25	0.2351	0.1065	0.1408	0.2174	0.1712	0.1196	0.1666	**0.2376**
30	0.2443	0.1065	0.1374	0.2445	0.2058	0.1174	0.1654	**0.2727**
35	0.2903	0.1065	0.1441	0.2519	0.2319	0.1187	0.1609	**0.2797**
40	0.2971	0.1065	0.1526	0.2729	0.2644	0.1198	0.1585	**0.3141**

Table C87: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 10$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.4291	0.2295	0.2884	0.5442	0.2884	0.2884	0.5442	**0.5442**
15	0.5852	0.2295	0.3208	0.6515	0.3598	0.2877	0.5780	**0.6896**
20	0.6715	0.2295	0.3562	0.7185	0.4600	0.2830	0.5653	**0.7784**
25	0.8255	0.2295	0.3897	0.7838	0.5920	0.2873	0.5564	**0.8513**
30	0.8721	0.2295	0.4136	0.8339	0.7122	0.2890	0.5408	**0.9037**
35	0.9265	0.2295	0.4470	0.8645	0.8047	0.2893	0.5211	**0.9320**
40	0.9407	0.2295	0.4809	0.8949	0.8800	0.2882	0.5070	**0.9588**

Table C88: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.4346	0.1507	0.1972	0.4610	0.1972	0.1972	0.4610	**0.4610**
15	0.5749	0.1507	0.2265	0.5571	0.2586	0.1970	0.4704	**0.6213**
20	0.6797	0.1507	0.2528	0.6403	0.3469	0.1961	0.4558	**0.7407**
25	0.8291	0.1507	0.2791	0.7081	0.4702	0.1960	0.4329	**0.8187**
30	0.8584	0.1507	0.2968	0.7562	0.5930	0.1973	0.4123	**0.8744**
35	0.9264	0.1507	0.3256	0.8097	0.7219	0.1962	0.4023	**0.9202**
40	0.9430	0.1507	0.3612	0.8512	0.8302	0.2002	0.3860	**0.9499**

Table C89: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.3129	0.2686	0.3251	0.5050	0.3251	0.3251	0.5050	**0.5050**
15	0.4347	0.2686	0.3484	0.5837	0.3779	0.3232	0.5400	**0.6012**
20	0.5106	0.2686	0.3801	0.6479	0.4585	0.3202	0.5448	**0.6754**
25	0.6694	0.2686	0.4096	0.7000	0.5571	0.3230	0.5277	**0.7344**
30	0.7149	0.2686	0.4187	0.7475	0.6491	0.3236	0.5204	**0.7881**
35	0.8018	0.2686	0.4493	0.7906	0.7362	0.3243	0.5101	**0.8336**
40	0.8221	0.2686	0.4764	0.8187	0.8026	0.3232	0.5002	**0.8631**

Table C90: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.3116	0.2083	0.2572	**0.4370**	0.2572	0.2572	**0.4370**	**0.4370**
15	0.4287	0.2083	0.2848	0.5277	0.3097	0.2580	0.4720	**0.5552**
20	0.5156	0.2083	0.3110	0.5920	0.3819	0.2522	0.4655	**0.6433**
25	0.6725	0.2083	0.3334	0.6520	0.4827	0.2553	0.4537	**0.7111**
30	0.7125	0.2083	0.3442	0.6993	0.5829	0.2572	0.4433	**0.7735**
35	0.8046	0.2083	0.3730	0.7421	0.6761	0.2556	0.4316	**0.8149**
40	0.8285	0.2083	0.4004	0.7738	0.7539	0.2582	0.4231	**0.8559**

Table C91: Estimated power of tests for mixed design under the exponential distribution with equal variance; treatments effects: d2=0.1; d3=0.2

Fixed Number of Blocks $n_b = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.1394	0.1929	0.2078	0.2590	0.2078	0.2078	0.2590	**0.2590**
20	0.1394	0.2288	0.2334	0.2895	0.2343	0.2380	0.2796	**0.2935**
25	0.1394	0.2574	0.2640	0.3126	0.2614	0.2689	0.2817	**0.3209**
30	0.1394	0.2926	0.2984	0.3407	0.2962	0.3042	0.2869	**0.3536**
35	0.1394	0.3208	0.3247	0.3636	0.3213	0.3332	0.2889	**0.3819**
40	0.1394	0.3479	0.3526	0.3762	0.3494	0.3585	0.2786	**0.4012**

Table C92: Estimated power of tests for mixed design under the normal distribution with equal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.5805	0.7291	0.7777	0.9118	0.7777	0.7777	0.9118	**0.9118**
20	0.5805	0.8359	0.8563	0.9438	0.8528	0.8653	0.9329	**0.9486**
25	0.5805	0.9012	0.9142	0.9656	0.9094	0.9210	0.9437	**0.9695**
30	0.5805	0.9437	0.9490	0.9785	0.9468	0.9536	0.9379	**0.9813**
35	0.5805	0.9677	0.9697	0.9870	0.9687	0.9736	0.9382	**0.9909**
40	0.5805	0.9806	0.9822	0.9929	0.9813	0.9841	0.9356	**0.9939**

Table C93: Estimated power of tests for mixed design under the t distribution with equal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.4242	0.5616	0.6069	0.7683	0.6069	0.6069	0.7683	**0.7683**
20	0.4242	0.6723	0.6951	0.8182	0.6915	0.7044	0.7964	**0.8257**
25	0.4242	0.7582	0.7745	0.8641	0.7688	0.7842	0.8109	**0.8763**
30	0.4242	0.8276	0.8372	0.9004	0.8326	0.8496	0.8136	**0.9114**
35	0.4242	0.8715	0.8767	0.9250	0.8735	0.8858	0.8134	**0.9383**
40	0.4242	0.9057	0.9104	0.9401	0.9077	0.9188	0.8055	**0.9542**

Table C94: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0.1; d3=0.2

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach I	II	III	IV	V	VI
15	0.1468	0.1433	0.1552	**0.2210**	0.1552	0.1552	**0.2210**	**0.2210**
20	0.1576	0.1433	0.1582	0.2363	0.1625	0.1552	0.2286	**0.2393**
25	0.2298	0.1433	0.1637	0.2562	0.1755	0.1545	0.2343	**0.2599**
30	0.2289	0.1433	0.1681	0.2802	0.1923	0.1554	0.2333	**0.2884**
35	0.2977	0.1433	0.1736	0.2982	0.2042	0.1566	0.2344	**0.3109**
40	0.2887	0.1433	0.1748	0.3145	0.2239	0.1546	0.2349	**0.3295**

Table C95: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0.1; d3=0.2

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
15	0.1426	0.1240	0.1356	0.2019	0.1356	0.1356	0.2019	**0.2019**
20	0.1570	0.1240	0.1409	0.2249	0.1446	0.1372	0.2118	**0.2301**
25	0.2410	0.1240	0.1455	0.2468	0.1561	0.1355	0.2163	**0.2591**
30	0.2322	0.1240	0.1469	0.2584	0.1666	0.1360	0.2089	**0.2736**
35	0.2946	0.1240	0.1507	0.2747	0.1799	0.1361	0.2099	**0.2979**
40	0.2792	0.1240	0.1554	0.2876	0.1998	0.1347	0.2108	**0.3145**

Table C96: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.5821	0.3041	0.3576	**0.7062**	0.3576	0.3576	**0.7062**	**0.7062**
20	0.5821	0.3660	0.3984	**0.7451**	0.3930	0.4123	0.7652	0.7131
25	0.5821	0.4230	0.4514	**0.7824**	0.4414	0.4724	0.7853	0.7327
30	0.5821	0.4931	0.5154	**0.8200**	0.5047	0.5347	0.8062	0.7607
35	0.5821	0.5439	0.5578	**0.8356**	0.5491	0.5806	0.8018	0.7683
40	0.5821	0.5769	0.5916	**0.8535**	0.5824	0.6138	0.8034	0.7807

Table C97: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0, 3)$ and RCBD $N(0, 1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.5814	0.1819	0.2232	**0.5992**	0.2232	0.2232	**0.5992**	**0.5992**
20	0.5814	0.2248	0.2510	**0.6388**	0.2457	0.2645	0.6737	0.5872
25	0.5814	0.2556	0.2780	**0.6640**	0.2689	0.2927	0.7039	0.5706
30	0.5814	0.2781	0.2979	**0.6802**	0.2882	0.3158	0.7158	0.5656
35	0.5814	0.3131	0.3253	**0.7103**	0.3183	0.3462	0.7324	0.5685
40	0.5814	0.3360	0.3494	**0.7194**	0.3413	0.3676	0.7313	0.5726

Table C98: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4333	0.3616	0.4064	**0.6538**	0.4064	0.4064	**0.6538**	**0.6538**
20	0.4333	0.4496	0.4737	**0.7100**	0.4708	0.4841	0.7049	0.6960
25	0.4333	0.5235	0.5463	**0.7488**	0.5371	0.5605	0.7231	0.7349
30	0.4333	0.5834	0.5993	**0.7885**	0.5925	0.6159	0.7286	0.7656
35	0.4333	0.6323	0.6409	**0.8086**	0.6362	0.6562	0.7275	0.7839
40	0.4333	0.6846	0.6957	**0.8416**	0.6893	0.7109	0.7252	0.8230

Table C99: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.4361	0.2737	0.3172	**0.5935**	0.3172	0.3172	**0.5935**	**0.5935**
20	0.4361	0.3422	0.3664	**0.6383**	0.3629	0.3786	0.6470	0.6140
25	0.4361	0.3959	0.4170	**0.6744**	0.4085	0.4329	0.6654	0.6388
30	0.4361	0.4495	0.4687	**0.7173**	0.4603	0.4871	0.6797	0.6698
35	0.4361	0.5019	0.5139	**0.7426**	0.5070	0.5323	0.6796	0.6918
40	0.4361	0.5420	0.5537	**0.7670**	0.5461	0.5703	0.6766	0.7107

Table C100: Estimated power of tests for mixed design under the exponential distribution with equal variance; treatments effects: d2=0.1; d3=0.2

Fixed Sample Size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach I	II	III	IV	V	VI
15	0.1397	0.1920	0.2084	**0.2541**	0.2084	0.2084	0.2541	0.2541
20	0.1537	0.1920	0.2104	**0.2864**	0.2153	0.2073	0.2841	0.2833
25	0.2350	0.1920	0.2173	**0.3057**	0.2316	0.2085	0.2890	0.3024
30	0.2334	0.1920	0.2214	**0.3280**	0.2469	0.2092	0.2966	0.3212
35	0.2941	0.1920	0.2272	**0.3483**	0.2650	0.2082	0.2967	0.3382
40	0.2899	0.1920	0.2307	**0.3693**	0.2879	0.2080	0.2982	0.3543

Table C101: Estimated power of tests for mixed design under the normal distribution with equal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks	L*	FW*	Approach I	II	III	IV	V	VI
15	0.5803	0.7296	0.7771	**0.9079**	0.7771	0.7771	0.9079	0.9079
20	0.6769	0.7296	0.7906	**0.9411**	0.8070	0.7781	0.9374	0.9348
25	0.8329	0.7296	0.8046	**0.9598**	0.8436	0.7780	0.9455	0.9535
30	0.8588	0.7296	0.8182	**0.9719**	0.8763	0.7791	0.9485	0.9683
35	0.9289	0.7296	0.8285	**0.9796**	0.9050	0.7775	0.9455	0.9763
40	0.9397	0.7296	0.8421	**0.9871**	0.9366	0.7773	0.9476	0.9849

Table C102: Estimated power of tests for mixed design under the t distribution with equal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks	L*	FW*	Approach I	II	III	IV	V	VI
15	0.4212	0.5542	0.6024	**0.7664**	0.6024	0.6024	0.7664	0.7664
20	0.5026	0.5542	0.6153	**0.8129**	0.6336	0.6027	0.8069	0.8036
25	0.6682	0.5542	0.6329	**0.8637**	0.6777	0.6004	0.8313	0.8558
30	0.7011	0.5542	0.6471	**0.8859**	0.7206	0.6061	0.8339	0.8771
35	0.8119	0.5542	0.6635	**0.9134**	0.7679	0.6019	0.8345	0.9045
40	0.8246	0.5542	0.6763	**0.9256**	0.8096	0.6018	0.8257	0.9183

Table C103: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0.1; d3=0.2

Fixed Sample size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
15	0.1468	0.1433	0.1552	**0.2210**	0.1552	0.1552	**0.2210**	**0.2210**
20	0.1576	0.1433	0.1582	0.2363	0.1625	0.1552	0.2286	**0.2393**
25	0.2298	0.1433	0.1637	0.2562	0.1755	0.1545	0.2343	**0.2599**
30	0.2289	0.1433	0.1681	0.2802	0.1923	0.1554	0.2333	**0.2884**
35	0.2977	0.1433	0.1736	0.2982	0.2042	0.1566	0.2344	**0.3109**
40	0.2887	0.1433	0.1748	0.3145	0.2239	0.1546	0.2349	**0.3295**

Table C104: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0.1; d3=0.2

Fixed Sample size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.1426	0.1240	0.1356	0.2019	0.1356	0.1356	0.2019	**0.2019**
20	0.1570	0.1240	0.1409	0.2249	0.1446	0.1372	0.2118	**0.2301**
25	0.2410	0.1240	0.1455	0.2468	0.1561	0.1355	0.2163	**0.2591**
30	0.2322	0.1240	0.1469	0.2584	0.1666	0.1360	0.2089	**0.2736**
35	0.2946	0.1240	0.1507	0.2747	0.1799	0.1361	0.2099	**0.2979**
40	0.2792	0.1240	0.1554	0.2876	0.1998	0.1347	0.2108	**0.3145**

Table C105: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample size $n_a = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.5766	0.3040	0.3580	**0.7068**	0.3580	0.3580	**0.7068**	**0.7068**
20	0.6857	0.3040	0.3743	0.7813	0.3984	0.3577	0.7327	**0.8075**
25	0.8309	0.3040	0.3971	0.8313	0.4583	0.3576	0.7350	**0.8691**
30	0.8671	0.3040	0.4167	0.8703	0.5218	0.3592	0.7270	**0.9178**
35	0.9300	0.3040	0.4361	0.9006	0.5896	0.3574	0.7153	**0.9438**
40	0.9420	0.3040	0.4555	0.9275	0.6680	0.3577	0.7053	**0.9626**

Table C106: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=1.0

Fixed Sample size$n_a = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.5832	0.1836	0.2233	0.6026	0.2233	0.2233	0.6026	**0.6026**
20	0.6850	0.1836	0.2398	0.6801	0.2617	0.2245	0.6166	**0.7262**
25	0.8320	0.1836	0.2555	0.7418	0.3067	0.2230	0.6097	**0.8144**
30	0.8677	0.1836	0.2751	0.7931	0.3730	0.2241	0.5948	**0.8794**
35	0.9276	0.1836	0.2894	0.8358	0.4417	0.2219	0.5758	**0.9211**
40	0.9425	0.1836	0.3084	0.8695	0.5215	0.2238	0.5615	**0.9473**

Table C107: Estimated powers of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample size $n_a = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4255	0.3632	0.4111	0.6529	0.4111	0.4111	0.6529	**0.6529**
20	0.5093	0.3632	0.4277	0.7105	0.4467	0.4133	0.6860	**0.7236**
25	0.6817	0.3632	0.4458	0.7658	0.4899	0.4133	0.7040	**0.7843**
30	0.7109	0.3632	0.4599	0.8031	0.5432	0.4144	0.6949	**0.8233**
35	0.8100	0.3632	0.4778	0.8374	0.6004	0.4149	0.6913	**0.8656**
40	0.8254	0.3632	0.4894	0.8630	0.6614	0.4136	0.6872	**0.8931**

Table C108: Estimated powers of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample size $n_a = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4219	0.2746	0.3186	0.5835	0.3186	0.3186	0.5835	**0.5835**
20	0.5136	0.2746	0.3344	0.6480	0.3507	0.3209	0.6103	**0.6720**
25	0.6763	0.2746	0.3496	0.7036	0.3933	0.3176	0.6180	**0.7403**
30	0.7123	0.2746	0.3630	0.7488	0.4429	0.3191	0.6175	**0.7957**
35	0.8144	0.2746	0.3775	0.7911	0.4985	0.3204	0.6055	**0.8435**
40	0.8174	0.2746	0.3912	0.8179	0.5639	0.3196	0.5977	**0.8717**

Table C109: Estimated power of tests for mixed design under the exponential distribution with equal variance; treatments effects: d2=0.1; d3=0.2;

Fixed Number of Blocks $n_b = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.1544	0.2269	0.2349	**0.3105**	0.2349	0.2349	**0.3105**	**0.3105**
25	0.1544	0.2576	0.2678	0.3366	0.2655	0.2700	0.3267	**0.3416**
30	0.1544	0.2886	0.2967	0.3575	0.2961	0.3001	0.3333	**0.3668**
35	0.1544	0.3189	0.3237	0.3899	0.3216	0.3295	0.3458	**0.4097**
40	0.1544	0.3438	0.3479	0.4058	0.3458	0.3528	0.3397	**0.4181**

Table C110: Estimated power of tests for mixed design under the normal distribution with equal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
20	0.6794	0.8295	0.8552	**0.9645**	0.8552	0.8552	**0.9645**	**0.9645**
25	0.6794	0.8970	0.9138	0.9796	0.9109	0.9184	0.9741	**0.9815**
30	0.6794	0.9457	0.9526	0.9899	0.9512	0.9563	0.9799	**0.9905**
35	0.6794	0.9667	0.9703	0.9935	0.9684	0.9736	0.9793	**0.9946**
40	0.6794	0.9801	0.9825	0.9951	0.9812	0.9840	0.9791	**0.9969**

Table C111: Estimated power of tests for mixed design under the t distribution with equal variance; treatments effects: d2=0.5; d3=1.0

Fixed number of Blocks $n_b = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.5196	0.6726	0.7051	0.8754	0.7051	0.7051	0.8754	**0.8754**
25	0.5196	0.7593	0.7800	0.9038	0.7756	0.7847	0.8957	**0.9087**
30	0.5196	0.8229	0.8371	0.9315	0.8331	0.8423	0.9076	**0.9344**
35	0.5196	0.8699	0.8796	0.9483	0.8752	0.8870	0.9095	**0.9533**
40	0.5196	0.9085	0.9153	0.9626	0.9113	0.9212	0.9154	**0.9694**

Table C112: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.1623	0.1651	0.1739	**0.2608**	0.1739	0.1739	**0.2608**	**0.2608**
25	0.1623	0.1795	0.1885	**0.2785**	0.1862	0.1900	0.2781	0.2759
30	0.1623	0.2006	0.2090	**0.2994**	0.2076	0.2144	0.2952	0.2915
35	0.1623	0.2180	0.2218	**0.3072**	0.2203	0.2257	0.2867	0.2992
40	0.1623	0.2401	0.2435	**0.3276**	0.2418	0.2470	0.2928	0.3150

Table C113: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.1518	0.1364	0.1415	**0.2261**	0.1415	0.1415	**0.2261**	**0.2261**
25	0.1518	0.1477	0.1552	**0.2439**	0.1537	0.1570	0.2433	0.2403
30	0.1518	0.1650	0.1722	**0.2591**	0.1700	0.1758	0.2545	0.2497
35	0.1518	0.1729	0.1762	**0.2626**	0.1743	0.1797	0.2560	0.2481
40	0.1518	0.1934	0.1968	**0.2810**	0.1947	0.2020	0.2615	0.2626

Table C114: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.7039	0.6223	0.6630	**0.9220**	0.6630	0.6630	**0.9220**	**0.9220**
25	0.7039	0.7074	0.7369	**0.9440**	0.7313	0.7452	0.9451	0.9412
30	0.7039	0.7670	0.7893	**0.9563**	0.7830	0.8010	0.9522	0.9514
35	0.7039	0.8281	0.8413	**0.9682**	0.8359	0.8538	0.9552	0.9640
40	0.7039	0.8620	0.8737	**0.9762**	0.8678	0.8844	0.9571	0.9699

Table C115: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)									
			Approach						
Sample Size	L*	FW*	I	II	III	IV	V	VI
20	0.6791	0.2260	0.2614	**0.7157**	0.2614	0.2614	**0.7157**	**0.7157**
25	0.6791	0.2598	0.2905	**0.7396**	0.2848	0.2968	0.7673	0.7006
30	0.6791	0.2769	0.2981	**0.7615**	0.2919	0.3108	0.7961	0.6838
35	0.6791	0.3239	0.3409	**0.7811**	0.3337	0.3585	0.8174	0.6813
40	0.6791	0.3450	0.3609	**0.7958**	0.3534	0.3795	0.8278	0.6843

Table C116: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
		Approach						
Sample Size	L*	FW*	I	II	III	IV	V	VI
20	0.7039	0.6223	0.6630	**0.9220**	0.6630	0.6630	**0.9220**	**0.9220**
25	0.7039	0.7074	0.7369	**0.9440**	0.7313	0.7452	0.9451	0.9412
30	0.7039	0.7670	0.7893	**0.9563**	0.7830	0.8010	0.9522	0.9514
35	0.7039	0.8281	0.8413	**0.9682**	0.8359	0.8538	0.9552	0.9640
40	0.7039	0.8620	0.8737	**0.9762**	0.8678	0.8844	0.9571	0.9699

Table C117: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
			Approach					
Sample Size	L*	FW*	I	II	III	IV	V	VI
20	0.5092	0.3346	0.3687	**0.6937**	0.3687	0.3687	**0.6937**	**0.6937**
25	0.5092	0.3899	0.4201	**0.7281**	0.4138	0.4264	0.7371	0.7101
30	0.5092	0.4466	0.4707	**0.7643**	0.4626	0.4827	0.7660	0.7310
35	0.5092	0.5055	0.5219	**0.7934**	0.5129	0.5383	0.7805	0.7575
40	0.5092	0.5460	0.5611	**0.8184**	0.5534	0.5735	0.7829	0.7721

Table C118: Estimated power of tests for mixed design under the exponential distribution with equal variance; treatments effects: d2=0.1; d3=0.2

Fixed Sample Size $n_a = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
			Approach					
Blocks	L*	FW*	I	II	III	IV	V	VI
20	0.1556	0.2302	0.2368	**0.3144**	0.2368	0.2368	**0.3144**	**0.3144**
25	0.2349	0.2302	0.2410	**0.3368**	0.2478	0.2398	0.3368	0.3316
30	0.2311	0.2302	0.2430	**0.3577**	0.2547	0.2386	0.3458	0.3492
35	0.2925	0.2302	0.2467	**0.3746**	0.2634	0.2391	0.3465	0.3609
40	0.2803	0.2302	0.2504	**0.3930**	0.2788	0.2402	0.3536	0.3804

Table C119: Estimated power of tests for mixed design under the normal distribution with equal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.6857	0.8296	0.8601	**0.9640**	0.8601	0.8601	**0.9640**	**0.9640**
25	0.8305	0.8296	0.8671	**0.9774**	0.8756	0.8620	0.9753	0.9753
30	0.8691	0.8296	0.8728	**0.9869**	0.8928	0.8600	0.9827	0.9840
35	0.9283	0.8296	0.8797	**0.9911**	0.9088	0.8618	0.9832	0.9886
40	0.9387	0.8296	0.8867	**0.9933**	0.9272	0.8627	0.9834	0.9914

Table C120: Estimated power of tests for mixed design under the t distribution with equal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	VI
20	0.5232	0.6750	0.7054	**0.8750**	0.7054	0.7054	**0.8750**	**0.8750**
25	0.6728	0.6750	0.7143	**0.9043**	0.7297	0.7068	0.9031	0.9008
30	0.7146	0.6750	0.7256	**0.9235**	0.7529	0.7091	0.9105	0.9189
35	0.8016	0.6750	0.7344	**0.9395**	0.7759	0.7095	0.9176	0.9337
40	0.8322	0.6750	0.7432	**0.9543**	0.8015	0.7092	0.9184	0.9477

Table C121: Estimated Power of Tests for Mixed Design under the Exponential distribution with Unequal variance; treatments effects: d2=0.1; d3=0.2

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.1590	0.1643	0.1706	**0.2565**	0.1706	0.1706	**0.2565**	**0.2565**
25	0.2403	0.1643	0.1738	**0.2819**	0.1798	0.1722	0.2742	0.2872
30	0.2356	0.1643	0.1770	**0.2948**	0.1885	0.1727	0.2752	0.3029
35	0.2945	0.1643	0.1832	**0.3081**	0.1969	0.1734	0.2761	0.3203
40	0.2849	0.1643	0.1814	**0.3250**	0.2026	0.1749	0.2731	0.3391

Table C122: Estimated power of tests for mixed design under the exponential distribution with unequal variance; treatments effects: d2=0.1; d3=0.2

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.1586	0.1452	0.1520	**0.2367**	0.1520	0.1520	**0.2367**	**0.2367**
25	0.2317	0.1452	0.1551	0.2587	0.1591	0.1536	0.2505	**0.2621**
30	0.2305	0.1452	0.1556	0.2760	0.1654	0.1521	0.2539	**0.2863**
35	0.2883	0.1452	0.1593	0.2912	0.1733	0.1523	0.2528	**0.3049**
40	0.2887	0.1452	0.1616	0.3120	0.1783	0.1548	0.2546	**0.3334**

Table C123: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.7096	0.6189	0.6645	0.9229	0.6645	0.6645	0.9229	**0.9229**
25	0.8428	0.6189	0.6763	0.9442	0.6936	0.6679	0.9367	**0.9479**
30	0.8820	0.6189	0.6915	0.9623	0.7228	0.6675	0.9441	**0.9677**
35	0.9403	0.6189	0.7015	0.9754	0.7524	0.6683	0.9464	**0.9806**
40	0.9566	0.6189	0.7139	0.9845	0.7886	0.6712	0.9481	**0.9893**

Table C124: Estimated power of tests for mixed design under the normal distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.6811	0.2186	0.2536	0.7083	0.2536	0.2536	0.7083	**0.7083**
25	0.8300	0.2186	0.2643	0.7712	0.2821	0.2561	0.7248	**0.8083**
30	0.8636	0.2186	0.2763	0.8256	0.3109	0.2555	0.7238	**0.8767**
35	0.9296	0.2186	0.2855	0.8604	0.3424	0.2556	0.7189	**0.9200**
40	0.9409	0.2186	0.2985	0.8871	0.3862	0.2572	0.7004	**0.9454**

Table C125: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.7096	0.6189	0.6645	**0.9229**	0.6645	0.6645	**0.9229**	**0.9229**
25	0.8428	0.6189	0.6763	0.9442	0.6936	0.6679	0.9367	**0.9479**
30	0.8820	0.6189	0.6915	0.9623	0.7228	0.6675	0.9441	**0.9677**
35	0.9403	0.6189	0.7015	0.9754	0.7524	0.6683	0.9464	**0.9806**
40	0.9566	0.6189	0.7139	0.9845	0.7886	0.6712	0.9481	**0.9893**

Table C126: Estimated power of tests for mixed design under the t distribution with unequal variance; treatments effects: d2=0.5; d3=1.0

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.5056	0.3288	0.3638	**0.6875**	0.3638	0.3638	**0.6875**	**0.6875**
25	0.6573	0.3288	0.3751	0.7332	0.3879	0.3660	0.7044	**0.7486**
30	0.7105	0.3288	0.3827	0.7840	0.4156	0.3669	0.7198	**0.8110**
35	0.8009	0.3288	0.3934	0.8158	0.4470	0.3656	0.7199	**0.8497**
40	0.8232	0.3288	0.4025	0.8474	0.4813	0.3685	0.7191	**0.8820**

APPENDIX D. ESTIMATED ALPHA VALUES FOUR POPULATIONS

Table D1: Estimated alpha levels of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed number of Blocks $n_b = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.0598	0.0498	0.0525	0.0498	0.0525	0.0525	0.0498	0.0498
15	0.0598	0.0502	0.0480	0.0511	0.0494	0.0486	0.0515	0.0509
20	0.0598	0.0524	0.0526	0.0526	0.0521	0.0527	0.0498	0.0529
25	0.0598	0.0450	0.0454	0.0483	0.0455	0.0466	0.0492	0.0461
30	0.0598	0.0509	0.0513	0.0503	0.0510	0.0511	0.0507	0.0496
35	0.0598	0.0483	0.0486	0.0510	0.0483	0.0491	0.0509	0.0498
40	0.0598	0.0517	0.0520	0.0506	0.0519	0.0513	0.0494	0.0520

Table D2: Estimated alpha levels of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed number of Blocks $n_b = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.0608	0.0488	0.0494	0.0474	0.0494	0.0494	0.0474	0.0474
15	0.0608	0.0493	0.0473	0.0513	0.0483	0.0475	0.0514	0.0500
20	0.0608	0.0475	0.0475	0.0470	0.0476	0.0475	0.0470	0.0468
25	0.0608	0.0510	0.0513	0.0486	0.0511	0.0515	0.0507	0.0483
30	0.0608	0.0482	0.0484	0.0508	0.0485	0.0492	0.0498	0.0491
35	0.0608	0.0506	0.0505	0.0501	0.0503	0.0513	0.0503	0.0505
40	0.0608	0.0532	0.0536	0.0546	0.0533	0.0538	0.0498	0.0520

Table D3: Estimated alpha levels of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed number of Blocks $n_b = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.0611	0.0528	0.0530	0.0505	0.0530	0.0530	0.0505	0.0505
15	0.0611	0.0522	0.0494	0.0508	0.0500	0.0510	0.0510	0.0528
20	0.0611	0.0484	0.0484	0.0485	0.0490	0.0482	0.0493	0.0491
25	0.0611	0.0476	0.0481	0.0519	0.0481	0.0488	0.0507	0.0487
30	0.0611	0.0508	0.0496	0.0529	0.0506	0.0508	0.0487	0.0507
35	0.0611	0.0528	0.0530	0.0527	0.0529	0.0538	0.0495	0.0513
40	0.0611	0.0477	0.0477	0.0486	0.0478	0.0480	0.0510	0.0481

Table D4: Estimated alpha levels of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.0543	0.0530	0.0539	0.0492	0.0539	0.0539	0.0492	0.0492
15	0.0543	0.0499	0.0476	0.0457	0.0488	0.0488	0.0453	0.0481
20	0.0543	0.0504	0.0504	0.0505	0.0503	0.0515	0.0466	0.0522
25	0.0543	0.0517	0.0513	0.0451	0.0517	0.0510	0.0461	0.0479
30	0.0543	0.0541	0.0535	0.0497	0.0537	0.0535	0.0463	0.0537
35	0.0543	0.0488	0.0485	0.0467	0.0486	0.0492	0.0469	0.0472
40	0.0543	0.0503	0.0503	0.0475	0.0504	0.0498	0.0465	0.0486

Table D5: Estimated alpha levels of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.0582	0.0505	0.0503	0.0503	0.0503	0.0503	0.0503	0.0503
15	0.0582	0.0517	0.0496	0.0454	0.0514	0.0503	0.0458	0.0436
20	0.0582	0.0513	0.0513	0.0480	0.0514	0.0523	0.0474	0.0517
25	0.0582	0.0489	0.0498	0.0468	0.0493	0.0493	0.0478	0.0488
30	0.0582	0.0492	0.0492	0.0506	0.0492	0.0508	0.0487	0.0519
35	0.0582	0.0531	0.0532	0.0500	0.0531	0.0522	0.0502	0.0496
40	0.0582	0.0497	0.0499	0.0493	0.0496	0.0490	0.0491	0.0504

Table D6: Estimated alpha levels of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.0580	0.0513	0.0506	0.0445	0.0506	0.0506	0.0445	0.0445
15	0.0580	0.0528	0.0509	0.0493	0.0517	0.0521	0.0498	0.0487
20	0.0580	0.0492	0.0487	0.0499	0.0491	0.0501	0.0487	0.0513
25	0.0580	0.0489	0.0487	0.0515	0.0491	0.0496	0.0509	0.0507
30	0.0580	0.0528	0.0529	0.0491	0.0527	0.0532	0.0482	0.0508
35	0.0580	0.0471	0.0467	0.0464	0.0466	0.0472	0.0479	0.0464
40	0.0580	0.0458	0.0459	0.0493	0.0458	0.0468	0.0489	0.0476

Table D7: Estimated alpha levels of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.0604	0.0522	0.0536	0.0502	0.0536	0.0536	0.0502	0.0502
15	0.0604	0.0516	0.0504	0.0508	0.0512	0.0509	0.0523	0.0511
20	0.0604	0.0507	0.0513	0.0533	0.0513	0.0516	0.0507	0.0521
25	0.0604	0.0482	0.0491	0.0486	0.0486	0.0499	0.0506	0.0512
30	0.0604	0.0480	0.0486	0.0496	0.0480	0.0496	0.0500	0.0499
35	0.0604	0.0467	0.0463	0.0463	0.0468	0.0463	0.0492	0.0436
40	0.0604	0.0482	0.0478	0.0517	0.0481	0.0480	0.0521	0.0483

Table D8: Estimated alpha levels of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.0585	0.0486	0.0498	0.0495	0.0498	0.0498	0.0495	0.0495
15	0.0585	0.0495	0.0490	0.0473	0.0485	0.0497	0.0491	0.0459
20	0.0585	0.0503	0.0496	0.0494	0.0501	0.0502	0.0481	0.0496
25	0.0585	0.0512	0.0515	0.0504	0.0516	0.0512	0.0477	0.0521
30	0.0585	0.0483	0.0488	0.0499	0.0489	0.0493	0.0479	0.0483
35	0.0585	0.0518	0.0519	0.0488	0.0518	0.0515	0.0472	0.0504
40	0.0585	0.0477	0.0480	0.0499	0.0478	0.0478	0.0488	0.0475

Table D9: Estimated alpha levels of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.0608	0.0503	0.0510	0.0484	0.0510	0.0510	0.0484	0.0484
15	0.0608	0.0556	0.0539	0.0538	0.0552	0.0540	0.0514	0.0542
20	0.0608	0.0514	0.0508	0.0540	0.0515	0.0516	0.0552	0.0518
25	0.0608	0.0477	0.0478	0.0491	0.0482	0.0480	0.0514	0.0467
30	0.0608	0.0520	0.0523	0.0481	0.0523	0.0517	0.0514	0.0491
35	0.0608	0.0509	0.0511	0.0498	0.0511	0.0514	0.0489	0.0516
40	0.0608	0.0523	0.0523	0.0539	0.0521	0.0525	0.0510	0.0513

Table D10: Estimated alpha levels of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0600	0.0507	0.0529	0.0492	0.0529	0.0529	0.0492	0.0492
15	0.0506	0.0507	0.0506	0.0504	0.0513	0.0508	0.0504	0.0485
20	0.0472	0.0507	0.0489	0.0495	0.0486	0.0508	0.0494	0.0497
25	0.0531	0.0507	0.0515	0.0501	0.0497	0.0507	0.0497	0.0497
30	0.0425	0.0507	0.0514	0.0519	0.0515	0.0503	0.0500	0.0497
35	0.0472	0.0507	0.0494	0.0497	0.0513	0.0503	0.0514	0.0513
40	0.0487	0.0507	0.0526	0.0483	0.0479	0.0510	0.0503	0.0500

Table D11: Estimated alpha levels of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0608	0.0507	0.0506	0.0479	0.0506	0.0506	0.0479	0.0479
15	0.0583	0.0507	0.0499	0.0480	0.0486	0.0498	0.0465	0.0483
20	0.0441	0.0507	0.0482	0.0484	0.0477	0.0499	0.0489	0.0495
25	0.0547	0.0507	0.0490	0.0462	0.0454	0.0495	0.0459	0.0508
30	0.0422	0.0507	0.0483	0.0482	0.0495	0.0494	0.0485	0.0492
35	0.0507	0.0507	0.0492	0.0504	0.0498	0.0499	0.0490	0.0497
40	0.0502	0.0507	0.0492	0.0469	0.0462	0.0506	0.0472	0.0509

Table D12: Estimated alpha levels of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0605	0.0496	0.0505	0.0525	0.0505	0.0505	0.0525	0.0525
15	0.0523	0.0496	0.0497	0.0493	0.0488	0.0494	0.0497	0.0484
20	0.0447	0.0496	0.0502	0.0528	0.0498	0.0501	0.0512	0.0529
25	0.0569	0.0496	0.0488	0.0518	0.0467	0.0484	0.0466	0.0523
30	0.0394	0.0496	0.0497	0.0474	0.0491	0.0478	0.0489	0.0479
35	0.0487	0.0496	0.0472	0.0515	0.0521	0.0475	0.0489	0.0487
40	0.0519	0.0496	0.0501	0.0505	0.0495	0.0495	0.0481	0.0483

Table D13: Estimated alpha levels of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0601	0.0517	0.0529	0.0482	0.0529	0.0529	0.0482	0.0482
15	0.0528	0.0517	0.0516	0.0501	0.0507	0.0516	0.0502	0.0491
20	0.0459	0.0517	0.0499	0.0501	0.0503	0.0517	0.0507	0.0487
25	0.0526	0.0517	0.0538	0.0463	0.0493	0.0509	0.0493	0.0487
30	0.0479	0.0517	0.0523	0.0484	0.0508	0.0512	0.0512	0.0519
35	0.0467	0.0517	0.0509	0.0517	0.0514	0.0519	0.0526	0.0497
40	0.0482	0.0517	0.0547	0.0500	0.0496	0.0512	0.0528	0.0492

Table D14: Estimated alpha levels of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0614	0.0545	0.0553	0.0502	0.0553	0.0553	0.0502	0.0502
15	0.0498	0.0545	0.0534	0.0468	0.0522	0.0539	0.0488	0.0479
20	0.0420	0.0545	0.0548	0.0531	0.0542	0.0551	0.0547	0.0495
25	0.0506	0.0545	0.0560	0.0534	0.0534	0.0551	0.0533	0.0489
30	0.0439	0.0545	0.0571	0.0536	0.0545	0.0548	0.0539	0.0524
35	0.0442	0.0545	0.0534	0.0492	0.0515	0.0553	0.0539	0.0470
40	0.0509	0.0545	0.0545	0.0525	0.0506	0.0543	0.0536	0.0499

Table D15: Estimated alpha levels of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0609	0.0522	0.0532	0.0492	0.0532	0.0532	0.0492	0.0492
15	0.0488	0.0522	0.0531	0.0486	0.0530	0.0526	0.0492	0.0486
20	0.0416	0.0522	0.0515	0.0497	0.0495	0.0525	0.0503	0.0493
25	0.0526	0.0522	0.0534	0.0540	0.0523	0.0520	0.0526	0.0494
30	0.0417	0.0522	0.0541	0.0512	0.0525	0.0518	0.0534	0.0492
35	0.0480	0.0522	0.0502	0.0497	0.0500	0.0513	0.0516	0.0500
40	0.0477	0.0522	0.0514	0.0471	0.0470	0.0521	0.0502	0.0470

Table D16: Estimated alpha levels of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0613	0.0498	0.0515	0.0518	0.0515	0.0515	0.0518	0.0518
15	0.0534	0.0498	0.0504	0.0484	0.0504	0.0495	0.0508	0.0476
20	0.0440	0.0498	0.0502	0.0490	0.0492	0.0504	0.0505	0.0506
25	0.0558	0.0498	0.0510	0.0522	0.0499	0.0499	0.0502	0.0516
30	0.0402	0.0498	0.0499	0.0495	0.0520	0.0497	0.0507	0.0472
35	0.0503	0.0498	0.0477	0.0487	0.0488	0.0491	0.0491	0.0495
40	0.0482	0.0498	0.0517	0.0495	0.0499	0.0504	0.0497	0.0461

Table D17: Estimated alpha levels of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 10$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0610	0.0495	0.0502	0.0514	0.0502	0.0502	0.0514	0.0514
15	0.0533	0.0495	0.0496	0.0473	0.0488	0.0493	0.0483	0.0493
20	0.0443	0.0495	0.0453	0.0425	0.0431	0.0482	0.0448	0.0436
25	0.0558	0.0495	0.0499	0.0520	0.0500	0.0485	0.0503	0.0518
30	0.0413	0.0495	0.0477	0.0498	0.0493	0.0479	0.0485	0.0480
35	0.0483	0.0495	0.0488	0.0504	0.0509	0.0487	0.0504	0.0522
40	0.0501	0.0495	0.0505	0.0495	0.0497	0.0495	0.0504	0.0489

Table D18: Estimated alpha levels of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 10$; (CRD $(T(3) * \sqrt{3})$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0623	0.0544	0.0548	0.0519	0.0548	0.0548	0.0519	0.0519
15	0.0549	0.0544	0.0537	0.0536	0.0559	0.0538	0.0548	0.0534
20	0.0439	0.0544	0.0516	0.0510	0.0506	0.0538	0.0510	0.0508
25	0.0529	0.0544	0.0546	0.0528	0.0534	0.0542	0.0537	0.0480
30	0.0430	0.0544	0.0537	0.0480	0.0506	0.0524	0.0519	0.0513
35	0.0493	0.0544	0.0536	0.0519	0.0516	0.0538	0.0530	0.0523
40	0.0518	0.0544	0.0543	0.0511	0.0501	0.0539	0.0528	0.0484

Table D19: Estimated alpha levels of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.0556	0.0517	0.0498	0.0508	0.0498	0.0498	0.0508	0.0508
20	0.0556	0.0531	0.0536	0.0493	0.0533	0.0523	0.0492	0.0505
25	0.0556	0.0495	0.0489	0.0508	0.0492	0.0495	0.0517	0.0488
30	0.0556	0.0499	0.0492	0.0511	0.0494	0.0501	0.0510	0.0493
35	0.0556	0.0484	0.0487	0.0520	0.0489	0.0491	0.0522	0.0506
40	0.0556	0.0525	0.0519	0.0529	0.0523	0.0522	0.0526	0.0520

Table D20: Estimated alpha levels of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.0483	0.0561	0.0552	0.0486	0.0552	0.0552	0.0486	0.0486
20	0.0483	0.0495	0.0505	0.0466	0.0498	0.0498	0.0467	0.0461
25	0.0483	0.0498	0.0502	0.0466	0.0502	0.0501	0.0462	0.0479
30	0.0483	0.0510	0.0507	0.0508	0.0507	0.0518	0.0498	0.0526
35	0.0483	0.0504	0.0508	0.0466	0.0507	0.0508	0.0462	0.0474
40	0.0483	0.0478	0.0479	0.0466	0.0481	0.0478	0.0449	0.0469

Table D21: Estimated alpha levels of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.0572	0.0514	0.0507	0.0512	0.0507	0.0507	0.0512	0.0512
20	0.0572	0.0504	0.0510	0.0521	0.0503	0.0507	0.0524	0.0517
25	0.0572	0.0469	0.0473	0.0492	0.0474	0.0468	0.0506	0.0473
30	0.0572	0.0496	0.0500	0.0503	0.0497	0.0505	0.0517	0.0488
35	0.0572	0.0498	0.0501	0.0526	0.0495	0.0510	0.0528	0.0495
40	0.0572	0.0503	0.0501	0.0506	0.0505	0.0503	0.0524	0.0486

Table D22: Estimated alpha levels of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.0572	0.0514	0.0507	0.0512	0.0507	0.0507	0.0512	0.0512
20	0.0572	0.0504	0.0510	0.0521	0.0503	0.0507	0.0524	0.0517
25	0.0572	0.0469	0.0473	0.0492	0.0474	0.0468	0.0506	0.0473
30	0.0572	0.0496	0.0500	0.0503	0.0497	0.0505	0.0517	0.0488
35	0.0572	0.0498	0.0501	0.0526	0.0495	0.0510	0.0528	0.0495
40	0.0572	0.0503	0.0501	0.0506	0.0505	0.0503	0.0524	0.0486

Table D23: Estimated alpha levels of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0502	0.0512	0.0525	0.0466	0.0525	0.0525	0.0466	0.0466
20	0.0502	0.0495	0.0496	0.0488	0.0498	0.0490	0.0492	0.0497
25	0.0502	0.0513	0.0514	0.0490	0.0514	0.0514	0.0474	0.0508
30	0.0502	0.0529	0.0527	0.0499	0.0528	0.0527	0.0489	0.0514
35	0.0502	0.0490	0.0494	0.0521	0.0489	0.0504	0.0490	0.0523
40	0.0502	0.0488	0.0483	0.0479	0.0489	0.0482	0.0474	0.0506

Table D24: Estimated alpha levels of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0515	0.0535	0.0535	0.0530	0.0535	0.0535	0.0530	0.0530
20	0.0515	0.0462	0.0472	0.0465	0.0471	0.0469	0.0465	0.0479
25	0.0515	0.0480	0.0494	0.0454	0.0485	0.0492	0.0458	0.0478
30	0.0515	0.0513	0.0514	0.0532	0.0516	0.0515	0.0523	0.0521
35	0.0515	0.0486	0.0489	0.0475	0.0488	0.0490	0.0477	0.0476
40	0.0515	0.0491	0.0483	0.0504	0.0490	0.0479	0.0516	0.0509

Table D25: Estimated alpha levels of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0436	0.0527	0.0533	0.0544	0.0533	0.0533	0.0544	0.0544
20	0.0436	0.0486	0.0480	0.0505	0.0523	0.0527	0.0510	0.0517
25	0.0436	0.0499	0.0509	0.0487	0.0492	0.0493	0.0495	0.0483
30	0.0436	0.0524	0.0520	0.0509	0.0538	0.0538	0.0509	0.0509
35	0.0436	0.0466	0.0456	0.0491	0.0520	0.0527	0.0498	0.0508
40	0.0436	0.0498	0.0495	0.0479	0.0498	0.0496	0.0492	0.0464

Table D26: Estimated alpha levels of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 15$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0558	0.0493	0.0494	0.0490	0.0494	0.0494	0.0490	0.0490
20	0.0558	0.0499	0.0504	0.0525	0.0505	0.0500	0.0530	0.0511
25	0.0558	0.0509	0.0510	0.0507	0.0515	0.0507	0.0529	0.0520
30	0.0558	0.0494	0.0488	0.0517	0.0490	0.0490	0.0539	0.0498
35	0.0558	0.0497	0.0501	0.0523	0.0499	0.0496	0.0521	0.0519
40	0.0558	0.0520	0.0521	0.0519	0.0518	0.0526	0.0538	0.0527

Table D27: Estimated alpha levels of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0491	0.0477	0.0479	0.0507	0.0479	0.0479	0.0507	0.0507
20	0.0448	0.0477	0.0478	0.0487	0.0481	0.0477	0.0494	0.0486
25	0.0513	0.0477	0.0484	0.0508	0.0486	0.0480	0.0508	0.0514
30	0.0438	0.0477	0.0480	0.0478	0.0496	0.0479	0.0474	0.0495
35	0.0463	0.0477	0.0478	0.0534	0.0483	0.0468	0.0494	0.0506
40	0.0489	0.0477	0.0492	0.0487	0.0501	0.0474	0.0519	0.0478

Table D28: Estimated alpha levels of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0537	0.0532	0.0530	0.0540	0.0530	0.0530	0.0540	0.0540
20	0.0458	0.0532	0.0530	0.0504	0.0543	0.0529	0.0508	0.0518
25	0.0529	0.0532	0.0531	0.0521	0.0531	0.0533	0.0532	0.0512
30	0.0412	0.0532	0.0527	0.0503	0.0540	0.0530	0.0510	0.0477
35	0.0452	0.0532	0.0537	0.0475	0.0529	0.0530	0.0523	0.0475
40	0.0551	0.0532	0.0516	0.0552	0.0526	0.0521	0.0525	0.0536

Table D29: Estimated alpha levels of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0483	0.0449	0.0447	0.0441	0.0447	0.0447	0.0441	0.0441
20	0.0456	0.0449	0.0449	0.0512	0.0459	0.0447	0.0518	0.0514
25	0.0552	0.0449	0.0466	0.0473	0.0462	0.0456	0.0474	0.0470
30	0.0446	0.0449	0.0458	0.0493	0.0463	0.0452	0.0473	0.0507
35	0.0477	0.0449	0.0476	0.0498	0.0482	0.0457	0.0492	0.0494
40	0.0530	0.0449	0.0449	0.0483	0.0442	0.0444	0.0454	0.0497

Table D30: Estimated alpha levels of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0541	0.0487	0.0477	0.0483	0.0477	0.0477	0.0483	0.0483
20	0.0435	0.0487	0.0474	0.0491	0.0477	0.0474	0.0497	0.0503
25	0.0527	0.0487	0.0465	0.0484	0.0466	0.0466	0.0488	0.0482
30	0.0415	0.0487	0.0477	0.0475	0.0492	0.0482	0.0470	0.0453
35	0.0488	0.0487	0.0483	0.0480	0.0470	0.0476	0.0453	0.0486
40	0.0518	0.0487	0.0471	0.0482	0.0476	0.0479	0.0481	0.0494

Table D31: Estimated alpha levels of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0412	0.0494	0.0495	0.0484	0.0495	0.0495	0.0484	0.0484
25	0.0530	0.0494	0.0497	0.0475	0.0494	0.0495	0.0489	0.0477
30	0.0412	0.0494	0.0502	0.0519	0.0504	0.0504	0.0518	0.0517
35	0.0473	0.0494	0.0507	0.0468	0.0503	0.0503	0.0495	0.0507
40	0.0531	0.0494	0.0505	0.0480	0.0510	0.0499	0.0488	0.0492

Table D32: Estimated alpha levels of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0457	0.0509	0.0513	0.0518	0.0513	0.0513	0.0518	0.0518
25	0.0526	0.0509	0.0512	0.0484	0.0509	0.0512	0.0481	0.0492
30	0.0462	0.0509	0.0516	0.0544	0.0514	0.0518	0.0533	0.0534
35	0.0472	0.0509	0.0519	0.0496	0.0511	0.0514	0.0508	0.0474
40	0.0529	0.0509	0.0508	0.0493	0.0512	0.0509	0.0513	0.0521

Table D33: Estimated alpha levels of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 15$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0545	0.0477	0.0488	0.0527	0.0488	0.0488	0.0527	0.0527
20	0.0442	0.0477	0.0465	0.0514	0.0466	0.0473	0.0491	0.0504
25	0.0491	0.0477	0.0474	0.0484	0.0469	0.0470	0.0465	0.0477
30	0.0407	0.0477	0.0464	0.0469	0.0486	0.0467	0.0481	0.0498
35	0.0484	0.0477	0.0482	0.0504	0.0463	0.0477	0.0458	0.0529
40	0.0496	0.0477	0.0466	0.0496	0.0475	0.0464	0.0478	0.0491

Table D34: Estimated alpha levels of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 15$; (CRD $N(0, 3)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0541	0.0506	0.0501	0.0510	0.0501	0.0501	0.0510	0.0510
20	0.0426	0.0506	0.0499	0.0497	0.0502	0.0502	0.0500	0.0491
25	0.0576	0.0506	0.0515	0.0534	0.0512	0.0504	0.0507	0.0535
30	0.0466	0.0506	0.0492	0.0493	0.0483	0.0503	0.0462	0.0518
35	0.0482	0.0506	0.0495	0.0509	0.0495	0.0499	0.0493	0.0505
40	0.0565	0.0506	0.0496	0.0528	0.0505	0.0495	0.0516	0.0544

Table D35: Estimated alpha levels of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0515	0.0478	0.0472	0.0487	0.0472	0.0472	0.0487	0.0487
20	0.0444	0.0478	0.0469	0.0476	0.0476	0.0469	0.0493	0.0498
25	0.0544	0.0478	0.0489	0.0508	0.0493	0.0481	0.0524	0.0498
30	0.0431	0.0478	0.0489	0.0525	0.0495	0.0488	0.0513	0.0501
35	0.0479	0.0478	0.0499	0.0482	0.0488	0.0473	0.0483	0.0477
40	0.0495	0.0478	0.0483	0.0495	0.0472	0.0475	0.0484	0.0483

Table D36: Estimated alpha levels of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.0412	0.0508	0.0512	0.0489	0.0512	0.0512	0.0489	0.0489
25	0.0412	0.0540	0.0542	0.0503	0.0540	0.0541	0.0493	0.0511
30	0.0412	0.0530	0.0523	0.0472	0.0523	0.0521	0.0473	0.0476
35	0.0412	0.0486	0.0494	0.0483	0.0493	0.0497	0.0498	0.0500
40	0.0412	0.0466	0.0464	0.0449	0.0468	0.0469	0.0475	0.0444

Table D37: Estimated alpha levels of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.0418	0.0472	0.0476	0.0479	0.0476	0.0476	0.0479	0.0479
25	0.0418	0.0499	0.0498	0.0521	0.0501	0.0503	0.0502	0.0530
30	0.0418	0.0477	0.0479	0.0485	0.0479	0.0476	0.0468	0.0485
35	0.0418	0.0479	0.0479	0.0488	0.0480	0.0479	0.0477	0.0489
40	0.0418	0.0463	0.0469	0.0507	0.0465	0.0472	0.0504	0.0484

Table D38: Estimated alpha levels of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.0414	0.0463	0.0463	0.0488	0.0463	0.0463	0.0488	0.0488
25	0.0414	0.0507	0.0505	0.0481	0.0513	0.0505	0.0470	0.0474
30	0.0414	0.0472	0.0479	0.0491	0.0473	0.0479	0.0488	0.0485
35	0.0414	0.0488	0.0489	0.0490	0.0490	0.0492	0.0471	0.0490
40	0.0414	0.0507	0.0508	0.0483	0.0509	0.0504	0.0463	0.0501

Table D39: Estimated alpha levels of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed number of Blocks $n_b = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.0426	0.0517	0.0522	0.0491	0.0522	0.0522	0.0491	0.0491
25	0.0426	0.0504	0.0511	0.0511	0.0513	0.0518	0.0508	0.0506
30	0.0426	0.0479	0.0479	0.0521	0.0479	0.0479	0.0493	0.0515
35	0.0426	0.0523	0.0532	0.0522	0.0528	0.0529	0.0507	0.0523
40	0.0426	0.0502	0.0501	0.0499	0.0507	0.0506	0.0481	0.0499

Table D40: Estimated alpha levels of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.0430	0.0498	0.0509	0.0526	0.0509	0.0509	0.0526	0.0526
25	0.0430	0.0526	0.0527	0.0483	0.0525	0.0533	0.0483	0.0500
30	0.0430	0.0482	0.0490	0.0502	0.0484	0.0487	0.0489	0.0502
35	0.0430	0.0517	0.0522	0.0511	0.0521	0.0522	0.0500	0.0496
40	0.0430	0.0473	0.0473	0.0497	0.0476	0.0473	0.0509	0.0498

Table D41: Estimated alpha levels of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.0418	0.0481	0.0471	0.0477	0.0471	0.0471	0.0477	0.0477
25	0.0418	0.0442	0.0441	0.0432	0.0443	0.0440	0.0436	0.0436
30	0.0418	0.0454	0.0462	0.0478	0.0460	0.0463	0.0482	0.0466
35	0.0418	0.0512	0.0516	0.0491	0.0517	0.0515	0.0474	0.0505
40	0.0418	0.0476	0.0477	0.0481	0.0477	0.0478	0.0473	0.0484

Table D42: Estimated alpha levels of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.0430	0.0450	0.0450	0.0464	0.0450	0.0450	0.0464	0.0464
25	0.0430	0.0490	0.0498	0.0485	0.0493	0.0501	0.0488	0.0462
30	0.0430	0.0493	0.0492	0.0474	0.0493	0.0492	0.0461	0.0502
35	0.0430	0.0470	0.0471	0.0476	0.0471	0.0472	0.0472	0.0504
40	0.0430	0.0495	0.0495	0.0488	0.0498	0.0493	0.0504	0.0471

Table D43: Estimated alpha levels of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
		Approach						
Sample Size	L*	FW*	I	II	III	IV	V	VI
20	0.0420	0.0537	0.0533	0.0493	0.0533	0.0533	0.0493	0.0493
25	0.0420	0.0480	0.0488	0.0514	0.0488	0.0490	0.0500	0.0512
30	0.0420	0.0492	0.0484	0.0449	0.0494	0.0485	0.0467	0.0443
35	0.0420	0.0494	0.0499	0.0484	0.0496	0.0500	0.0485	0.0490
40	0.0420	0.0506	0.0504	0.0494	0.0504	0.0511	0.0481	0.0496

Table D44: Estimated alpha levels of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
			Approach					
Blocks	L*	FW*	I	II	III	IV	V	VI
20	0.0451	0.0484	0.0494	0.0478	0.0494	0.0494	0.0478	0.0478
25	0.0558	0.0484	0.0501	0.0507	0.0496	0.0494	0.0498	0.0505
30	0.0421	0.0484	0.0506	0.0488	0.0512	0.0500	0.0496	0.0483
35	0.0502	0.0484	0.0499	0.0477	0.0488	0.0487	0.0493	0.0493
40	0.0533	0.0484	0.0494	0.0485	0.0503	0.0494	0.0495	0.0467

Table D45: Estimated alpha levels of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
			Approach					
Blocks	L*	FW*	I	II	III	IV	V	VI
20	0.0435	0.0526	0.0530	0.0489	0.0530	0.0530	0.0489	0.0489
25	0.0537	0.0526	0.0543	0.0494	0.0533	0.0537	0.0488	0.0500
30	0.0450	0.0526	0.0526	0.0535	0.0531	0.0535	0.0542	0.0526
35	0.0450	0.0526	0.0542	0.0518	0.0537	0.0537	0.0528	0.0492
40	0.0504	0.0526	0.0527	0.0523	0.0529	0.0538	0.0526	0.0531

Table D46: Estimated alpha levels of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
			Approach					
Blocks	L*	FW*	I	II	III	IV	V	VI
20	0.0452	0.0470	0.0476	0.0497	0.0476	0.0476	0.0497	0.0497
25	0.0565	0.0470	0.0472	0.0509	0.0465	0.0468	0.0497	0.0519
30	0.0447	0.0470	0.0480	0.0490	0.0482	0.0481	0.0489	0.0507
35	0.0506	0.0470	0.0478	0.0510	0.0485	0.0475	0.0483	0.0489
40	0.0490	0.0470	0.0470	0.0490	0.0468	0.0474	0.0498	0.0507

Table D47: Estimated alpha levels of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0414	0.0466	0.0468	0.0485	0.0468	0.0468	0.0485	0.0485
25	0.0555	0.0466	0.0483	0.0458	0.0482	0.0476	0.0470	0.0464
30	0.0418	0.0466	0.0468	0.0521	0.0470	0.0469	0.0518	0.0512
35	0.0460	0.0466	0.0478	0.0484	0.0469	0.0471	0.0490	0.0464
40	0.0532	0.0466	0.0480	0.0518	0.0485	0.0472	0.0513	0.0520

Table D48: Estimated alpha levels of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0467	0.0537	0.0537	0.0538	0.0537	0.0537	0.0538	0.0538
25	0.0539	0.0537	0.0542	0.0512	0.0542	0.0532	0.0504	0.0529
30	0.0430	0.0537	0.0531	0.0525	0.0535	0.0538	0.0517	0.0525
35	0.0471	0.0537	0.0537	0.0519	0.0532	0.0539	0.0514	0.0513
40	0.0472	0.0537	0.0536	0.0499	0.0545	0.0541	0.0520	0.0489

Table D49: Estimated alpha levels of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0412	0.0494	0.0495	0.0484	0.0495	0.0495	0.0484	0.0484
25	0.0530	0.0494	0.0497	0.0475	0.0494	0.0495	0.0489	0.0477
30	0.0412	0.0494	0.0502	0.0519	0.0504	0.0504	0.0518	0.0517
35	0.0473	0.0494	0.0507	0.0468	0.0503	0.0503	0.0495	0.0507
40	0.0531	0.0494	0.0505	0.0480	0.0510	0.0499	0.0488	0.0492

Table D50: Estimated alpha levels of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0457	0.0509	0.0513	0.0518	0.0513	0.0513	0.0518	0.0518
25	0.0526	0.0509	0.0512	0.0484	0.0509	0.0512	0.0481	0.0492
30	0.0462	0.0509	0.0516	0.0544	0.0514	0.0518	0.0533	0.0534
35	0.0472	0.0509	0.0519	0.0496	0.0511	0.0514	0.0508	0.0474
40	0.0529	0.0509	0.0508	0.0493	0.0512	0.0509	0.0513	0.0521

Table D51: Estimated alpha levels of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.0442	0.0506	0.0516	0.0508	0.0516	0.0516	0.0508	0.0508
25	0.0561	0.0506	0.0524	0.0498	0.0520	0.0518	0.0507	0.0506
30	0.0422	0.0506	0.0513	0.0522	0.0513	0.0518	0.0522	0.0531
35	0.0434	0.0506	0.0526	0.0505	0.0529	0.0516	0.0513	0.0510
40	0.0544	0.0506	0.0503	0.0518	0.0500	0.0509	0.0521	0.0533

Table D52: Estimated alpha levels of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0472	0.0488	0.0483	0.0478	0.0483	0.0483	0.0478	0.0478
25	0.0562	0.0488	0.0512	0.0517	0.0509	0.0507	0.0509	0.0514
30	0.0429	0.0488	0.0494	0.0488	0.0495	0.0494	0.0468	0.0490
35	0.0461	0.0488	0.0500	0.0507	0.0499	0.0491	0.0500	0.0503
40	0.0509	0.0488	0.0505	0.0492	0.0497	0.0489	0.0494	0.0484

Table D53: Estimated alpha levels of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0360	0.0522	0.0501	0.0512	0.0501	0.0501	0.0512	0.0512
25	0.0571	0.0522	0.0509	0.0485	0.0514	0.0515	0.0497	0.0493
30	0.0463	0.0522	0.0510	0.0477	0.0513	0.0515	0.0476	0.0484
35	0.0598	0.0522	0.0505	0.0502	0.0514	0.0514	0.0499	0.0496
40	0.0472	0.0522	0.0508	0.0475	0.0498	0.0518	0.0491	0.0501

Table D54: Estimated alpha levels of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0435	0.0526	0.0530	0.0489	0.0530	0.0530	0.0489	0.0489
25	0.0537	0.0526	0.0543	0.0494	0.0533	0.0537	0.0488	0.0500
30	0.0450	0.0526	0.0526	0.0535	0.0531	0.0535	0.0542	0.0526
35	0.0450	0.0526	0.0542	0.0518	0.0537	0.0537	0.0528	0.0492
40	0.0504	0.0526	0.0527	0.0523	0.0529	0.0538	0.0526	0.0531

APPENDIX E: ESTIMATED POWER FOUR POPULATIONS

Table E1: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.4951	0.5220	0.5844	**0.7320**	0.5844	0.5844	**0.7320**	**0.7320**
15	0.4951	0.6757	0.7025	0.8137	0.6965	0.7177	0.7790	**0.8193**
20	0.4951	0.7664	0.7837	0.8653	0.7761	0.7986	0.7880	**0.8723**
25	0.4951	0.8421	0.8514	0.8999	0.8462	0.8649	0.7794	**0.9128**
30	0.4951	0.8934	0.8988	0.9304	0.8950	0.9091	0.7672	**0.9408**
35	0.4951	0.9304	0.9327	0.9502	0.9313	0.9404	0.7589	**0.9609**
40	0.4951	0.9546	0.9564	0.9609	0.9554	0.9603	0.7473	**0.9726**

Table E2: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.2632	0.2806	0.3169	0.4014	0.3169	0.3169	0.4014	**0.4014**
15	0.2632	0.3629	0.3777	0.4661	0.3747	0.3907	0.4361	**0.4752**
20	0.2632	0.4392	0.4569	0.5297	0.4484	0.4726	0.4464	**0.5445**
25	0.2632	0.5031	0.5170	0.5823	0.5112	0.5330	0.4349	**0.6048**
30	0.2632	0.5744	0.5825	0.6283	0.5767	0.5978	0.4310	**0.6569**
35	0.2632	0.6350	0.6414	0.6702	0.6374	0.6539	0.4214	**0.7033**
40	0.2632	0.6875	0.6916	0.6955	0.6889	0.7046	0.4102	**0.7411**

Table E3: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed number of Blocks $n_b = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.2435	0.2567	0.2878	0.3699	0.2878	0.2878	0.3699	**0.3699**
15	0.2435	0.3389	0.3521	0.4327	0.3492	0.3628	0.4053	**0.4411**
20	0.2435	0.3900	0.4033	0.4821	0.3977	0.4170	0.4019	**0.4942**
25	0.2435	0.4683	0.4756	0.5356	0.4728	0.4911	0.3999	**0.5540**
30	0.2435	0.5313	0.5389	0.5777	0.5333	0.5533	0.3930	**0.6047**
35	0.2435	0.5859	0.5919	0.6116	0.5875	0.6042	0.3828	**0.6522**
40	0.2435	0.6378	0.6430	0.6514	0.6398	0.6541	0.3800	**0.6938**

Table E4: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.4950	0.3776	0.4450	**0.6285**	0.4450	0.4450	**0.6285**	**0.6285**
15	0.4950	0.4807	0.5082	0.7023	0.5014	0.5299	0.6886	**0.6896**
20	0.4950	0.5781	0.5973	0.7591	0.5883	0.6159	0.7030	**0.7421**
25	0.4950	0.6615	0.6746	0.8047	0.6674	0.6935	0.7046	**0.7854**
30	0.4950	0.7154	0.7253	0.8372	0.7183	0.7466	0.6984	**0.8228**
35	0.4950	0.7705	0.7775	0.8605	0.7720	0.7935	0.6845	**0.8490**
40	0.4950	0.8220	0.8264	0.8858	0.8230	0.8387	0.6765	**0.8814**

Table E5: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach I	II	III	IV	V	VI
10	0.5043	0.3055	0.3628	**0.5826**	0.3628	0.3628	**0.5826**	**0.5826**
15	0.6100	0.3055	0.3872	0.6709	0.4271	0.3598	0.6214	**0.6976**
20	0.6911	0.3055	0.4114	0.7343	0.5130	0.3580	0.6166	**0.7775**
25	0.7830	0.3055	0.4468	0.7849	0.6176	0.3574	0.5966	**0.8332**
30	0.8190	0.3055	0.4739	0.8279	0.7211	0.3575	0.5882	**0.8798**
35	0.8836	0.3055	0.4995	0.8712	0.8102	0.3579	0.5704	**0.9195**
40	0.9228	0.3055	0.5382	0.8930	0.8741	0.3610	0.5624	**0.9403**

Table E6: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 10$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.4691	0.2180	**0.2734**	0.5083	0.2734	0.2734	**0.5083**	**0.5083**
15	0.4691	0.2863	0.3104	0.5690	0.3061	0.3291	0.5833	**0.5300**
20	0.4691	0.3382	0.3608	0.6192	0.3509	0.3843	0.6059	**0.5556**
25	0.4691	0.3931	0.4076	0.6484	0.3993	0.4327	0.6044	**0.5701**
30	0.4691	0.4509	0.4643	0.6882	0.4546	0.4905	0.6023	**0.6061**
35	0.4691	0.4926	0.5023	0.7180	0.4950	0.5288	0.6015	**0.6302**
40	0.4691	0.5483	0.5578	0.7473	0.5507	0.5791	0.5994	**0.6644**

Table E7: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	**L***	**FW***	**Approach I**	**II**	**III**	**IV**	**V**	**VI**
10	0.4782	0.1414	0.1842	**0.4263**	0.1842	0.1842	**0.4263**	**0.4263**
15	0.4782	0.1773	0.1980	0.4719	0.1924	0.2142	0.5076	**0.4138**
20	0.4782	0.2009	0.2210	0.4943	0.2127	0.2395	0.5334	**0.3999**
25	0.4782	0.2370	0.2508	0.5327	0.2427	0.2700	0.5491	**0.4126**
30	0.4782	0.2604	0.2726	0.5552	0.2650	0.2939	0.5486	**0.4163**
35	0.4782	0.2914	0.3005	0.5771	0.2947	0.3241	0.5461	**0.4314**
40	0.4782	0.3175	0.3258	0.6030	0.3207	0.3478	0.5436	**0.4409**

Table E8: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	**L***	**FW***	**Approach I**	**II**	**III**	**IV**	**V**	**VI**
10	0.2534	0.1187	0.1383	**0.2387**	0.1383	0.1383	0.2387	**0.2387**
15	0.2534	0.1373	0.1461	**0.2650**	0.1442	0.1556	0.2753	0.2431
20	0.2534	0.1548	0.1644	**0.2920**	0.1610	0.1744	0.2876	0.2527
25	0.2534	0.1731	0.1806	**0.3122**	0.1766	0.1922	0.2922	0.2654
30	0.2534	0.2014	0.2067	**0.3311**	0.2026	0.2189	0.2974	0.2759
35	0.2534	0.2043	0.2107	**0.3389**	0.2066	0.2213	0.2906	0.2750
40	0.2534	0.2372	0.2414	**0.3580**	0.2386	0.2543	0.2900	0.2980

Table E9: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	**L***	**FW***	**Approach I**	**II**	**III**	**IV**	**V**	**VI**
10	0.2472	0.1026	0.1260	**0.2259**	0.1260	0.1260	**0.2259**	**0.2259**
15	0.2472	0.1211	0.1285	**0.2421**	0.1270	0.1365	0.2547	0.2159
20	0.2472	0.1338	0.1407	**0.2584**	0.1380	0.1478	0.2671	0.2184
25	0.2472	0.1409	0.1471	**0.2717**	0.1445	0.1567	0.2712	0.2159
30	0.2472	0.1551	0.1599	**0.2856**	0.1575	0.1701	0.2743	0.2231
35	0.2472	0.1740	0.1782	**0.2996**	0.1754	0.1878	0.2715	0.2333
40	0.2472	0.1862	0.1892	**0.3131**	0.1873	0.2016	0.2742	0.2455

Table E10: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
10	0.5089	0.5354	0.6021	**0.7411**	0.6021	0.6021	**0.7411**	**0.7411**
15	0.6013	0.5354	0.6230	**0.8047**	0.6598	0.5944	0.7825	0.7965
20	0.6843	0.5354	0.6506	**0.8508**	0.7338	0.5968	0.7927	0.8501
25	0.7894	0.5354	0.6807	**0.8900**	0.8026	0.5953	0.7910	0.8841
30	0.8197	0.5354	0.7062	**0.9157**	0.8681	0.5966	0.7841	0.9113
35	0.8806	0.5354	0.7256	0.9348	0.9104	0.5962	0.7762	**0.9357**
40	0.9245	0.5354	0.7547	0.9556	0.9474	0.5973	0.7697	**0.9587**

Table E11: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2759	0.2790	0.3185	**0.4129**	0.3185	0.3185	0.4129	0.4129
15	0.3295	0.2790	0.3328	**0.4672**	0.3565	0.3145	0.4542	0.4617
20	0.3527	0.2790	0.3454	**0.5136**	0.4022	0.3145	0.4584	0.5033
25	0.4618	0.2790	0.3741	**0.5650**	0.4734	0.3160	0.4628	0.5600
30	0.4806	0.2790	0.3881	**0.6050**	0.5384	0.3134	0.4537	0.5971
35	0.5506	0.2790	0.4008	**0.6450**	0.6026	0.3168	0.4455	0.6402
40	0.6221	0.2790	0.4311	0.6817	0.6630	0.3160	0.4447	**0.6867**

Table E12: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2503	0.2570	0.2933	**0.3729**	0.2933	0.2933	**0.3729**	**0.3729**
15	0.3004	0.2570	0.3038	**0.4344**	0.3286	0.2892	0.4198	0.4282
20	0.3308	0.2570	0.3163	**0.4785**	0.3690	0.2897	0.4213	0.4729
25	0.4156	0.2570	0.3393	**0.5225**	0.4294	0.2885	0.4196	0.5102
30	0.4404	0.2570	0.3536	**0.5652**	0.5003	0.2866	0.4200	0.5614
35	0.5040	0.2570	0.3652	**0.5920**	0.5553	0.2900	0.4091	0.5881
40	0.5614	0.2570	0.3924	**0.6302**	0.6117	0.2904	0.4025	0.6298

Table E13: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.4952	0.3803	0.4409	**0.6278**	0.4409	0.4409	**0.6278**	**0.6278**
15	0.6083	0.3803	0.4657	0.7175	0.5057	0.4366	0.6753	**0.7327**
20	0.6866	0.3803	0.4915	0.7765	0.5903	0.4379	0.6787	**0.8045**
25	0.7888	0.3803	0.5275	0.8258	0.6881	0.4375	0.6720	**0.8509**
30	0.8290	0.3803	0.5545	0.8688	0.7806	0.4363	0.6568	**0.8988**
35	0.8812	0.3803	0.5794	0.8962	0.8515	0.4364	0.6458	**0.9242**
40	0.9221	0.3803	0.6113	0.9156	0.9006	0.4395	0.6328	**0.9449**

Table E14: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.5043	0.3055	0.3628	**0.5826**	0.3628	0.3628	**0.5826**	**0.5826**
15	0.6100	0.3055	0.3872	0.6709	0.4271	0.3598	0.6214	**0.6976**
20	0.6911	0.3055	0.4114	0.7343	0.5130	0.3580	0.6166	**0.7775**
25	0.7830	0.3055	0.4468	0.7849	0.6176	0.3574	0.5966	**0.8332**
30	0.8190	0.3055	0.4739	0.8279	0.7211	0.3575	0.5882	**0.8798**
35	0.8836	0.3055	0.4995	0.8712	0.8102	0.3579	0.5704	**0.9195**
40	0.9228	0.3055	0.5382	0.8930	0.8741	0.3610	0.5624	**0.9403**

Table E15: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.4744	0.2187	0.2778	**0.5069**	0.2778	0.2778	**0.5069**	**0.5069**
15	0.5919	0.2187	0.3002	0.6068	0.3439	0.2703	0.5347	**0.6490**
20	0.6675	0.2187	0.3245	0.6829	0.4288	0.2718	0.5342	**0.7483**
25	0.7845	0.2187	0.3622	0.7409	0.5386	0.2764	0.5175	**0.8177**
30	0.8305	0.2187	0.3890	0.8020	0.6618	0.2738	0.4992	**0.8789**
35	0.8875	0.2187	0.4146	0.8394	0.7639	0.2736	0.4861	**0.9151**
40	0.9292	0.2187	0.4512	0.8685	0.8411	0.2755	0.4746	**0.9416**

Table E16: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.4765	0.1384	0.1800	0.4199	0.1800	0.1800	0.4199	**0.4199**
15	0.5896	0.1384	0.2005	0.5172	0.2340	0.1775	0.4306	**0.5813**
20	0.6769	0.1384	0.2188	0.5933	0.3081	0.1784	0.4188	**0.7006**
25	0.7915	0.1384	0.2528	0.6662	0.4294	0.1784	0.4060	**0.7865**
30	0.8278	0.1384	0.2745	0.7249	0.5537	0.1772	0.3834	**0.8513**
35	0.8919	0.1384	0.2978	0.7762	0.6814	0.1777	0.3692	**0.9017**
40	0.9263	0.1384	0.3288	0.8101	0.7794	0.1797	0.3519	**0.9290**

Table E17: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2556	0.1735	0.2032	**0.3044**	0.2032	0.2032	**0.3044**	**0.3044**
15	0.2979	0.1735	0.2153	0.3515	0.2354	0.2007	0.3225	**0.3629**
20	0.3326	0.1735	0.2261	0.4044	0.2721	0.2010	0.3243	**0.4250**
25	0.4226	0.1735	0.2455	0.4406	0.3339	0.2013	0.3238	**0.4743**
30	0.4264	0.1735	0.2580	0.4759	0.3924	0.2012	0.3131	**0.5134**
35	0.4986	0.1735	0.2688	0.5129	0.4576	0.1993	0.3058	**0.5620**
40	0.5628	0.1735	0.2866	0.5457	0.5255	0.2010	0.2982	**0.6021**

Table E18: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2520	0.1452	0.1732	**0.2708**	0.1732	0.1732	**0.2708**	**0.2708**
15	0.3016	0.1452	0.1812	0.3202	0.1982	0.1680	0.2892	**0.3387**
20	0.3245	0.1452	0.1896	0.3649	0.2383	0.1682	0.2878	**0.3957**
25	0.4233	0.1452	0.2094	0.4095	0.2991	0.1671	0.2875	**0.4581**
30	0.4438	0.1452	0.2209	0.4479	0.3611	0.1655	0.2821	**0.5101**
35	0.5002	0.1452	0.2333	0.4771	0.4198	0.1676	0.2672	**0.5418**
40	0.5683	0.1452	0.2518	0.5099	0.4857	0.1689	0.2631	**0.5909**

Table E19: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach						
			I	II	III	IV	V	VI
15	0.6097	0.6737	0.7167	0.8717	0.7167	0.7167	0.8717	**0.8717**
20	0.6097	0.7687	0.7942	0.9092	0.7871	0.7995	0.8982	**0.9124**
25	0.6097	0.8483	0.8623	0.9403	0.8572	0.8704	0.9094	**0.9436**
30	0.6097	0.8968	0.9037	0.9569	0.8999	0.9113	0.9076	**0.9615**
35	0.6097	0.9282	0.9329	0.9664	0.9295	0.9383	0.9005	**0.9717**
40	0.6097	0.9559	0.9578	0.9801	0.9566	0.9630	0.9009	**0.9831**

Table E20: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.4284	0.4828	0.5230	**0.6918**	0.5230	0.5230	**0.6918**	**0.6918**
20	0.4284	0.5774	0.6083	0.7522	0.5990	0.6137	0.7354	**0.7565**
25	0.4284	0.6690	0.6869	0.7995	0.6806	0.6982	0.7489	**0.8112**
30	0.4284	0.7410	0.7525	0.8403	0.7468	0.7650	0.7510	**0.8548**
35	0.4284	0.7944	0.8026	0.8702	0.7980	0.8127	0.7475	**0.8843**
40	0.4284	0.8376	0.8441	0.8945	0.8399	0.8549	0.7397	**0.9114**

Table E21: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.3191	0.3637	0.3958	**0.5337**	0.3958	0.3958	**0.5337**	**0.5337**
20	0.3191	0.4352	0.4581	0.5965	0.4521	0.4633	0.5739	**0.6008**
25	0.3191	0.5073	0.5254	0.6413	0.5188	0.5362	0.5840	**0.6535**
30	0.3191	0.5845	0.5951	0.6911	0.5894	0.6070	0.5893	**0.7060**
35	0.3191	0.6371	0.6485	0.7284	0.6421	0.6581	0.5824	**0.7437**
40	0.3191	0.6920	0.6988	0.7583	0.6946	0.7095	0.5731	**0.7856**

Table E22: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.6035	0.4899	0.5381	**0.7824**	0.5381	0.5381	**0.7824**	**0.7824**
20	0.6035	0.5683	0.6034	**0.8216**	0.5940	0.6143	0.8164	0.8103
25	0.6035	0.6455	0.6694	**0.8609**	0.6594	0.6830	0.8363	0.8443
30	0.6035	0.7108	0.7246	**0.8839**	0.7173	0.7406	0.8384	0.8695
35	0.6035	0.7735	0.7841	**0.9087**	0.7782	0.7952	0.8405	0.8945
40	0.6035	0.8141	0.8206	**0.9238**	0.8160	0.8324	0.8350	0.9118

Table E23: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach						
			I	II	III	IV	V	VI	
15	0.6063	0.3909	0.4410	**0.7313**	0.4410	0.4410	**0.7313**	**0.7313**	
20	0.6063	0.4614	0.4993	**0.7698**	0.4890	0.5078	0.7760	0.7526	
25	0.6063	0.5326	0.5565	**0.8052**	0.5473	0.5709	0.7955	0.7763	
30	0.6063	0.5987	0.6150	**0.8344**	0.6079	0.6328	0.8027	0.7983	
35	0.6063	0.6521	0.6679	**0.8610**	0.6596	0.6829	0.8069	0.8237	
40	0.6063	0.6974	0.7074	**0.8819**	0.7014	0.7242	0.8015	0.8456	

Table E24: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.3927	0.1913	0.2147	**0.4327**	0.2147	0.2147	**0.4327**	**0.4327**
20	0.3927	0.2189	0.2416	**0.4703**	0.2344	0.2461	0.4815	0.4427
25	0.3927	0.2593	0.2775	**0.4993**	0.2706	0.2880	0.5095	0.4606
30	0.3927	0.2823	0.2949	**0.5293**	0.2889	0.3068	0.5151	0.4682
35	0.3927	0.3169	0.3299	**0.5457**	0.3223	0.3427	0.5179	0.4808
40	0.3927	0.3395	0.3487	**0.5706**	0.3429	0.3640	0.5173	0.4908

Table E25: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.3841	0.1283	0.1469	**0.3549**	0.1469	0.1469	**0.3549**	**0.3549**
20	0.3841	0.1463	0.1627	0.3849	0.1590	0.1663	**0.4079**	0.3532
25	0.3841	0.1625	0.1756	0.4053	0.1698	0.1840	**0.4319**	0.3470
30	0.3841	0.1866	0.1958	0.4259	0.1912	0.2058	**0.4466**	0.3477
35	0.3841	0.1949	0.2028	0.4338	0.1982	0.2125	**0.4485**	0.3414
40	0.3841	0.2037	0.2090	0.4529	0.2062	0.2193	**0.4598**	0.3431

Table E26: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 15$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.2971	0.1424	0.1596	**0.3179**	0.1596	0.1596	**0.3179**	**0.3179**
20	0.2971	0.1597	0.1743	**0.3387**	0.1702	0.1769	0.3506	0.3156
25	0.2971	0.1774	0.1884	**0.3563**	0.1842	0.1953	0.3696	0.3218
30	0.2971	0.1963	0.2031	**0.3784**	0.1993	0.2116	0.3756	0.3222
35	0.2971	0.2182	0.2243	**0.3973**	0.2210	0.2331	0.3864	0.3377
40	0.2971	0.2333	0.2388	**0.4058**	0.2354	0.2492	0.3797	0.3409

Table E27: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4488	0.2584	0.2929	**0.2871**	0.1339	0.1339	**0.2871**	**0.2871**
20	0.4488	0.3050	0.3326	**0.3066**	0.1423	0.1493	0.3215	0.2846
25	0.4488	0.3614	0.3840	**0.3227**	0.1574	0.1676	0.3431	0.2875
30	0.4488	0.4066	0.4204	**0.3360**	0.1602	0.1716	0.3512	0.2799
35	0.4488	0.4483	0.4604	**0.3536**	0.1797	0.1897	0.3546	0.2857
40	0.4488	0.4919	0.5014	**0.3644**	0.1863	0.1983	0.3582	0.2892

Table E28: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.6035	0.6757	0.7171	**0.8668**	0.7171	0.7171	**0.8668**	**0.8668**
20	0.6751	0.6757	0.7295	**0.9029**	0.7460	0.7168	0.8971	0.8997
25	0.7889	0.6757	0.7481	**0.9330**	0.7819	0.7188	0.9126	0.9285
30	0.8295	0.6757	0.7549	**0.9536**	0.8216	0.7201	0.9133	0.9482
35	0.8813	0.6757	0.7724	**0.9621**	0.8585	0.7196	0.9148	**0.9622**
40	0.9156	0.6757	0.7813	**0.9719**	0.8957	0.7208	0.9089	0.9715

Table E29: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4284	0.4740	0.5157	**0.6951**	0.5157	0.5157	**0.6951**	**0.6951**
20	0.4856	0.4740	0.5280	**0.7448**	0.5477	0.5150	0.7339	0.7414
25	0.5921	0.4740	0.5456	**0.7837**	0.5840	0.5172	0.7527	0.7786
30	0.6273	0.4740	0.5574	**0.8210**	0.6330	0.5188	0.7554	0.8153
35	0.7052	0.4740	0.5761	**0.8502**	0.6784	0.5159	0.7551	0.8392
40	0.7704	0.4740	0.5859	**0.8747**	0.7223	0.5167	0.7482	0.8689

Table E30: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3263	0.3633	0.3942	**0.5420**	0.3942	0.3942	**0.5420**	**0.5420**
20	0.3708	0.3633	0.4007	**0.5893**	0.4177	0.3935	0.5817	0.5867
25	0.4578	0.3633	0.4190	**0.6331**	0.4482	0.3938	0.5947	0.6261
30	0.4848	0.3633	0.4219	**0.6768**	0.4872	0.3940	0.6029	0.6677
35	0.5542	0.3633	0.4384	**0.7056**	0.5257	0.3945	0.5993	0.6982
40	0.6213	0.3633	0.4489	**0.7369**	0.5692	0.3952	0.5954	0.7295

Table E31: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

ixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.6056	0.4801	0.5279	**0.7793**	0.5279	0.5279	**0.7793**	**0.7793**
20	0.6831	0.4801	0.5446	0.8306	0.5657	0.5290	0.8101	**0.8401**
25	0.7898	0.4801	0.5640	0.8717	0.6151	0.5282	0.8175	**0.8860**
30	0.8236	0.4801	0.5751	0.8992	0.6668	0.5294	0.8147	**0.9174**
35	0.8831	0.4801	0.5984	0.9246	0.7249	0.5266	0.8161	**0.9419**
40	0.9197	0.4801	0.6089	0.9404	0.7788	0.5282	0.8077	**0.9580**

Table E32: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.6071	0.3947	0.4405	**0.7288**	0.4405	0.4405	**0.7288**	**0.7288**
20	0.6823	0.3947	0.4557	0.7903	0.4759	0.4401	0.7588	**0.8068**
25	0.7892	0.3947	0.4751	0.8350	0.5232	0.4411	0.7609	**0.8669**
30	0.8206	0.3947	0.4898	0.8707	0.5812	0.4423	0.7520	**0.9031**
35	0.8783	0.3947	0.5072	0.8936	0.6398	0.4410	0.7496	**0.9228**
40	0.9213	0.3947	0.5228	0.9186	0.7021	0.4425	0.7365	**0.9518**

Table E33: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3814	0.1840	0.2092	**0.4282**	0.2092	0.2092	**0.4282**	**0.4282**
20	0.4356	0.1840	0.2195	0.4914	0.2324	0.2114	0.4531	**0.5202**
25	0.5447	0.1840	0.2329	0.5484	0.2634	0.2113	0.4589	**0.5892**
30	0.5772	0.1840	0.2413	0.5983	0.3041	0.2107	0.4573	**0.6612**
35	0.6593	0.1840	0.2547	0.6333	0.3486	0.2116	0.4456	**0.7105**
40	0.7200	0.1840	0.2613	0.6760	0.3996	0.2097	0.4329	**0.7574**

Table E34: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3884	0.1259	0.1451	**0.3633**	0.1451	0.1451	**0.3633**	**0.3633**
20	0.4283	0.1259	0.1533	0.4161	0.1646	0.1466	0.3701	**0.4549**
25	0.5453	0.1259	0.1604	0.4677	0.1882	0.1452	0.3708	**0.5372**
30	0.5694	0.1259	0.1672	0.5147	0.2216	0.1463	0.3601	**0.6029**
35	0.6558	0.1259	0.1821	0.5639	0.2636	0.1466	0.3530	**0.6742**
40	0.7113	0.1259	0.1874	0.5966	0.3109	0.1460	0.3428	**0.7152**

Table E35: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3025	0.2251	0.2489	**0.3973**	0.2489	0.2489	**0.3973**	**0.3973**
20	0.3289	0.2251	0.2554	0.4441	0.2678	0.2490	0.4237	**0.4558**
25	0.4159	0.2251	0.2657	0.4818	0.2878	0.2496	0.4322	**0.5027**
30	0.4306	0.2251	0.2733	0.5231	0.3246	0.2502	0.4297	**0.5445**
35	0.4965	0.2251	0.2804	0.5555	0.3551	0.2480	0.4220	**0.5853**
40	0.5582	0.2251	0.2892	0.5895	0.3949	0.2493	0.4182	**0.6320**

Table E36: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3019	0.1789	0.1982	**0.3559**	0.1982	0.1982	**0.3559**	**0.3559**
20	0.3334	0.1789	0.2058	0.4116	0.2176	0.1986	0.3847	**0.4282**
25	0.4217	0.1789	0.2171	0.4451	0.2418	0.2006	0.3833	**0.4731**
30	0.4400	0.1789	0.2201	0.4825	0.2705	0.1988	0.3774	**0.5215**
35	0.5044	0.1789	0.2320	0.5179	0.3004	0.1992	0.3698	**0.5739**
40	0.5527	0.1789	0.2360	0.5422	0.3371	0.1994	0.3602	**0.6067**

Table E37: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.6782	0.7786	0.8097	**0.9376**	0.8097	0.8097	**0.9376**	**0.9376**
25	0.6782	0.8423	0.8607	0.9561	0.8576	0.8652	0.9511	**0.9570**
30	0.6782	0.9009	0.9116	0.9722	0.9088	0.9171	0.9602	**0.9751**
35	0.6782	0.9300	0.9372	0.9808	0.9338	0.9408	0.9615	**0.9816**
40	0.6782	0.9537	0.9575	0.9874	0.9554	0.9605	0.9611	**0.9887**

Table E38: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.4834	0.5808	0.6178	**0.8050**	0.6178	0.6178	**0.8050**	**0.8050**
25	0.4834	0.6584	0.6821	0.8395	0.6788	0.6876	0.8288	**0.8432**
30	0.4834	0.7357	0.7532	0.8768	0.7478	0.7605	0.8417	**0.8822**
35	0.4834	0.7921	0.8013	0.8996	0.7986	0.8097	0.8481	**0.9079**
40	0.4834	0.8407	0.8493	0.9185	0.8453	0.8590	0.8488	**0.9312**

Table E39: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed number of Blocks $n_b = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.3532	0.4385	0.4681	**0.6423**	0.4681	0.4681	**0.6423**	**0.6423**
25	0.3532	0.5166	0.5376	0.6914	0.5345	0.5427	0.6741	**0.6978**
30	0.3532	0.5778	0.5941	0.7283	0.5887	0.6018	0.6853	**0.7365**
35	0.3532	0.6370	0.6480	0.7650	0.6445	0.6558	0.6963	**0.7755**
40	0.3532	0.6888	0.6975	0.7907	0.6934	0.7048	0.6968	**0.8059**

Table E40: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.6775	0.4661	0.5115	**0.8272**	0.5115	0.5115	**0.8272**	**0.8272**
25	0.6775	0.5335	0.5645	**0.8567**	0.5575	0.5729	0.8598	0.8456
30	0.6775	0.5994	0.6227	**0.8828**	0.6154	0.6337	0.8783	0.8632
35	0.6775	0.6557	0.6742	**0.8976**	0.6655	0.6879	0.8846	0.8785
40	0.6775	0.6927	0.7079	**0.9138**	0.6999	0.7204	0.8887	0.8859

Table E41: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
20	0.6882	0.4717	0.5150	**0.8297**	0.5150	0.5150	**0.8297**	**0.8297**
25	0.7878	0.4717	0.5275	0.8681	0.5390	0.5169	0.8492	**0.8811**
30	0.8155	0.4717	0.5352	0.8937	0.5665	0.5159	0.8553	**0.9090**
35	0.8822	0.4717	0.5500	0.9206	0.5979	0.5174	0.8619	**0.9378**
40	0.9147	0.4717	0.5578	0.9376	0.6388	0.5161	0.8527	**0.9540**

Table E42: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.6732	0.3378	0.3818	**0.7706**	0.3818	0.3818	**0.7706**	**0.7706**
25	0.6732	0.3901	0.4230	**0.8051**	0.4161	0.4320	0.8173	0.7818
30	0.6732	0.4489	0.4737	**0.8291**	0.4664	0.4873	0.8381	0.7834
35	0.6732	0.4996	0.5237	**0.8577**	0.5131	0.5395	0.8581	0.8043
40	0.6732	0.5379	0.5525	**0.8666**	0.5453	0.5701	0.8569	0.8078

Table E43: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.6751	0.2049	0.2405	**0.6757**	0.2405	0.2405	0.6757	0.6757
25	0.6751	0.2305	0.2558	**0.6946**	0.2516	0.2641	0.7255	0.6530
30	0.6751	0.2644	0.2887	**0.7276**	0.2807	0.3010	0.7697	0.6497
35	0.6751	0.2982	0.3148	**0.7509**	0.3069	0.3284	0.7877	0.6527
40	0.6751	0.3102	0.3257	**0.7548**	0.3177	0.3392	0.7928	0.6310

Table E44: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.3792	0.0469	0.0550	**0.2510**	0.0550	0.0550	0.2510	0.2510
25	0.3792	0.0504	0.0579	**0.2503**	0.0566	0.0600	0.2842	0.2151
30	0.3792	0.0519	0.0559	**0.2523**	0.0547	0.0595	0.3128	0.1936
35	0.3792	0.0485	0.0516	**0.2420**	0.0501	0.0542	0.3240	0.1666
40	0.3792	0.0528	0.0566	**0.2548**	0.0547	0.0597	0.3415	0.1587

Table E45: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.5159	0.3130	0.3466	**0.6615**	0.3466	0.3466	**0.6615**	**0.6615**
25	0.5159	0.3505	0.3786	**0.6911**	0.3731	0.3860	0.6979	0.6718
30	0.5159	0.4067	0.4252	**0.7332**	0.4193	0.4362	0.7348	0.6945
35	0.5159	0.4599	0.4774	**0.7621**	0.4705	0.4895	0.7468	0.7151
40	0.5159	0.4981	0.5122	**0.7816**	0.5056	0.5264	0.7482	0.7323

Table E46: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.6755	0.7703	0.8071	**0.9356**	0.8071	0.8071	0.9356	0.9356
25	0.7914	0.7703	0.8163	**0.9581**	0.8247	0.8067	0.9565	0.9568
30	0.8265	0.7703	0.8237	**0.9700**	0.8449	0.8071	0.9612	0.9679
35	0.8871	0.7703	0.8333	**0.9799**	0.8651	0.8083	0.9662	0.9786
40	0.9201	0.7703	0.8393	**0.9853**	0.8823	0.8065	0.9631	0.9831

Table E47: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.4834	0.5877	0.6252	**0.8079**	0.6252	0.6252	0.8079	0.8079
25	0.6053	0.5877	0.6381	**0.8474**	0.6470	0.6288	0.8427	0.8422
30	0.6215	0.5877	0.6431	**0.8682**	0.6677	0.6282	0.8511	0.8642
35	0.7097	0.5877	0.6549	**0.8960**	0.6924	0.6278	0.8591	0.8896
40	0.7732	0.5877	0.6610	**0.9107**	0.7221	0.6278	0.8615	0.9068

Table E48: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.3625	0.4444	0.4731	**0.6440**	0.4731	0.4731	0.6440	0.6440
25	0.4569	0.4444	0.4820	**0.6887**	0.4896	0.4744	0.6838	0.6832
30	0.4713	0.4444	0.4884	**0.7229**	0.5107	0.4745	0.6999	0.7168
35	0.5523	0.4444	0.4993	**0.7530**	0.5289	0.4755	0.7064	0.7467
40	0.6082	0.4444	0.5054	**0.7794**	0.5595	0.4754	0.7088	0.7718

Table E49: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.6820	0.5748	0.6181	0.8770	**0.6181**	0.6181	**0.8770**	**0.8770**
25	0.7938	0.5748	0.6299	0.9030	0.6430	0.6188	0.8921	**0.9086**
30	0.8248	0.5748	0.6375	0.9287	0.6689	0.6192	0.9006	**0.9365**
35	0.8828	0.5748	0.6533	0.9477	0.6984	0.6207	0.9055	**0.9558**
40	0.9206	0.5748	0.6602	0.9608	0.7375	0.6201	0.9050	**0.9691**

Table E50: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.6882	0.4717	0.5150	0.8297	0.5150	0.5150	0.8297	**0.8297**
25	0.7878	0.4717	0.5275	0.8681	0.5390	0.5169	0.8492	**0.8811**
30	0.8155	0.4717	0.5352	0.8937	0.5665	0.5159	0.8553	**0.9090**
35	0.8822	0.4717	0.5500	0.9206	0.5979	0.5174	0.8619	**0.9378**
40	0.9147	0.4717	0.5578	0.9376	0.6388	0.5161	0.8527	**0.9540**

Table E51: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.6732	0.3414	0.3846	**0.7733**	0.3846	0.3846	**0.7733**	**0.7733**
25	0.7971	0.3414	0.3982	0.8282	0.4109	0.3851	0.7980	**0.8488**
30	0.8249	0.3414	0.4087	0.8632	0.4414	0.3857	0.7990	**0.8934**
35	0.8901	0.3414	0.4230	0.9017	0.4790	0.3876	0.7971	**0.9349**
40	0.9291	0.3414	0.4319	0.9183	0.5190	0.3859	0.7921	**0.9507**

Table E52: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 20$; (CRD $N\ (0,3)$ and RCBD $N\ (0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.6711	0.1981	0.2368	**0.6782**	0.2368	0.2368	**0.6782**	**0.6782**
25	0.7901	0.1981	0.2464	0.7323	0.2582	0.2360	0.6823	**0.7702**
30	0.8192	0.1981	0.2540	0.7827	0.2862	0.2367	0.6822	**0.8417**
35	0.8843	0.1981	0.2679	0.8310	0.3179	0.2357	0.6823	**0.8964**
40	0.9236	0.1981	0.2745	0.8622	0.3587	0.2354	0.6706	**0.9290**

Table E53: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.3796	0.3358	0.3690	**0.6104**	0.3690	0.3690	**0.6104**	**0.6104**
25	0.4985	0.3358	0.3794	0.6603	0.3860	0.3705	0.6425	**0.6652**
30	0.5249	0.3358	0.3825	0.7093	0.4090	0.3672	0.6670	**0.7242**
35	0.6067	0.3358	0.3947	0.7434	0.4327	0.3681	0.6694	**0.7558**
40	0.6792	0.3358	0.4005	0.7748	0.4633	0.3684	0.6646	**0.7980**

Table E54: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.2; d4=0.7

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.5126	0.3039	0.3394	**0.6619**	0.3394	0.3394	**0.6619**	**0.6619**
25	0.6299	0.3039	0.3504	0.7098	0.3588	0.3398	0.6817	**0.7293**
30	0.6552	0.3039	0.3566	0.7545	0.3865	0.3396	0.6961	**0.7826**
35	0.7379	0.3039	0.3667	0.7906	0.4118	0.3400	0.6933	**0.8268**
40	0.8061	0.3039	0.3765	0.8257	0.4514	0.3398	0.6905	**0.8667**

Table E55: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Number of Blocks $n_b = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1134	0.1051	0.1200	**0.1409**	0.1200	0.1200	**0.1409**	**0.1409**
10	0.1134	0.1400	0.1450	0.1652	0.1433	0.1519	0.1483	**0.1661**
15	0.1134	0.1836	0.1853	0.1904	0.1834	0.1877	0.1489	**0.1990**
20	0.1134	0.2020	0.2052	0.2100	0.2036	0.2151	0.1429	**0.2207**
25	0.1134	0.2330	0.2377	0.2337	0.2346	0.2441	0.1411	**0.2510**
30	0.1134	0.2535	0.2570	0.2454	0.2542	0.2652	0.1367	**0.2710**
35	0.1134	0.2836	0.2855	0.2695	0.2839	0.2899	0.1355	**0.2967**
40	0.1134	0.3048	0.3071	0.2886	0.3048	0.3155	0.1283	**0.3195**

Table E56: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1899	0.1829	0.2422	0.3187	0.2422	0.2422	0.3187	**0.3187**
10	0.1899	0.3454	0.3686	0.4423	0.3609	0.3931	0.3631	**0.4554**
15	0.1899	0.4930	0.5058	0.5508	0.4943	0.5305	0.3568	**0.5775**
20	0.1899	0.6172	0.6293	0.6395	0.6232	0.6560	0.3371	**0.6851**
25	0.1899	0.7125	0.7207	0.7103	0.7147	0.7440	0.3251	**0.7631**
30	0.1899	0.7846	0.7905	0.7564	0.7863	0.8079	0.3157	**0.8218**
35	0.1899	0.8518	0.8559	0.8033	0.8524	0.8692	0.3126	**0.8795**
40	0.1899	0.8904	0.8930	0.8470	0.8904	0.9038	0.3087	**0.9103**

Table E57: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1899	0.1829	0.2422	0.3187	0.2422	0.2422	0.3187	**0.3187**
10	0.1899	0.3454	0.3686	0.4423	0.3609	0.3931	0.3631	**0.4554**
15	0.1899	0.4930	0.5058	0.5508	0.4943	0.5305	0.3568	**0.5775**
20	0.1899	0.6172	0.6293	0.6395	0.6232	0.6560	0.3371	**0.6851**
25	0.1899	0.7125	0.7207	0.7103	0.7147	0.7440	0.3251	**0.7631**
30	0.1899	0.7846	0.7905	0.7564	0.7863	0.8079	0.3157	**0.8218**
35	0.1899	0.8518	0.8559	0.8033	0.8524	0.8692	0.3126	**0.8795**
40	0.1899	0.8904	0.8930	0.8470	0.8904	0.9038	0.3087	**0.9103**

Table E58: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)									
Sample			Approach						
Size	L*	FW*	I	II	III	IV	V	VI
5	0.1047	0.0902	0.1010	**0.1209**	0.1010	0.1010	**0.1209**	**0.1209**
10	0.1047	0.1212	0.1236	0.1426	0.1237	0.1290	0.1315	**0.1403**
15	0.1047	0.1340	0.1344	0.1549	0.1322	0.1387	0.1257	**0.1504**
20	0.1047	0.1512	0.1548	0.1702	0.1539	0.1634	0.1266	**0.1666**
25	0.1047	0.1692	0.1718	0.1819	0.1703	0.1762	0.1223	**0.1831**
30	0.1047	0.1919	0.1941	0.2004	0.1916	0.2009	0.1211	**0.2065**
35	0.1047	0.2075	0.2092	0.2081	0.2079	0.2127	0.1187	**0.2193**
40	0.1047	0.2219	0.2238	0.2194	0.2219	0.2280	0.1162	**0.2300**

Table E59: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.1095	0.0797	0.0900	**0.1141**	0.0900	0.0900	**0.1141**	**0.1141**
10	0.1095	0.1017	0.1041	**0.1335**	0.1032	0.1090	0.1294	0.1259
15	0.1095	0.1161	0.1168	**0.1465**	0.1157	0.1206	0.1276	0.1359
20	0.1095	0.1332	0.1374	**0.1575**	0.1351	0.1461	0.1228	0.1503
25	0.1095	0.1478	0.1496	**0.1710**	0.1484	0.1567	0.1240	0.1634
30	0.1095	0.1573	0.1607	**0.1771**	0.1579	0.1661	0.1236	0.1716
35	0.1095	0.1693	0.1705	**0.1874**	0.1698	0.1753	0.1201	0.1804
40	0.1095	0.1843	0.1860	**0.1985**	0.1845	0.1933	0.1162	0.1960

Table E60: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.2244	0.1171	0.1535	**0.2356**	0.1535	0.1535	0.2356	0.2356
10	0.2244	0.1587	0.1715	**0.2821**	0.1668	0.1868	0.2797	0.2489
15	0.2244	0.2062	0.2157	**0.3186**	0.2073	0.2358	0.2829	0.2736
20	0.2244	0.2406	0.2494	**0.3495**	0.2443	0.2702	0.2779	0.2965
25	0.2244	0.2706	0.2776	**0.3801**	0.2724	0.2991	0.2747	0.3199
30	0.2244	0.3082	0.3119	**0.4148**	0.3085	0.3320	0.2720	0.3539
35	0.2244	0.3425	0.3471	**0.4322**	0.3442	0.3650	0.2662	0.3828
40	0.2244	0.3801	0.3836	**0.4600**	0.3805	0.4049	0.2557	0.4201

Table E61: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1813	0.0988	0.1325	**0.1993**	0.1325	0.1325	**0.1993**	**0.1993**
10	0.1813	0.1373	0.1495	**0.2409**	0.1449	0.1660	0.2308	0.2155
15	0.1813	0.1652	0.1722	**0.2733**	0.1652	0.1881	0.2357	0.2294
20	0.1813	0.1961	0.2029	**0.2962**	0.1990	0.2231	0.2292	0.2462
25	0.1813	0.2207	0.2278	**0.3258**	0.2229	0.2505	0.2228	0.2669
30	0.1813	0.2500	0.2549	**0.3477**	0.2509	0.2735	0.2190	0.2924
35	0.1813	0.2691	0.2734	**0.3680**	0.2699	0.2934	0.2120	0.3103
40	0.1813	0.2999	0.3038	**0.3918**	0.3001	0.3226	0.2056	0.3356

Table E62: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1637	0.0507	0.0668	**0.1134**	0.0668	0.0668	**0.1134**	**0.1134**
10	0.1637	0.0500	0.0544	**0.1165**	0.0530	0.0610	0.1405	0.0880
15	0.1637	0.0568	0.0585	**0.1223**	0.0565	0.0645	0.1448	0.0828
20	0.1637	0.0544	0.0578	**0.1183**	0.0556	0.0662	0.1474	0.0767
25	0.1637	0.0507	0.0523	**0.1138**	0.0511	0.0572	0.1488	0.0658
30	0.1637	0.0519	0.0543	**0.1136**	0.0524	0.0607	0.1515	0.0673
35	0.1637	0.0503	0.0512	**0.1132**	0.0506	0.0570	0.1540	0.0619
40	0.1637	0.0513	0.0520	**0.1138**	0.0514	0.0569	0.1561	0.0599

Table E63: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1575	0.0491	0.0666	**0.1108**	0.0666	0.0666	**0.1108**	**0.1108**
10	0.1575	0.0506	0.0567	**0.1116**	0.0548	0.0626	0.1324	0.0891
15	0.1575	0.0487	0.0514	**0.1097**	0.0488	0.0570	0.1379	0.0720
20	0.1575	0.0459	0.0486	**0.1077**	0.0473	0.0547	0.1443	0.0633
25	0.1575	0.0480	0.0500	**0.1077**	0.0481	0.0564	0.1420	0.0641
30	0.1575	0.0482	0.0503	**0.1098**	0.0485	0.0567	0.1451	0.0610
35	0.1575	0.0520	0.0529	**0.1119**	0.0521	0.0576	0.1471	0.0627
40	0.1575	0.0478	0.0486	**0.1084**	0.0479	0.0536	0.1474	0.0566

Table E64: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Sample Size $n_a = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
5	0.1104	0.1013	0.1171	0.1351	**0.1171**	0.1171	**0.1351**	**0.1351**
10	0.1511	0.1013	0.1275	0.1602	**0.1516**	0.1155	0.1442	0.1573
15	0.1645	0.1013	0.1420	0.1812	**0.1836**	0.1235	0.1437	0.1783
20	0.1681	0.1013	0.1555	0.1984	**0.2077**	0.1239	0.1407	0.2005
25	0.2118	0.1013	0.1929	0.2211	**0.2287**	0.1223	0.1368	0.2190
30	0.2019	0.1013	0.1991	0.2307	**0.2509**	0.1199	0.1361	0.2401
35	0.2372	0.1013	0.2106	0.2421	**0.2618**	0.1184	0.1314	0.2579
40	0.2696	0.1013	0.2180	0.2568	**0.2875**	0.1187	0.1296	0.2806

Table E65: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1899	0.1849	0.2408	**0.3140**	0.2408	0.2408	**0.3140**	**0.3140**
10	0.3297	0.1849	0.2982	**0.4260**	0.3894	0.2461	0.3620	0.4209
15	0.4245	0.1849	0.3623	0.5220	**0.5295**	0.2613	0.3571	0.5146
20	0.4901	0.1849	0.4228	0.5933	**0.6260**	0.2606	0.3396	0.5963
25	0.6269	0.1849	0.5197	0.6629	**0.7081**	0.2586	0.3298	0.6777
30	0.6643	0.1849	0.5896	0.7194	**0.7695**	0.2598	0.3212	0.7460
35	0.7538	0.1849	0.6368	0.7630	**0.8160**	0.2590	0.3131	0.8007
40	0.8239	0.1849	0.6927	0.8018	**0.8570**	0.2583	0.3004	0.8457

Table E66: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1870	0.1208	0.1591	**0.2346**	0.1591	0.1591	**0.2346**	**0.2346**
10	0.3375	0.1208	0.2029	0.3244	0.2809	0.1623	0.2560	**0.3511**
15	0.4294	0.1208	0.2482	0.4035	**0.4165**	0.1713	0.2464	0.4619
20	0.4927	0.1208	0.3039	0.4753	**0.5411**	0.1687	0.2329	0.5597
25	0.6380	0.1208	0.3848	0.5427	**0.6516**	0.1702	0.2247	0.6540
30	0.6612	0.1208	0.4308	0.5892	**0.7231**	0.1693	0.2149	0.7207
35	0.7679	0.1208	0.4981	0.6556	**0.7947**	0.1707	0.2087	0.7930
40	0.8213	0.1208	0.5455	0.6944	**0.8337**	0.1708	0.2005	0.8325

Table E67: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1103	0.0936	0.1035	**0.1183**	0.1035	0.1035	**0.1183**	**0.1183**
10	0.1479	0.0936	0.1154	0.1408	0.1375	0.1075	0.1295	**0.1470**
15	0.1607	0.0936	0.1298	0.1638	0.1650	0.1143	0.1322	**0.1680**
20	0.1671	0.0936	0.1391	0.1835	0.1967	0.1115	0.1250	**0.1993**
25	0.2118	0.0936	0.1715	0.2035	**0.2237**	0.1106	0.1238	0.2162
30	0.2025	0.0936	0.1826	0.2166	**0.2420**	0.1094	0.1228	0.2358
35	0.2421	0.0936	0.1895	0.2257	**0.2590**	0.1094	0.1199	0.2565
40	0.2769	0.0936	0.2084	0.2434	**0.2853**	0.1091	0.1185	0.2806

Table E68: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1104	0.1013	0.1171	**0.1351**	0.1171	0.1171	**0.1351**	**0.1351**
10	0.1511	0.1013	0.1275	**0.1602**	0.1516	0.1155	0.1442	0.1573
15	0.1645	0.1013	0.1420	0.1812	**0.1836**	0.1235	0.1437	0.1783
20	0.1681	0.1013	0.1555	0.1984	**0.2077**	0.1239	0.1407	0.2005
25	0.2118	0.1013	0.1929	0.2211	**0.2287**	0.1223	0.1368	0.2190
30	0.2019	0.1013	0.1991	0.2307	**0.2509**	0.1199	0.1361	0.2401
35	0.2372	0.1013	0.2106	0.2421	**0.2618**	0.1184	0.1314	0.2579
40	0.2696	0.1013	0.2180	0.2568	**0.2875**	0.1187	0.1296	0.2806

Table E69: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 5$; (CRD $N\ (0, 2)$ and RCBD $N\ (0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1899	0.1849	0.2408	**0.3140**	0.2408	0.2408	**0.3140**	**0.3140**
10	0.3297	0.1849	0.2982	**0.4260**	0.3894	0.2461	0.3620	0.4209
15	0.4245	0.1849	0.3623	0.5220	**0.5295**	0.2613	0.3571	0.5146
20	0.4901	0.1849	0.4228	0.5933	**0.6260**	0.2606	0.3396	0.5963
25	0.6269	0.1849	0.5197	0.6629	**0.7081**	0.2586	0.3298	0.6777
30	0.6643	0.1849	0.5896	0.7194	**0.7695**	0.2598	0.3212	0.7460
35	0.7538	0.1849	0.6368	0.7630	**0.8160**	0.2590	0.3131	0.8007
40	0.8239	0.1849	0.6927	0.8018	**0.8570**	0.2583	0.3004	0.8457

Table E70: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1804	0.0972	0.1316	**0.2012**	0.1316	0.1316	**0.2012**	**0.2012**
10	0.3245	0.0972	0.1669	0.2845	0.2425	0.1338	0.2172	**0.3151**
15	0.4386	0.0972	0.2152	0.3692	0.3844	0.1416	0.2104	**0.4441**
20	0.4978	0.0972	0.2608	0.4322	0.5110	0.1401	0.1978	**0.5418**
25	0.6350	0.0972	0.3404	0.4901	0.6234	0.1401	0.1861	**0.6381**
30	0.6620	0.0972	0.3858	0.5402	0.7027	0.1385	0.1830	**0.7064**
35	0.7520	0.0972	0.4358	0.5926	0.7696	0.1404	0.1761	**0.7722**
40	0.8113	0.0972	0.4848	0.6373	0.8124	0.1375	0.1664	**0.8159**

Table E71: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1630	0.1305	0.1660	**0.2195**	0.1660	0.1660	**0.2195**	**0.2195**
10	0.2718	0.1305	0.1972	0.2925	0.2641	0.1671	0.2426	**0.2984**
15	0.3369	0.1305	0.2391	0.3600	0.3700	0.1785	0.2371	**0.3822**
20	0.3864	0.1305	0.2828	0.4164	**0.4573**	0.1802	0.2298	0.4544
25	0.4871	0.1305	0.3522	0.4639	**0.5242**	0.1760	0.2150	0.5100
30	0.5139	0.1305	0.3917	0.5088	**0.5963**	0.1758	0.2115	0.5776
35	0.6040	0.1305	0.4353	0.5570	**0.6504**	0.1737	0.2060	0.6377
40	0.6764	0.1305	0.4848	0.6045	**0.7014**	0.1748	0.2008	0.6948

Table E72: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1640	0.1116	0.1422	**0.2035**	0.1422	0.1422	**0.2035**	**0.2035**
10	0.2714	0.1116	0.1731	0.2660	0.2332	0.1441	0.2127	**0.2855**
15	0.3405	0.1116	0.2120	0.3298	0.3421	0.1547	0.2099	**0.3694**
20	0.3879	0.1116	0.2511	0.3839	0.4321	0.1558	0.2004	**0.4451**
25	0.5021	0.1116	0.3194	0.4418	**0.5224**	0.1504	0.1920	0.5145
30	0.5151	0.1116	0.3573	0.4800	**0.5836**	0.1516	0.1865	0.5717
35	0.6007	0.1116	0.3992	0.5220	**0.6374**	0.1503	0.1824	0.6304
40	0.6699	0.1116	0.4438	0.5633	**0.6868**	0.1493	0.1759	0.6822

Table E73: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Number of Blocks $n_b = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.1624	0.1794	0.1899	**0.2460**	0.1899	0.1899	**0.2460**	**0.2460**
20	0.1624	0.2016	0.2120	0.2666	0.2080	0.2130	0.2607	**0.2666**
25	0.1624	0.2313	0.2380	0.2897	0.2348	0.2420	0.2643	**0.2964**
30	0.1624	0.2610	0.2651	0.3170	0.2640	0.2699	0.2697	**0.3225**
35	0.1624	0.2861	0.2921	0.3391	0.2887	0.2973	0.2654	**0.3473**
40	0.1624	0.3118	0.3148	0.3504	0.3131	0.3236	0.2668	**0.3620**

Table E74: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.4264	0.4968	0.5453	**0.7375**	0.5453	0.5453	**0.7375**	**0.7375**
20	0.4264	0.6165	0.6510	0.8091	0.6419	0.6588	0.7838	**0.8159**
25	0.4264	0.7066	0.7304	0.8553	0.7211	0.7438	0.7973	**0.8652**
30	0.4264	0.7918	0.8038	0.8918	0.7987	0.8192	0.7957	**0.9052**
35	0.4264	0.8516	0.8590	0.9144	0.8543	0.8688	0.7889	**0.9331**
40	0.4264	0.8981	0.9026	0.9410	0.8995	0.9109	0.7886	**0.9555**

Table E75: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.3340	0.3829	0.4202	**0.5937**	0.4202	0.4202	**0.5937**	**0.5937**
20	0.3340	0.4715	0.5020	0.6571	0.4928	0.5081	0.6356	**0.6642**
25	0.3340	0.5606	0.5797	0.7104	0.5719	0.5903	0.6474	**0.7203**
30	0.3340	0.6366	0.6479	0.7631	0.6432	0.6607	0.6544	**0.7748**
35	0.3340	0.7068	0.7199	0.8013	0.7120	0.7302	0.6521	**0.8205**
40	0.3340	0.7535	0.7593	0.8263	0.7556	0.7716	0.6364	**0.8434**

Table E76: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.1624	0.1366	0.1456	**0.2065**	0.1456	0.1456	**0.2065**	**0.2065**
20	0.1624	0.1571	0.1644	**0.2257**	0.1622	0.1658	0.2248	0.2221
25	0.1624	0.1696	0.1748	**0.2366**	0.1732	0.1788	0.2263	0.2342
30	0.1624	0.1830	0.1859	**0.2481**	0.1842	0.1922	0.2283	0.2411
35	0.1624	0.2042	0.2082	**0.2634**	0.2057	0.2115	0.2277	0.2543
40	0.1624	0.2249	0.2263	**0.2828**	0.2258	0.2341	0.2287	0.2761

Table E77: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.1633	0.1213	0.1303	**0.1942**	0.1303	0.1303	**0.1942**	**0.1942**
20	0.1633	0.1325	0.1387	**0.2054**	0.1373	0.1404	0.2071	0.2002
25	0.1633	0.1464	0.1531	**0.2117**	0.1506	0.1561	0.2069	0.2023
30	0.1633	0.1580	0.1609	**0.2288**	0.1595	0.1659	0.2181	0.2174
35	0.1633	0.1675	0.1714	**0.2366**	0.1693	0.1769	0.2150	0.2178
40	0.1633	0.1852	0.1875	**0.2475**	0.1861	0.1925	0.2148	0.2324

Table E78: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.4265	0.2464	0.2807	**0.5453**	0.2807	0.2807	**0.5453**	**0.5453**
20	0.4265	0.3066	0.3388	**0.6016**	0.3300	0.3460	0.6067	0.5835
25	0.4265	0.3571	0.3768	**0.6378**	0.3683	0.3912	0.6284	0.6002
30	0.4265	0.4171	0.4309	**0.6769**	0.4236	0.4471	0.6414	0.6181
35	0.4265	0.4562	0.4689	**0.7049**	0.4615	0.4846	0.6405	0.6439
40	0.4265	0.5017	0.5086	**0.7293**	0.5046	0.5256	0.6355	0.6713

Table E79: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.4396	0.1690	0.2003	**0.4505**	0.2003	0.2003	**0.4505**	**0.4505**
20	0.4396	0.1886	0.2093	**0.4828**	0.2030	0.2154	0.5019	0.4473
25	0.4396	0.2247	0.2393	**0.5170**	0.2324	0.2492	0.5412	0.4520
30	0.4396	0.2608	0.2721	**0.5478**	0.2678	0.2857	0.5580	0.4624
35	0.4396	0.2750	0.2883	**0.5696**	0.2813	0.3008	0.5620	0.4660
40	0.4396	0.3045	0.3119	**0.5950**	0.3080	0.3286	0.5666	0.4770

Table E80: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 15$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.3404	0.0508	0.0622	**0.2124**	0.0622	0.0622	**0.2124**	**0.2124**
20	0.3404	0.0488	0.0571	**0.2122**	0.0549	0.0585	0.2462	0.1785
25	0.3404	0.0489	0.0532	**0.2064**	0.0513	0.0565	0.2629	0.1512
30	0.3404	0.0507	0.0542	**0.2109**	0.0529	0.0588	0.2863	0.1329
35	0.3404	0.0527	0.0565	**0.2103**	0.0537	0.0603	0.2924	0.1201
40	0.3404	0.0529	0.0550	**0.2137**	0.0537	0.0587	0.3064	0.1154

Table E81: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size			Approach					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.3268	0.0507	0.0610	**0.2072**	0.0610	0.0610	**0.2072**	**0.2072**
20	0.3268	0.0499	0.0576	0.2107	0.0560	0.0591	0.2440	**0.1766**
25	0.3268	0.0485	0.0525	0.2040	0.0509	0.0548	0.2558	**0.1471**
30	0.3268	0.0516	0.0547	0.2048	0.0535	0.0583	0.2743	**0.1316**
35	0.3268	0.0494	0.0524	0.2065	0.0507	0.0559	0.2839	**0.1193**
40	0.3268	0.0495	0.0511	0.2049	0.0502	0.0556	0.2930	**0.1081**

Table E82: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Sample Size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.1644	0.1782	0.1880	**0.2395**	0.1880	0.1880	**0.2395**	**0.2395**
20	0.1685	0.1782	0.1908	**0.2683**	0.1974	0.1881	0.2667	0.2646
25	0.2139	0.1782	0.1984	**0.2870**	0.2096	0.1891	0.2697	0.2834
30	0.2029	0.1782	0.2019	**0.3004**	0.2270	0.1904	0.2710	0.2941
35	0.2375	0.1782	0.2058	**0.3197**	0.2375	0.1883	0.2715	0.3096
40	0.2769	0.1782	0.2099	**0.3429**	0.2628	0.1879	0.2744	0.3351

Table E83: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.4264	0.4958	0.5427	**0.7417**	0.5427	0.5427	**0.7417**	**0.7417**
20	0.4907	0.4958	0.5573	**0.8018**	0.5790	0.5432	0.7909	0.7920
25	0.6334	0.4958	0.5775	**0.8454**	0.6269	0.5430	0.8111	0.8372
30	0.6595	0.4958	0.5920	**0.8759**	0.6759	0.5465	0.8115	0.8655
35	0.7534	0.4958	0.6139	**0.9043**	0.7296	0.5432	0.8102	0.8981
40	0.8154	0.4958	0.6257	**0.9249**	0.7798	0.5439	0.8087	0.9153

Table E84: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.3343	0.3770	0.4147	**0.5825**	0.4147	0.4147	**0.5825**	**0.5825**
20	0.3828	0.3770	0.4247	**0.6495**	0.4434	0.4135	0.6411	0.6430
25	0.4911	0.3770	0.4420	**0.6951**	0.4821	0.4129	0.6523	0.6848
30	0.5122	0.3770	0.4526	**0.7387**	0.5267	0.4145	0.6613	0.7246
35	0.6027	0.3770	0.4691	**0.7728**	0.5733	0.4127	0.6546	0.7661
40	0.6760	0.3770	0.4804	**0.8032**	0.6242	0.4184	0.6549	0.7960

Table E85: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.1591	0.1311	0.1412	**0.1999**	0.1412	0.1412	**0.1999**	**0.1999**
20	0.1695	0.1311	0.1417	0.2301	0.1458	0.1396	0.2208	**0.2287**
25	0.2202	0.1311	0.1477	0.2447	0.1585	0.1402	0.2222	**0.2523**
30	0.2077	0.1311	0.1502	0.2590	0.1739	0.1405	0.2180	**0.2702**
35	0.2447	0.1311	0.1548	0.2777	0.1864	0.1406	0.2184	**0.2905**
40	0.2796	0.1311	0.1585	0.2991	0.2072	0.1399	0.2185	**0.3168**

Table E86: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.1564	0.1250	0.1339	**0.1912**	0.1339	0.1339	**0.1912**	**0.1912**
20	0.1727	0.1250	0.1364	0.2151	0.1401	0.1348	0.2080	**0.2231**
25	0.2197	0.1250	0.1421	0.2331	0.1529	0.1347	0.2087	**0.2410**
30	0.2006	0.1250	0.1421	0.2445	0.1633	0.1338	0.2019	**0.2589**
35	0.2348	0.1250	0.1465	0.2620	0.1733	0.1336	0.2050	**0.2754**
40	0.2743	0.1250	0.1495	0.2757	0.1896	0.1341	0.2014	**0.3034**

Table E87: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 15$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4304	0.2487	0.2842	0.5467	0.2842	0.2842	**0.5467**	**0.5467**
20	0.4960	0.2487	0.2956	0.6153	0.3137	0.2857	0.5764	**0.6405**
25	0.6353	0.2487	0.3109	0.6723	0.3493	0.2873	0.5753	**0.7136**
30	0.6664	0.2487	0.3220	0.7258	0.4006	0.2868	0.5740	**0.7741**
35	0.7545	0.2487	0.3391	0.7648	0.4575	0.2860	0.5697	**0.8262**
40	0.8199	0.2487	0.3494	0.8006	0.5180	0.2862	0.5571	**0.8650**

Table E88: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 15$; (CRD $N(0, 3)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4237	0.1643	0.1896	**0.4417**	0.1896	0.1896	**0.4417**	**0.4417**
20	0.4980	0.1643	0.1997	0.5200	0.2131	0.1908	0.4672	**0.5599**
25	0.6353	0.1643	0.2127	0.5786	0.2489	0.1900	0.4676	**0.6510**
30	0.6706	0.1643	0.2220	0.6363	0.2908	0.1913	0.4623	**0.7268**
35	0.7570	0.1643	0.2354	0.6836	0.3357	0.1904	0.4450	**0.7901**
40	0.8231	0.1643	0.2462	0.7223	0.4008	0.1886	0.4374	**0.8386**

Table E89: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3370	0.2775	0.3100	**0.4979**	0.3100	0.3100	**0.4979**	**0.4979**
20	0.3839	0.2775	0.3163	0.5582	0.3318	0.3078	0.5331	**0.5652**
25	0.4993	0.2775	0.3312	0.6096	0.3660	0.3099	0.5456	**0.6236**
30	0.5123	0.2775	0.3383	0.6510	0.4099	0.3109	0.5456	**0.6715**
35	0.6044	0.2775	0.3562	0.6946	0.4549	0.3093	0.5447	**0.7206**
40	0.6732	0.2775	0.3654	0.7266	0.5021	0.3107	0.5333	**0.7571**

Table E90: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3335	0.2312	0.2584	**0.4570**	0.2584	0.2584	**0.4570**	**0.4570**
20	0.3839	0.2312	0.2693	0.5075	0.2837	0.2597	0.4844	**0.5268**
25	0.5048	0.2312	0.2824	0.5626	0.3174	0.2608	0.4941	**0.5913**
30	0.5153	0.2312	0.2913	0.6151	0.3571	0.2628	0.4878	**0.6487**
35	0.6017	0.2312	0.3050	0.6510	0.3953	0.2589	0.4811	**0.6932**
40	0.6763	0.2312	0.3128	0.6889	0.4426	0.2593	0.4749	**0.7404**

Table E91: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Number of Blocks $n_b = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.1670	0.2022	0.2148	**0.2924**	0.2148	0.2148	**0.2924**	**0.2924**
25	0.1670	0.2315	0.2430	0.3157	0.2414	0.2458	0.3056	**0.3189**
30	0.1670	0.2645	0.2722	0.3443	0.2699	0.2759	0.3212	**0.3446**
35	0.1670	0.2783	0.2843	0.3534	0.2825	0.2886	0.3158	**0.3615**
40	0.1670	0.3126	0.3169	0.3838	0.3147	0.3219	0.3246	**0.3938**

Table E92: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.5001	0.6176	0.6592	**0.8583**	0.6592	0.6592	**0.8583**	**0.8583**
25	0.5001	0.7102	0.7394	0.8956	0.7350	0.7461	0.8850	**0.8999**
30	0.5001	0.7901	0.8082	0.9250	0.8030	0.8163	0.8962	**0.9297**
35	0.5001	0.8488	0.8592	0.9481	0.8546	0.8683	0.9001	**0.9529**
40	0.5001	0.8932	0.8995	0.9563	0.8963	0.9063	0.8994	**0.9638**

Table E93: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed number of Blocks $n_b = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.3935	0.4724	0.5092	**0.7137**	0.5092	0.5092	**0.7137**	**0.7137**
25	0.3935	0.5565	0.5799	0.7601	0.5764	0.5866	0.7443	**0.7648**
30	0.3935	0.6399	0.6574	0.8015	0.6511	0.6666	0.7643	**0.8080**
35	0.3935	0.7066	0.7195	0.8401	0.7143	0.7292	0.7705	**0.8527**
40	0.3935	0.7561	0.7673	0.8577	0.7616	0.7771	0.7658	**0.8697**

Table E94: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.1612	0.1545	0.1629	**0.2426**	0.1629	0.1629	0.2426	0.2426
25	0.1612	0.1617	0.1681	**0.2557**	0.1669	0.1705	0.2535	0.2545
30	0.1612	0.1872	0.1946	**0.2788**	0.1928	0.1969	0.2715	0.2697
35	0.1612	0.2007	0.2075	**0.2867**	0.2049	0.2109	0.2728	0.2784
40	0.1612	0.2204	0.2247	**0.3059**	0.2227	0.2298	0.2764	0.2951

Table E95: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.1624	0.1295	0.1391	**0.2209**	0.1391	0.1391	**0.2209**	**0.2209**
25	0.1624	0.1402	0.1473	**0.2315**	0.1466	0.1497	0.2327	0.2280
30	0.1624	0.1576	0.1641	**0.2450**	0.1609	0.1671	0.2415	0.2320
35	0.1624	0.1752	0.1793	**0.2620**	0.1779	0.1818	0.2507	0.2498
40	0.1624	0.1836	0.1868	**0.2631**	0.1853	0.1905	0.2471	0.2478

Table E96: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.4970	0.2998	0.3361	**0.6624**	0.3361	0.3361	**0.6624**	**0.6624**
25	0.4970	0.3565	0.3813	**0.6997**	0.3770	0.3884	0.7100	0.6737
30	0.4970	0.4084	0.4284	**0.7336**	0.4209	0.4369	0.7426	0.6988
35	0.4970	0.4564	0.4730	**0.7663**	0.4661	0.4864	0.7536	0.7233
40	0.4970	0.4953	0.5074	**0.7872**	0.5017	0.5224	0.7631	0.7306

Table E97: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.5006	0.1928	0.2214	**0.5557**	0.2214	0.2214	**0.5557**	**0.5557**
25	0.5006	0.2200	0.2397	**0.5853**	0.2359	0.2442	0.6092	0.5525
30	0.5006	0.2582	0.2725	**0.6136**	0.2670	0.2788	0.6445	0.5541
35	0.5006	0.2799	0.2951	**0.6311**	0.2894	0.3061	0.6608	0.5490
40	0.5006	0.3053	0.3170	**0.6578**	0.3121	0.3283	0.6728	0.5670

Table E98: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.5289	0.2722	0.3072	**0.6402**	0.3072	0.3072	**0.6402**	**0.6402**
25	0.5289	0.3275	0.3558	**0.6806**	0.3505	0.3627	0.6935	0.6608
30	0.5289	0.3653	0.3871	**0.7107**	0.3801	0.3979	0.7207	0.6718
35	0.5289	0.4128	0.4288	**0.7331**	0.4216	0.4430	0.7315	0.6798
40	0.5289	0.4513	0.4643	**0.7601**	0.4582	0.4775	0.7425	0.6966

Table E99: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.3816	0.0531	0.0622	**0.2490**	0.0622	0.0622	**0.2490**	**0.2490**
25	0.3816	0.0505	0.0572	0.2479	0.0563	0.0589	**0.2851**	0.2133
30	0.3816	0.0531	0.0566	0.2550	0.0555	0.0591	**0.3139**	0.1915
35	0.3816	0.0485	0.0518	0.2509	0.0504	0.0554	**0.3302**	0.1667
40	0.3816	0.0508	0.0533	0.2548	0.0527	0.0555	**0.3449**	0.1497

Table E100: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Sample Size $n_a = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.1627	0.2047	0.2172	**0.2953**	0.2172	0.2172	**0.2953**	**0.2953**
25	0.2158	0.2047	0.2215	**0.3075**	0.2229	0.2181	0.3026	0.3030
30	0.2125	0.2047	0.2231	**0.3353**	0.2331	0.2181	0.3250	0.3302
35	0.2426	0.2047	0.2267	**0.3496**	0.2417	0.2185	0.3213	0.3420
40	0.2818	0.2047	0.2288	**0.3743**	0.2517	0.2192	0.3317	0.3673

Table E101: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.5001	0.6174	0.6596	**0.8565**	0.6596	0.6596	**0.8565**	**0.8565**
25	0.6256	0.6174	0.6709	**0.8895**	0.6813	0.6593	0.8866	0.8858
30	0.6673	0.6174	0.6804	**0.9165**	0.7065	0.6615	0.9012	0.9115
35	0.7618	0.6174	0.6934	**0.9396**	0.7373	0.6613	0.9112	0.9348
40	0.8277	0.6174	0.7009	**0.9496**	0.7696	0.6625	0.9137	0.9463

Table E102: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.3792	0.4761	0.5109	**0.7120**	0.5109	0.5109	**0.7120**	**0.7120**
25	0.4992	0.4761	0.5216	**0.7563**	0.5305	0.5126	0.7512	0.7535
30	0.5118	0.4761	0.5276	**0.7951**	0.5522	0.5112	0.7710	0.7858
35	0.6008	0.4761	0.5403	**0.8267**	0.5830	0.5122	0.7820	0.8181
40	0.6741	0.4761	0.5482	**0.8546**	0.6139	0.5121	0.7834	0.8422

Table E103: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.1621	0.1510	0.1613	0.2399	0.1613	0.1613	0.2399	**0.2399**
25	0.2169	0.1510	0.1667	0.2622	0.1685	0.1627	0.2576	**0.2684**
30	0.2069	0.1510	0.1674	0.2855	0.1744	0.1630	0.2653	**0.2923**
35	0.2445	0.1510	0.1707	0.2995	0.1818	0.1624	0.2678	**0.3092**
40	0.2810	0.1510	0.1731	0.3276	0.1958	0.1609	0.2735	**0.3343**

Table E104: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=0.45

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.1588	0.1342	0.1438	**0.2167**	0.1438	0.1438	**0.2167**	**0.2167**
25	0.2209	0.1342	0.1472	0.2492	0.1496	0.1443	0.2390	**0.2549**
30	0.2051	0.1342	0.1478	0.2605	0.1546	0.1436	0.2400	**0.2719**
35	0.2435	0.1342	0.1510	0.2747	0.1639	0.1433	0.2406	**0.2909**
40	0.2717	0.1342	0.1535	0.2854	0.1694	0.1428	0.2380	**0.3043**

Table E105: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.4960	0.2958	0.3331	0.6642	0.3331	0.3331	0.6642	**0.6642**
25	0.6351	0.2958	0.3440	0.7197	0.3552	0.3333	0.6912	**0.7369**
30	0.6676	0.2958	0.3509	0.7614	0.3779	0.3343	0.6984	**0.7912**
35	0.7571	0.2958	0.3628	0.8048	0.4080	0.3352	0.7000	**0.8476**
40	0.8256	0.2958	0.3707	0.8392	0.4492	0.3342	0.6933	**0.8837**

Table E106: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.4981	0.1941	0.2248	**0.5525**	0.2248	0.2248	**0.5525**	**0.5525**
25	0.6294	0.1941	0.2327	0.6176	0.2396	0.2242	0.5734	**0.6479**
30	0.6542	0.1941	0.2381	0.6654	0.2571	0.2244	0.5751	**0.7213**
35	0.7578	0.1941	0.2497	0.7178	0.2847	0.2234	0.5718	**0.7927**
40	0.8263	0.1941	0.2529	0.7533	0.3143	0.2248	0.5686	**0.8431**

Table E107: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.5274	0.4128	0.4515	**0.7335**	0.4515	0.4515	**0.7335**	**0.7335**
25	0.6535	0.4128	0.4659	0.7858	0.4758	0.4545	0.7652	**0.7935**
30	0.6744	0.4128	0.4724	0.8176	0.4992	0.4550	0.7745	**0.8308**
35	0.7569	0.4128	0.4851	0.8522	0.5317	0.4549	0.7792	**0.8696**
40	0.8151	0.4128	0.4901	0.8746	0.5628	0.4533	0.7782	**0.8983**

Table E108: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=0; d4=2.0

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.3796	0.2698	0.2998	**0.5513**	0.2998	0.2998	**0.5513**	**0.5513**
25	0.4996	0.2698	0.3089	0.6010	0.3158	0.2994	0.5801	**0.6157**
30	0.5164	0.2698	0.3149	0.6454	0.3367	0.3008	0.5880	**0.6704**
35	0.5973	0.2698	0.3216	0.6848	0.3577	0.2994	0.5903	**0.7181**
40	0.6705	0.2698	0.3307	0.7197	0.3858	0.3005	0.5885	**0.7619**

Table E109: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Number of Blocks $n_b = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)									
Sample			Approach						
Size	L*	FW*	I	II	III	IV	V	VI
5	0.1384	0.1340	0.1503	**0.1785**	0.1503	0.1503	**0.1785**	**0.1785**
10	0.1384	0.1968	0.2037	0.2219	0.2024	0.2093	0.1960	**0.2293**
15	0.1384	0.2401	0.2419	0.2491	0.2383	0.2479	0.1890	**0.2615**
20	0.1384	0.2833	0.2895	0.2849	0.2854	0.3000	0.1823	**0.3047**
25	0.1384	0.3212	0.3263	0.3096	0.3233	0.3367	0.1790	**0.3449**
30	0.1384	0.3532	0.3569	0.3372	0.3536	0.3654	0.1722	**0.3734**
35	0.1384	0.4004	0.4017	0.3687	0.4007	0.4096	0.1729	**0.4180**
40	0.1384	0.4231	0.4250	0.3856	0.4232	0.4347	0.1653	**0.4384**

Table E110: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.3042	0.3176	0.3966	0.4953	0.3966	0.3966	0.4953	**0.4953**
10	0.3042	0.5286	0.5603	0.6335	0.5480	0.5906	0.5456	**0.6546**
15	0.3042	0.6869	0.7005	0.7364	0.6901	0.7260	0.5329	**0.7670**
20	0.3042	0.7964	0.8054	0.8139	0.8001	0.8283	0.5101	**0.8500**
25	0.3042	0.8712	0.8763	0.8638	0.8726	0.8907	0.4943	**0.9035**
30	0.3042	0.9209	0.9245	0.8990	0.9216	0.9332	0.4811	**0.9398**
35	0.3042	0.9531	0.9543	0.9269	0.9532	0.9593	0.4689	**0.9626**
40	0.3042	0.9701	0.9712	0.9461	0.9702	0.9742	0.4620	**0.9762**

Table E111: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.2427	0.2326	0.2929	**0.3681**	0.2929	0.2929	**0.3681**	**0.3681**
10	0.2427	0.3994	0.4220	0.4932	0.4141	0.4442	0.4176	**0.4983**
15	0.2427	0.5343	0.5457	0.5861	0.5358	0.5708	0.4084	**0.6101**
20	0.2427	0.6285	0.6425	0.6581	0.6339	0.6694	0.3932	**0.6931**
25	0.2427	0.7198	0.7282	0.7155	0.7222	0.7495	0.3824	**0.7677**
30	0.2427	0.7907	0.7945	0.7673	0.7913	0.8117	0.3732	**0.8226**
35	0.2427	0.8369	0.8405	0.8035	0.8376	0.8531	0.3636	**0.8615**
40	0.2427	0.8829	0.8841	0.8390	0.8830	0.8923	0.3631	**0.8966**

Table E112: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1473	0.1094	0.1284	**0.1592**	0.1284	0.1284	**0.1592**	**0.1592**
10	0.1473	0.1384	0.1430	0.1871	0.1419	0.1508	0.1752	**0.1770**
15	0.1473	0.1699	0.1722	0.2078	0.1697	0.1787	0.1759	**0.1996**
20	0.1473	0.1928	0.1990	0.2304	0.1959	0.2101	0.1750	**0.2191**
25	0.1473	0.2187	0.2247	0.2502	0.2201	0.2342	0.1714	**0.2412**
30	0.1473	0.2394	0.2426	0.2637	0.2395	0.2524	0.1705	**0.2595**
35	0.1473	0.2637	0.2666	0.2791	0.2648	0.2755	0.1670	**0.2828**
40	0.1473	0.2825	0.2835	0.2916	0.2829	0.2951	0.1644	**0.3014**

Table E113: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1359	0.0959	0.1081	**0.1437**	0.1081	0.1081	**0.1437**	0.1437
10	0.1359	0.1220	0.1264	**0.1637**	0.1247	0.1342	0.1568	0.1516
15	0.1359	0.1385	0.1420	**0.1785**	0.1387	0.1481	0.1587	0.1653
20	0.1359	0.1624	0.1658	**0.1979**	0.1645	0.1763	0.1563	0.1834
25	0.1359	0.1709	0.1735	**0.2009**	0.1723	0.1796	0.1551	0.1877
30	0.1359	0.1960	0.1984	**0.2262**	0.1963	0.2067	0.1536	0.2154
35	0.1359	0.2039	0.2061	**0.2314**	0.2046	0.2143	0.1499	0.2214
40	0.1359	0.2305	0.2321	**0.2442**	0.2307	0.2402	0.1463	**0.2443**

Table E114: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.3019	0.1479	0.2041	**0.3208**	0.2041	0.2041	**0.3208**	**0.3208**
10	0.3019	0.2175	0.2416	**0.3985**	0.2326	0.2659	0.3896	0.3505
15	0.3019	0.2867	0.3014	**0.4530**	0.2896	0.3272	0.3975	0.3897
20	0.3019	0.3437	0.3565	**0.5055**	0.3502	0.3893	0.3889	0.4248
25	0.3019	0.3970	0.4051	**0.5451**	0.3993	0.4375	0.3841	0.4717
30	0.3019	0.4515	0.4606	**0.5834**	0.4524	0.4917	0.3796	0.5154
35	0.3019	0.4983	0.5042	**0.6192**	0.4990	0.5315	0.3752	0.5543
40	0.3019	0.5549	0.5596	**0.6554**	0.5552	0.5886	0.3666	0.6030

Table E115: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.3083	0.1067	0.1526	**0.2739**	0.1526	0.1526	**0.2739**	**0.2739**
10	0.3083	0.1460	0.1612	**0.3202**	0.1561	0.1793	0.3436	0.2568
15	0.3083	0.1792	0.1891	**0.3567**	0.1808	0.2085	0.3574	0.2679
20	0.3083	0.2107	0.2209	**0.3914**	0.2147	0.2446	0.3581	0.2814
25	0.3083	0.2332	0.2416	**0.4100**	0.2353	0.2674	0.3535	0.2938
30	0.3083	0.2659	0.2719	**0.4488**	0.2668	0.2959	0.3515	0.3218
35	0.3083	0.3000	0.3056	**0.4738**	0.3009	0.3309	0.3471	0.3496
40	0.3083	0.3202	0.3246	**0.4932**	0.3207	0.3483	0.3383	0.3652

Table E116: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.2343	0.1274	0.1717	**0.2579**	0.1717	0.1717	**0.2579**	**0.2579**
10	0.2343	0.1877	0.2047	**0.3085**	0.1980	0.2216	0.3021	0.2822
15	0.2343	0.2398	0.2488	**0.3572**	0.2415	0.2721	0.3066	0.3153
20	0.2343	0.2795	0.2903	**0.4016**	0.2835	0.3147	0.3070	0.3462
25	0.2343	0.3248	0.3336	**0.4283**	0.3270	0.3558	0.2972	0.3762
30	0.2343	0.3711	0.3767	**0.4671**	0.3716	0.3989	0.2905	0.4201
35	0.2343	0.4138	0.4189	**0.4987**	0.4145	0.4387	0.2846	0.4556
40	0.2343	0.4465	0.4502	**0.5267**	0.4465	0.4727	0.2799	0.4871

Table E117: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.2348	0.1091	0.1413	**0.2334**	0.1413	0.1413	**0.2334**	**0.2334**
10	0.2348	0.1536	0.1679	**0.2818**	0.1627	0.1847	0.2820	0.2439
15	0.2348	0.1887	0.1973	**0.3161**	0.1901	0.2178	0.2892	0.2638
20	0.2348	0.2237	0.2325	**0.3460**	0.2265	0.2558	0.2874	0.2876
25	0.2348	0.2460	0.2542	**0.3666**	0.2478	0.2789	0.2819	0.3010
30	0.2348	0.2906	0.2972	**0.4021**	0.2918	0.3192	0.2764	0.3389
35	0.2348	0.3117	0.3167	**0.4208**	0.3126	0.3397	0.2742	0.3568
40	0.2348	0.3467	0.3511	**0.4458**	0.3468	0.3693	0.2647	0.3821

Table E118: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Sample Size $n_a = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.1397	0.1403	0.1586	**0.1797**	0.1586	0.1586	**0.1797**	**0.1797**
10	0.1902	0.1403	0.1732	0.2091	0.2037	0.1597	0.1944	**0.2059**
15	0.2175	0.1403	0.1991	0.2463	0.2484	0.1680	0.2005	**0.2369**
20	0.2225	0.1403	0.2085	0.2692	0.2781	0.1668	0.1899	**0.2669**
25	0.2906	0.1403	0.2633	0.3099	0.3197	0.1647	0.1907	**0.3034**
30	0.2854	0.1403	0.2738	0.3210	0.3469	0.1636	0.1843	**0.3322**
35	0.3292	0.1403	0.2971	0.3423	**0.3640**	0.1664	0.1821	0.3597
40	0.3764	0.1403	0.3168	0.3627	**0.3937**	0.1646	0.1803	0.3874

Table E119: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.3042	0.3132	0.3955	**0.4985**	0.3955	0.3955	**0.4985**	**0.4985**
10	0.4988	0.3132	0.4780	**0.6176**	0.5798	0.4074	0.5493	0.6092
15	0.6154	0.3132	0.5551	0.7138	**0.7258**	0.4226	0.5469	0.7117
20	0.6917	0.3132	0.6234	0.7813	**0.8099**	0.4212	0.5265	0.7859
25	0.7983	0.3132	0.7094	0.8322	**0.8617**	0.4197	0.5121	0.8367
30	0.8376	0.3132	0.7620	0.8684	**0.9037**	0.4164	0.5040	0.8891
35	0.8987	0.3132	0.8115	0.9020	**0.9351**	0.4155	0.4894	0.9253
40	0.9312	0.3132	0.8464	0.9224	**0.9490**	0.4154	0.4781	0.9433

Table E120: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.2312	0.2436	0.3006	0.3597	0.3006	0.3006	0.3597	**0.3597**
10	0.3765	0.2436	0.3552	0.4659	0.4353	0.3038	0.4120	**0.4578**
15	0.4671	0.2436	0.4098	0.5473	**0.5569**	0.3204	0.4063	0.5432
20	0.5241	0.2436	0.4665	0.6149	**0.6418**	0.3158	0.3919	0.6210
25	0.6462	0.2436	0.5538	0.6704	**0.7161**	0.3163	0.3799	0.6865
30	0.6784	0.2436	0.6047	0.7125	**0.7721**	0.3151	0.3713	0.7467
35	0.7610	0.2436	0.6510	0.7617	**0.8113**	0.3145	0.3619	0.7973
40	0.8112	0.2436	0.6907	0.7911	**0.8438**	0.3146	0.3542	0.8350

Table E121: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1403	0.1105	0.1275	0.1515	0.1275	0.1275	0.1515	**0.1515**
10	0.1959	0.1105	0.1446	0.1927	0.1783	0.1293	0.1659	**0.1996**
15	0.2194	0.1105	0.1642	0.2242	0.2261	0.1393	0.1654	**0.2368**
20	0.2303	0.1105	0.1810	0.2479	0.2638	0.1354	0.1577	**0.2659**
25	0.2869	0.1105	0.2152	0.2650	**0.2980**	0.1324	0.1512	0.2899
30	0.2828	0.1105	0.2303	0.2831	**0.3300**	0.1346	0.1520	0.3224
35	0.3381	0.1105	0.2532	0.3083	**0.3610**	0.1327	0.1490	0.3595
40	0.3783	0.1105	0.2739	0.3283	**0.3923**	0.1345	0.1464	0.3858

Table E122: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1407	0.0987	0.1168	**0.1483**	0.1168	0.1168	**0.1483**	**0.1483**
10	0.1930	0.0987	0.1313	0.1765	0.1613	0.1171	0.1518	**0.1868**
15	0.2124	0.0987	0.1456	0.2027	0.2063	0.1205	0.1473	**0.2168**
20	0.2309	0.0987	0.1675	0.2347	0.2556	0.1210	0.1457	**0.2605**
25	0.2917	0.0987	0.2013	0.2553	0.2919	0.1205	0.1381	**0.2928**
30	0.2884	0.0987	0.2207	0.2762	0.3298	0.1195	0.1374	**0.3256**
35	0.3299	0.0987	0.2367	0.2884	**0.3464**	0.1189	0.1342	0.3425
40	0.3833	0.0987	0.2588	0.3130	**0.3900**	0.1184	0.1319	0.3872

Table E123: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.3076	0.1485	0.2050	**0.3320**	0.2050	0.2050	**0.3320**	**0.3320**
10	0.4949	0.1485	0.2704	0.4552	0.3799	0.2081	0.3430	**0.5014**
15	0.6219	0.1485	0.3425	0.5553	0.5786	0.2229	0.3324	**0.6473**
20	0.6910	0.1485	0.4097	0.6319	0.7111	0.2170	0.3031	**0.7398**
25	0.8111	0.1485	0.5065	0.6969	0.8091	0.2181	0.2907	**0.8168**
30	0.8456	0.1485	0.5771	0.7577	0.8727	0.2183	0.2832	**0.8767**
35	0.9035	0.1485	0.6374	0.8025	0.9164	0.2178	0.2727	**0.9163**
40	0.9377	0.1485	0.6918	0.8396	0.9440	0.2176	0.2612	**0.9437**

Table E124: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.3040	0.1016	0.1473	**0.2668**	0.1473	0.1473	**0.2668**	**0.2668**
10	0.5014	0.1016	0.2004	0.3922	0.3095	0.1507	0.2738	**0.4669**
15	0.6191	0.1016	0.2621	0.4872	0.5163	0.1589	0.2508	**0.6206**
20	0.6966	0.1016	0.3277	0.5650	0.6684	0.1589	0.2334	**0.7242**
25	0.8098	0.1016	0.4244	0.6415	0.7891	0.1580	0.2194	**0.8102**
30	0.8393	0.1016	0.4983	0.7053	0.8532	0.1570	0.2090	**0.8606**
35	0.8979	0.1016	0.5594	0.7517	0.9018	0.1528	0.1999	**0.9035**
40	0.9337	0.1016	0.6221	0.7857	0.9307	0.1578	0.1953	**0.9336**

Table E125: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2295	0.1650	0.2114	**0.2926**	0.2114	0.2114	**0.2926**	**0.2926**
10	0.3784	0.1650	0.2660	0.3981	0.3526	0.2190	0.3243	**0.4151**
15	0.4691	0.1650	0.3136	0.4732	0.4865	0.2268	0.3079	**0.5113**
20	0.5331	0.1650	0.3702	0.5388	0.5948	0.2293	0.2971	**0.6017**
25	0.6497	0.1650	0.4556	0.6041	**0.6787**	0.2247	0.2821	0.6707
30	0.6853	0.1650	0.5126	0.6500	**0.7462**	0.2266	0.2774	0.7372
35	0.7600	0.1650	0.5598	0.6990	**0.7967**	0.2256	0.2730	0.7913
40	0.8224	0.1650	0.6088	0.7287	**0.8378**	0.2242	0.2638	0.8345

Table E126: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2309	0.1409	0.1831	**0.2714**	0.1831	0.1831	**0.2714**	**0.2714**
10	0.3791	0.1409	0.2338	0.3672	0.3171	0.1859	0.2914	**0.3911**
15	0.4656	0.1409	0.2832	0.4350	0.4528	0.1984	0.2770	**0.4961**
20	0.5275	0.1409	0.3325	0.4996	0.5665	0.1939	0.2606	**0.5830**
25	0.6464	0.1409	0.4177	0.5728	0.6645	0.1942	0.2509	**0.6583**
30	0.6868	0.1409	0.4746	0.6219	0.7416	0.1951	0.2438	**0.7365**
35	0.7618	0.1409	0.5268	0.6648	0.7897	0.1934	0.2380	**0.7854**
40	0.8218	0.1409	0.5731	0.7097	0.8327	0.1930	0.2280	**0.8332**

Table E127: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Number of Blocks $n_b = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.1940	0.1934	0.2136	**0.2612**	0.2136	0.2136	**0.2612**	**0.2612**
15	0.1940	0.2305	0.2371	0.2963	0.2375	0.2458	0.2794	**0.2991**
20	0.1940	0.2781	0.2868	0.3328	0.2832	0.2969	0.2809	**0.3407**
25	0.1940	0.3133	0.3196	0.3686	0.3165	0.3278	0.2836	**0.3734**
30	0.1940	0.3592	0.3641	0.3877	0.3606	0.3760	0.2777	**0.4095**
35	0.1940	0.3933	0.3974	0.4146	0.3946	0.4076	0.2712	**0.4355**
40	0.1940	0.4310	0.4328	0.4481	0.4317	0.4434	0.2711	**0.4761**

Table E128: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.4928	0.5239	0.5972	**0.7481**	0.5972	0.5972	**0.7481**	**0.7481**
15	0.4928	0.6914	0.7174	0.8362	0.7118	0.7330	0.8024	**0.8425**
20	0.4928	0.7913	0.8090	0.8862	0.8015	0.8238	0.8038	**0.8952**
25	0.4928	0.8671	0.8765	0.9235	0.8709	0.8903	0.7969	**0.9362**
30	0.4928	0.9201	0.9250	0.9490	0.9215	0.9335	0.7888	**0.9614**
35	0.4928	0.9540	0.9574	0.9634	0.9554	0.9620	0.7728	**0.9757**
40	0.4928	0.9681	0.9695	0.9748	0.9686	0.9736	0.7646	**0.9832**

Table E129: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed number of Blocks $n_b = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.3843	0.3982	0.4553	**0.5835**	0.4553	0.4553	**0.5835**	**0.5835**
15	0.3843	0.5359	0.5598	0.6908	0.5543	0.5785	0.6523	**0.6949**
20	0.3843	0.6326	0.6508	0.7488	0.6436	0.6699	0.6484	**0.7579**
25	0.3843	0.7171	0.7301	0.7984	0.7236	0.7470	0.6447	**0.8148**
30	0.3843	0.7832	0.7908	0.8356	0.7860	0.8074	0.6301	**0.8600**
35	0.3843	0.8373	0.8439	0.8640	0.8391	0.8558	0.6154	**0.8910**
40	0.3843	0.8814	0.8843	0.8903	0.8823	0.8930	0.6031	**0.9174**

Table E130: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach						
			I	II	III	IV	V	VI
10	0.1931	0.1431	0.1633	**0.2158**	0.1633	0.1633	**0.2158**	**0.2158**
15	0.1931	0.1673	0.1718	**0.2375**	0.1715	0.1771	0.2327	0.2338
20	0.1931	0.2004	0.2077	**0.2699**	0.2044	0.2155	0.2454	0.2608
25	0.1931	0.2155	0.2190	**0.2842**	0.2173	0.2263	0.2415	0.2698
30	0.1931	0.2475	0.2504	**0.3030**	0.2480	0.2574	0.2396	0.2948
35	0.1931	0.2689	0.2726	**0.3134**	0.2705	0.2789	0.2397	0.3115
40	0.1931	0.2834	0.2871	**0.3416**	0.2848	0.2951	0.2376	0.3332

Table E131: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.1912	0.1491	0.1658	**0.2177**	0.1658	0.1658	**0.2177**	**0.2177**
15	0.1912	0.1718	0.1774	**0.2348**	0.1765	0.1836	0.2332	0.2296
20	0.1912	0.1823	0.1901	**0.2537**	0.1865	0.1968	0.2365	0.2435
25	0.1912	0.2139	0.2202	**0.2816**	0.2175	0.2272	0.2400	0.2725
30	0.1912	0.2396	0.2436	**0.2987**	0.2402	0.2533	0.2345	0.2890
35	0.1912	0.2667	0.2704	**0.3224**	0.2683	0.2800	0.2382	0.3085
40	0.1912	0.2844	0.2875	**0.3401**	0.2852	0.2943	0.2356	0.3284

Table E132: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.4934	0.2205	0.2747	**0.5176**	0.2747	0.2747	**0.5176**	**0.5176**
15	0.4934	0.2801	0.3079	**0.5835**	0.3014	0.3263	**0.5952**	0.5403
20	0.4934	0.3337	0.3556	**0.6155**	0.3456	0.3786	0.6081	0.5483
25	0.4934	0.4011	0.4193	**0.6688**	0.4102	0.4464	0.6268	0.5880
30	0.4934	0.4520	0.4644	**0.7045**	0.4563	0.4905	0.6223	0.6170
35	0.4934	0.5042	0.5147	**0.7376**	0.5072	0.5396	0.6196	0.6413
40	0.4934	0.5302	0.5407	**0.7529**	0.5341	0.5631	0.6171	0.6569

Table E133: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)									
Sample Size	**L***	**FW***	**Approach**						
			I	**II**	**III**	**IV**	**V**	**VI**
10	0.4926	0.1488	0.1947	**0.4521**	0.1947	0.1947	**0.4521**	**0.4521**
15	0.4926	0.1784	0.1978	0.4678	0.1921	0.2136	**0.5025**	0.4135
20	0.4926	0.2103	0.2269	0.5103	0.2196	0.2469	**0.5422**	0.4172
25	0.4926	0.2378	0.2516	0.5415	0.2428	0.2752	**0.5587**	0.4129
30	0.4926	0.2624	0.2726	**0.5611**	0.2652	0.2963	0.5539	0.4171
35	0.4926	0.2980	0.3062	**0.5879**	0.3003	0.3283	0.5556	0.4354
40	0.4926	0.3222	0.3282	**0.6112**	0.3234	0.3514	0.5567	0.4460

Table E134: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	**L***	**FW***	**Approach**					
			I	**II**	**III**	**IV**	**V**	**VI**
10	0.3761	0.1829	0.2250	**0.4049**	0.2250	0.2250	**0.4049**	**0.4049**
15	0.3761	0.2371	0.2589	**0.4598**	0.2541	0.2741	**0.4639**	0.4314
20	0.3761	0.2865	0.3034	**0.5050**	0.2963	0.3217	0.4867	0.4542
25	0.3761	0.3297	0.3434	**0.5396**	0.3362	0.3629	0.4885	0.4754
30	0.3761	0.3776	0.3881	**0.5712**	0.3812	0.4098	0.4832	0.5050
35	0.3761	0.4092	0.4156	**0.5910**	0.4112	0.4338	0.4764	0.5184
40	0.3761	0.4620	0.4699	**0.6291**	0.4650	0.4884	0.4752	0.5613

Table E135: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	**L***	**FW***	**Approach**					
			I	**II**	**III**	**IV**	**V**	**VI**
10	0.3739	0.1533	0.1915	**0.3642**	0.1915	0.1915	**0.3642**	**0.3642**
15	0.3739	0.1899	0.2063	**0.4054**	0.2030	0.2189	**0.4212**	0.3715
20	0.3739	0.2201	0.2345	**0.4336**	0.2283	0.2486	**0.4377**	0.3733
25	0.3739	0.2584	0.2690	**0.4743**	0.2628	0.2854	0.4470	0.3953
30	0.3739	0.2814	0.2909	**0.4943**	0.2844	0.3091	0.4501	0.4015
35	0.3739	0.3210	0.3279	**0.5258**	0.3228	0.3458	0.4513	0.4350
40	0.3739	0.3503	0.3582	**0.5509**	0.3521	0.3763	0.4455	0.4538

Table E136: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Sample Size $n_a = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.1973	0.1951	0.2187	**0.2623**	0.2187	0.2187	**0.2623**	**0.2623**
15	0.2212	0.1951	0.2236	**0.3006**	0.2378	0.2145	0.2884	0.2958
20	0.2250	0.1951	0.2296	**0.3265**	0.2565	0.2144	0.2898	0.3204
25	0.2855	0.1951	0.2456	**0.3456**	0.2935	0.2137	0.2884	0.3358
30	0.2795	0.1951	0.2508	**0.3742**	0.3284	0.2114	0.2859	0.3686
35	0.3354	0.1951	0.2569	**0.4005**	0.3751	0.2138	0.2828	0.3980
40	0.3754	0.1951	0.2746	**0.4152**	0.4050	0.2146	0.2807	0.4207

Table E137: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.4928	0.5275	0.5965	**0.7528**	0.5965	0.5965	**0.7528**	**0.7528**
15	0.6107	0.5275	0.6222	**0.8202**	0.6621	0.5920	0.8021	0.8152
20	0.6873	0.5275	0.6477	**0.8725**	0.7400	0.5964	0.8128	0.8646
25	0.7970	0.5275	0.6830	**0.9046**	0.8227	0.5948	0.8099	0.8987
30	0.8452	0.5275	0.7130	**0.9334**	0.8906	0.5927	0.8023	0.9321
35	0.8955	0.5275	0.7347	**0.9526**	0.9307	0.5933	0.7955	0.9508
40	0.9337	0.5275	0.7673	**0.9634**	0.9579	0.5954	0.7874	0.9631

Table E138: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4715	0.5227	0.5652	**0.7398**	0.5652	0.5652	**0.7398**	**0.7398**
20	0.5216	0.5227	0.5755	**0.7921**	0.5955	0.5634	0.7817	0.7853
25	0.6588	0.5227	0.5920	**0.8352**	0.6344	0.5646	0.8024	0.8312
30	0.6900	0.5227	0.6056	**0.8671**	0.6802	0.5687	0.8075	0.8631
35	0.7519	0.5227	0.6223	**0.8882**	0.7261	0.5651	0.7982	0.8833
40	0.8163	0.5227	0.6350	**0.9102**	0.7698	0.5665	0.7940	0.9097

Table E139: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2007	0.1466	0.1670	**0.2231**	0.1670	0.1670	**0.2231**	**0.2231**
15	0.2166	0.1466	0.1688	0.2528	0.1813	0.1624	0.2348	**0.2561**
20	0.2329	0.1466	0.1762	0.2814	0.2080	0.1637	0.2400	**0.2929**
25	0.2938	0.1466	0.1890	0.3006	0.2383	0.1638	0.2318	**0.3203**
30	0.2920	0.1466	0.1943	0.3196	0.2754	0.1614	0.2260	**0.3451**
35	0.3413	0.1466	0.2027	0.3477	0.3121	0.1619	0.2224	**0.3778**
40	0.3689	0.1466	0.2117	0.3593	0.3460	0.1646	0.2186	**0.3945**

Table E140: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.1914	0.1218	0.1371	**0.1999**	0.1371	0.1371	**0.1999**	**0.1999**
15	0.2172	0.1218	0.1408	0.2250	0.1511	0.1333	0.2051	**0.2380**
20	0.2305	0.1218	0.1524	0.2569	0.1812	0.1380	0.2110	**0.2781**
25	0.2824	0.1218	0.1598	0.2683	0.2067	0.1348	0.2016	**0.2956**
30	0.2836	0.1218	0.1669	0.3027	0.2501	0.1354	0.1982	**0.3366**
35	0.3349	0.1218	0.1718	0.3159	0.2828	0.1357	0.1960	**0.3614**
40	0.3686	0.1218	0.1855	0.3346	0.3203	0.1378	0.1909	**0.3844**

Table E141: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 10$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.4931	0.2144	0.2678	**0.5229**	0.2678	0.2678	**0.5229**	**0.5229**
15	0.6152	0.2144	0.2930	0.6203	0.3367	0.2643	0.5494	**0.6648**
20	0.6872	0.2144	0.3180	0.6926	0.4228	0.2658	0.5374	**0.7597**
25	0.8074	0.2144	0.3563	0.7606	0.5474	0.2673	0.5230	**0.8364**
30	0.8380	0.2144	0.3858	0.8071	0.6707	0.2639	0.5082	**0.8827**
35	0.8986	0.2144	0.4095	0.8487	0.7733	0.2646	0.4901	**0.9271**
40	0.9341	0.2144	0.4484	0.8784	0.8569	0.2668	0.4737	**0.9465**

Table E142: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.4988	0.1411	0.1862	**0.4401**	0.1862	0.1862	**0.4401**	**0.4401**
15	0.6081	0.1411	0.2079	0.5290	0.2440	0.1836	0.4458	**0.5927**
20	0.6958	0.1411	0.2271	0.6200	0.3234	0.1861	0.4375	**0.7170**
25	0.8111	0.1411	0.2626	0.6938	0.4419	0.1863	0.4193	**0.8095**
30	0.8432	0.1411	0.2875	0.7444	0.5774	0.1842	0.4047	**0.8693**
35	0.9041	0.1411	0.3133	0.7938	0.6961	0.1845	0.3919	**0.9112**
40	0.9358	0.1411	0.3458	0.8254	0.7901	0.1846	0.3709	**0.9412**

Table E143: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.3704	0.2599	0.3071	**0.4692**	0.3071	0.3071	**0.4692**	**0.4692**
15	0.4681	0.2599	0.3253	0.5622	0.3588	0.3032	0.5193	**0.5783**
20	0.5382	0.2599	0.3456	0.6299	0.4340	0.3046	0.5181	**0.6571**
25	0.6476	0.2599	0.3777	0.6807	0.5234	0.3035	0.5071	**0.7197**
30	0.6879	0.2599	0.3942	0.7266	0.6215	0.3036	0.4926	**0.7768**
35	0.7575	0.2599	0.4148	0.7627	0.7058	0.3017	0.4841	**0.8144**
40	0.8171	0.2599	0.4524	0.7974	0.7763	0.3047	0.4714	**0.8538**

Table E144: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.3827	0.2023	0.2451	**0.4237**	0.2451	0.2451	**0.4237**	**0.4237**
15	0.4808	0.2023	0.2652	0.5108	0.2968	0.2446	0.4594	**0.5434**
20	0.5307	0.2023	0.2864	0.5740	0.3682	0.2476	0.4502	**0.6243**
25	0.6499	0.2023	0.3140	0.6348	0.4578	0.2448	0.4399	**0.6937**
30	0.6825	0.2023	0.3355	0.6831	0.5631	0.2445	0.4275	**0.7593**
35	0.7686	0.2023	0.3515	0.7300	0.6573	0.2447	0.4146	**0.8129**
40	0.8242	0.2023	0.3859	0.7685	0.7410	0.2462	0.4050	**0.8503**

Table E145: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Number of Blocks $n_b = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample			**Approach**					
Size	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.2114	0.2373	0.2506	**0.3288**	0.2506	0.2506	**0.3288**	**0.3288**
20	0.2114	0.2759	0.2891	0.3570	0.2857	0.2905	0.3431	**0.3606**
25	0.2114	0.3168	0.3277	0.3933	0.3229	0.3337	0.3559	**0.4026**
30	0.2114	0.3546	0.3611	0.4251	0.3584	0.3700	0.3583	**0.4404**
35	0.2114	0.3901	0.3973	0.4493	0.3938	0.4036	0.3562	**0.4675**
40	0.2114	0.4197	0.4242	0.4690	0.4219	0.4336	0.3454	**0.4894**

Table E146: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample			**Approach**					
Size	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.6181	0.6828	0.7354	**0.8923**	0.7354	0.7354	**0.8923**	**0.8923**
20	0.6181	0.7898	0.8205	0.9300	0.8135	0.8275	0.9205	**0.9372**
25	0.6181	0.8681	0.8847	0.9534	0.8786	0.8929	0.9224	**0.9591**
30	0.6181	0.9204	0.9271	0.9692	0.9242	0.9349	0.9235	**0.9734**
35	0.6181	0.9515	0.9554	0.9778	0.9530	0.9593	0.9191	**0.9838**
40	0.6181	0.9717	0.9734	0.9848	0.9725	0.9759	0.9152	**0.9911**

Table E147: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample			**Approach**					
Size	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.4716	0.5271	0.5711	**0.7514**	0.5711	0.5711	**0.7514**	**0.7514**
20	0.4716	0.6351	0.6638	0.8047	0.6573	0.6718	0.7869	**0.8107**
25	0.4716	0.7135	0.7326	0.8443	0.7246	0.7421	0.7974	**0.8513**
30	0.4716	0.7862	0.7975	0.8851	0.7925	0.8110	0.8018	**0.8940**
35	0.4716	0.8402	0.8486	0.9087	0.8437	0.8585	0.7985	**0.9194**
40	0.4716	0.8827	0.8874	0.9280	0.8849	0.8952	0.7918	**0.9402**

Table E148: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)									
Sample			Approach						
Size	L*	FW*	I	II	III	IV	V	VI
15	0.2215	0.1736	0.1890	**0.2824**	0.1890	0.1890	**0.2824**	**0.2824**
20	0.2215	0.1930	0.2082	**0.3066**	0.2034	0.2102	0.3042	0.2985
25	0.2215	0.2189	0.2276	**0.3222**	0.2244	0.2319	0.3112	0.3112
30	0.2215	0.2413	0.2454	**0.3374**	0.2435	0.2536	0.3117	0.3264
35	0.2215	0.2624	0.2697	**0.3635**	0.2652	0.2759	0.3164	0.3520
40	0.2215	0.2864	0.2888	**0.3763**	0.2880	0.2973	0.3077	0.3643

Table E149: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.2142	0.1381	0.1476	**0.2422**	0.1476	0.1476	**0.2422**	**0.2422**
20	0.2142	0.1566	0.1676	**0.2624**	0.1646	0.1700	0.2652	0.2545
25	0.2142	0.1794	0.1883	**0.2864**	0.1846	0.1932	0.2858	0.2723
30	0.2142	0.1913	0.1949	**0.2979**	0.1935	0.2030	0.2817	0.2708
35	0.2142	0.2076	0.2125	**0.3058**	0.2095	0.2191	0.2859	0.2808
40	0.2142	0.2282	0.2315	**0.3261**	0.2296	0.2378	0.2818	0.2983

Table E150: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.6216	0.2907	0.3393	**0.6826**	0.3393	0.3393	**0.6826**	**0.6826**
20	0.6216	0.3514	0.3869	**0.7267**	0.3790	0.3978	0.7400	0.6956
25	0.6216	0.4036	0.4278	**0.7636**	0.4192	0.4443	0.7734	0.7064
30	0.6216	0.4576	0.4757	**0.7895**	0.4666	0.4958	0.7809	0.7184
35	0.6216	0.4988	0.5150	**0.8063**	0.5052	0.5349	0.7841	0.7300
40	0.6216	0.5450	0.5585	**0.8340**	0.5505	0.5790	0.7859	0.7488

Table E151: Estimated Power of Tests for Mixed Design under the Normal Distribution with Unequal variance; K=4; Treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.6114	0.1739	0.2119	**0.5812**	0.2119	0.2119	**0.5812**	**0.5812**
20	0.6114	0.2034	0.2341	**0.6101**	0.2245	0.2413	0.6438	0.5582
25	0.6114	0.2380	0.2631	**0.6364**	0.2531	0.2769	0.6821	0.5508
30	0.6114	0.2660	0.2811	**0.6596**	0.2738	0.2980	0.6989	0.5410
35	0.6114	0.3003	0.3149	**0.6894**	0.3057	0.3347	0.7088	0.5510
40	0.6114	0.3178	0.3304	**0.7071**	0.3226	0.3498	0.7158	0.5448

Table E152: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.4680	0.2374	0.2720	**0.5375**	0.2720	0.2720	**0.5375**	**0.5375**
20	0.4680	0.2800	0.3058	**0.5750**	0.2988	0.3130	0.5890	0.5463
25	0.4680	0.3258	0.3486	**0.6094**	0.3381	0.3613	0.6137	0.5669
30	0.4680	0.3695	0.3839	**0.6437**	0.3767	0.4007	0.6284	0.5829
35	0.4680	0.4133	0.4278	**0.6756**	0.4192	0.4436	0.6307	0.6016
40	0.4680	0.4530	0.4634	**0.7049**	0.4566	0.4815	0.6397	0.6263

Table E153: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.4783	0.1891	0.2203	**0.4956**	0.2203	0.2203	**0.4956**	**0.4956**
20	0.4783	0.2128	0.2377	**0.5305**	0.2311	0.2450	0.5557	0.4934
25	0.4783	0.2555	0.2744	**0.5605**	0.2668	0.2861	0.5832	0.5003
30	0.4783	0.2831	0.2946	**0.5911**	0.2889	0.3097	0.5957	0.5027
35	0.4783	0.3158	0.3276	**0.6153**	0.3213	0.3413	0.6010	0.5177
40	0.4783	0.3462	0.3556	**0.6378**	0.3510	0.3709	0.6033	0.5299

Table E154: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Sample Size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach I	II	III	IV	V	VI
15	0.2168	0.2402	0.2572	**0.3322**	0.2572	0.2572	**0.3322**	**0.3322**
20	0.2295	0.2402	0.2594	**0.3674**	0.2681	0.2553	0.3608	0.3634
25	0.2930	0.2402	0.2709	**0.3934**	0.2902	0.2574	0.3712	0.3891
30	0.2900	0.2402	0.2713	**0.4155**	0.3061	0.2567	0.3669	0.4099
35	0.3323	0.2402	0.2824	**0.4393**	0.3295	0.2562	0.3705	0.4325
40	0.3772	0.2402	0.2851	**0.4633**	0.3521	0.2561	0.3682	0.4571

Table E155: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks	L*	FW*	Approach I	II	III	IV	V	VI
15	0.6181	0.6906	0.7383	**0.8952**	0.7383	0.7383	**0.8952**	**0.8952**
20	0.6922	0.6906	0.7491	**0.9261**	0.7705	0.7362	0.9214	0.9223
25	0.8004	0.6906	0.7651	**0.9481**	0.8093	0.7373	0.9323	0.9438
30	0.8414	0.6906	0.7803	**0.9628**	0.8507	0.7392	0.9365	0.9615
35	0.8959	0.6906	0.7975	**0.9728**	0.8847	0.7390	0.9324	0.9715
40	0.9378	0.6906	0.8088	**0.9828**	0.9136	0.7391	0.9296	0.9827

Table E156: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4715	0.5227	0.5652	**0.7398**	0.5652	0.5652	**0.7398**	**0.7398**
20	0.5216	0.5227	0.5755	**0.7921**	0.5955	0.5634	0.7817	0.7853
25	0.6588	0.5227	0.5920	**0.8352**	0.6344	0.5646	0.8024	0.8312
30	0.6900	0.5227	0.6056	**0.8671**	0.6802	0.5687	0.8075	0.8631
35	0.7519	0.5227	0.6223	**0.8882**	0.7261	0.5651	0.7982	0.8833
40	0.8163	0.5227	0.6350	**0.9102**	0.7698	0.5665	0.7940	0.9097

Table E157: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2161	0.1695	0.1831	**0.2750**	0.1831	0.1831	**0.2750**	**0.2750**
20	0.2290	0.1695	0.1852	0.3000	0.1927	0.1833	0.2873	**0.3070**
25	0.2989	0.1695	0.1949	0.3320	0.2124	0.1821	0.2980	**0.3474**
30	0.2862	0.1695	0.1952	0.3512	0.2283	0.1820	0.2927	**0.3660**
35	0.3369	0.1695	0.2043	0.3764	0.2510	0.1827	0.2917	**0.4001**
40	0.3782	0.1695	0.2100	0.3997	0.2727	0.1843	0.2913	**0.4265**

Table E158: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.2

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2145	0.1427	0.1558	**0.2485**	0.1558	0.1558	**0.2485**	**0.2485**
20	0.2282	0.1427	0.1588	0.2787	0.1661	0.1553	0.2631	**0.2898**
25	0.2827	0.1427	0.1640	0.2961	0.1756	0.1543	0.2607	**0.3135**
30	0.2906	0.1427	0.1671	0.3225	0.1956	0.1550	0.2558	**0.3482**
35	0.3415	0.1427	0.1735	0.3467	0.2114	0.1549	0.2520	**0.3839**
40	0.3777	0.1427	0.1770	0.3741	0.2352	0.1555	0.2512	**0.4104**

Table E159: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.6115	0.2800	0.3282	**0.6735**	0.3282	0.3282	**0.6735**	**0.6735**
20	0.6951	0.2800	0.3423	0.7509	0.3658	0.3276	0.6998	**0.7794**
25	0.8038	0.2800	0.3615	0.7947	0.4142	0.3295	0.6993	**0.8452**
30	0.8408	0.2800	0.3757	0.8465	0.4734	0.3312	0.6920	**0.8988**
35	0.8938	0.2800	0.3960	0.8775	0.5456	0.3294	0.6805	**0.9278**
40	0.9331	0.2800	0.4088	0.9034	0.6257	0.3291	0.6683	**0.9510**

Table E160: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
15	0.6045	0.1812	0.2171	**0.5747**	0.2171	0.2171	**0.5747**	**0.5747**
20	0.6912	0.1812	0.2270	0.6668	0.2474	0.2143	0.6022	**0.7125**
25	0.8026	0.1812	0.2450	0.7242	0.2926	0.2160	0.5947	**0.7953**
30	0.8404	0.1812	0.2588	0.7818	0.3530	0.2193	0.5745	**0.8670**
35	0.9002	0.1812	0.2768	0.8239	0.4188	0.2171	0.5681	**0.9093**
40	0.9375	0.1812	0.2934	0.8614	0.4946	0.2171	0.5447	**0.9447**

Table E161: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4733	0.3290	0.3686	**0.6234**	0.3686	0.3686	**0.6234**	**0.6234**
20	0.5360	0.3290	0.3841	0.6850	0.4031	0.3706	0.6584	**0.6990**
25	0.6594	0.3290	0.4008	0.7435	0.4463	0.3692	0.6680	**0.7636**
30	0.6791	0.3290	0.4118	0.7767	0.5006	0.3714	0.6671	**0.8008**
35	0.7570	0.3290	0.4331	0.8109	0.5573	0.3686	0.6606	**0.8422**
40	0.8164	0.3290	0.4430	0.8422	0.6135	0.3701	0.6511	**0.8750**

Table E162: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.5; d3=0.5; d4=1.0

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4682	0.2623	0.3034	**0.5578**	0.3034	0.3034	**0.5578**	**0.5578**
20	0.5346	0.2623	0.3138	0.6313	0.3319	0.3047	0.5951	**0.6499**
25	0.6477	0.2623	0.3284	0.6827	0.3691	0.3022	0.5954	**0.7223**
30	0.6792	0.2623	0.3396	0.7291	0.4203	0.3031	0.5912	**0.7744**
35	0.7591	0.2623	0.3538	0.7702	0.4706	0.3026	0.5816	**0.8250**
40	0.8152	0.2623	0.3658	0.8007	0.5351	0.3018	0.5700	**0.8586**

Table E163: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Number of Blocks $n_b = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.1261	0.1250	0.1417	**0.1652**	0.1417	0.1417	**0.1652**	**0.1652**
10	0.1261	0.1764	0.1818	0.2026	0.1799	0.1900	0.1793	**0.2114**
15	0.1261	0.2316	0.2364	0.2451	0.2312	0.2417	0.1763	**0.2583**
20	0.1261	0.2619	0.2680	0.2709	0.2643	0.2797	0.1680	**0.2881**
25	0.1261	0.3002	0.3056	0.2975	0.3018	0.3139	0.1655	**0.3205**
30	0.1261	0.3448	0.3484	0.3293	0.3452	0.3562	0.1617	**0.3642**
35	0.1261	0.3727	0.3747	0.3503	0.3734	0.3852	0.1585	**0.3920**
40	0.1261	0.4128	0.4161	0.3803	0.4128	0.4268	0.1529	**0.4336**

Table E164: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=0.3; d4=0.6

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)									
Sample			Approach						
Size	L*	FW*	I	II	III	IV	V	VI
5	0.1218	0.1273	0.1480	**0.1742**	0.1480	0.1480	**0.1742**	**0.1742**
10	0.1218	0.1865	0.1931	0.2150	0.1923	0.1999	0.1814	**0.2223**
15	0.1218	0.2424	0.2473	0.2525	0.2420	0.2567	0.1782	**0.2717**
20	0.1218	0.2910	0.2978	0.2968	0.2944	0.3085	0.1740	**0.3192**
25	0.1218	0.3458	0.3511	0.3322	0.3475	0.3623	0.1708	**0.3715**
30	0.1218	0.3857	0.3913	0.3645	0.3862	0.4022	0.1657	**0.4125**
35	0.1218	0.4286	0.4335	0.3997	0.4297	0.4439	0.1579	**0.4529**
40	0.1218	0.4672	0.4696	0.4221	0.4672	0.4796	0.1548	**0.4840**

Table E165: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=0.3; d4=0.6

Fixed number of Blocks $n_b = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.1100	0.1128	0.1257	**0.1432**	0.1257	0.1257	**0.1432**	**0.1432**
10	0.1100	0.1507	0.1553	0.1746	0.1542	0.1609	0.1535	**0.1737**
15	0.1100	0.1938	0.1969	0.2083	0.1937	0.2041	0.1553	**0.2198**
20	0.1100	0.2208	0.2258	0.2265	0.2236	0.2351	0.1496	**0.2411**
25	0.1100	0.2555	0.2608	0.2565	0.2572	0.2713	0.1477	**0.2791**
30	0.1100	0.2986	0.3016	0.2860	0.2988	0.3097	0.1434	**0.3162**
35	0.1100	0.3250	0.3281	0.3049	0.3256	0.3371	0.1366	**0.3407**
40	0.1100	0.3615	0.3633	0.3206	0.3616	0.3709	0.1318	**0.3741**

Table E166: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.1336	0.1027	0.1203	**0.1464**	0.1203	0.1203	**0.1464**	**0.1464**
10	0.1336	0.1352	0.1435	0.1792	0.1418	0.1510	0.1651	**0.1737**
15	0.1336	0.1592	0.1622	0.1909	0.1597	0.1692	0.1618	**0.1848**
20	0.1336	0.1874	0.1923	0.2156	0.1894	0.2032	0.1590	**0.2101**
25	0.1336	0.2012	0.2058	0.2254	0.2027	0.2140	0.1538	**0.2235**
30	0.1336	0.2360	0.2381	0.2516	0.2363	0.2441	0.1544	**0.2527**
35	0.1336	0.2597	0.2610	0.2652	0.2601	0.2681	0.1512	**0.2729**
40	0.1336	0.2785	0.2812	0.2845	0.2789	0.2911	0.1490	**0.2965**

Table E167: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)									
Sample Size			Approach						
	L*	FW*	I	II	III	IV	V	VI
5	0.1333	0.0925	0.1063	**0.1389**	0.1063	0.1063	**0.1389**	**0.1389**
10	0.1333	0.1110	0.1154	**0.1556**	0.1142	0.1225	0.1527	0.1431
15	0.1333	0.1367	0.1382	**0.1757**	0.1362	0.1453	0.1584	0.1633
20	0.1333	0.1501	0.1540	**0.1883**	0.1525	0.1658	0.1529	0.1758
25	0.1333	0.1702	0.1733	**0.2019**	0.1714	0.1799	0.1546	0.1873
30	0.1333	0.1930	0.1954	**0.2240**	0.1933	0.2011	0.1499	0.2098
35	0.1333	0.2015	0.2035	**0.2321**	0.2017	0.2115	0.1446	0.2173
40	0.1333	0.2179	0.2187	**0.2375**	0.2181	0.2283	0.1430	0.2321

Table E168: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2745	0.1353	0.1844	0.2979	0.1844	0.1844	**0.2979**	**0.2979**
10	0.2745	0.2213	0.2413	**0.3834**	0.2322	0.2658	0.3700	0.3488
15	0.2745	0.2833	0.2963	**0.4416**	0.2851	0.3240	0.3756	0.3826
20	0.2745	0.3403	0.3527	**0.4865**	0.3452	0.3826	0.3630	0.4176
25	0.2745	0.3921	0.4025	**0.5305**	0.3948	0.4331	0.3565	0.4620
30	0.2745	0.4458	0.4551	**0.5673**	0.4472	0.4849	0.3521	0.5095
35	0.2745	0.4975	0.5036	**0.6029**	0.4987	0.5313	0.3443	0.5494
40	0.2745	0.5373	0.5436	**0.6354**	0.5379	0.5708	0.3345	0.5874

Table E169: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2861	0.1027	0.1469	**0.2677**	0.1469	0.1469	**0.2677**	**0.2677**
10	0.2861	0.1423	0.1577	**0.3040**	0.1512	0.1805	0.3196	0.2501
15	0.2861	0.1747	0.1851	**0.3451**	0.1761	0.2056	0.3351	0.2591
20	0.2861	0.2026	0.2132	**0.3656**	0.2074	0.2387	0.3323	0.2740
25	0.2861	0.2371	0.2442	**0.4026**	0.2384	0.2696	0.3350	0.2942
30	0.2861	0.2663	0.2732	**0.4285**	0.2679	0.3000	0.3293	0.3226
35	0.2861	0.2902	0.2950	**0.4484**	0.2915	0.3209	0.3207	0.3408
40	0.2861	0.3056	0.3099	**0.4660**	0.3061	0.3335	0.3169	0.3473

Table E170: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)									
Sample Size	L*	FW*	Approach						
			I	II	III	IV	V	VI
5	0.1734	0.1143	0.1393	**0.1917**	0.1393	0.1393	**0.1917**	**0.1917**
10	0.1734	0.1554	0.1630	**0.2306**	0.1609	0.1712	0.2242	0.2128
15	0.1734	0.1859	0.1918	**0.2633**	0.1867	0.2055	0.2243	0.2369
20	0.1734	0.2252	0.2330	**0.2926**	0.2281	0.2496	0.2175	0.2681
25	0.1734	0.2638	0.2675	**0.3302**	0.2648	0.2840	0.2145	0.3010
30	0.1734	0.2933	0.2979	**0.3503**	0.2940	0.3099	0.2125	0.3235
35	0.1734	0.3191	0.3239	**0.3689**	0.3196	0.3407	0.2089	0.3539
40	0.1734	0.3599	0.3632	**0.3907**	0.3602	0.3777	0.2010	0.3884

Table E171: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.2129	0.1325	0.1756	**0.2513**	0.1756	0.1756	**0.2513**	**0.2513**
10	0.2129	0.2023	0.2167	**0.3092**	0.2125	0.2351	0.2973	0.2910
15	0.2129	0.2620	0.2726	**0.3689**	0.2639	0.2965	0.3022	0.3345
20	0.2129	0.3106	0.3209	**0.4123**	0.3143	0.3442	0.2904	0.3748
25	0.2129	0.3611	0.3679	**0.4505**	0.3627	0.3922	0.2861	0.4146
30	0.2129	0.4043	0.4108	**0.4913**	0.4054	0.4350	0.2795	0.4552
35	0.2129	0.4585	0.4646	**0.5246**	0.4594	0.4850	0.2729	0.5014
40	0.2129	0.5008	0.5049	**0.5568**	0.5009	0.5248	0.2642	0.5352

Table E172: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Sample Size $n_a = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1343	0.1316	0.1502	**0.1698**	0.1502	0.1502	**0.1698**	**0.1698**
10	0.1914	0.1316	0.1669	0.2043	0.1945	0.1529	0.1885	**0.2044**
15	0.2067	0.1316	0.1808	0.2352	0.2357	0.1593	0.1836	**0.2316**
20	0.2178	0.1316	0.2016	0.2638	0.2706	0.1588	0.1831	**0.2574**
25	0.2848	0.1316	0.2473	0.2901	0.3083	0.1605	0.1807	**0.2962**
30	0.2732	0.1316	0.2632	0.3123	0.3328	0.1568	0.1770	**0.3177**
35	0.3166	0.1316	0.2814	0.3263	**0.3515**	0.1576	0.1768	0.3422
40	0.3555	0.1316	0.2968	0.3443	**0.3735**	0.1566	0.1717	0.3674

Table E173: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0;

Fixed Sample Size $n_a = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
5	0.1218	0.1314	0.1499	**0.1753**	0.1499	0.1499	0.1753	**0.1753**
10	0.1964	0.1314	0.1736	**0.2263**	0.2138	0.1550	0.2024	0.2185
15	0.2180	0.1314	0.1946	0.2583	**0.2611**	0.1620	0.1965	0.2493
20	0.2363	0.1314	0.2153	0.2875	**0.2981**	0.1618	0.1923	0.2894
25	0.3063	0.1314	0.2714	0.3268	**0.3403**	0.1594	0.1860	0.3236
30	0.3152	0.1314	0.2953	0.3511	**0.3834**	0.1620	0.1845	0.3694
35	0.3675	0.1314	0.3172	0.3729	**0.4112**	0.1600	0.1835	0.4004
40	0.4152	0.1314	0.3431	0.3982	**0.4356**	0.1599	0.1764	0.4282

Table E174: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1170	0.1093	0.1237	**0.1473**	0.1237	0.1237	0.1473	0.1473
10	0.1615	0.1093	0.1403	**0.1829**	0.1697	0.1250	0.1603	0.1774
15	0.1828	0.1093	0.1573	0.2055	**0.2061**	0.1350	0.1598	0.2007
20	0.1819	0.1093	0.1704	0.2205	**0.2290**	0.1321	0.1553	0.2213
25	0.2402	0.1093	0.2148	0.2499	**0.2659**	0.1325	0.1517	0.2504
30	0.2299	0.1093	0.2279	0.2625	**0.2858**	0.1313	0.1483	0.2732
35	0.2746	0.1093	0.2396	0.2760	**0.3038**	0.1322	0.1480	0.2993
40	0.3150	0.1093	0.2608	0.3035	**0.3387**	0.1302	0.1429	0.3293

Table E175: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1330	0.1074	0.1244	**0.1540**	0.1244	0.1244	**0.1540**	**0.1540**
10	0.1884	0.1074	0.1401	0.1856	0.1739	0.1255	0.1635	**0.1900**
15	0.2106	0.1074	0.1595	0.2164	0.2198	0.1329	0.1608	**0.2230**
20	0.2162	0.1074	0.1764	0.2366	**0.2539**	0.1330	0.1572	**0.2539**
25	0.2715	0.1074	0.2153	0.2623	**0.2841**	0.1313	0.1491	0.2762
30	0.2660	0.1074	0.2287	0.2744	**0.3136**	0.1303	0.1472	0.3044
35	0.3083	0.1074	0.2427	0.2893	**0.3366**	0.1304	0.1453	0.3296
40	0.3607	0.1074	0.2691	0.3222	**0.3721**	0.1288	0.1430	0.3694

Table E176: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.1329	0.0915	0.1071	**0.1409**	0.1071	0.1071	**0.1409**	**0.1409**
10	0.1908	0.0915	0.1213	0.1722	0.1547	0.1070	0.1438	**0.1841**
15	0.2047	0.0915	0.1370	0.1947	0.1989	0.1118	0.1382	**0.2111**
20	0.2146	0.0915	0.1544	0.2198	0.2362	0.1114	0.1336	**0.2446**
25	0.2697	0.0915	0.1907	0.2398	**0.2716**	0.1128	0.1285	**0.2716**
30	0.2672	0.0915	0.2109	0.2577	**0.3075**	0.1095	0.1277	0.3004
35	0.3137	0.0915	0.2266	0.2816	**0.3340**	0.1096	0.1265	0.3347
40	0.3569	0.0915	0.2454	0.3008	**0.3616**	0.1094	0.1219	0.3596

Table E177: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.2800	0.1401	0.1940	0.3117	0.1940	0.1940	0.3117	**0.3117**
10	0.4735	0.1401	0.2531	0.4322	0.3610	0.1958	0.3271	**0.4796**
15	0.5959	0.1401	0.3163	0.5322	0.5549	0.2069	0.3079	**0.6223**
20	0.6739	0.1401	0.3865	0.6122	0.6978	0.2069	0.2905	**0.7232**
25	0.7915	0.1401	0.4877	0.6845	0.7976	0.2067	0.2749	**0.8029**
30	0.8310	0.1401	0.5537	0.7400	**0.8665**	0.2049	0.2649	0.8651
35	0.8905	0.1401	0.6188	0.7853	**0.9040**	0.2051	0.2562	0.9037
40	0.9273	0.1401	0.6759	0.8248	**0.9348**	0.2034	0.2448	0.9343

Table E178: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.2786	0.1035	0.1490	**0.2596**	0.1490	0.1490	**0.2596**	**0.2596**
10	0.4765	0.1035	0.1964	0.3731	0.2994	0.1505	0.2639	**0.4393**
15	0.5974	0.1035	0.2504	0.4698	0.4980	0.1568	0.2419	**0.6022**
20	0.6702	0.1035	0.3109	0.5478	0.6516	0.1560	0.2277	**0.6995**
25	0.7877	0.1035	0.4136	0.6211	0.7707	0.1565	0.2154	**0.7867**
30	0.8163	0.1035	0.4718	0.6755	0.8339	0.1556	0.2049	**0.8408**
35	0.8903	0.1035	0.5388	0.7313	0.8963	0.1543	0.1991	**0.8987**
40	0.9289	0.1035	0.6123	0.7788	0.9287	0.1551	0.1896	**0.9308**

Table E179: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2215	0.1596	0.2081	**0.2862**	0.2081	0.2081	**0.2862**	**0.2862**
10	0.3599	0.1596	0.2522	0.3787	0.3372	0.2094	0.3091	**0.3957**
15	0.4524	0.1596	0.3023	0.4576	0.4713	0.2193	0.2967	**0.4945**
20	0.5153	0.1596	0.3614	0.5314	0.5799	0.2222	0.2900	**0.5871**
25	0.6421	0.1596	0.4543	0.5934	**0.6750**	0.2187	0.2767	0.6663
30	0.6686	0.1596	0.5062	0.6430	**0.7328**	0.2200	0.2725	0.7219
35	0.7444	0.1596	0.5582	0.6914	**0.7821**	0.2179	0.2672	0.7741
40	0.7969	0.1596	0.5998	0.7212	**0.8173**	0.2164	0.2523	0.8140

Table E180: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2254	0.1384	0.1820	**0.2624**	0.1820	0.1820	**0.2624**	**0.2624**
10	0.3608	0.1384	0.2260	0.3555	0.3083	0.1859	0.2803	**0.3815**
15	0.4485	0.1384	0.2735	0.4217	0.4382	0.1961	0.2704	**0.4778**
20	0.4956	0.1384	0.3196	0.4891	0.5485	0.1927	0.2529	**0.5592**
25	0.6233	0.1384	0.4007	0.5486	**0.6449**	0.1930	0.2470	0.6421
30	0.6648	0.1384	0.4534	0.6110	**0.7214**	0.1922	0.2400	0.7138
35	0.7404	0.1384	0.5075	0.6465	**0.7706**	0.1933	0.2335	0.7667
40	0.8101	0.1384	0.5571	0.6965	**0.8200**	0.1925	0.2238	0.8184

Table E181: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Number of Blocks $n_b = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.1849	0.1891	0.2088	**0.2490**	0.2088	0.2088	**0.2490**	**0.2490**
15	0.1849	0.2231	0.2297	0.2763	0.2299	0.2357	0.2617	**0.2788**
20	0.1849	0.2544	0.2632	0.3063	0.2596	0.2736	0.2647	**0.3163**
25	0.1849	0.2929	0.2971	0.3364	0.2954	0.3056	0.2650	**0.3413**
30	0.1849	0.3424	0.3484	0.3693	0.3446	0.3579	0.2577	**0.3922**
35	0.1849	0.3667	0.3699	0.3946	0.3680	0.3803	0.2549	**0.4175**
40	0.1849	0.4092	0.4138	0.4154	0.4107	0.4246	0.2487	**0.4508**

Table E182: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.1953	0.1951	0.2199	**0.2728**	0.2199	0.2199	**0.2728**	**0.2728**
15	0.1953	0.2361	0.2463	0.3104	0.2445	0.2542	0.2937	**0.3107**
20	0.1953	0.2876	0.2988	0.3562	0.2946	0.3081	0.3024	**0.3635**
25	0.1953	0.3465	0.3539	0.3969	0.3512	0.3626	0.3046	**0.4119**
30	0.1953	0.3785	0.3841	0.4289	0.3811	0.3979	0.2972	**0.4459**
35	0.1953	0.4271	0.4314	0.4586	0.4286	0.4435	0.2888	**0.4845**
40	0.1953	0.4777	0.4821	0.4905	0.4791	0.4915	0.2850	**0.5261**

Table E183: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed number of Blocks $n_b = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.1677	0.1574	0.1740	**0.2139**	0.1740	0.1740	**0.2139**	**0.2139**
15	0.1677	0.1881	0.1958	0.2452	0.1946	0.2017	0.2289	**0.2451**
20	0.1677	0.2271	0.2346	0.2756	0.2321	0.2428	0.2365	**0.2821**
25	0.1677	0.2586	0.2653	0.3041	0.2628	0.2733	0.2389	**0.3130**
30	0.1677	0.2973	0.3011	0.3256	0.2985	0.3096	0.2339	**0.3451**
35	0.1677	0.3185	0.3225	0.3459	0.3192	0.3304	0.2277	**0.3613**
40	0.1677	0.3620	0.3663	0.3741	0.3639	0.3751	0.2238	**0.4017**

Table E184: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0.35; d4=0.25

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.1910	0.1426	0.1588	**0.2140**	0.1588	0.1588	**0.2140**	**0.2140**
15	0.1910	0.1658	0.1710	**0.2375**	0.1714	0.1800	0.2300	0.2326
20	0.1910	0.1814	0.1890	**0.2542**	0.1856	0.1988	0.2378	0.2410
25	0.1910	0.2136	0.2182	**0.2754**	0.2157	0.2289	0.2381	0.2688
30	0.1910	0.2385	0.2431	**0.3004**	0.2406	0.2533	0.2417	0.2885
35	0.1910	0.2503	0.2528	**0.3121**	0.2513	0.2614	0.2345	0.2967
40	0.1910	0.2733	0.2756	**0.3248**	0.2739	0.2831	0.2350	0.3157

Table E185: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.1857	0.1370	0.1528	**0.2071**	0.1528	0.1528	**0.2071**	**0.2071**
15	0.1857	0.1636	0.1688	**0.2311**	0.1685	0.1752	0.2271	0.2241
20	0.1857	0.1826	0.1895	**0.2501**	0.1865	0.1966	0.2337	0.2383
25	0.1857	0.2113	0.2165	**0.2726**	0.2144	0.2238	0.2354	0.2621
30	0.1857	0.2396	0.2443	**0.3017**	0.2410	0.2529	0.2352	0.2913
35	0.1857	0.2569	0.2605	**0.3093**	0.2583	0.2696	0.2273	0.3025
40	0.1857	0.2793	0.2822	**0.3277**	0.2801	0.2905	0.2237	0.3227

Table E186: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.4691	0.2180	0.2734	**0.5083**	0.2734	0.2734	**0.5083**	**0.5083**
15	0.4691	0.2863	0.3104	**0.5690**	0.3061	0.3291	0.5833	0.5300
20	0.4691	0.3382	0.3608	**0.6192**	0.3509	0.3843	0.6059	0.5556
25	0.4691	0.3931	0.4076	**0.6484**	0.3993	0.4327	0.6044	0.5701
30	0.4691	0.4509	0.4643	**0.6882**	0.4546	0.4905	0.6023	0.6061
35	0.4691	0.4926	0.5023	**0.7180**	0.4950	0.5288	0.6015	0.6302
40	0.4691	0.5483	0.5578	**0.7473**	0.5507	0.5791	0.5994	0.6644

Table E187: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.4782	0.1414	0.1842	**0.4263**	0.1842	0.1842	**0.4263**	**0.4263**
15	0.4782	0.1773	0.1980	**0.4719**	0.1924	0.2142	0.5076	0.4138
20	0.4782	0.2009	0.2210	**0.4943**	0.2127	0.2395	0.5334	0.3999
25	0.4782	0.2370	0.2508	**0.5327**	0.2427	0.2700	0.5491	0.4126
30	0.4782	0.2604	0.2726	**0.5552**	0.2650	0.2939	0.5486	0.4163
35	0.4782	0.2914	0.3005	**0.5771**	0.2947	0.3241	0.5461	0.4314
40	0.4782	0.3175	0.3258	**0.6030**	0.3207	0.3478	0.5436	0.4409

Table E188: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.3654	0.2482	0.2982	**0.4681**	0.2982	0.2982	**0.4681**	**0.4681**
15	0.3654	0.3376	0.3587	**0.5380**	0.3528	0.3771	0.5260	0.5254
20	0.3654	0.4137	0.4340	**0.5943**	0.4252	0.4511	0.5391	0.5759
25	0.3654	0.4688	0.4826	**0.6459**	0.4751	0.5056	0.5417	0.6170
30	0.3654	0.5296	0.5394	**0.6761**	0.5325	0.5602	0.5284	0.6463
35	0.3654	0.5868	0.5951	**0.7182**	0.5894	0.6145	0.5255	0.6905
40	0.3654	0.6402	0.6451	**0.7447**	0.6412	0.6624	0.5171	0.7229

Table E189: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.3618	0.1935	0.2360	**0.4102**	0.2360	0.2360	**0.4102**	**0.4102**
15	0.3618	0.2599	0.2775	**0.4659**	0.2735	0.2911	0.4729	0.4413
20	0.3618	0.3025	0.3190	**0.5124**	0.3111	0.3384	0.4844	0.4714
25	0.3618	0.3634	0.3745	**0.5546**	0.3680	0.3936	0.4869	0.4985
30	0.3618	0.4002	0.4123	**0.5880**	0.4044	0.4347	0.4843	0.5298
35	0.3618	0.4546	0.4641	**0.6239**	0.4569	0.4844	0.4812	0.5668
40	0.3618	0.5002	0.5104	**0.6485**	0.5024	0.5282	0.4762	0.6007

Table E190: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0.35; d4=0.25

Fixed Sample Size $n_a = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach I	II	III	IV	V	VI
10	0.1856	0.1796	0.2005	**0.2465**	0.2005	0.2005	**0.2465**	**0.2465**
15	0.2051	0.1796	0.2065	**0.2779**	0.2185	0.1966	0.2676	0.2717
20	0.2196	0.1796	0.2136	**0.3148**	0.2446	0.1980	0.2785	0.3088
25	0.2756	0.1796	0.2291	**0.3384**	0.2802	0.1966	0.2749	0.3289
30	0.2753	0.1796	0.2364	**0.3571**	0.3214	0.1970	0.2725	0.3532
35	0.3222	0.1796	0.2441	**0.3782**	0.3526	0.1970	0.2666	0.3779
40	0.3593	0.1796	0.2590	0.3992	0.3882	0.1969	0.2665	**0.4032**

Table E191: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
			Approach					
Blocks	L*	FW*	I	II	III	IV	V	VI
10	0.1953	0.1925	0.2165	**0.2734**	0.2165	0.2165	**0.2734**	**0.2734**
15	0.2214	0.1925	0.2253	**0.3140**	0.2406	0.2146	0.3034	0.3106
20	0.2326	0.1925	0.2303	**0.3453**	0.2687	0.2115	0.3084	0.3352
25	0.3015	0.1925	0.2486	**0.3776**	0.3110	0.2138	0.3038	0.3706
30	0.3084	0.1925	0.2560	**0.4100**	0.3636	0.2130	0.3000	0.4040
35	0.3611	0.1925	0.2651	**0.4395**	0.4116	0.2107	0.2984	0.4335
40	0.4118	0.1925	0.2834	0.4617	0.4438	0.2113	0.2912	**0.4667**

Table E192: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
			Approach					
Blocks	L*	FW*	I	II	III	IV	V	VI
10	0.1602	0.1537	0.1716	**0.2129**	0.1716	0.1716	**0.2129**	**0.2129**
15	0.1742	0.1537	0.1772	**0.2413**	0.1890	0.1679	0.2321	0.2349
20	0.1852	0.1537	0.1802	**0.2607**	0.2054	0.1675	0.2334	0.2574
25	0.2437	0.1537	0.1943	**0.2886**	0.2422	0.1688	0.2370	0.2837
30	0.2387	0.1537	0.2017	**0.3092**	0.2771	0.1679	0.2320	0.3117
35	0.2760	0.1537	0.2053	**0.3313**	0.3088	0.1671	0.2289	0.3306
40	0.3195	0.1537	0.2199	0.3517	0.3409	0.1680	0.2248	**0.3565**

Table E193: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0.35; d4=0.25

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
			Approach					
Blocks	L*	FW*	I	II	III	IV	V	VI
10	0.1872	0.1410	0.1592	**0.2127**	0.1592	0.1592	**0.2127**	**0.2127**
15	0.2089	0.1410	0.1648	0.2440	0.1764	0.1556	0.2286	**0.2488**
20	0.2080	0.1410	0.1663	0.2585	0.1922	0.1562	0.2221	**0.2663**
25	0.2697	0.1410	0.1769	0.2791	0.2227	0.1554	0.2163	**0.2990**
30	0.2794	0.1410	0.1858	0.3187	0.2729	0.1564	0.2205	**0.3412**
35	0.3130	0.1410	0.1935	0.3318	0.3040	0.1574	0.2179	**0.3558**
40	0.3553	0.1410	0.2083	0.3466	0.3339	0.1573	0.2125	**0.3773**

Table E194: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0.35; d4=0.25

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)									
Blocks			**Approach**						
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.1844	0.1166	0.1332	**0.1916**	0.1332	0.1332	**0.1916**	**0.1916**
15	0.2088	0.1166	0.1395	0.2157	0.1507	0.1314	0.1979	**0.2280**
20	0.2203	0.1166	0.1416	0.2418	0.1677	0.1302	0.2015	**0.2654**
25	0.2690	0.1166	0.1536	0.2645	0.2004	0.1287	0.1929	**0.2884**
30	0.2707	0.1166	0.1626	0.2874	0.2368	0.1303	0.1925	**0.3235**
35	0.3277	0.1166	0.1642	0.3110	0.2807	0.1299	0.1875	**0.3561**
40	0.3532	0.1166	0.1810	0.3315	0.3163	0.1296	0.1848	**0.3731**

Table E195: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.4744	0.2187	0.2778	**0.5069**	0.2778	0.2778	**0.5069**	**0.5069**
15	0.5919	0.2187	0.3002	0.6068	0.3439	0.2703	0.5347	**0.6490**
20	0.6675	0.2187	0.3245	0.6829	0.4288	0.2718	0.5342	**0.7483**
25	0.7845	0.2187	0.3622	0.7409	0.5386	0.2764	0.5175	**0.8177**
30	0.8305	0.2187	0.3890	0.8020	0.6618	0.2738	0.4992	**0.8789**
35	0.8875	0.2187	0.4146	0.8394	0.7639	0.2736	0.4861	**0.9151**
40	0.9292	0.2187	0.4512	0.8685	0.8411	0.2755	0.4746	**0.9416**

Table E196: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.4765	0.1384	0.1800	**0.4199**	0.1800	0.1800	**0.4199**	**0.4199**
15	0.5896	0.1384	0.2005	0.5172	0.2340	0.1775	0.4306	**0.5813**
20	0.6769	0.1384	0.2188	0.5933	0.3081	0.1784	0.4188	**0.7006**
25	0.7915	0.1384	0.2528	0.6662	0.4294	0.1784	0.4060	**0.7865**
30	0.8278	0.1384	0.2745	0.7249	0.5537	0.1772	0.3834	**0.8513**
35	0.8919	0.1384	0.2978	0.7762	0.6814	0.1777	0.3692	**0.9017**
40	0.9263	0.1384	0.3288	0.8101	0.7794	0.1797	0.3519	**0.9290**

Table E197: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
			Approach					
Blocks	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.3677	0.2588	0.3043	**0.4622**	0.3043	0.3043	**0.4622**	**0.4622**
15	0.4530	0.2588	0.3204	0.5482	0.3543	0.2991	0.5054	**0.5647**
20	0.5057	0.2588	0.3433	0.6025	0.4221	0.3002	0.5093	**0.6296**
25	0.6360	0.2588	0.3761	0.6703	0.5220	0.3026	0.5052	**0.7130**
30	0.6516	0.2588	0.3915	0.7090	0.6070	0.2992	0.4845	**0.7496**
35	0.7416	0.2588	0.4115	0.7524	0.6929	0.3004	0.4750	**0.8003**
40	0.8109	0.2588	0.4444	0.7956	0.7709	0.3045	0.4640	**0.8503**

Table E198: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
			Approach					
Blocks	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.3716	0.1959	0.2384	**0.4212**	0.2384	0.2384	**0.4212**	**0.4212**
15	0.4566	0.1959	0.2555	0.4955	0.2863	0.2315	0.4420	**0.5233**
20	0.5118	0.1959	0.2696	0.5581	0.3482	0.2344	0.4335	**0.6026**
25	0.6273	0.1959	0.3014	0.6211	0.4444	0.2339	0.4269	**0.6786**
30	0.6626	0.1959	0.3211	0.6649	0.5464	0.2326	0.4144	**0.7408**
35	0.7453	0.1959	0.3404	0.7134	0.6355	0.2320	0.4003	**0.7920**
40	0.7923	0.1959	0.3708	0.7422	0.7136	0.2341	0.3874	**0.8186**

Table E199: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Number of Blocks $n_b = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
			Approach					
Sample Size	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.2069	0.2252	0.2383	**0.3162**	0.2383	0.2383	**0.3162**	**0.3162**
20	0.2069	0.2664	0.2794	0.3493	0.2751	0.2813	0.3372	**0.3531**
25	0.2069	0.2957	0.3059	0.3768	0.3018	0.3096	0.3436	**0.3886**
30	0.2069	0.3407	0.3472	0.4063	0.3448	0.3556	0.3485	**0.4173**
35	0.2069	0.3729	0.3782	0.4356	0.3749	0.3843	0.3460	**0.4523**
40	0.2069	0.4199	0.4250	0.4714	0.4220	0.4329	0.3458	**0.4886**

Table E200: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.2166	0.2496	0.2670	**0.3596**	0.2670	0.2670	**0.3596**	**0.3596**
20	0.2166	0.2848	0.3012	0.3926	0.2958	0.3041	0.3780	**0.3963**
25	0.2166	0.3393	0.3523	0.4371	0.3453	0.3606	0.3928	**0.4447**
30	0.2166	0.3827	0.3921	0.4656	0.3872	0.4024	0.3912	**0.4827**
35	0.2166	0.4337	0.4401	0.5026	0.4368	0.4505	0.3934	**0.5167**
40	0.2166	0.4731	0.4774	0.5277	0.4751	0.4877	0.3830	**0.5565**

Table E201: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.1742	0.1970	0.2104	**0.2750**	0.2104	0.2104	**0.2750**	**0.2750**
20	0.1742	0.2223	0.2346	0.2928	0.2311	0.2360	0.2804	**0.2992**
25	0.1742	0.2636	0.2724	0.3327	0.2682	0.2774	0.3013	**0.3374**
30	0.1742	0.2888	0.2937	0.3463	0.2915	0.3012	0.2946	**0.3587**
35	0.1742	0.3228	0.3310	0.3776	0.3259	0.3370	0.2947	**0.3891**
40	0.1742	0.3585	0.3613	0.4039	0.3602	0.3696	0.2951	**0.4203**

Table E202: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.2043	0.1624	0.1748	**0.2561**	0.1748	0.1748	**0.2561**	**0.2561**
20	0.2043	0.1866	0.1962	**0.2807**	0.1930	0.1987	0.2805	0.2756
25	0.2043	0.2099	0.2184	**0.3041**	0.2146	0.2237	0.2942	0.2997
30	0.2043	0.2363	0.2408	**0.3306**	0.2384	0.2456	0.2982	0.3152
35	0.2043	0.2517	0.2582	**0.3371**	0.2543	0.2632	0.2913	0.3256
40	0.2043	0.2761	0.2799	**0.3559**	0.2770	0.2866	0.2957	0.3453

Table E203: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.2123	0.1379	0.1498	**0.2400**	0.1498	0.1498	**0.2400**	**0.2400**
20	0.2123	0.1529	0.1634	**0.2565**	0.1605	0.1658	0.2584	0.2517
25	0.2123	0.1662	0.1753	**0.2704**	0.1718	0.1790	0.2676	0.2538
30	0.2123	0.1939	0.1984	**0.2951**	0.1972	0.2061	0.2773	0.2754
35	0.2123	0.2081	0.2147	**0.2993**	0.2110	0.2198	0.2734	0.2770
40	0.2123	0.2210	0.2228	**0.3097**	0.2219	0.2312	0.2727	0.2879

Table E204: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.5893	0.2795	0.3228	**0.6617**	0.3228	0.3228	**0.6617**	**0.6617**
20	0.5893	0.3312	0.3656	**0.7055**	0.3574	0.3749	0.7205	0.6722
25	0.5893	0.3864	0.4141	**0.7410**	0.4021	0.4306	0.7501	0.6861
30	0.5893	0.4426	0.4641	**0.7801**	0.4532	0.4889	0.7642	0.7125
35	0.5893	0.4984	0.5140	**0.7984**	0.5050	0.5335	0.7644	0.7207
40	0.5893	0.5487	0.5592	**0.8266**	0.5532	0.5803	0.7683	0.7516

Table E205: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.5952	0.1782	0.2152	**0.5654**	0.2152	0.2152	**0.5654**	**0.5654**
20	0.5952	0.2096	0.2374	**0.5982**	0.2295	0.2435	0.6307	0.5511
25	0.5952	0.2254	0.2474	**0.6231**	0.2383	0.2590	0.6663	0.5368
30	0.5952	0.2665	0.2818	**0.6468**	0.2741	0.2978	0.6865	0.5285
35	0.5952	0.2878	0.3017	**0.6712**	0.2932	0.3182	0.6954	0.5284
40	0.5952	0.3103	0.3210	**0.6911**	0.3135	0.3424	0.7016	0.5384

Table E206: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.4580	0.3332	0.3735	**0.6116**	0.3735	0.3735	**0.6116**	**0.6116**
20	0.4580	0.4029	0.4345	**0.6642**	0.4261	0.4415	0.6619	0.6525
25	0.4580	0.4660	0.4901	**0.7060**	0.4797	0.5027	0.6808	0.6859
30	0.4580	0.5389	0.5517	**0.7526**	0.5458	0.5702	0.6934	0.7293
35	0.4580	0.5804	0.5968	**0.7766**	0.5874	0.6117	0.6885	0.7448
40	0.4580	0.6328	0.6400	**0.8009**	0.6356	0.6544	0.6884	0.7724

Table E207: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.4488	0.2584	0.2929	**0.5494**	0.2929	0.2929	**0.5494**	**0.5494**
20	0.4488	0.3050	0.3326	**0.5911**	0.3251	0.3383	0.5987	0.5674
25	0.4488	0.3614	0.3840	**0.6352**	0.3752	0.3950	0.6244	0.6046
30	0.4488	0.4066	0.4204	**0.6618**	0.4140	0.4346	0.6336	0.6166
35	0.4488	0.4483	0.4604	**0.6894**	0.4522	0.4761	0.6309	0.6339
40	0.4488	0.4919	0.5014	**0.7170**	0.4961	0.5211	0.6280	0.6567

Table E208: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Sample Size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
15	0.2078	0.2280	0.2428	**0.3172**	0.2428	0.2428	**0.3172**	**0.3172**
20	0.2179	0.2280	0.2470	**0.3423**	0.2555	0.2415	0.3385	0.3395
25	0.2729	0.2280	0.2554	**0.3702**	0.2676	0.2435	0.3455	0.3635
30	0.2728	0.2280	0.2554	**0.3988**	0.2898	0.2425	0.3544	0.3922
35	0.3149	0.2280	0.2646	**0.4187**	0.3063	0.2397	0.3486	0.4091
40	0.3536	0.2280	0.2678	**0.4363**	0.3333	0.2414	0.3516	0.4325

Table E209: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2166	0.2430	0.2607	**0.3571**	0.2607	0.2607	**0.3571**	**0.3571**
20	0.2332	0.2430	0.2646	**0.3893**	0.2755	0.2604	0.3844	0.3835
25	0.2968	0.2430	0.2759	**0.4152**	0.2945	0.2623	0.3927	0.4072
30	0.3092	0.2430	0.2801	**0.4612**	0.3191	0.2630	0.4061	0.4561
35	0.3611	0.2430	0.2892	**0.4894**	0.3467	0.2615	0.4036	0.4761
40	0.4182	0.2430	0.2939	**0.5117**	0.3772	0.2616	0.3971	0.5084

Table E210: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.1736	0.1846	0.1971	**0.2632**	0.1971	0.1971	**0.2632**	**0.2632**
20	0.1771	0.1846	0.2018	**0.2920**	0.2079	0.1975	0.2879	0.2865
25	0.2360	0.1846	0.2104	**0.3184**	0.2232	0.1987	0.2986	0.3134
30	0.2241	0.1846	0.2125	**0.3357**	0.2433	0.1992	0.3008	0.3331
35	0.2717	0.1846	0.2190	**0.3630**	0.2632	0.1972	0.2987	0.3539
40	0.3109	0.1846	0.2255	**0.3826**	0.2828	0.1976	0.2963	0.3765

Table E211: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2096	0.1605	0.1751	**0.2591**	**0.1751**	0.1751	**0.2591**	**0.2591**
20	0.2172	0.1605	0.1781	0.2904	0.1844	0.1748	0.2765	**0.2972**
25	0.2728	0.1605	0.1845	0.3089	0.1964	0.1728	0.2780	**0.3197**
30	0.2727	0.1605	0.1886	0.3281	0.2159	0.1751	0.2786	**0.3460**
35	0.3248	0.1605	0.1943	0.3623	0.2340	0.1723	0.2753	**0.3817**
40	0.3541	0.1605	0.1970	0.3768	0.2558	0.1729	0.2704	**0.4014**

Table E212: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.1980	0.1418	0.1549	**0.2363**	0.1549	0.1549	**0.2363**	**0.2363**
20	0.2108	0.1418	0.1565	0.2687	0.1627	0.1534	0.2542	**0.2747**
25	0.2813	0.1418	0.1633	0.2862	0.1752	0.1534	0.2551	**0.3066**
30	0.2711	0.1418	0.1663	0.3119	0.1935	0.1552	0.2530	**0.3349**
35	0.3206	0.1418	0.1734	0.3406	0.2127	0.1533	0.2513	**0.3671**
40	0.3573	0.1418	0.1755	0.3489	0.2302	0.1538	0.2456	**0.3901**

Table E213: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.5944	0.2875	0.3284	**0.6694**	0.3284	0.3284	**0.6694**	**0.6694**
20	0.6743	0.2875	0.3431	0.7408	0.3646	0.3298	0.6912	**0.7695**
25	0.7899	0.2875	0.3631	0.7924	0.4142	0.3283	0.6903	**0.8369**
30	0.8232	0.2875	0.3744	0.8339	0.4788	0.3311	0.6884	**0.8887**
35	0.8873	0.2875	0.3987	0.8721	0.5444	0.3299	0.6751	**0.9263**
40	0.9301	0.2875	0.4153	0.9053	0.6148	0.3296	0.6617	**0.9520**

Table E214: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.5829	0.1729	0.2115	**0.5619**	0.2115	0.2115	**0.5619**	**0.5619**
20	0.6699	0.1729	0.2230	0.6445	0.2423	0.2121	0.5792	**0.6923**
25	0.7937	0.1729	0.2416	0.7078	0.2839	0.2120	0.5784	**0.7878**
30	0.8338	0.1729	0.2492	0.7667	0.3417	0.2129	0.5625	**0.8544**
35	0.8875	0.1729	0.2682	0.8075	0.4065	0.2110	0.5450	**0.9033**
40	0.9304	0.1729	0.2804	0.8470	0.4827	0.2119	0.5349	**0.9368**

Table E215: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 15$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4522	0.3275	0.3664	**0.6105**	0.3664	0.3664	**0.6105**	**0.6105**
20	0.5158	0.3275	0.3799	0.6712	0.3970	0.3671	0.6389	**0.6857**
25	0.6323	0.3275	0.3953	0.7233	0.4372	0.3674	0.6511	**0.7446**
30	0.6597	0.3275	0.4044	0.7625	0.4860	0.3678	0.6489	**0.7903**
35	0.7443	0.3275	0.4236	0.8007	0.5410	0.3666	0.6430	**0.8351**
40	0.8051	0.3275	0.4374	0.8355	0.6004	0.3660	0.6390	**0.8641**

Table E216: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4450	0.2530	0.2896	**0.5467**	0.2896	0.2896	**0.5467**	**0.5467**
20	0.5049	0.2530	0.2990	0.6113	0.3181	0.2866	0.5726	**0.6340**
25	0.6367	0.2530	0.3163	0.6629	0.3559	0.2890	0.5722	**0.7020**
30	0.6643	0.2530	0.3237	0.7100	0.4024	0.2897	0.5713	**0.7618**
35	0.7452	0.2530	0.3402	0.7530	0.4511	0.2882	0.5580	**0.8077**
40	0.8027	0.2530	0.3536	0.7866	0.5098	0.2853	0.5507	**0.8475**

Table E217: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Number of Blocks $n_b = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.2191	0.2682	0.2841	**0.3819**	0.2841	0.2841	**0.3819**	**0.3819**
25	0.2191	0.3049	0.3167	0.4153	0.3150	0.3193	0.4047	**0.4142**
30	0.2191	0.3283	0.3381	0.4348	0.3345	0.3429	0.4105	**0.4373**
35	0.2191	0.3778	0.3855	0.4616	0.3832	0.3915	0.4124	**0.4746**
40	0.2191	0.4081	0.4143	0.4937	0.4114	0.4235	0.4212	**0.5037**

Table E218: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.2273	0.2869	0.3055	**0.4362**	0.3055	0.3055	**0.4362**	**0.4362**
25	0.2273	0.3374	0.3519	0.4726	0.3495	0.3563	0.4571	**0.4778**
30	0.2273	0.3944	0.4061	0.5087	0.4023	0.4112	0.4790	**0.5167**
35	0.2273	0.4311	0.4403	0.5349	0.4372	0.4466	0.4733	**0.5487**
40	0.2273	0.4639	0.4718	0.5631	0.4685	0.4814	0.4745	**0.5779**

Table E219: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed number of Blocks $n_b = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.1849	0.2257	0.2395	**0.3385**	0.2395	0.2395	**0.3385**	**0.3385**
25	0.1849	0.2625	0.2730	0.3603	0.2712	0.2757	0.3519	**0.3602**
30	0.1849	0.2931	0.3004	0.3902	0.2979	0.3046	0.3633	**0.3948**
35	0.1849	0.3249	0.3324	0.4117	0.3293	0.3372	0.3685	**0.4171**
40	0.1849	0.3540	0.3611	0.4343	0.3582	0.3666	0.3658	**0.4443**

Table E220: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.2144	0.1832	0.1969	**0.3155**	0.1969	0.1969	**0.3155**	**0.3155**
25	0.2144	0.2103	0.2205	**0.3291**	0.2190	0.2237	0.3271	0.3226
30	0.2144	0.2312	0.2373	**0.3544**	0.2358	0.2414	0.3470	0.3477
35	0.2144	0.2579	0.2658	**0.3680**	0.2632	0.2696	0.3503	0.3574
40	0.2144	0.2727	0.2790	**0.3855**	0.2763	0.2849	0.3480	0.3738

Table E221: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.2123	0.1591	0.1709	**0.2804**	0.1709	0.1709	**0.2804**	**0.2804**
25	0.2123	0.1760	0.1847	**0.2987**	0.1834	0.1886	0.3050	0.2920
30	0.2123	0.1914	0.1989	**0.3135**	0.1960	0.2021	0.3138	0.2995
35	0.2123	0.2071	0.2145	**0.3324**	0.2113	0.2198	0.3230	0.3096
40	0.2123	0.2207	0.2246	**0.3424**	0.2227	0.2307	0.3241	0.3148

Table E222: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.6732	0.3378	0.3818	**0.7706**	0.3818	0.3818	**0.7706**	**0.7706**
25	0.6732	0.3901	0.4230	**0.8051**	0.4161	0.4320	0.8173	0.7818
30	0.6732	0.4489	0.4737	**0.8291**	0.4664	0.4873	0.8381	0.7834
35	0.6732	0.4996	0.5237	**0.8577**	0.5131	0.5395	0.8581	0.8043
40	0.6732	0.5379	0.5525	**0.8666**	0.5453	0.5701	0.8569	0.8078

Table E223: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0, 3)$ and RCBD $N(0, 1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.6751	0.2049	0.2405	**0.6757**	0.2405	0.2405	**0.6757**	**0.6757**
25	0.6751	0.2305	0.2558	**0.6946**	0.2516	0.2641	0.7255	0.6530
30	0.6751	0.2644	0.2887	**0.7276**	0.2807	0.3010	0.7697	0.6497
35	0.6751	0.2982	0.3148	**0.7509**	0.3069	0.3284	0.7877	0.6527
40	0.6751	0.3102	0.3257	**0.7548**	0.3177	0.3392	0.7928	0.6310

Table E224: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.5091	0.3908	0.4274	**0.7123**	0.4274	0.4274	**0.7123**	**0.7123**
25	0.5091	0.4619	0.4888	**0.7599**	0.4835	0.4981	0.7629	0.7514
30	0.5091	0.5302	0.5534	**0.7963**	0.5475	0.5637	0.7818	0.7799
35	0.5091	0.5849	0.6003	**0.8220**	0.5940	0.6135	0.7915	0.8002
40	0.5091	0.6244	0.6381	**0.8383**	0.6307	0.6516	0.7885	0.8145

Table E225: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $(T(3) * \sqrt{3})$ and CRBD $T(3)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.5159	0.3130	0.3466	**0.6615**	0.3466	0.3466	**0.6615**	**0.6615**
25	0.5159	0.3505	0.3786	**0.6911**	0.3731	0.3860	0.6979	0.6718
30	0.5159	0.4067	0.4252	**0.7332**	0.4193	0.4362	0.7348	0.6945
35	0.5159	0.4599	0.4774	**0.7621**	0.4705	0.4895	0.7468	0.7151
40	0.5159	0.4981	0.5122	**0.7816**	0.5056	0.5264	0.7482	0.7323

Table E226: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Sample Size $n_a = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.2220	0.2624	0.2798	**0.3807**	0.2798	0.2798	**0.3807**	**0.3807**
25	0.2644	0.2624	0.2844	**0.3994**	0.2886	0.2792	0.3956	0.3988
30	0.2703	0.2624	0.2906	**0.4337**	0.3023	0.2826	0.4152	0.4307
35	0.3201	0.2624	0.2938	**0.4644**	0.3122	0.2812	0.4277	0.4519
40	0.3585	0.2624	0.2952	**0.4757**	0.3270	0.2797	0.4238	0.4673

Table E227: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.2273	0.2828	0.3034	**0.4345**	0.3034	0.3034	**0.4345**	**0.4345**
25	0.3104	0.2828	0.3101	**0.4735**	0.3144	0.3046	0.4690	0.4705
30	0.3165	0.2828	0.3139	**0.5112**	0.3294	0.3040	0.4880	0.5050
35	0.3616	0.2828	0.3220	**0.5283**	0.3435	0.3070	0.4889	0.5242
40	0.4196	0.2828	0.3262	**0.5577**	0.3646	0.3064	0.4893	0.5452

Table E228: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.1793	0.2240	0.2392	**0.3234**	0.2392	0.2392	**0.3234**	**0.3234**
25	0.2289	0.2240	0.2466	**0.3481**	0.2501	0.2406	0.3471	0.3455
30	0.2352	0.2240	0.2474	**0.3819**	0.2592	0.2412	0.3677	0.3774
35	0.2710	0.2240	0.2523	**0.3970**	0.2680	0.2397	0.3745	0.3906
40	0.3072	0.2240	0.2551	**0.4177**	0.2828	0.2403	0.3685	0.4119

Table E229: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.2085	0.1854	0.1977	**0.3083**	0.1977	0.1977	**0.3083**	**0.3083**
25	0.2771	0.1854	0.2037	0.3390	0.2067	0.1984	0.3286	**0.3445**
30	0.2749	0.1854	0.2054	0.3682	0.2150	0.1987	0.3381	**0.3732**
35	0.3152	0.1854	0.2096	0.3821	0.2254	0.1980	0.3343	**0.3995**
40	0.3625	0.1854	0.2107	0.4032	0.2366	0.1983	0.3371	**0.4219**

Table E230: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0; d3=0.25; d4=0.25

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.2175	0.1579	0.1696	0.2842	**0.1696**	0.1696	**0.2842**	**0.2842**
25	0.2710	0.1579	0.1731	0.3091	0.1762	0.1699	0.2959	**0.3159**
30	0.2701	0.1579	0.1764	0.3345	0.1864	0.1701	0.3057	**0.3508**
35	0.3209	0.1579	0.1797	0.3554	0.1933	0.1701	0.3033	**0.3790**
40	0.3593	0.1579	0.1829	0.3712	0.2088	0.1697	0.2992	**0.3993**

Table E231: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.6732	0.3414	0.3846	**0.7733**	0.3846	0.3846	**0.7733**	**0.7733**
25	0.7971	0.3414	0.3982	0.8282	0.4109	0.3851	0.7980	**0.8488**
30	0.8249	0.3414	0.4087	0.8632	0.4414	0.3857	0.7990	**0.8934**
35	0.8901	0.3414	0.4230	0.9017	0.4790	0.3876	0.7971	**0.9349**
40	0.9291	0.3414	0.4319	0.9183	0.5190	0.3859	0.7921	**0.9507**

Table E232: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.6711	0.1981	0.2368	**0.6782**	0.2368	0.2368	**0.6782**	**0.6782**
25	0.7901	0.1981	0.2464	0.7323	0.2582	0.2360	0.6823	**0.7702**
30	0.8192	0.1981	0.2540	0.7827	0.2862	0.2367	0.6822	**0.8417**
35	0.8843	0.1981	0.2679	0.8310	0.3179	0.2357	0.6823	**0.8964**
40	0.9236	0.1981	0.2745	0.8622	0.3587	0.2354	0.6706	**0.9290**

Table E233: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 20$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.5135	0.4029	0.4410	**0.7259**	0.4410	0.4410	**0.7259**	**0.7259**
25	0.6376	0.4029	0.4530	0.7724	0.4639	0.4415	0.7534	**0.7816**
30	0.6686	0.4029	0.4603	0.8136	0.4886	0.4420	0.7722	**0.8298**
35	0.7390	0.4029	0.4728	0.8414	0.5183	0.4420	0.7706	**0.8599**
40	0.8037	0.4029	0.4794	0.8670	0.5538	0.4415	0.7649	**0.8910**

Table E234: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0; d3=1.0; d4=1.0

Fixed Sample Size $n_a = 20$; (CRD $(T(3) * \sqrt{3})$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.5126	0.3039	0.3394	**0.6619**	0.3394	0.3394	**0.6619**	**0.6619**
25	0.6299	0.3039	0.3504	0.7098	0.3588	0.3398	0.6817	**0.7293**
30	0.6552	0.3039	0.3566	0.7545	0.3865	0.3396	0.6961	**0.7826**
35	0.7379	0.3039	0.3667	0.7906	0.4118	0.3400	0.6933	**0.8268**
40	0.8061	0.3039	0.3765	0.8257	0.4514	0.3398	0.6905	**0.8667**

Table E235: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Number of Blocks $n_b = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1581	0.1983	0.2437	0.2801	0.2437	0.2437	0.2801	**0.2801**
10	0.1581	0.3006	0.3087	0.3450	0.3058	0.3253	0.2990	**0.3556**
15	0.1581	0.3728	0.3841	0.4116	0.3779	0.4012	0.2946	**0.4281**
20	0.1581	0.4539	0.4612	0.4698	0.4545	0.4770	0.2871	**0.4991**
25	0.1581	0.5223	0.5257	0.5150	0.5229	0.5388	0.2803	**0.5544**
30	0.1581	0.5718	0.5746	0.5568	0.5732	0.5906	0.2709	**0.6034**
35	0.1581	0.6232	0.6251	0.5918	0.6232	0.6429	0.2657	**0.6523**
40	0.1581	0.6764	0.6790	0.6276	0.6768	0.6921	0.2586	**0.6993**

Table E236: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)									
Sample			Approach						
Size	L*	FW*	I	II	III	IV	V	VI
5	0.2168	0.2191	0.2720	0.3336	0.2720	0.2720	0.3336	**0.3336**
10	0.2168	0.3659	0.3835	0.4440	0.3778	0.4029	0.3722	**0.4571**
15	0.2168	0.4834	0.4951	0.5296	0.4858	0.5168	0.3629	**0.5559**
20	0.2168	0.5739	0.5849	0.5989	0.5788	0.6102	0.3511	**0.6296**
25	0.2168	0.6650	0.6727	0.6609	0.6672	0.6941	0.3358	**0.7089**
30	0.2168	0.7363	0.7412	0.7125	0.7370	0.7580	0.3292	**0.7710**
35	0.2168	0.7882	0.7920	0.7525	0.7890	0.8055	0.3208	**0.8160**
40	0.2168	0.8374	0.8400	0.7915	0.8377	0.8516	0.3190	**0.8573**

Table E237: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.1744	0.1745	0.2097	0.2529	0.2097	0.2097	0.2529	**0.2529**
10	0.1744	0.2758	0.2886	0.3301	0.2858	0.3055	0.2768	**0.3393**
15	0.1744	0.3527	0.3607	0.3916	0.3518	0.3792	0.2735	**0.4093**
20	0.1744	0.4437	0.4539	0.4565	0.4477	0.4735	0.2653	**0.4927**
25	0.1744	0.5172	0.5236	0.5046	0.5190	0.5406	0.2566	**0.5529**
30	0.1744	0.5757	0.5821	0.5520	0.5766	0.6012	0.2512	**0.6154**
35	0.1744	0.6349	0.6385	0.5944	0.6354	0.6509	0.2461	**0.6632**
40	0.1744	0.6828	0.6860	0.6319	0.6834	0.7027	0.2398	**0.7099**

Table E238: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.1571	0.1181	0.1435	**0.1819**	0.1435	0.1435	**0.1819**	**0.1819**
10	0.1571	0.1611	0.1678	0.2147	0.1656	0.1757	0.2011	**0.2046**
15	0.1571	0.1979	0.2007	0.2408	0.1982	0.2104	0.1926	**0.2288**
20	0.1571	0.2328	0.2382	0.2670	0.2359	0.2498	0.1986	**0.2639**
25	0.1571	0.2582	0.2628	0.2959	0.2593	0.2749	0.1934	**0.2882**
30	0.1571	0.2877	0.2918	0.3136	0.2882	0.3038	0.1854	**0.3120**
35	0.1571	0.3226	0.3267	0.3373	0.3232	0.3401	0.1864	**0.3492**
40	0.1571	0.3455	0.3480	0.3555	0.3455	0.3598	0.1796	**0.3657**

Table E239: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1589	0.1079	0.1269	**0.1630**	0.1269	0.1269	**0.1630**	**0.1630**
10	0.1589	0.1399	0.1482	**0.1929**	0.1466	0.1551	0.1882	0.1790
15	0.1589	0.1628	0.1658	**0.2131**	0.1629	0.1765	0.1898	0.2009
20	0.1589	0.1836	0.1896	**0.2325**	0.1865	0.2019	0.1877	0.2118
25	0.1589	0.2158	0.2196	**0.2596**	0.2171	0.2292	0.1836	0.2392
30	0.1589	0.2373	0.2404	**0.2742**	0.2377	0.2524	0.1823	0.2628
35	0.1589	0.2500	0.2524	**0.2869**	0.2504	0.2612	0.1772	0.2681
40	0.1589	0.2746	0.2767	**0.3036**	0.2745	0.2860	0.1753	0.2936

Table E240: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.2095	0.1084	0.1423	**0.2175**	0.1423	0.1423	**0.2175**	**0.2175**
10	0.2095	0.1649	0.1798	**0.2734**	0.1738	0.1947	0.2680	0.2446
15	0.2095	0.2030	0.2123	**0.3112**	0.2041	0.2301	0.2704	0.2684
20	0.2095	0.2420	0.2494	**0.3461**	0.2452	0.2696	0.2657	0.2960
25	0.2095	0.2723	0.2807	**0.3747**	0.2749	0.3033	0.2632	0.3249
30	0.2095	0.3068	0.3115	**0.4019**	0.3077	0.3305	0.2539	0.3499
35	0.2095	0.3470	0.3518	**0.4281**	0.3479	0.3687	0.2518	0.3831
40	0.2095	0.3711	0.3741	**0.4506**	0.3711	0.3950	0.2423	0.4067

Table E241: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.2191	0.0886	0.1166	**0.1945**	0.1166	0.1166	**0.1945**	**0.1945**
10	0.2191	0.1166	0.1289	**0.2317**	0.1237	0.1409	0.2415	0.1932
15	0.2191	0.1341	0.1413	**0.2502**	0.1353	0.1560	0.2471	0.1920
20	0.2191	0.1503	0.1569	**0.2601**	0.1527	0.1736	0.2449	0.1951
25	0.2191	0.1778	0.1839	**0.2830**	0.1801	0.2005	0.2423	0.2192
30	0.2191	0.1909	0.1947	**0.3021**	0.1914	0.2131	0.2409	0.2310
35	0.2191	0.2014	0.2046	**0.3143**	0.2021	0.2201	0.2374	0.2340
40	0.2191	0.2212	0.2240	**0.3306**	0.2214	0.2394	0.2351	0.2497

Table E242: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1734	0.1143	0.1393	**0.1917**	0.1393	0.1393	0.1917	0.1917
10	0.1734	0.1554	0.1630	**0.2306**	0.1609	0.1712	0.2242	0.2128
15	0.1734	0.1859	0.1918	**0.2633**	0.1867	0.2055	0.2243	0.2369
20	0.1734	0.2252	0.2330	**0.2926**	0.2281	0.2496	0.2175	0.2681
25	0.1734	0.2638	0.2675	**0.3302**	0.2648	0.2840	0.2145	0.3010
30	0.1734	0.2933	0.2979	**0.3503**	0.2940	0.3099	0.2125	0.3235
35	0.1734	0.3191	0.3239	**0.3689**	0.3196	0.3407	0.2089	0.3539
40	0.1734	0.3599	0.3632	**0.3907**	0.3602	0.3777	0.2010	0.3884

Table E243: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1818	0.0998	0.1253	**0.1843**	0.1253	0.1253	**0.1843**	**0.1843**
10	0.1818	0.1268	0.1332	**0.2117**	0.1316	0.1460	0.2110	0.1868
15	0.1818	0.1577	0.1616	**0.2363**	0.1578	0.1729	0.2187	0.2033
20	0.1818	0.1850	0.1925	**0.2650**	0.1881	0.2100	0.2169	0.2314
25	0.1818	0.2032	0.2086	**0.2878**	0.2045	0.2250	0.2135	0.2413
30	0.1818	0.2293	0.2338	**0.3038**	0.2298	0.2471	0.2096	0.2633
35	0.1818	0.2477	0.2505	**0.3148**	0.2484	0.2650	0.2077	0.2752
40	0.1818	0.2728	0.2759	**0.3392**	0.2732	0.2899	0.2003	0.3002

Table E244: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Sample Size $n_a = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1571	0.2058	0.2502	**0.2794**	0.2502	0.2502	**0.2794**	**0.2794**
10	0.2651	0.2058	0.2794	**0.3556**	**0.3285**	0.2522	0.3191	0.3496
15	0.3016	0.2058	0.3206	0.3983	**0.4007**	0.2483	0.3059	0.3970
20	0.3961	0.2058	0.3503	0.4529	**0.4693**	0.2490	0.2994	0.4552
25	0.4793	0.2058	0.4012	0.4962	**0.5328**	0.2527	0.2916	0.5125
30	0.5399	0.2058	0.4360	0.5370	**0.5843**	0.2557	0.2899	0.5668
35	0.5806	0.2058	0.4782	0.5691	**0.6183**	0.2507	0.2840	0.6016
40	0.6246	0.2058	0.5048	0.5946	**0.6504**	0.2528	0.2789	0.6417

Table E245: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2168	0.2208	0.2674	**0.3268**	0.2674	0.2674	**0.3268**	**0.3268**
10	0.3435	0.2208	0.3196	**0.4244**	0.3956	0.2748	0.3721	0.4104
15	0.4273	0.2208	0.3696	0.4967	**0.5046**	0.2896	0.3659	0.4989
20	0.4774	0.2208	0.4248	0.5667	**0.5910**	0.2840	0.3570	0.5633
25	0.5901	0.2208	0.5068	0.6210	**0.6579**	0.2875	0.3429	0.6301
30	0.6237	0.2208	0.5520	0.6691	**0.7145**	0.2853	0.3387	0.6941
35	0.7018	0.2208	0.5969	0.7055	**0.7567**	0.2840	0.3297	0.7418
40	0.7680	0.2208	0.6408	0.7423	**0.8026**	0.2849	0.3209	0.7928

Table E246: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1704	0.1736	0.2103	**0.2521**	0.2103	0.2103	0.2521	0.2521
10	0.2669	0.1736	0.2462	**0.3231**	0.3013	0.2123	0.2871	0.3165
15	0.3279	0.1736	0.2851	0.3837	**0.3912**	0.2211	0.2840	0.3809
20	0.3661	0.1736	0.3262	0.4411	**0.4664**	0.2206	0.2734	0.4423
25	0.4632	0.1736	0.4009	0.4883	**0.5210**	0.2207	0.2656	0.4957
30	0.4749	0.1736	0.4279	0.5172	**0.5604**	0.2190	0.2635	0.5380
35	0.5432	0.1736	0.4663	0.5546	**0.6016**	0.2164	0.2551	0.5855
40	0.6170	0.1736	0.5048	0.5927	**0.6497**	0.2202	0.2486	0.6403

Table E247: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1635	0.1220	0.1437	0.1817	0.1437	0.1437	0.1817	**0.1817**
10	0.2190	0.1220	0.1625	0.2203	0.2040	0.1455	0.1915	**0.2304**
15	0.2561	0.1220	0.1857	0.2543	0.2583	0.1521	0.1852	**0.2760**
20	0.2659	0.1220	0.2079	0.2896	0.3082	0.1510	0.1800	**0.3100**
25	0.3482	0.1220	0.2577	0.3290	**0.3639**	0.1516	0.1793	0.3561
30	0.3516	0.1220	0.2783	0.3433	**0.4051**	0.1505	0.1705	0.3951
35	0.4199	0.1220	0.3089	0.3812	**0.4477**	0.1497	0.1731	0.4412
40	0.4599	0.1220	0.3306	0.4025	**0.4758**	0.1487	0.1668	0.4704

Table E248: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1582	0.1040	0.1254	0.1652	0.1254	0.1254	0.1652	**0.1652**
10	0.2217	0.1040	0.1428	0.2027	0.1824	0.1250	0.1689	**0.2180**
15	0.2561	0.1040	0.1665	0.2454	0.2519	0.1310	0.1671	**0.2662**
20	0.2742	0.1040	0.1883	0.2708	0.3029	0.1312	0.1601	**0.3120**
25	0.3452	0.1040	0.2330	0.3004	**0.3506**	0.1314	0.1556	0.3502
30	0.3553	0.1040	0.2641	0.3296	**0.4023**	0.1301	0.1526	0.3944
35	0.4053	0.1040	0.2832	0.3557	**0.4307**	0.1306	0.1506	0.4256
40	0.4569	0.1040	0.3012	0.3740	**0.4628**	0.1303	0.1448	0.4626

Table E249: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2205	0.1161	0.1530	0.2371	0.1530	0.1530	0.2371	**0.2371**
10	0.3381	0.1161	0.1919	0.3088	0.2662	0.1540	0.2405	**0.3391**
15	0.4253	0.1161	0.2395	0.3766	0.3924	0.1653	0.2356	**0.4435**
20	0.4787	0.1161	0.2762	0.4414	0.5035	0.1647	0.2192	**0.5243**
25	0.5949	0.1161	0.3626	0.5029	0.6006	0.1643	0.2144	**0.6048**
30	0.6288	0.1161	0.4119	0.5572	**0.6778**	0.1631	0.2049	0.6753
35	0.7048	0.1161	0.4589	0.5962	**0.7264**	0.1641	0.2008	0.7247
40	0.7711	0.1161	0.5084	0.6421	**0.7801**	0.1637	0.1918	0.7782

Table E250: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2132	0.0880	0.1165	**0.1937**	0.1165	0.1165	**0.1937**	**0.1937**
10	0.3588	0.0880	0.1548	0.2820	0.2283	0.1232	0.1996	**0.3292**
15	0.4246	0.0880	0.1912	0.3332	0.3497	0.1263	0.1866	**0.4202**
20	0.4887	0.0880	0.2366	0.4071	0.4835	0.1274	0.1774	**0.5243**
25	0.5991	0.0880	0.3061	0.4570	0.5759	0.1255	0.1660	**0.5931**
30	0.6274	0.0880	0.3514	0.5066	0.6577	0.1239	0.1595	**0.6633**
35	0.7086	0.0880	0.4004	0.5526	0.7180	0.1255	0.1563	**0.7205**
40	0.7702	0.0880	0.4454	0.5925	0.7685	0.1257	0.1501	**0.7734**

Table E251: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 5$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1739	0.1332	0.1641	0.2132	0.1641	0.1641	0.2132	**0.2132**
10	0.2736	0.1332	0.1893	0.2751	0.2472	0.1625	0.2303	**0.2908**
15	0.3162	0.1332	0.2225	0.3249	0.3312	0.1727	0.2219	**0.3468**
20	0.3638	0.1332	0.2656	0.3869	**0.4221**	0.1745	0.2174	0.4218
25	0.4609	0.1332	0.3230	0.4310	**0.4854**	0.1715	0.2083	0.4724
30	0.4722	0.1332	0.3599	0.4584	**0.5394**	0.1729	0.2050	0.5274
35	0.5531	0.1332	0.3992	0.5015	**0.5901**	0.1701	0.1990	0.5834
40	0.6129	0.1332	0.4353	0.5407	**0.6330**	0.1680	0.1905	0.6287

Table E252: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 5$; (CRD $(T(3) * \sqrt{3})$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1707	0.1088	0.1383	**0.1942**	0.1383	0.1383	**0.1942**	**0.1942**
10	0.2757	0.1088	0.1707	0.2573	0.2254	0.1411	0.2072	**0.2794**
15	0.3250	0.1088	0.1995	0.3022	0.3122	0.1464	0.1987	**0.3437**
20	0.3686	0.1088	0.2342	0.3569	0.4003	0.1476	0.1912	**0.4178**
25	0.4561	0.1088	0.2921	0.3967	**0.4685**	0.1452	0.1794	0.4606
30	0.4794	0.1088	0.3287	0.4319	**0.5294**	0.1462	0.1770	0.5296
35	0.5587	0.1088	0.3676	0.4768	**0.5853**	0.1436	0.1726	0.5804
40	0.6131	0.1088	0.3975	0.5078	**0.6243**	0.1440	0.1647	0.6233

Table E253: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Number of Blocks $n_b = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2269	0.2230	0.2474	**0.3135**	0.2474	0.2474	**0.3135**	**0.3135**
15	0.2269	0.2868	0.2978	0.3640	0.2954	0.3071	0.3414	**0.3650**
20	0.2269	0.3335	0.3469	0.4061	0.3424	0.3558	0.3412	**0.4122**
25	0.2269	0.3851	0.3924	0.4350	0.3888	0.4031	0.3433	**0.4538**
30	0.2269	0.4425	0.4489	0.4782	0.4440	0.4626	0.3390	**0.5021**
35	0.2269	0.4829	0.4880	0.5127	0.4849	0.5013	0.3318	**0.5419**
40	0.2269	0.5243	0.5277	0.5353	0.5250	0.5401	0.3268	**0.5736**

Table E254: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)									
Sample			Approach						
Size	L*	FW*	I	II	III	IV	V	VI
10	0.3488	0.3590	0.4145	**0.5389**	0.4145	0.4145	**0.5389**	**0.5389**
15	0.3488	0.4878	0.5075	0.6329	0.5025	0.5226	0.5963	**0.6358**
20	0.3488	0.5816	0.6023	0.6986	0.5940	0.6202	0.5977	**0.7121**
25	0.3488	0.6634	0.6750	0.7451	0.6697	0.6919	0.5867	**0.7678**
30	0.3488	0.7347	0.7436	0.7892	0.7374	0.7585	0.5788	**0.8143**
35	0.3488	0.7932	0.8000	0.8253	0.7955	0.8136	0.5679	**0.8520**
40	0.3488	0.8426	0.8463	0.8580	0.8436	0.8566	0.5539	**0.8877**

Table E255: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed number of Blocks $n_b = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.2715	0.2773	0.3166	**0.4095**	0.3166	0.3166	**0.4095**	**0.4095**
15	0.2715	0.3797	0.3958	0.4918	0.3918	0.4066	0.4535	**0.4956**
20	0.2715	0.4409	0.4561	0.5339	0.4509	0.4699	0.4541	**0.5512**
25	0.2715	0.5128	0.5239	0.5870	0.5194	0.5406	0.4512	**0.6080**
30	0.2715	0.5789	0.5873	0.6339	0.5811	0.6028	0.4437	**0.6584**
35	0.2715	0.6390	0.6453	0.6810	0.6418	0.6606	0.4276	**0.7078**
40	0.2715	0.6920	0.6970	0.7138	0.6940	0.7093	0.4249	**0.7488**

Table E256: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.2244	0.1650	0.1875	**0.2579**	0.1875	0.1875	**0.2579**	**0.2579**
15	0.2244	0.2011	0.2118	0.2953	0.2099	0.2188	0.2899	**0.2875**
20	0.2244	0.2327	0.2419	0.3177	0.2384	0.2519	0.2905	**0.3071**
25	0.2244	0.2585	0.2635	0.3392	0.2616	0.2725	0.2883	**0.3231**
30	0.2244	0.2960	0.3014	0.3746	0.2978	0.3124	0.2893	**0.3556**
35	0.2244	0.3157	0.3198	0.3878	0.3166	0.3319	0.2861	**0.3734**
40	0.2244	0.3566	0.3604	0.4190	0.3574	0.3705	0.2808	**0.4082**

Table E257: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)									
Sample			**Approach**						
Size	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.2274	0.1666	0.1910	**0.2630**	0.1910	0.1910	**0.2630**	**0.2630**
15	0.2274	0.1953	0.2022	0.2877	0.2005	0.2099	0.2868	**0.2783**
20	0.2274	0.2287	0.2362	0.3241	0.2340	0.2464	0.2965	**0.3113**
25	0.2274	0.2626	0.2685	0.3461	0.2659	0.2776	0.2906	**0.3311**
30	0.2274	0.2901	0.2952	0.3732	0.2924	0.3079	0.2919	**0.3590**
35	0.2274	0.3218	0.3268	0.3983	0.3235	0.3378	0.2877	**0.3833**
40	0.2274	0.3433	0.3476	0.4166	0.3449	0.3571	0.2865	**0.3981**

Table E258: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample			**Approach**					
Size	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.3493	0.1603	0.1965	**0.3572**	0.1965	0.1965	**0.3572**	**0.3572**
15	0.3493	0.2087	0.2240	**0.4049**	0.2213	0.2368	0.4102	0.3766
20	0.3493	0.2363	0.2521	**0.4435**	0.2453	0.2674	0.4330	0.3942
25	0.3493	0.2709	0.2830	**0.4702**	0.2769	0.2997	0.4335	0.4053
30	0.3493	0.3107	0.3183	**0.5032**	0.3127	0.3372	0.4343	0.4276
35	0.3493	0.3517	0.3594	**0.5341**	0.3546	0.3754	0.4316	0.4562
40	0.3493	0.3748	0.3808	**0.5487**	0.3761	0.3989	0.4268	0.4688

Table E259: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample			**Approach**					
Size	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.2751	0.1318	0.1590	**0.2669**	0.1590	0.1590	**0.2669**	**0.2669**
15	0.2751	0.1549	0.1642	**0.3001**	0.1621	0.1748	0.3062	0.2744
20	0.2751	0.1746	0.1858	**0.3273**	0.1811	0.1971	0.3189	0.2869
25	0.2751	0.2038	0.2114	**0.3423**	0.2078	0.2215	0.3231	0.2916
30	0.2751	0.2263	0.2331	**0.3642**	0.2281	0.2465	0.3194	0.3078
35	0.2751	0.2551	0.2620	**0.3958**	0.2570	0.2742	0.3300	0.3334
40	0.2751	0.2742	0.2779	**0.4054**	0.2750	0.2888	0.3195	0.3412

Table E260: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)									
Sample Size	L*	FW*	Approach						
			I	II	III	IV	V	VI	
10	0.2781	0.1504	0.1814	**0.3003**	0.1814	0.1814	**0.3003**	**0.3003**
15	0.2781	0.1871	0.1977	**0.3311**	0.1961	0.2095	0.3337	0.3114
20	0.2781	0.2265	0.2390	**0.3668**	0.2326	0.2528	0.3489	0.3384
25	0.2781	0.2680	0.2781	**0.3973**	0.2738	0.2903	0.3526	0.3636
30	0.2781	0.2950	0.3026	**0.4279**	0.2978	0.3183	0.3540	0.3873
35	0.2781	0.3305	0.3344	**0.4497**	0.3320	0.3485	0.3482	0.4090
40	0.2781	0.3620	0.3671	**0.4747**	0.3632	0.3798	0.3491	0.4335

Table E261: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)									
Sample Size	L*	FW*	Approach						
			I	II	III	IV	V	VI	
10	0.2751	0.1318	0.1590	**0.2669**	0.1590	0.1590	**0.2669**	**0.2669**
15	0.2751	0.1549	0.1642	**0.3001**	0.1621	0.1748	0.3062	0.2744
20	0.2751	0.1746	0.1858	**0.3273**	0.1811	0.1971	0.3189	0.2869
25	0.2751	0.2038	0.2114	**0.3423**	0.2078	0.2215	0.3231	0.2916
30	0.2751	0.2263	0.2331	**0.3642**	0.2281	0.2465	0.3194	0.3078
35	0.2751	0.2551	0.2620	**0.3958**	0.2570	0.2742	0.3300	0.3334
40	0.2751	0.2742	0.2779	**0.4054**	0.2750	0.2888	0.3195	0.3412

Table E262: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Sample Size $n_a = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.2273	0.2201	0.2467	**0.3087**	0.2467	0.2467	**0.3087**	**0.3087**
15	0.2616	0.2201	0.2572	0.3496	0.2725	0.2446	0.3350	**0.3498**
20	0.2775	0.2201	0.2665	0.3882	0.3046	0.2450	0.3462	**0.3819**
25	0.3496	0.2201	0.2816	0.4191	0.3492	0.2461	0.3413	**0.4134**
30	0.3588	0.2201	0.2928	0.4569	0.4029	0.2434	0.3378	**0.4551**
35	0.3985	0.2201	0.2968	0.4697	0.4400	0.2431	0.3294	**0.4730**
40	0.4588	0.2201	0.3194	0.4983	0.4855	0.2465	0.3274	**0.5106**

Table E263: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.3488	0.3637	0.4167	**0.5380**	0.4167	0.4167	0.5380	0.5380
15	0.4265	0.3637	0.4346	**0.6155**	0.4705	0.4107	0.5961	0.6089
20	0.4780	0.3637	0.4571	**0.6770**	0.5367	0.4118	0.6089	0.6660
25	0.6009	0.3637	0.4873	**0.7298**	0.6179	0.4122	0.6052	0.7173
30	0.6243	0.3637	0.5082	**0.7635**	0.6989	0.4127	0.5921	0.7586
35	0.7119	0.3637	0.5291	**0.8058**	0.7651	0.4104	0.5906	0.8033
40	0.7643	0.3637	0.5608	**0.8292**	0.8154	0.4127	0.5768	0.8274

Table E264: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.2684	0.2799	0.3156	**0.4145**	0.3156	0.3156	**0.4145**	**0.4145**
15	0.3304	0.2799	0.3302	**0.4714**	0.3558	0.3119	0.4539	0.4668
20	0.3564	0.2799	0.3453	**0.5190**	0.4075	0.3131	0.4636	0.5139
25	0.4541	0.2799	0.3738	**0.5671**	0.4809	0.3152	0.4677	0.5570
30	0.4798	0.2799	0.3885	**0.6156**	0.5473	0.3131	0.4585	0.6079
35	0.5480	0.2799	0.4020	**0.6490**	0.6091	0.3135	0.4504	0.6485
40	0.6115	0.2799	0.4271	0.6801	0.6625	0.3147	0.4386	**0.6835**

Table E265: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.2612	0.1983	0.2155	**0.3353**	0.2155	0.2155	**0.3353**	**0.3353**
20	0.2766	0.1983	0.2179	0.3680	0.2258	0.2144	0.3481	**0.3764**
25	0.3508	0.1983	0.2305	0.4039	0.2510	0.2172	0.3599	**0.4174**
30	0.3622	0.1983	0.2334	0.4322	0.2731	0.2182	0.3557	**0.4555**
35	0.4009	0.1983	0.2447	0.4527	0.2970	0.2152	0.3467	**0.4799**
40	0.4610	0.1983	0.2496	0.4794	0.3273	0.2168	0.3448	**0.5122**

Table E266: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)									
Blocks			**Approach**						
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.2277	0.1378	0.1591	**0.2331**	0.1591	0.1591	**0.2331**	**0.2331**
15	0.2566	0.1378	0.1660	0.2742	0.1802	0.1560	0.2487	**0.2841**
20	0.2729	0.1378	0.1736	0.3061	0.2085	0.1563	0.2443	**0.3270**
25	0.3446	0.1378	0.1896	0.3320	0.2521	0.1566	0.2431	**0.3699**
30	0.3554	0.1378	0.2007	0.3727	0.3071	0.1564	0.2420	**0.4165**
35	0.4086	0.1378	0.2043	0.3941	0.3496	0.1568	0.2316	**0.4509**
40	0.4662	0.1378	0.2242	0.4278	0.4088	0.1574	0.2304	**0.4882**

Table E267: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.3489	0.1640	0.2000	**0.3573**	0.2000	0.2000	**0.3573**	**0.3573**
15	0.4290	0.1640	0.2120	0.4364	0.2393	0.1938	0.3802	**0.4666**
20	0.4756	0.1640	0.2274	0.4952	0.2923	0.1963	0.3689	**0.5532**
25	0.6065	0.1640	0.2530	0.5581	0.3858	0.1960	0.3684	**0.6344**
30	0.6301	0.1640	0.2727	0.6023	0.4758	0.1969	0.3535	**0.6937**
35	0.7025	0.1640	0.2862	0.6511	0.5760	0.1968	0.3429	**0.7433**
40	0.7759	0.1640	0.3188	0.6922	0.6605	0.1979	0.3363	**0.7965**

Table E268: Estimated Power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.2688	0.1502	0.1798	**0.2947**	0.1798	0.1798	**0.2947**	**0.2947**
15	0.3382	0.1502	0.1911	0.3483	0.2114	0.1776	0.3120	**0.3736**
20	0.3528	0.1502	0.1985	0.3931	0.2502	0.1751	0.3054	**0.4256**
25	0.4561	0.1502	0.2234	0.4448	0.3214	0.1777	0.3085	**0.4942**
30	0.4690	0.1502	0.2327	0.4810	0.3874	0.1751	0.2918	**0.5443**
35	0.5554	0.1502	0.2448	0.5226	0.4580	0.1754	0.2879	**0.6051**
40	0.6108	0.1502	0.2686	0.5491	0.5266	0.1781	0.2798	**0.6407**

Table E269: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
10	0.2653	0.1882	0.2182	**0.3245**	0.2182	0.2182	**0.3245**	**0.3245**
15	0.3254	0.1882	0.2322	0.3902	0.2542	0.2162	0.3552	**0.4017**
20	0.3598	0.1882	0.2443	0.4340	0.2965	0.2175	0.3534	**0.4584**
25	0.4594	0.1882	0.2670	0.4721	0.3603	0.2185	0.3490	**0.5085**
30	0.4774	0.1882	0.2806	0.5200	0.4359	0.2167	0.3424	**0.5646**
35	0.5460	0.1882	0.2935	0.5610	0.5037	0.2169	0.3367	**0.6099**
40	0.6134	0.1882	0.3180	0.5976	0.5733	0.2169	0.3297	**0.6549**

Table E270: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2688	0.1502	0.1798	**0.2947**	0.1798	0.1798	**0.2947**	**0.2947**
15	0.3382	0.1502	0.1911	0.3483	0.2114	0.1776	0.3120	**0.3736**
20	0.3528	0.1502	0.1985	0.3931	0.2502	0.1751	0.3054	**0.4256**
25	0.4561	0.1502	0.2234	0.4448	0.3214	0.1777	0.3085	**0.4942**
30	0.4690	0.1502	0.2327	0.4810	0.3874	0.1751	0.2918	**0.5443**
35	0.5554	0.1502	0.2448	0.5226	0.4580	0.1754	0.2879	**0.6051**
40	0.6108	0.1502	0.2686	0.5491	0.5266	0.1781	0.2798	**0.6407**

Table E271: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Number of Blocks $n_b = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.2528	0.2799	0.2985	**0.4006**	0.2985	0.2985	**0.4006**	**0.4006**
20	0.2528	0.3392	0.3538	0.4486	0.3493	0.3559	0.4305	**0.4504**
25	0.2528	0.3899	0.4021	0.4834	0.3954	0.4074	0.4354	**0.4907**
30	0.2528	0.4318	0.4393	0.5138	0.4369	0.4480	0.4355	**0.5250**
35	0.2528	0.4876	0.4976	0.5558	0.4914	0.5041	0.4424	**0.5735**
40	0.2528	0.5178	0.5225	0.5788	0.5200	0.5316	0.4338	**0.5971**

Table E272: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.4311	0.4752	0.5154	**0.6956**	0.5154	0.5154	**0.6956**	**0.6956**
20	0.4311	0.5730	0.6039	0.7485	0.5966	0.6097	0.7289	**0.7536**
25	0.4311	0.6736	0.6908	0.7999	0.6844	0.7001	0.7482	**0.8128**
30	0.4311	0.7441	0.7531	0.8378	0.7492	0.7672	0.7472	**0.8527**
35	0.4311	0.8027	0.8111	0.8757	0.8073	0.8199	0.7412	**0.8928**
40	0.4311	0.8385	0.8442	0.8877	0.8413	0.8540	0.7332	**0.9078**

Table E273: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.3243	0.3733	0.4007	**0.5464**	0.4007	0.4007	**0.5464**	**0.5464**
20	0.3243	0.4420	0.4663	0.6017	0.4596	0.4704	0.5794	**0.6071**
25	0.3243	0.5056	0.5217	0.6436	0.5149	0.5320	0.5875	**0.6535**
30	0.3243	0.5728	0.5844	0.6876	0.5792	0.5961	0.5890	**0.6993**
35	0.3243	0.6345	0.6438	0.7281	0.6382	0.6551	0.5860	**0.7449**
40	0.3243	0.6847	0.6914	0.7532	0.6876	0.7042	0.5790	**0.7770**

Table E274: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.2524	0.1998	0.2168	**0.3295**	0.2168	0.2168	**0.3295**	**0.3295**
20	0.2524	0.2345	0.2498	**0.3652**	0.2451	0.2530	0.3610	0.3588
25	0.2524	0.2628	0.2742	**0.3940**	0.2697	0.2816	0.3696	0.3845
30	0.2524	0.2887	0.2963	**0.4131**	0.2924	0.3048	0.3807	0.3967
35	0.2524	0.3229	0.3300	**0.4446**	0.3258	0.3376	0.3753	0.4203
40	0.2524	0.3466	0.3514	**0.4570**	0.3489	0.3604	0.3701	0.4335

Table E275: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.2611	0.1586	0.1753	**0.3021**	0.1753	0.1753	**0.3021**	**0.3021**
20	0.2611	0.1845	0.1982	**0.3237**	0.1938	0.2021	0.3264	0.3117
25	0.2611	0.2116	0.2208	**0.3497**	0.2165	0.2268	0.3421	0.3288
30	0.2611	0.2348	0.2420	**0.3683**	0.2388	0.2514	0.3458	0.3410
35	0.2611	0.2571	0.2628	**0.3811**	0.2598	0.2702	0.3522	0.3522
40	0.2611	0.2723	0.2757	**0.3941**	0.2737	0.2872	0.3484	0.3624

Table E276: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.4282	0.2048	0.2349	**0.4786**	0.2349	0.2349	**0.4786**	**0.4786**
20	0.4282	0.2440	0.2681	**0.5147**	0.2619	0.2735	0.5278	0.4888
25	0.4282	0.2767	0.2947	**0.5453**	0.2883	0.3061	0.5522	0.4964
30	0.4282	0.3007	0.3117	**0.5691**	0.3064	0.3246	0.5623	0.5050
35	0.4282	0.3385	0.3513	**0.6017**	0.3442	0.3662	0.5654	0.5243
40	0.4282	0.3726	0.3823	**0.6235**	0.3771	0.3966	0.5731	0.5382

Table E277: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.4183	0.1410	0.1619	**0.3986**	0.1619	0.1619	**0.3986**	**0.3986**
20	0.4183	0.1537	0.1709	**0.4186**	0.1661	0.1762	0.4444	0.3786
25	0.4183	0.1732	0.1884	**0.4424**	0.1821	0.1961	0.4778	0.3769
30	0.4183	0.1881	0.1961	**0.4529**	0.1918	0.2087	0.4850	0.3593
35	0.4183	0.2090	0.2173	**0.4795**	0.2122	0.2277	0.4982	0.3711
40	0.4183	0.2216	0.2285	**0.4937**	0.2255	0.2407	0.4952	0.3704

Table E278: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.3257	0.1887	0.2097	**0.3859**	0.2097	0.2097	**0.3859**	**0.3859**
20	0.3257	0.2252	0.2457	**0.4265**	0.2399	0.2505	0.4310	0.4108
25	0.3257	0.2569	0.2705	**0.4584**	0.2646	0.2786	0.4485	0.4290
30	0.3257	0.2944	0.3018	**0.4818**	0.2991	0.3160	0.4551	0.4498
35	0.3257	0.3268	0.3383	**0.5126**	0.3326	0.3494	0.4559	0.4652
40	0.3257	0.3558	0.3619	**0.5306**	0.3585	0.3748	0.4560	0.4836

Table E279: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.3335	0.1598	0.1813	**0.3562**	0.1813	0.1813	**0.3562**	**0.3562**
20	0.3335	0.1767	0.1932	**0.3855**	0.1886	0.1982	0.3975	0.3627
25	0.3335	0.2004	0.2147	**0.4069**	0.2096	0.2218	0.4154	0.3691
30	0.3335	0.2249	0.2332	**0.4305**	0.2291	0.2423	0.4284	0.3741
35	0.3335	0.2465	0.2559	**0.4505**	0.2494	0.2678	0.4348	0.3851
40	0.3335	0.2686	0.2748	**0.4737**	0.2719	0.2854	0.4402	0.3962

Table E280: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Sample Size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach I	II	III	IV	V	VI
15	0.2543	0.2929	0.3127	**0.4051**	0.3127	0.3127	**0.4051**	**0.4051**
20	0.2768	0.2929	0.3195	**0.4517**	0.3300	0.3136	0.4433	0.4439
25	0.3450	0.2929	0.3263	**0.4817**	0.3480	0.3113	0.4523	0.4742
30	0.3544	0.2929	0.3352	**0.5122**	0.3793	0.3142	0.4564	0.5011
35	0.4126	0.2929	0.3434	**0.5316**	0.4033	0.3127	0.4527	0.5239
40	0.4633	0.2929	0.3495	**0.5615**	0.4331	0.3140	0.4526	0.5566

Table E281: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4311	0.4885	0.5302	**0.6957**	0.5302	0.5302	**0.6957**	**0.6957**
20	0.4821	0.4885	0.5431	**0.7479**	0.5599	0.5302	0.7398	0.7465
25	0.6077	0.4885	0.5586	**0.8033**	0.5964	0.5319	0.7657	0.7924
30	0.6227	0.4885	0.5698	**0.8270**	0.6414	0.5315	0.7611	0.8174
35	0.6977	0.4885	0.5881	**0.8572**	0.6898	0.5292	0.7659	0.8460
40	0.7741	0.4885	0.5961	**0.8816**	0.7313	0.5305	0.7584	0.8769

Table E282: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3221	0.3726	0.4018	**0.5395**	0.4018	0.4018	**0.5395**	**0.5395**
20	0.3671	0.3726	0.4114	**0.5977**	0.4277	0.4025	0.5895	0.5909
25	0.4605	0.3726	0.4241	**0.6308**	0.4542	0.4005	0.5976	0.6195
30	0.4772	0.3726	0.4310	**0.6778**	0.4932	0.4020	0.6074	0.6628
35	0.5486	0.3726	0.4478	**0.7078**	0.5349	0.4017	0.6037	0.6997
40	0.6141	0.3726	0.4560	**0.7335**	0.5771	0.4009	0.6015	0.7272

Table E283: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2612	0.1983	0.2155	**0.3353**	0.2155	0.2155	**0.3353**	**0.3353**
20	0.2766	0.1983	0.2179	0.3680	0.2258	0.2144	0.3481	**0.3764**
25	0.3508	0.1983	0.2305	0.4039	0.2510	0.2172	0.3599	**0.4174**
30	0.3622	0.1983	0.2334	0.4322	0.2731	0.2182	0.3557	**0.4555**
35	0.4009	0.1983	0.2447	0.4527	0.2970	0.2152	0.3467	**0.4799**
40	0.4610	0.1983	0.2496	0.4794	0.3273	0.2168	0.3448	**0.5122**

Table E284: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2558	0.1682	0.1837	**0.3074**	0.1837	0.1837	**0.3074**	**0.3074**
20	0.2709	0.1682	0.1838	0.3370	0.1937	0.1808	0.3175	**0.3474**
25	0.3466	0.1682	0.1959	0.3700	0.2152	0.1826	0.3244	**0.3906**
30	0.3458	0.1682	0.1999	0.3984	0.2381	0.1824	0.3200	**0.4271**
35	0.4156	0.1682	0.2086	0.4206	0.2595	0.1814	0.3114	**0.4624**
40	0.4620	0.1682	0.2111	0.4402	0.2867	0.1820	0.3034	**0.4973**

Table E285: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 15$; (CRD $N\,(0,2)$ and RCBD $N\,(0,1)$)								
			Approach					
Blocks	L*	FW*	I	II	III	IV	V	VI
15	0.4246	0.2098	0.2374	**0.4814**	0.2374	0.2374	**0.4814**	**0.4814**
20	0.4833	0.2098	0.2453	0.5382	0.2593	0.2363	0.4929	**0.5651**
25	0.6024	0.2098	0.2580	0.5906	0.2918	0.2367	0.4966	**0.6430**
30	0.6282	0.2098	0.2665	0.6452	0.3350	0.2395	0.4949	**0.7060**
35	0.7112	0.2098	0.2802	0.6918	0.3783	0.2355	0.4866	**0.7651**
40	0.7656	0.2098	0.2873	0.7176	0.4366	0.2375	0.4756	**0.7977**

Table E286: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
			Approach					
Blocks	L*	FW*	I	II	III	IV	V	VI
15	0.4313	0.1401	0.1617	**0.4092**	0.1617	0.1617	**0.4092**	**0.4092**
20	0.4880	0.1401	0.1680	0.4637	0.1813	0.1615	0.4163	**0.5047**
25	0.5946	0.1401	0.1781	0.5198	0.2086	0.1605	0.4095	**0.5880**
30	0.6264	0.1401	0.1885	0.5696	0.2502	0.1634	0.4073	**0.6658**
35	0.7001	0.1401	0.1976	0.6028	0.2882	0.1594	0.3843	**0.7136**
40	0.7708	0.1401	0.2094	0.6553	0.3452	0.1600	0.3830	**0.7776**

Table E287: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
			Approach					
Blocks	L*	FW*	I	II	III	IV	V	VI
15	0.3261	0.2347	0.2600	**0.4307**	0.2600	0.2600	**0.4307**	**0.4307**
20	0.3589	0.2347	0.2701	0.4821	0.2833	0.2603	0.4569	**0.4919**
25	0.4579	0.2347	0.2794	0.5307	0.3067	0.2611	0.4712	**0.5525**
30	0.4801	0.2347	0.2864	0.5691	0.3429	0.2618	0.4636	**0.5978**
35	0.5488	0.2347	0.3011	0.6053	0.3814	0.2616	0.4614	**0.6440**
40	0.6164	0.2347	0.3088	0.6366	0.4239	0.2607	0.4542	**0.6809**

Table E288: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
			Approach					
Blocks	L*	FW*	I	II	III	IV	V	VI
15	0.3312	0.1871	0.2115	**0.3878**	0.2115	0.2115	**0.3878**	**0.3878**
20	0.3559	0.1871	0.2163	0.4298	0.2263	0.2088	0.4033	**0.4492**
25	0.4619	0.1871	0.2267	0.4772	0.2517	0.2092	0.4071	**0.5106**
30	0.4804	0.1871	0.2348	0.5226	0.2865	0.2120	0.4061	**0.5717**
35	0.5508	0.1871	0.2432	0.5582	0.3227	0.2097	0.3991	**0.6146**
40	0.6159	0.1871	0.2535	0.5907	0.3597	0.2102	0.3883	**0.6635**

Table E289: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Number of Blocks $n_b = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.2827	0.3350	0.3582	**0.4902**	0.3582	0.3582	**0.4902**	**0.4902**
25	0.2827	0.3826	0.3984	0.5314	0.3952	0.4049	0.5210	**0.5319**
30	0.2827	0.4351	0.4496	0.5606	0.4455	0.4550	0.5276	**0.5636**
35	0.2827	0.4803	0.4901	0.5911	0.4862	0.4973	0.5340	**0.6028**
40	0.2827	0.5140	0.5225	0.6126	0.5182	0.5295	0.5305	**0.6234**

Table E290: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.4830	0.5815	0.6203	**0.8032**	0.6203	0.6203	**0.8032**	**0.8032**
25	0.4830	0.6643	0.6892	0.8408	0.6856	0.6947	0.8324	**0.8446**
30	0.4830	0.7362	0.7523	0.8710	0.7469	0.7591	0.8414	**0.8774**
35	0.4830	0.7923	0.8061	0.8981	0.8009	0.8143	0.8436	**0.9051**
40	0.4830	0.8402	0.8468	0.9187	0.8440	0.8549	0.8436	**0.9280**

Table E291: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed number of Blocks $n_b = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.3658	0.4416	0.4720	**0.6508**	0.4720	0.4720	**0.6508**	**0.6508**
25	0.3658	0.5036	0.5288	0.7003	0.5245	0.5356	0.6828	**0.6987**
30	0.3658	0.5716	0.5907	0.7365	0.5846	0.5965	0.6991	**0.7386**
35	0.3658	0.6353	0.6469	0.7677	0.6419	0.6567	0.6996	**0.7759**
40	0.3658	0.6853	0.6953	0.7926	0.6903	0.7041	0.7024	**0.8043**

Table E292: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.2715	0.2272	0.2470	**0.3952**	0.2470	0.2470	**0.3952**	**0.3952**
25	0.2715	0.2657	0.2775	**0.4220**	0.2758	0.2806	0.4249	0.4156
30	0.2715	0.2907	0.3013	**0.4500**	0.2971	0.3059	0.4400	0.4417
35	0.2715	0.3189	0.3270	**0.4717**	0.3237	0.3332	0.4442	0.4505
40	0.2715	0.3540	0.3616	**0.5024**	0.3575	0.3688	0.4531	0.4787

Table E293: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.2783	0.1838	0.1997	**0.3586**	0.1997	0.1997	**0.3586**	**0.3586**
25	0.2783	0.2065	0.2202	**0.3831**	0.2180	0.2237	0.3845	0.3695
30	0.2783	0.2347	0.2449	**0.4018**	0.2410	0.2488	0.4035	0.3794
35	0.2783	0.2565	0.2667	**0.4220**	0.2633	0.2727	0.4125	0.3959
40	0.2783	0.2849	0.2918	**0.4424**	0.2891	0.2984	0.4178	0.4126

Table E294: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.4800	0.2358	0.2666	**0.5731**	0.2666	0.2666	**0.5731**	**0.5731**
25	0.4800	0.2724	0.2938	**0.6053**	0.2903	0.3029	0.6184	0.5824
30	0.4800	0.3030	0.3220	**0.6305**	0.3155	0.3310	0.6481	0.5851
35	0.4800	0.3373	0.3511	**0.6495**	0.3446	0.3610	0.6550	0.5917
40	0.4800	0.3768	0.3890	**0.6817**	0.3827	0.4005	0.6663	0.6124

Table E295: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.4866	0.1574	0.1811	**0.4911**	0.1811	0.1811	**0.4911**	**0.4911**
25	0.4866	0.1651	0.1816	0.5103	0.1782	0.1868	**0.5369**	0.4749
30	0.4866	0.1842	0.1977	0.5273	0.1936	0.2040	**0.5654**	0.4618
35	0.4866	0.2110	0.2222	0.5445	0.2172	0.2301	**0.5823**	0.4598
40	0.4866	0.2285	0.2377	0.5618	0.2323	0.2496	**0.5953**	0.4525

Table E296: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 20$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.3621	0.2228	0.2474	**0.4769**	0.2474	0.2474	**0.4769**	**0.4769**
25	0.3621	0.2646	0.2829	**0.5063**	0.2799	0.2873	0.5145	0.4906
30	0.3621	0.2962	0.3121	**0.5318**	0.3064	0.3185	0.5365	0.5039
35	0.3621	0.3156	0.3285	**0.5588**	0.3228	0.3363	0.5449	0.5200
40	0.3621	0.3585	0.3681	**0.5891**	0.3637	0.3785	0.5591	0.5446

Table E297: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.3526	0.1816	0.2031	**0.4285**	0.2031	0.2031	**0.4285**	**0.4285**
25	0.3526	0.2057	0.2198	**0.4523**	0.2176	0.2243	0.4632	0.4313
30	0.3526	0.2321	0.2428	**0.4824**	0.2404	0.2486	0.4935	0.4395
35	0.3526	0.2554	0.2658	**0.4999**	0.2609	0.2735	0.5059	0.4505
40	0.3526	0.2753	0.2852	**0.5134**	0.2808	0.2953	0.5068	0.4531

Table E298: Estimated power of tests for mixed design under the exponential distribution with equal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Sample Size $n_a = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.2725	0.3335	0.3529	**0.4774**	0.3529	0.3529	**0.4774**	**0.4774**
25	0.3470	0.3335	0.3639	**0.5244**	0.3688	0.3578	0.5220	0.5203
30	0.3544	0.3335	0.3635	**0.5470**	0.3809	0.3545	0.5279	0.5423
35	0.4157	0.3335	0.3707	**0.5773**	0.3962	0.3538	0.5410	0.5747
40	0.4581	0.3335	0.3738	**0.6063**	0.4155	0.3539	0.5392	0.5990

Table E299: Estimated power of tests for mixed design under the normal distribution with equal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.4830	0.5733	0.6098	**0.8032**	0.6098	0.6098	**0.8032**	**0.8032**
25	0.5952	0.5733	0.6234	**0.8341**	0.6331	0.6143	0.8273	0.8306
30	0.6356	0.5733	0.6315	**0.8720**	0.6559	0.6134	0.8495	0.8638
35	0.7037	0.5733	0.6416	**0.8938**	0.6827	0.6145	0.8563	0.8873
40	0.7664	0.5733	0.6495	**0.9104**	0.7108	0.6129	0.8583	0.9042

Table E300: Estimated power of tests for mixed design under the t distribution with equal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.3595	0.4355	0.4684	**0.6476**	0.4684	0.4684	**0.6476**	**0.6476**
25	0.4645	0.4355	0.4782	**0.6890**	0.4856	0.4685	0.6858	0.6848
30	0.4771	0.4355	0.4828	**0.7152**	0.5041	0.4677	0.6982	0.7080
35	0.5534	0.4355	0.4919	**0.7573**	0.5272	0.4682	0.7112	0.7478
40	0.6067	0.4355	0.4978	**0.7715**	0.5540	0.4680	0.7076	0.7648

Table E301: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI	
20	0.2752	0.2329	0.2544	**0.4039**	0.2544	0.2544	**0.4039**	**0.4039**
25	0.3454	0.2329	0.2605	0.4298	0.2643	0.2538	0.4193	**0.4373**
30	0.3571	0.2329	0.2640	0.4749	0.2785	0.2567	0.4390	**0.4890**
35	0.4113	0.2329	0.2713	0.4996	0.2936	0.2545	0.4407	**0.5204**
40	0.4547	0.2329	0.2726	0.5159	0.3089	0.2547	0.4345	**0.5378**

Table E302: Estimated power of tests for mixed design under the exponential distribution with unequal variance; k=4; treatments effects: d2=0.1; d3=0.2; d4=0.3

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.2726	0.1811	0.1983	**0.3526**	0.1983	0.1983	**0.3526**	**0.3526**
25	0.3466	0.1811	0.2065	0.3931	0.2116	0.1991	0.3735	**0.4033**
30	0.3500	0.1811	0.2093	0.4231	0.2216	0.2013	0.3805	**0.4429**
35	0.4096	0.1811	0.2131	0.4472	0.2373	0.1996	0.3823	**0.4775**
40	0.4559	0.1811	0.2159	0.4744	0.2516	0.2004	0.3769	**0.5123**

Table E303: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.4807	0.2394	0.2688	**0.5746**	0.2688	0.2688	**0.5746**	**0.5746**
25	0.5912	0.2394	0.2777	0.6172	0.2851	0.2692	0.5879	**0.6442**
30	0.6230	0.2394	0.2833	0.6731	0.3058	0.2696	0.5956	**0.7117**
35	0.7112	0.2394	0.2924	0.7199	0.3312	0.2700	0.6014	**0.7710**
40	0.7756	0.2394	0.2986	0.7519	0.3611	0.2694	0.5921	**0.8172**

Table E304: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.4857	0.1538	0.1775	**0.4892**	0.1775	0.1775	**0.4892**	**0.4892**
25	0.5986	0.1538	0.1841	0.5482	0.1917	0.1766	0.5073	**0.5818**
30	0.6205	0.1538	0.1898	0.5962	0.2089	0.1772	0.5056	**0.6568**
35	0.7130	0.1538	0.1989	0.6471	0.2329	0.1791	0.4983	**0.7278**
40	0.7799	0.1538	0.2028	0.6850	0.2575	0.1769	0.4939	**0.7837**

Table E305: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.3641	0.2761	0.3031	**0.5270**	0.3031	0.3031	**0.5270**	**0.5270**
25	0.4610	0.2761	0.3130	0.5716	0.3170	0.3045	0.5534	**0.5826**
30	0.4763	0.2761	0.3176	0.6115	0.3401	0.3045	0.5677	**0.6298**
35	0.5438	0.2761	0.3240	0.6354	0.3549	0.3042	0.5634	**0.6647**
40	0.6078	0.2761	0.3314	0.6715	0.3836	0.3050	0.5634	**0.7037**

Table E306: Estimated power of tests for mixed design under the t distribution with unequal variance; k=4; treatments effects: d2=0.25; d3=0.5; d4=0.75

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.3629	0.2210	0.2441	**0.4706**	0.2441	0.2441	**0.4706**	**0.4706**
25	0.4681	0.2210	0.2545	0.5158	0.2605	0.2476	0.4919	**0.5325**
30	0.4848	0.2210	0.2574	0.5672	0.2732	0.2450	0.5060	**0.5967**
35	0.5458	0.2210	0.2655	0.5893	0.2929	0.2451	0.4981	**0.6269**
40	0.6141	0.2210	0.2684	0.6295	0.3190	0.2456	0.5025	**0.6822**

APPENDIX F: ESTIMATED ALPHA VALUES FIVE POPULATIONS

Table F1: Estimated alpha levels of test for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.0445	0.0525	0.0502	0.0508	0.0502	0.0502	0.0508	0.0508
15	0.0445	0.0512	0.0513	0.0501	0.0511	0.0513	0.0492	0.0522
20	0.0445	0.0505	0.0497	0.0470	0.0502	0.0503	0.0496	0.0468
25	0.0445	0.0466	0.0474	0.0451	0.0464	0.0470	0.0467	0.0447
30	0.0445	0.0501	0.0504	0.0456	0.0507	0.0508	0.0491	0.0486
35	0.0445	0.0461	0.0460	0.0462	0.0461	0.0462	0.0490	0.0455
40	0.0445	0.0489	0.0491	0.0483	0.0488	0.0485	0.0477	0.0476

Table F2: Estimated alpha levels of test for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.0464	0.0510	0.0496	0.0504	0.0496	0.0496	0.0504	0.0504
15	0.0464	0.0527	0.0520	0.0513	0.0527	0.0526	0.0512	0.0520
20	0.0464	0.0506	0.0500	0.0514	0.0506	0.0510	0.0510	0.0540
25	0.0464	0.0464	0.0462	0.0521	0.0469	0.0461	0.0519	0.0499
30	0.0464	0.0513	0.0513	0.0498	0.0513	0.0517	0.0513	0.0501
35	0.0464	0.0555	0.0557	0.0498	0.0558	0.0551	0.0501	0.0555
40	0.0464	0.0471	0.0474	0.0533	0.0472	0.0480	0.0502	0.0492

Table F3: Estimated alpha levels of test for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed number of Blocks $n_b = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.0469	0.0525	0.0502	0.0498	0.0502	0.0502	0.0498	0.0498
15	0.0469	0.0477	0.0481	0.0491	0.0483	0.0481	0.0491	0.0500
20	0.0469	0.0547	0.0536	0.0498	0.0541	0.0530	0.0500	0.0494
25	0.0469	0.0481	0.0485	0.0491	0.0484	0.0493	0.0509	0.0505
30	0.0469	0.0434	0.0442	0.0465	0.0437	0.0443	0.0502	0.0444
35	0.0469	0.0517	0.0519	0.0492	0.0516	0.0513	0.0509	0.0500
40	0.0469	0.0487	0.0492	0.0500	0.0488	0.0491	0.0508	0.0493

Table F4: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks10; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach						
			I	II	III	IV	V	VI
10	0.0452	0.0500	0.0478	0.0483	0.0478	0.0478	0.0483	0.0483
15	0.0452	0.0494	0.0490	0.0456	0.0493	0.0492	0.0468	0.0470
20	0.0452	0.0479	0.0461	0.0471	0.0469	0.0457	0.0473	0.0451
25	0.0452	0.0505	0.0505	0.0470	0.0504	0.0508	0.0452	0.0496
30	0.0452	0.0468	0.0470	0.0506	0.0469	0.0472	0.0496	0.0479
35	0.0452	0.0496	0.0493	0.0503	0.0495	0.0495	0.0478	0.0500
40	0.0452	0.0492	0.0493	0.0447	0.0489	0.0482	0.0481	0.0488

Table F5: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.0492	0.0516	0.0514	0.0546	0.0514	0.0514	0.0546	0.0546
15	0.0492	0.0516	0.0505	0.0527	0.0510	0.0502	0.0528	0.0517
20	0.0492	0.0537	0.0527	0.0510	0.0534	0.0523	0.0532	0.0499
25	0.0492	0.0484	0.0479	0.0496	0.0483	0.0482	0.0497	0.0502
30	0.0492	0.0540	0.0545	0.0539	0.0541	0.0548	0.0536	0.0559
35	0.0492	0.0476	0.0470	0.0518	0.0471	0.0466	0.0544	0.0476
40	0.0492	0.0506	0.0507	0.0513	0.0508	0.0512	0.0525	0.0500

Table F6: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.0492	0.0494	0.0478	0.0538	0.0478	0.0478	0.0538	0.0538
15	0.0492	0.0452	0.0456	0.0491	0.0461	0.0458	0.0515	0.0501
20	0.0492	0.0531	0.0523	0.0501	0.0526	0.0536	0.0522	0.0510
25	0.0492	0.0540	0.0550	0.0506	0.0545	0.0544	0.0502	0.0538
30	0.0492	0.0504	0.0509	0.0498	0.0505	0.0509	0.0513	0.0491
35	0.0492	0.0527	0.0524	0.0530	0.0527	0.0527	0.0536	0.0515
40	0.0492	0.0469	0.0469	0.0528	0.0468	0.0471	0.0520	0.0475

Table F7: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.0457	0.0501	0.0494	0.0507	0.0494	0.0494	0.0507	0.0507
15	0.0457	0.0483	0.0476	0.0473	0.0483	0.0467	0.0467	0.0475
20	0.0457	0.0458	0.0461	0.0474	0.0458	0.0473	0.0472	0.0487
25	0.0457	0.0494	0.0493	0.0520	0.0495	0.0488	0.0510	0.0517
30	0.0457	0.0498	0.0499	0.0496	0.0500	0.0498	0.0514	0.0508
35	0.0457	0.0523	0.0517	0.0506	0.0521	0.0522	0.0491	0.0536
40	0.0457	0.0465	0.0460	0.0453	0.0461	0.0461	0.0490	0.0449

Table F8: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.0442	0.0521	0.0502	0.0498	0.0502	0.0502	0.0498	0.0498
15	0.0442	0.0533	0.0522	0.0495	0.0539	0.0518	0.0486	0.0511
20	0.0442	0.0512	0.0498	0.0492	0.0503	0.0501	0.0481	0.0498
25	0.0442	0.0507	0.0508	0.0521	0.0507	0.0502	0.0493	0.0499
30	0.0442	0.0488	0.0488	0.0489	0.0490	0.0492	0.0499	0.0500
35	0.0442	0.0493	0.0490	0.0472	0.0492	0.0500	0.0476	0.0497
40	0.0442	0.0520	0.0523	0.0500	0.0521	0.0516	0.0480	0.0520

Table F9: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.0445	0.0525	0.0502	0.0508	0.0502	0.0502	0.0508	0.0508
15	0.0445	0.0512	0.0513	0.0501	0.0511	0.0513	0.0492	0.0522
20	0.0445	0.0505	0.0497	0.0470	0.0502	0.0503	0.0496	0.0468
25	0.0445	0.0466	0.0474	0.0451	0.0464	0.0470	0.0467	0.0447
30	0.0445	0.0501	0.0504	0.0456	0.0507	0.0508	0.0491	0.0486
35	0.0445	0.0461	0.0460	0.0462	0.0461	0.0462	0.0490	0.0455
40	0.0445	0.0489	0.0491	0.0483	0.0488	0.0485	0.0477	0.0476

Table F10: Estimated alpha levels of test for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0;

Fixed Sample Size $n_a = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.0444	0.0486	0.0481	0.0485	0.0481	0.0481	0.0485	0.0485
15	0.0445	0.0486	0.0479	0.0521	0.0483	0.0486	0.0505	0.0534
20	0.0489	0.0486	0.0481	0.0511	0.0503	0.0477	0.0492	0.0505
25	0.0551	0.0486	0.0499	0.0523	0.0491	0.0482	0.0482	0.0533
30	0.0506	0.0486	0.0480	0.0494	0.0508	0.0481	0.0487	0.0475
35	0.0559	0.0486	0.0495	0.0512	0.0501	0.0491	0.0502	0.0535
40	0.0496	0.0486	0.0496	0.0505	0.0514	0.0487	0.0495	0.0486

Table F11: Estimated alpha levels of test for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.0501	0.0513	0.0494	0.0502	0.0494	0.0494	0.0502	0.0502
15	0.0458	0.0513	0.0497	0.0507	0.0507	0.0499	0.0489	0.0524
20	0.0477	0.0513	0.0493	0.0486	0.0501	0.0505	0.0476	0.0496
25	0.0492	0.0513	0.0510	0.0466	0.0495	0.0508	0.0486	0.0453
30	0.0529	0.0513	0.0494	0.0502	0.0518	0.0503	0.0508	0.0509
35	0.0531	0.0513	0.0487	0.0517	0.0507	0.0495	0.0498	0.0509
40	0.0507	0.0513	0.0503	0.0466	0.0479	0.0509	0.0505	0.0472

Table F12: Estimated alpha levels of test for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.1807	0.1759	0.2334	0.3084	0.2334	0.2334	0.3084	0.3084
15	0.0432	0.0506	0.0494	0.0488	0.0494	0.0494	0.0488	0.0488
20	0.0381	0.0506	0.0513	0.0513	0.0511	0.0522	0.0514	0.0532
25	0.0443	0.0506	0.0513	0.0525	0.0548	0.0495	0.0535	0.0487
30	0.0563	0.0506	0.0509	0.0526	0.0492	0.0492	0.0483	0.0542
35	0.0548	0.0506	0.0497	0.0508	0.0497	0.0512	0.0493	0.0510
40	0.0530	0.0506	0.0479	0.0489	0.0483	0.0502	0.0480	0.0502

Table F13: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.0482	0.0518	0.0499	0.0509	0.0499	0.0499	0.0509	0.0509
15	0.0415	0.0518	0.0493	0.0497	0.0494	0.0499	0.0473	0.0496
20	0.0499	0.0518	0.0507	0.0486	0.0529	0.0500	0.0512	0.0508
25	0.0501	0.0518	0.0511	0.0478	0.0491	0.0517	0.0487	0.0460
30	0.0536	0.0518	0.0492	0.0509	0.0511	0.0516	0.0498	0.0526
35	0.0567	0.0518	0.0485	0.0517	0.0490	0.0511	0.0489	0.0527
40	0.0532	0.0518	0.0494	0.0511	0.0519	0.0502	0.0500	0.0517

Table F14: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.0467	0.0547	0.0527	0.0508	0.0527	0.0527	0.0508	0.0508
15	0.0409	0.0547	0.0530	0.0518	0.0525	0.0523	0.0518	0.0516
20	0.0518	0.0547	0.0529	0.0560	0.0534	0.0521	0.0526	0.0550
25	0.0516	0.0547	0.0546	0.0528	0.0518	0.0549	0.0518	0.0509
30	0.0548	0.0547	0.0515	0.0526	0.0518	0.0533	0.0528	0.0513
35	0.0555	0.0547	0.0522	0.0516	0.0525	0.0521	0.0536	0.0522
40	0.0477	0.0547	0.0529	0.0497	0.0495	0.0541	0.0529	0.0478

Table F15: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 10$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.0482	0.0512	0.0493	0.0503	0.0493	0.0493	0.0503	0.0503
15	0.0417	0.0512	0.0514	0.0487	0.0504	0.0510	0.0493	0.0503
20	0.0474	0.0512	0.0498	0.0475	0.0505	0.0492	0.0480	0.0462
25	0.0532	0.0512	0.0516	0.0498	0.0495	0.0506	0.0484	0.0492
30	0.0510	0.0512	0.0484	0.0486	0.0517	0.0507	0.0504	0.0483
35	0.0536	0.0512	0.0509	0.0528	0.0522	0.0505	0.0524	0.0511
40	0.0534	0.0512	0.0512	0.0521	0.0523	0.0510	0.0523	0.0502

Table F16: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0;

Fixed Sample Size $n_a = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0462	0.0511	0.0491	0.0503	0.0491	0.0491	0.0503	0.0503
15	0.0429	0.0511	0.0498	0.0519	0.0507	0.0500	0.0514	0.0536
20	0.0493	0.0511	0.0498	0.0530	0.0526	0.0498	0.0528	0.0525
25	0.0504	0.0511	0.0495	0.0512	0.0526	0.0492	0.0516	0.0500
30	0.0520	0.0511	0.0494	0.0501	0.0528	0.0502	0.0505	0.0491
35	0.0539	0.0511	0.0505	0.0507	0.0515	0.0492	0.0514	0.0491
40	0.0549	0.0511	0.0471	0.0496	0.0509	0.0493	0.0481	0.0555

Table F17: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0536	0.0535	0.0543	0.0512	0.0529	0.0536	0.0525	0.0507
15	0.0517	0.0535	0.0496	0.0488	0.0494	0.0519	0.0510	0.0475
20	0.0581	0.0535	0.0525	0.0503	0.0508	0.0530	0.0525	0.0515
25	0.0505	0.0535	0.0528	0.0519	0.0517	0.0535	0.0526	0.0489
30	0.0448	0.0532	0.0501	0.0476	0.0472	0.0532	0.0502	0.0498
35	0.0620	0.0532	0.0516	0.0519	0.0523	0.0532	0.0526	0.0496
40	0.0523	0.0532	0.0520	0.0497	0.0499	0.0536	0.0526	0.0519

Table F18: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.0444	0.0486	0.0481	0.0485	0.0481	0.0481	0.0485	0.0485
15	0.0445	0.0486	0.0479	0.0521	0.0483	0.0486	0.0505	0.0534
20	0.0489	0.0486	0.0481	0.0511	0.0503	0.0477	0.0492	0.0505
25	0.0551	0.0486	0.0499	0.0523	0.0491	0.0482	0.0482	0.0533
30	0.0506	0.0486	0.0480	0.0494	0.0508	0.0481	0.0487	0.0475
35	0.0559	0.0486	0.0495	0.0512	0.0501	0.0491	0.0502	0.0535
40	0.0496	0.0486	0.0496	0.0505	0.0514	0.0487	0.0495	0.0486

Table F19: Estimated alpha levels of test for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0389	0.0494	0.0517	0.0507	0.0517	0.0517	0.0507	0.0507
20	0.0389	0.0503	0.0489	0.0459	0.0494	0.0497	0.0451	0.0477
25	0.0389	0.0523	0.0528	0.0500	0.0526	0.0524	0.0503	0.0514
30	0.0389	0.0548	0.0550	0.0507	0.0553	0.0551	0.0488	0.0542
35	0.0389	0.0509	0.0501	0.0496	0.0507	0.0503	0.0497	0.0484
40	0.0389	0.0470	0.0477	0.0480	0.0471	0.0478	0.0486	0.0487

Table F20: Estimated alpha levels of test for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0419	0.0486	0.0484	0.0495	0.0484	0.0484	0.0495	0.0495
20	0.0419	0.0511	0.0495	0.0487	0.0498	0.0501	0.0502	0.0486
25	0.0419	0.0498	0.0493	0.0498	0.0492	0.0496	0.0502	0.0488
30	0.0419	0.0486	0.0479	0.0446	0.0488	0.0478	0.0475	0.0458
35	0.0419	0.0510	0.0503	0.0484	0.0509	0.0505	0.0493	0.0506
40	0.0419	0.0525	0.0526	0.0521	0.0527	0.0519	0.0517	0.0502

Table F21: Estimated alpha levels of test for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0406	0.0462	0.0481	0.0482	0.0481	0.0481	0.0482	0.0482
20	0.0406	0.0474	0.0467	0.0509	0.0466	0.0471	0.0497	0.0492
25	0.0406	0.0484	0.0486	0.0504	0.0484	0.0490	0.0508	0.0493
30	0.0406	0.0513	0.0518	0.0528	0.0514	0.0517	0.0539	0.0515
35	0.0406	0.0483	0.0485	0.0491	0.0485	0.0488	0.0473	0.0502
40	0.0406	0.0478	0.0479	0.0512	0.0479	0.0483	0.0501	0.0505

Table F22: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0420	0.0490	0.0495	0.0516	0.0495	0.0495	0.0516	0.0516
20	0.0420	0.0529	0.0515	0.0515	0.0520	0.0520	0.0508	0.0511
25	0.0420	0.0511	0.0509	0.0489	0.0512	0.0502	0.0472	0.0488
30	0.0420	0.0514	0.0511	0.0519	0.0512	0.0518	0.0488	0.0514
35	0.0420	0.0537	0.0534	0.0492	0.0534	0.0534	0.0491	0.0515
40	0.0420	0.0492	0.0492	0.0484	0.0493	0.0487	0.0478	0.0474

Table F23: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0364	0.0495	0.0503	0.0484	0.0503	0.0503	0.0484	0.0484
20	0.0364	0.0494	0.0477	0.0466	0.0484	0.0481	0.0461	0.0460
25	0.0364	0.0544	0.0546	0.0507	0.0545	0.0545	0.0488	0.0536
30	0.0364	0.0506	0.0506	0.0523	0.0513	0.0508	0.0489	0.0508
35	0.0364	0.0537	0.0539	0.0494	0.0536	0.0543	0.0495	0.0528
40	0.0364	0.0478	0.0480	0.0495	0.0478	0.0482	0.0459	0.0481

Table F24: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0418	0.0494	0.0504	0.0516	0.0504	0.0504	0.0516	0.0516
20	0.0418	0.0504	0.0494	0.0486	0.0504	0.0500	0.0491	0.0475
25	0.0418	0.0526	0.0538	0.0500	0.0534	0.0540	0.0506	0.0511
30	0.0418	0.0485	0.0492	0.0497	0.0489	0.0489	0.0492	0.0503
35	0.0418	0.0506	0.0504	0.0498	0.0505	0.0510	0.0529	0.0505
40	0.0418	0.0478	0.0482	0.0488	0.0482	0.0480	0.0523	0.0479

Table F25: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0408	0.0494	0.0497	0.0509	0.0497	0.0497	0.0509	0.0509
20	0.0408	0.0533	0.0524	0.0510	0.0527	0.0528	0.0508	0.0521
25	0.0408	0.0501	0.0498	0.0488	0.0501	0.0503	0.0498	0.0485
30	0.0408	0.0482	0.0482	0.0529	0.0483	0.0490	0.0498	0.0531
35	0.0408	0.0542	0.0538	0.0524	0.0540	0.0541	0.0526	0.0539
40	0.0408	0.0478	0.0475	0.0463	0.0476	0.0471	0.0507	0.0483

Table F26: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 15$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.0412	0.0494	0.0502	0.0502	0.0502	0.0502	0.0502	0.0502
20	0.0412	0.0470	0.0462	0.0500	0.0462	0.0463	0.0498	0.0486
25	0.0412	0.0498	0.0504	0.0513	0.0498	0.0499	0.0518	0.0518
30	0.0412	0.0502	0.0506	0.0496	0.0507	0.0503	0.0502	0.0509
35	0.0412	0.0501	0.0502	0.0487	0.0499	0.0505	0.0496	0.0508
40	0.0412	0.0491	0.0494	0.0494	0.0493	0.0491	0.0528	0.0498

Table F27: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0389	0.0494	0.0517	0.0507	0.0517	0.0517	0.0507	0.0507
20	0.0389	0.0503	0.0489	0.0459	0.0494	0.0497	0.0451	0.0477
25	0.0389	0.0523	0.0528	0.0500	0.0526	0.0524	0.0503	0.0514
30	0.0389	0.0548	0.0550	0.0507	0.0553	0.0551	0.0488	0.0542
35	0.0389	0.0509	0.0501	0.0496	0.0507	0.0503	0.0497	0.0484
40	0.0389	0.0470	0.0477	0.0480	0.0471	0.0478	0.0486	0.0487

Table F28: Estimated alpha levels of test for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0405	0.0497	0.0494	0.0470	0.0494	0.0494	0.0470	0.0470
20	0.0454	0.0497	0.0511	0.0483	0.0509	0.0509	0.0478	0.0477
25	0.0545	0.0497	0.0499	0.0499	0.0500	0.0499	0.0493	0.0523
30	0.0522	0.0497	0.0506	0.0511	0.0495	0.0512	0.0494	0.0484
35	0.0550	0.0497	0.0502	0.0503	0.0501	0.0494	0.0494	0.0499
40	0.0524	0.0497	0.0491	0.0518	0.0501	0.0506	0.0504	0.0539

Table F29: Estimated alpha levels of test for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0389	0.0499	0.0497	0.0484	0.0497	0.0497	0.0484	0.0484
20	0.0530	0.0499	0.0508	0.0497	0.0507	0.0508	0.0498	0.0498
25	0.0515	0.0499	0.0517	0.0502	0.0507	0.0516	0.0497	0.0517
30	0.0555	0.0499	0.0513	0.0520	0.0511	0.0508	0.0529	0.0498
35	0.0519	0.0499	0.0506	0.0501	0.0500	0.0505	0.0508	0.0486
40	0.0557	0.0499	0.0512	0.0499	0.0508	0.0509	0.0515	0.0537

Table F30: Estimated alpha levels of test for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0429	0.0551	0.0548	0.0518	0.0548	0.0548	0.0518	0.0518
20	0.0483	0.0551	0.0539	0.0503	0.0537	0.0541	0.0508	0.0509
25	0.0506	0.0551	0.0555	0.0526	0.0545	0.0556	0.0540	0.0513
30	0.0551	0.0551	0.0560	0.0501	0.0543	0.0557	0.0535	0.0516
35	0.0556	0.0551	0.0537	0.0503	0.0507	0.0544	0.0504	0.0511
40	0.0489	0.0551	0.0537	0.0500	0.0523	0.0550	0.0528	0.0480

Table F31: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0389	0.0484	0.0486	0.0469	0.0486	0.0486	0.0469	0.0469
20	0.0540	0.0484	0.0507	0.0534	0.0502	0.0500	0.0523	0.0534
25	0.0555	0.0484	0.0489	0.0487	0.0487	0.0482	0.0497	0.0512
30	0.0542	0.0484	0.0491	0.0509	0.0497	0.0479	0.0493	0.0506
35	0.0561	0.0484	0.0495	0.0519	0.0503	0.0485	0.0514	0.0533
40	0.0476	0.0484	0.0479	0.0482	0.0496	0.0488	0.0497	0.0463

Table F32: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0408	0.0531	0.0532	0.0539	0.0532	0.0532	0.0539	0.0539
20	0.0479	0.0531	0.0536	0.0508	0.0538	0.0532	0.0523	0.0495
25	0.0504	0.0531	0.0525	0.0544	0.0524	0.0525	0.0552	0.0513
30	0.0574	0.0531	0.0533	0.0543	0.0540	0.0532	0.0542	0.0541
35	0.0534	0.0531	0.0537	0.0510	0.0527	0.0529	0.0522	0.0497
40	0.0503	0.0531	0.0527	0.0489	0.0525	0.0533	0.0515	0.0489

Table F33: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0422	0.0513	0.0502	0.0500	0.0502	0.0502	0.0500	0.0500
20	0.0516	0.0513	0.0525	0.0523	0.0528	0.0521	0.0510	0.0533
25	0.0495	0.0513	0.0524	0.0512	0.0502	0.0512	0.0493	0.0509
30	0.0535	0.0513	0.0510	0.0526	0.0512	0.0511	0.0508	0.0514
35	0.0504	0.0513	0.0498	0.0472	0.0483	0.0506	0.0486	0.0456
40	0.0534	0.0513	0.0505	0.0507	0.0510	0.0507	0.0517	0.0504

Table F34: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0434	0.0495	0.0506	0.0519	0.0506	0.0506	0.0519	0.0519
20	0.0510	0.0495	0.0506	0.0495	0.0505	0.0506	0.0496	0.0507
25	0.0517	0.0495	0.0504	0.0504	0.0493	0.0504	0.0497	0.0526
30	0.0547	0.0495	0.0505	0.0500	0.0494	0.0500	0.0483	0.0496
35	0.0582	0.0495	0.0514	0.0515	0.0508	0.0498	0.0503	0.0525
40	0.0479	0.0495	0.0496	0.0497	0.0514	0.0505	0.0502	0.0472

Table F35: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0422	0.0525	0.0541	0.0530	0.0541	0.0541	0.0530	0.0530
20	0.0456	0.0525	0.0531	0.0484	0.0530	0.0532	0.0500	0.0488
25	0.0568	0.0525	0.0544	0.0520	0.0539	0.0539	0.0521	0.0537
30	0.0514	0.0525	0.0528	0.0531	0.0521	0.0537	0.0519	0.0503
35	0.0518	0.0525	0.0556	0.0525	0.0542	0.0540	0.0567	0.0524
40	0.0527	0.0525	0.0511	0.0452	0.0498	0.0528	0.0493	0.0488

Table F36: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.0405	0.0497	0.0494	0.0470	0.0494	0.0494	0.0470	0.0470
20	0.0454	0.0497	0.0511	0.0483	0.0509	0.0509	0.0478	0.0477
25	0.0545	0.0497	0.0499	0.0499	0.0500	0.0499	0.0493	0.0523
30	0.0522	0.0497	0.0506	0.0511	0.0495	0.0512	0.0494	0.0484
35	0.0550	0.0497	0.0502	0.0503	0.0501	0.0494	0.0494	0.0499
40	0.0524	0.0497	0.0491	0.0518	0.0501	0.0506	0.0504	0.0539

Table F37: Estimated alpha levels of test for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.0478	0.0529	0.0525	0.0534	0.0525	0.0525	0.0534	0.0534
25	0.0478	0.0478	0.0488	0.0469	0.0482	0.0490	0.0470	0.0464
30	0.0478	0.0523	0.0517	0.0504	0.0517	0.0514	0.0489	0.0504
35	0.0478	0.0458	0.0456	0.0470	0.0463	0.0455	0.0491	0.0491
40	0.0478	0.0482	0.0481	0.0486	0.0477	0.0481	0.0493	0.0484

Table F38: Estimated alpha levels of test for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.0486	0.0489	0.0482	0.0491	0.0482	0.0482	0.0491	0.0491
25	0.0486	0.0494	0.0498	0.0510	0.0498	0.0493	0.0519	0.0509
30	0.0486	0.0504	0.0505	0.0502	0.0506	0.0499	0.0510	0.0505
35	0.0486	0.0529	0.0529	0.0517	0.0530	0.0527	0.0529	0.0521
40	0.0486	0.0488	0.0490	0.0513	0.0487	0.0492	0.0525	0.0494

Table F39: Estimated alpha levels of test for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed number of Blocks $n_b = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.0513	0.0533	0.0524	0.0540	0.0524	0.0524	0.0540	0.0540
25	0.0513	0.0488	0.0488	0.0505	0.0487	0.0489	0.0507	0.0520
30	0.0513	0.0494	0.0500	0.0498	0.0499	0.0492	0.0513	0.0488
35	0.0513	0.0492	0.0484	0.0546	0.0489	0.0489	0.0545	0.0529
40	0.0513	0.0511	0.0504	0.0524	0.0506	0.0506	0.0514	0.0503

Table F40: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.0467	0.0547	0.0525	0.0525	0.0525	0.0525	0.0525	0.0525
25	0.0467	0.0507	0.0509	0.0509	0.0511	0.0510	0.0518	0.0500
30	0.0467	0.0503	0.0503	0.0493	0.0500	0.0512	0.0514	0.0501
35	0.0467	0.0497	0.0485	0.0483	0.0488	0.0487	0.0477	0.0489
40	0.0467	0.0508	0.0508	0.0488	0.0508	0.0510	0.0482	0.0495

Table F41: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.0475	0.0543	0.0554	0.0543	0.0554	0.0554	0.0543	0.0543
25	0.0475	0.0505	0.0501	0.0512	0.0503	0.0500	0.0509	0.0503
30	0.0475	0.0480	0.0479	0.0517	0.0482	0.0483	0.0493	0.0500
35	0.0475	0.0531	0.0531	0.0529	0.0528	0.0531	0.0513	0.0512
40	0.0475	0.0487	0.0487	0.0486	0.0483	0.0484	0.0484	0.0510

Table F42: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.0502	0.0496	0.0492	0.0511	0.0492	0.0492	0.0511	0.0511
25	0.0502	0.0509	0.0511	0.0507	0.0510	0.0508	0.0529	0.0506
30	0.0502	0.0481	0.0478	0.0466	0.0479	0.0481	0.0478	0.0466
35	0.0502	0.0530	0.0524	0.0520	0.0525	0.0529	0.0525	0.0505
40	0.0502	0.0502	0.0505	0.0534	0.0502	0.0507	0.0542	0.0519

Table F43: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.0480	0.0561	0.0561	0.0529	0.0561	0.0561	0.0529	0.0529
25	0.0480	0.0575	0.0580	0.0556	0.0580	0.0579	0.0556	0.0558
30	0.0480	0.0593	0.0584	0.0542	0.0590	0.0588	0.0530	0.0537
35	0.0480	0.0571	0.0564	0.0559	0.0567	0.0562	0.0495	0.0575
40	0.0480	0.0598	0.0601	0.0542	0.0597	0.0595	0.0512	0.0542

Table F44: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.0467	0.0485	0.0482	0.0474	0.0482	0.0482	0.0474	0.0474
25	0.0467	0.0513	0.0505	0.0504	0.0507	0.0504	0.0513	0.0504
30	0.0467	0.0527	0.0532	0.0511	0.0533	0.0540	0.0515	0.0520
35	0.0467	0.0517	0.0515	0.0469	0.0517	0.0518	0.0471	0.0500
40	0.0467	0.0499	0.0497	0.0471	0.0498	0.0502	0.0483	0.0467

Table F45: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.0478	0.0529	0.0525	0.0534	0.0525	0.0525	0.0534	0.0534
25	0.0478	0.0478	0.0488	0.0469	0.0482	0.0490	0.0470	0.0464
30	0.0478	0.0523	0.0517	0.0504	0.0517	0.0514	0.0489	0.0504
35	0.0478	0.0458	0.0456	0.0470	0.0463	0.0455	0.0491	0.0491
40	0.0478	0.0482	0.0481	0.0486	0.0477	0.0481	0.0493	0.0484

Table F46: Estimated alpha levels of test for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0459	0.0519	0.0501	0.0489	0.0501	0.0501	0.0489	0.0489
25	0.0519	0.0519	0.0494	0.0507	0.0500	0.0502	0.0514	0.0508
30	0.0532	0.0519	0.0512	0.0511	0.0503	0.0513	0.0496	0.0504
35	0.0567	0.0519	0.0500	0.0540	0.0503	0.0514	0.0528	0.0543
40	0.0499	0.0519	0.0513	0.0500	0.0517	0.0511	0.0520	0.0494

Table F47: Estimated alpha levels of test for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0515	0.0536	0.0529	0.0526	0.0529	0.0529	0.0526	0.0526
25	0.0521	0.0536	0.0521	0.0497	0.0519	0.0523	0.0498	0.0471
30	0.0507	0.0536	0.0514	0.0514	0.0522	0.0524	0.0525	0.0507
35	0.0504	0.0536	0.0525	0.0491	0.0518	0.0530	0.0516	0.0488
40	0.0531	0.0536	0.0517	0.0500	0.0506	0.0528	0.0509	0.0502

Table F48: Estimated alpha levels of test for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0494	0.0515	0.0516	0.0506	0.0516	0.0516	0.0506	0.0506
25	0.0512	0.0515	0.0517	0.0493	0.0518	0.0520	0.0499	0.0497
30	0.0534	0.0515	0.0530	0.0508	0.0531	0.0525	0.0503	0.0495
35	0.0535	0.0515	0.0510	0.0519	0.0506	0.0510	0.0522	0.0503
40	0.0507	0.0515	0.0511	0.0480	0.0512	0.0513	0.0503	0.0474

Table F49: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0481	0.0483	0.0474	0.0492	0.0474	0.0474	0.0492	0.0492
25	0.0513	0.0483	0.0484	0.0519	0.0488	0.0480	0.0521	0.0508
30	0.0528	0.0483	0.0476	0.0477	0.0477	0.0480	0.0474	0.0487
35	0.0524	0.0483	0.0471	0.0468	0.0468	0.0478	0.0463	0.0482
40	0.0507	0.0483	0.0468	0.0461	0.0461	0.0471	0.0470	0.0481

Table F50: Estimated alpha levels of test for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0472	0.0493	0.0480	0.0454	0.0480	0.0480	0.0454	0.0454
25	0.0500	0.0493	0.0490	0.0503	0.0493	0.0493	0.0493	0.0503
30	0.0534	0.0493	0.0492	0.0502	0.0488	0.0491	0.0489	0.0500
35	0.0567	0.0493	0.0484	0.0507	0.0490	0.0491	0.0496	0.0511
40	0.0545	0.0493	0.0499	0.0502	0.0503	0.0494	0.0518	0.0529

Table F51: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0538	0.0499	0.0502	0.0547	0.0502	0.0502	0.0547	0.0547
25	0.0553	0.0499	0.0495	0.0496	0.0501	0.0497	0.0502	0.0487
30	0.0542	0.0499	0.0492	0.0488	0.0494	0.0500	0.0484	0.0485
35	0.0540	0.0499	0.0507	0.0492	0.0506	0.0505	0.0487	0.0490
40	0.0513	0.0499	0.0499	0.0507	0.0498	0.0491	0.0472	0.0494

Table F52: Estimated alpha levels of test for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0506	0.0592	0.0591	0.0554	0.0591	0.0591	0.0554	0.0554
25	0.0554	0.0592	0.0590	0.0525	0.0593	0.0594	0.0545	0.0525
30	0.0530	0.0592	0.0597	0.0556	0.0600	0.0588	0.0565	0.0538
35	0.0565	0.0592	0.0593	0.0533	0.0600	0.0585	0.0572	0.0515
40	0.0512	0.0592	0.0580	0.0544	0.0574	0.0580	0.0568	0.0521

Table F53: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0474	0.0498	0.0485	0.0476	0.0485	0.0485	0.0476	0.0476
25	0.0533	0.0498	0.0491	0.0507	0.0495	0.0501	0.0499	0.0497
30	0.0533	0.0498	0.0492	0.0480	0.0492	0.0493	0.0486	0.0489
35	0.0573	0.0498	0.0491	0.0540	0.0502	0.0492	0.0518	0.0552
40	0.0509	0.0498	0.0479	0.0485	0.0482	0.0495	0.0471	0.0490

Table F54: Estimated alpha levels of test for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.0459	0.0519	0.0501	0.0489	0.0501	0.0501	0.0489	0.0489
25	0.0519	0.0519	0.0494	0.0507	0.0500	0.0502	0.0514	0.0508
30	0.0532	0.0519	0.0512	0.0511	0.0503	0.0513	0.0496	0.0504
35	0.0567	0.0519	0.0500	0.0540	0.0503	0.0514	0.0528	0.0543
40	0.0499	0.0519	0.0513	0.0500	0.0517	0.0511	0.0520	0.0494

APPENDIX G: ESTIMATED POWERS FIVE POPULATIONS

Table G1: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Number of Blocks $n_b = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.2542	0.3044	0.3305	**0.4170**	0.3305	0.3305	**0.4170**	**0.4170**
15	0.2542	0.3808	0.4015	0.4916	0.3958	0.4107	0.4599	**0.4998**
20	0.2542	0.4562	0.4677	0.5443	0.4644	0.4807	0.4716	**0.5554**
25	0.2542	0.5121	0.5221	0.5810	0.5156	0.5345	0.4574	**0.6007**
30	0.2542	0.5680	0.5753	0.6207	0.5702	0.5906	0.4500	**0.6426**
35	0.2542	0.6318	0.6353	0.6644	0.6327	0.6484	0.4472	**0.6953**
40	0.2542	0.6753	0.6801	0.6981	0.6769	0.6930	0.4350	**0.7292**

Table G2: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.4438	0.5149	0.5751	**0.7357**	0.5751	0.5751	**0.7357**	**0.7357**
15	0.4438	0.6591	0.6948	0.8219	0.6842	0.7099	0.7844	**0.8264**
20	0.4438	0.7715	0.7869	0.8700	0.7804	0.8024	0.7847	**0.8800**
25	0.4438	0.8551	0.8637	0.9116	0.8586	0.8768	0.7805	**0.9258**
30	0.4438	0.9025	0.9093	0.9367	0.9058	0.9211	0.7686	**0.9523**
35	0.4438	0.9389	0.9411	0.9569	0.9396	0.9476	0.7588	**0.9663**
40	0.4438	0.9603	0.9621	0.9699	0.9611	0.9661	0.7473	**0.9793**

Table G3: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed number of Blocks $n_b = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.3297	0.3416	0.3824	**0.5440**	0.3824	0.3824	**0.5440**	**0.5440**
15	0.3297	0.4499	0.4804	0.6147	0.4735	0.4935	0.5905	**0.6173**
20	0.3297	0.5320	0.5461	0.6793	0.5399	0.5654	0.5983	**0.6760**
25	0.3297	0.6278	0.6400	0.7354	0.6322	0.6584	0.5981	**0.7422**
30	0.3297	0.6945	0.7032	0.7786	0.6972	0.7228	0.5919	**0.7887**
35	0.3297	0.7475	0.7538	0.8122	0.7496	0.7721	0.5778	**0.8266**
40	0.3297	0.7972	0.8023	0.8422	0.7986	0.8136	0.5692	**0.8546**

Table G4: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2483	0.2106	0.2375	**0.3465**	0.2375	0.2375	**0.3465**	**0.3465**
15	0.2483	0.2642	0.2819	0.3900	0.2786	0.2907	0.3809	**0.3846**
20	0.2483	0.3154	0.3251	0.4332	0.3203	0.3400	0.3927	**0.4243**
25	0.2483	0.3562	0.3650	0.4652	0.3592	0.3781	0.3953	**0.4531**
30	0.2483	0.3898	0.3977	0.4895	0.3931	0.4150	0.3797	**0.4751**
35	0.2483	0.4292	0.4324	0.5222	0.4298	0.4445	0.3778	**0.4987**
40	0.2483	0.4724	0.4779	0.5492	0.4733	0.4885	0.3725	**0.5421**

Table G5: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.2610	0.1707	0.1919	**0.3193**	0.1919	0.1919	**0.3193**	**0.3193**
15	0.2610	0.2065	0.2223	**0.3597**	0.2172	0.2313	0.3572	0.3421
20	0.2610	0.2404	0.2509	**0.3852**	0.2477	0.2634	0.3699	0.3585
25	0.2610	0.2759	0.2854	**0.4141**	0.2796	0.2962	0.3739	0.3741
30	0.2610	0.3220	0.3287	**0.4534**	0.3252	0.3419	0.3718	0.4133
35	0.2610	0.3437	0.3488	**0.4684**	0.3446	0.3629	0.3686	0.4278
40	0.2610	0.3746	0.3792	**0.4872**	0.3756	0.3938	0.3635	0.4490

Table G6: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.4317	0.2172	0.2628	**0.5133**	0.2628	0.2628	**0.5133**	**0.5133**
15	0.4317	0.2673	0.2955	**0.5638**	0.2869	0.3134	0.5773	0.5233
20	0.4317	0.3316	0.3497	**0.6178**	0.3404	0.3723	0.6088	0.5526
25	0.4317	0.3824	0.4000	**0.6485**	0.3897	0.4230	0.6059	0.5643
30	0.4317	0.4366	0.4482	**0.6847**	0.4413	0.4712	0.6113	0.5957
35	0.4317	0.4848	0.4936	**0.7198**	0.4867	0.5177	0.6069	0.6275
40	0.4317	0.5294	0.5375	**0.7454**	0.5315	0.5583	0.6011	0.6464

Table G7: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)									
Sample			Approach						
Size	L*	FW*	I	II	III	IV	V	VI
10	0.4367	0.1419	0.1802	**0.4280**	0.1802	0.1802	**0.4280**	**0.4280**
15	0.4367	0.1713	0.1943	**0.4607**	0.1866	0.2072	0.5004	0.4000
20	0.4367	0.2033	0.2201	**0.4979**	0.2123	0.2378	0.5334	0.4027
25	0.4367	0.2280	0.2408	**0.5204**	0.2318	0.2599	0.5418	0.3982
30	0.4367	0.2549	0.2667	**0.5516**	0.2606	0.2884	0.5467	0.4116
35	0.4367	0.2759	0.2848	**0.5651**	0.2783	0.3072	0.5437	0.4109
40	0.4367	0.3054	0.3140	**0.5946**	0.3072	0.3343	0.5451	0.4339

Table G8: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.3291	0.2188	0.2578	**0.4421**	0.2578	0.2578	**0.4421**	**0.4421**
15	0.3291	0.2813	0.3066	**0.4916**	0.2995	0.3192	0.4928	0.4727
20	0.3291	0.3463	0.3613	**0.5458**	0.3550	0.3794	0.5130	0.5083
25	0.3291	0.3964	0.4105	**0.5859**	0.4016	0.4319	0.5132	0.5426
30	0.3291	0.4548	0.4667	**0.6270**	0.4601	0.4876	0.5081	0.5796
35	0.3291	0.5089	0.5159	**0.6581**	0.5108	0.5381	0.5059	0.6140
40	0.3291	0.5451	0.5512	**0.6866**	0.5469	0.5693	0.4964	0.6444

Table G9: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.2751	0.1318	0.1590	**0.2669**	0.1590	0.1590	**0.2669**	**0.2669**
15	0.2751	0.1549	0.1642	**0.3001**	0.1621	0.1748	0.3062	0.2744
20	0.2751	0.1746	0.1858	**0.3273**	0.1811	0.1971	0.3189	0.2869
25	0.2751	0.2038	0.2114	**0.3423**	0.2078	0.2215	0.3231	0.2916
30	0.2751	0.2263	0.2331	**0.3642**	0.2281	0.2465	0.3194	0.3078
35	0.2751	0.2551	0.2620	**0.3958**	0.2570	0.2742	0.3300	0.3334
40	0.2751	0.2742	0.2779	**0.4054**	0.2750	0.2888	0.3195	0.3412

Table G10: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Sample Size $n_a = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.2602	0.3058	0.3313	**0.4287**	0.3313	0.3313	**0.4287**	**0.4287**
15	0.3081	0.3058	0.3536	**0.4894**	0.3754	0.3378	0.4713	0.4831
20	0.4007	0.3058	0.3725	**0.5341**	0.4333	0.3374	0.4810	0.5294
25	0.4686	0.3058	0.3884	**0.5742**	0.4814	0.3381	0.4727	0.5663
30	0.5270	0.3058	0.4001	**0.6159**	0.5540	0.3378	0.4735	0.6118
35	0.5797	0.3058	0.4186	0.6516	0.6045	0.3373	0.4666	**0.6528**
40	0.6162	0.3058	0.4347	0.6768	0.6618	0.3382	0.4554	**0.6812**

Table G11: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.4356	0.5073	0.5667	**0.7348**	0.5667	0.5667	**0.7348**	**0.7348**
15	0.5494	0.5073	0.5995	**0.8094**	0.6394	0.5700	0.7851	0.8070
20	0.6968	0.5073	0.6363	**0.8653**	0.7308	0.5720	0.7996	0.8589
25	0.7879	0.5073	0.6646	**0.8981**	0.8046	0.5742	0.7905	0.8941
30	0.8561	0.5073	0.6848	**0.9227**	0.8746	0.5742	0.7874	0.9213
35	0.9026	0.5073	0.7149	0.9446	0.9195	0.5732	0.7759	**0.9450**
40	0.9283	0.5073	0.7402	0.9609	0.9533	0.5743	0.7671	**0.9613**

Table G12: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.1807	0.1759	0.2334	0.3084	0.2334	0.2334	0.3084	**0.3084**
15	0.3259	0.3337	0.3786	0.5403	0.3786	0.3786	0.5403	**0.5403**
20	0.4178	0.3337	0.4066	0.6139	0.4418	0.3811	0.5824	**0.6167**
25	0.5321	0.3337	0.4329	0.6794	0.5219	0.3794	0.5996	**0.6807**
30	0.6253	0.3337	0.4586	0.7265	0.6045	0.3823	0.5887	**0.7351**
35	0.7091	0.3337	0.4765	0.7718	0.6856	0.3853	0.5802	**0.7886**
40	0.7721	0.3337	0.5057	0.8102	0.7567	0.3831	0.5693	**0.8309**

Table G13: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2592	0.2527	0.2812	**0.3909**	0.2812	0.2812	0.3909	0.3909
15	0.3079	0.2527	0.2965	**0.4421**	0.3178	0.2789	0.4202	0.4466
20	0.4003	0.2527	0.3142	**0.4880**	0.3771	0.2789	0.4254	0.4975
25	0.4658	0.2527	0.3314	**0.5348**	0.4292	0.2827	0.4192	0.5464
30	0.5275	0.2527	0.3414	0.5762	0.4950	0.2821	0.4156	**0.5917**
35	0.5764	0.2527	0.3609	0.6080	0.5603	0.2826	0.4079	**0.6311**
40	0.6256	0.2527	0.3788	0.6380	0.6189	0.2832	0.3970	**0.6690**

Table G14: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2586	0.1764	0.1990	**0.3237**	0.1990	0.1990	**0.3237**	**0.3237**
15	0.3057	0.1764	0.2189	0.3729	0.2373	0.2045	0.3412	**0.3934**
20	0.3934	0.1764	0.2289	0.4248	0.2898	0.2010	0.3404	**0.4529**
25	0.4674	0.1764	0.2485	0.4631	0.3465	0.2046	0.3360	**0.5053**
30	0.5188	0.1764	0.2564	0.4941	0.4087	0.2039	0.3239	**0.5544**
35	0.5820	0.1764	0.2755	0.5489	0.4862	0.2010	0.3215	**0.6133**
40	0.6195	0.1764	0.2923	0.5758	0.5520	0.2043	0.3088	**0.6528**

Table G15: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Sample Size $n_a = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.4370	0.2167	0.2631	**0.5158**	0.2631	0.2631	**0.5158**	**0.5158**
15	0.5593	0.2167	0.2883	0.6088	0.3291	0.2655	0.5376	**0.6559**
20	0.6946	0.2167	0.3186	0.6840	0.4251	0.2633	0.5275	**0.7500**
25	0.7940	0.2167	0.3472	0.7468	0.5370	0.2668	0.5165	**0.8279**
30	0.8608	0.2167	0.3710	0.8034	0.6609	0.2664	0.5034	**0.8852**
35	0.9061	0.2167	0.3987	0.8383	0.7572	0.2665	0.4811	**0.9192**
40	0.9394	0.2167	0.4386	0.8771	0.8524	0.2659	0.4747	**0.9494**

Table G16: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Sample Size $n_a = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.4321	0.1422	0.1758	**0.4312**	0.1758	0.1758	**0.4312**	**0.4312**
15	0.5490	0.1422	0.1994	**0.5276**	0.2309	0.1789	0.4399	**0.5889**
20	0.7009	0.1422	0.2202	**0.6069**	0.3155	0.1758	0.4250	**0.7133**
25	0.7910	0.1422	0.2467	**0.6750**	0.4290	0.1793	0.4098	**0.7961**
30	0.8598	0.1422	0.2677	**0.7365**	0.5621	0.1813	0.3916	**0.8596**
35	0.8955	0.1422	0.2922	**0.7761**	0.6764	0.1782	0.3738	**0.8929**
40	0.9332	0.1422	0.3221	**0.8224**	0.7842	0.1810	0.3581	**0.9348**

Table G17: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.3303	0.2162	0.2542	**0.4409**	0.2542	0.2542	**0.4409**	**0.4409**
15	0.4119	0.2162	0.2780	0.5099	0.3091	0.2565	0.4588	**0.5381**
20	0.5438	0.2162	0.3032	0.5847	0.3880	0.2594	0.4705	**0.6263**
25	0.6416	0.2162	0.3260	0.6480	0.4718	0.2606	0.4554	**0.6998**
30	0.7134	0.2162	0.3418	0.6904	0.5673	0.2588	0.4433	**0.7515**
35	0.7698	0.2162	0.3682	0.7293	0.6592	0.2592	0.4323	**0.8015**
40	0.8046	0.2162	0.3913	0.7662	0.7411	0.2607	0.4202	**0.8341**

Table G18: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.2688	0.1502	0.1798	**0.2947**	0.1798	0.1798	**0.2947**	**0.2947**
15	0.3382	0.1502	0.1911	0.3483	0.2114	0.1776	0.3120	**0.3736**
20	0.3528	0.1502	0.1985	0.3931	0.2502	0.1751	0.3054	**0.4256**
25	0.4561	0.1502	0.2234	0.4448	0.3214	0.1777	0.3085	**0.4942**
30	0.4690	0.1502	0.2327	0.4810	0.3874	0.1751	0.2918	**0.5443**
35	0.5554	0.1502	0.2448	0.5226	0.4580	0.1754	0.2879	**0.6051**
40	0.6108	0.1502	0.2686	0.5491	0.5266	0.1781	0.2798	**0.6407**

Table G19: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Number of Blocks $n_b = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.3078	0.3719	0.4027	**0.5458**	0.4027	0.4027	**0.5458**	**0.5458**
20	0.3078	0.4455	0.4638	0.5993	0.4599	0.4721	0.5808	**0.6016**
25	0.3078	0.5168	0.5303	0.6445	0.5248	0.5398	0.5938	**0.6532**
30	0.3078	0.5792	0.5903	0.6819	0.5853	0.5994	0.5939	**0.6970**
35	0.3078	0.6292	0.6374	0.7230	0.6329	0.6494	0.6027	**0.7378**
40	0.3078	0.6788	0.6858	0.7493	0.6807	0.6962	0.5860	**0.7659**

Table G20: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.5620	0.6541	0.7014	**0.8742**	0.7014	0.7014	**0.8742**	**0.8742**
20	0.5620	0.7669	0.7931	0.9183	0.7867	0.8024	0.9059	**0.9207**
25	0.5620	0.8504	0.8651	0.9459	0.8596	0.8742	0.9154	**0.9499**
30	0.5620	0.8994	0.9075	0.9648	0.9035	0.9159	0.9156	**0.9680**
35	0.5620	0.9375	0.9414	0.9756	0.9391	0.9470	0.9148	**0.9800**
40	0.5620	0.9635	0.9659	0.9826	0.9646	0.9687	0.9096	**0.9876**

Table G21: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.4153	0.4451	0.4856	**0.6935**	0.4856	0.4856	0.6935	0.6935
20	0.4153	0.5450	0.5690	**0.7502**	0.5635	0.5797	0.7346	0.7482
25	0.4153	0.6180	0.6382	**0.7935**	0.6294	0.6506	0.7477	0.7883
30	0.4153	0.6885	0.7018	**0.8311**	0.6961	0.7162	0.7525	0.8305
35	0.4153	0.7432	0.7534	0.8578	0.7479	0.7674	0.7508	**0.8605**
40	0.4153	0.7947	0.8011	0.8837	0.7968	0.8121	0.7369	**0.8846**

Table G22: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.3032	0.2583	0.2873	**0.4555**	0.2873	0.2873	**0.4555**	**0.4555**
20	0.3032	0.2972	0.3138	**0.4875**	0.3092	0.3208	0.4842	0.4765
25	0.3032	0.3464	0.3608	**0.5272**	0.3548	0.3716	0.5037	0.5078
30	0.3032	0.3992	0.4097	**0.5606**	0.4054	0.4199	0.5102	0.5437
35	0.3032	0.4304	0.4391	**0.5858**	0.4344	0.4511	0.5104	0.5603
40	0.3032	0.4747	0.4810	**0.6161**	0.4770	0.4947	0.5110	0.5945

Table G23: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.3015	0.2135	0.2363	**0.4126**	0.2363	0.2363	**0.4126**	**0.4126**
20	0.3015	0.2543	0.2680	**0.4462**	0.2651	0.2744	0.4501	0.4298
25	0.3015	0.2761	0.2896	**0.4633**	0.2840	0.2968	0.4560	0.4353
30	0.3015	0.3069	0.3172	**0.4915**	0.3125	0.3278	0.4698	0.4546
35	0.3015	0.3482	0.3571	**0.5230**	0.3511	0.3687	0.4699	0.4780
40	0.3015	0.3744	0.3810	**0.5444**	0.3771	0.3921	0.4707	0.4963

Table G24: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.5510	0.2650	0.3157	**0.6633**	0.3157	0.3157	**0.6633**	**0.6633**
20	0.5510	0.3313	0.3610	**0.7001**	0.3534	0.3737	0.7194	0.6697
25	0.5510	0.3838	0.4077	**0.7449**	0.3984	0.4253	0.7478	0.6880
30	0.5510	0.4331	0.4483	**0.7649**	0.4412	0.4662	0.7542	0.6918
35	0.5510	0.4730	0.4894	**0.7927**	0.4798	0.5102	0.7657	0.7071
40	0.5510	0.5331	0.5450	**0.8120**	0.5375	0.5600	0.7629	0.7293

Table G25: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.5581	0.1827	0.2198	**0.5711**	0.2198	0.2198	**0.5711**	**0.5711**
20	0.5581	0.1985	0.2211	**0.5925**	0.2161	0.2315	0.6287	0.5466
25	0.5581	0.2324	0.2520	**0.6306**	0.2442	0.2644	0.6736	0.5404
30	0.5581	0.2556	0.2735	**0.6570**	0.2654	0.2869	0.6934	0.5361
35	0.5581	0.2813	0.2922	**0.6682**	0.2858	0.3123	0.7015	0.5282
40	0.5581	0.3056	0.3151	**0.6834**	0.3093	0.3322	0.7000	0.5247

Table G26: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4188	0.2853	0.3240	**0.5809**	0.3240	0.3240	**0.5809**	**0.5809**
20	0.4188	0.3483	0.3724	**0.6282**	0.3662	0.3833	0.6298	0.6073
25	0.4188	0.3869	0.4045	**0.6582**	0.3975	0.4180	0.6504	0.6239
30	0.4188	0.4473	0.4613	**0.7022**	0.4548	0.4768	0.6651	0.6603
35	0.4188	0.5035	0.5138	**0.7279**	0.5079	0.5304	0.6645	0.6844
40	0.4188	0.5501	0.5601	**0.7555**	0.5540	0.5752	0.6660	0.7083

Table G27: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4131	0.2267	0.2605	**0.5247**	0.2605	0.2605	**0.5247**	**0.5247**
20	0.4131	0.2585	0.2795	**0.5637**	0.2744	0.2893	0.5773	0.5339
25	0.4131	0.3151	0.3331	**0.5968**	0.3249	0.3450	0.5973	0.5471
30	0.4131	0.3475	0.3624	**0.6194**	0.3562	0.3771	0.6078	0.5589
35	0.4131	0.3878	0.3996	**0.6550**	0.3923	0.4173	0.6161	0.5776
40	0.4131	0.4169	0.4248	**0.6687**	0.4206	0.4415	0.6111	0.5904

Table G28: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Sample Size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3091	0.3731	0.4033	**0.5416**	0.4033	0.4033	0.5416	0.5416
20	0.3955	0.3731	0.4149	**0.5891**	0.4265	0.4059	0.5785	0.5874
25	0.4826	0.3731	0.4255	**0.6325**	0.4551	0.4032	0.5970	0.6347
30	0.5380	0.3731	0.4362	0.6714	0.4898	0.4061	0.5985	**0.6694**
35	0.5702	0.3731	0.4452	**0.6893**	0.5259	0.4009	0.5961	0.6863
40	0.6174	0.3731	0.4525	**0.7247**	0.5673	0.4071	0.5947	0.7200

Table G29: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.5580	0.6543	0.7064	**0.8806**	0.7064	0.7064	**0.8806**	**0.8806**
20	0.6978	0.6543	0.7232	**0.9110**	0.7420	0.7085	0.9066	0.9090
25	0.7940	0.6543	0.7362	**0.9422**	0.7759	0.7082	0.9193	0.9372
30	0.8534	0.6543	0.7527	**0.9566**	0.8187	0.7078	0.9185	0.9523
35	0.8960	0.6543	0.7660	**0.9705**	0.8576	0.7089	0.9181	0.9679
40	0.9340	0.6543	0.7767	**0.9778**	0.8937	0.7093	0.9137	0.9768

Table G30: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4053	0.4366	0.4834	**0.6823**	0.4834	0.4834	**0.6823**	**0.6823**
20	0.5415	0.4366	0.4984	0.7524	0.5176	0.4835	0.7384	**0.7559**
25	0.6356	0.4366	0.5164	0.7955	0.5580	0.4815	0.7496	**0.7940**
30	0.7055	0.4366	0.5277	0.8282	0.6039	0.4831	0.7450	**0.8320**
35	0.7654	0.4366	0.5422	0.8575	0.6524	0.4823	0.7423	**0.8638**
40	0.8056	0.4366	0.5538	0.8826	0.7075	0.4808	0.7390	**0.8879**

Table G31: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
15	0.3058	0.3216	0.3496	**0.5063**	0.3496	0.3496	**0.5063**	**0.5063**
20	0.3959	0.3216	0.3599	**0.5459**	0.3708	0.3494	0.5296	0.5499
25	0.4688	0.3216	0.3704	**0.5930**	0.3986	0.3517	0.5519	0.5981
30	0.5253	0.3216	0.3807	**0.6223**	0.4313	0.3509	0.5431	0.6308
35	0.5774	0.3216	0.3907	**0.6607**	0.4684	0.3508	0.5446	0.6729
40	0.6154	0.3216	0.3966	**0.6842**	0.5090	0.3510	0.5378	0.6992

Table G32: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=.0.4

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2952	0.2031	0.2273	**0.3981**	0.2273	0.2273	**0.3981**	**0.3981**
20	0.3973	0.2031	0.2351	0.4529	0.2463	0.2286	0.4255	**0.4715**
25	0.4717	0.2031	0.2440	0.5003	0.2699	0.2287	0.4289	**0.5322**
30	0.5329	0.2031	0.2536	0.5283	0.3052	0.2294	0.4214	**0.5794**
35	0.5795	0.2031	0.2649	0.5714	0.3397	0.2278	0.4161	**0.6256**
40	0.6270	0.2031	0.2691	0.6005	0.3798	0.2273	0.4083	**0.6625**

Table G33: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Sample Size $n_a = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.5529	0.2779	0.3294	**0.6694**	0.3294	0.3294	**0.6694**	**0.6694**
20	0.6917	0.2779	0.3486	0.7358	0.3700	0.3321	0.6943	**0.7627**
25	0.7945	0.2779	0.3640	0.7978	0.4143	0.3330	0.6952	**0.8457**
30	0.8535	0.2779	0.3817	0.8444	0.4721	0.3322	0.6847	**0.8943**
35	0.8999	0.2779	0.4005	0.8702	0.5356	0.3330	0.6786	**0.9234**
40	0.9287	0.2779	0.4090	0.8998	0.6151	0.3349	0.6666	**0.9498**

Table G34: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Sample Size $n_a = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.5479	0.1716	0.2077	**0.5677**	0.2077	0.2077	**0.5677**	**0.5677**
20	0.6877	0.1716	0.2223	0.6412	0.2381	0.2097	0.5779	**0.6897**
25	0.7923	0.1716	0.2361	0.7154	0.2794	0.2096	0.5780	**0.7891**
30	0.8546	0.1716	0.2481	0.7653	0.3319	0.2091	0.5678	**0.8593**
35	0.8996	0.1716	0.2626	0.8078	0.4011	0.2084	0.5485	**0.8972**
40	0.9293	0.1716	0.2739	0.8460	0.4778	0.2091	0.5335	**0.9331**

Table G35: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
15	0.4125	0.2756	0.3163	**0.5710**	0.3163	0.3163	**0.5710**	**0.5710**
20	0.5439	0.2756	0.3344	0.6402	0.3514	0.3192	0.6055	**0.6621**
25	0.6307	0.2756	0.3455	0.6931	0.3850	0.3181	0.6082	**0.7233**
30	0.7107	0.2756	0.3603	0.7408	0.4365	0.3182	0.6100	**0.7839**
35	0.7649	0.2756	0.3740	0.7759	0.4916	0.3190	0.5974	**0.8231**
40	0.8097	0.2756	0.3858	0.8071	0.5527	0.3192	0.5944	**0.8555**

Table G36: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4051	0.2162	0.2505	**0.5148**	0.2505	0.2505	**0.5148**	**0.5148**
20	0.5433	0.2162	0.2632	0.5853	0.2776	0.2515	0.5425	**0.6144**
25	0.6396	0.2162	0.2767	0.6382	0.3153	0.2545	0.5402	**0.6889**
30	0.7059	0.2162	0.2880	0.6894	0.3620	0.2507	0.5390	**0.7561**
35	0.7657	0.2162	0.2998	0.7361	0.4123	0.2517	0.5289	**0.8080**
40	0.8079	0.2162	0.3096	0.7665	0.4772	0.2524	0.5190	**0.8388**

Table G37: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

		Fixed Number of Blocks $n_b = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)						
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.4043	0.4437	0.4713	**0.6463**	0.4713	0.4713	**0.6463**	**0.6463**
25	0.4043	0.5155	0.5360	0.6821	0.5306	0.5408	0.6660	**0.6872**
30	0.4043	0.5747	0.5907	0.7230	0.5871	0.5989	0.6927	**0.7294**
35	0.4043	0.6233	0.6339	0.7539	0.6298	0.6424	0.6936	**0.7639**
40	0.4043	0.6761	0.6851	0.7853	0.6805	0.6924	0.6939	**0.7945**

Table G38: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.6959	0.7755	0.8065	**0.9455**	0.8065	0.8065	**0.9455**	**0.9455**
25	0.6959	0.8484	0.8691	**0.9640**	0.8634	0.8720	0.9616	**0.9639**
30	0.6959	0.9007	0.9113	0.9767	0.9087	0.9161	0.9651	**0.9796**
35	0.6959	0.9420	0.9468	0.9859	0.9449	0.9507	0.9680	**0.9887**
40	0.6959	0.9621	0.9655	0.9901	0.9642	0.9692	0.9648	**0.9927**

Table G39: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed number of Blocks $n_b = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample		**Approach**						
Size	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.5264	0.2586	0.2892	**0.6174**	0.2892	0.2892	**0.6174**	**0.6174**
25	0.5264	0.3136	0.3369	**0.6552**	0.3309	0.3436	0.6677	0.6346
30	0.5264	0.3367	0.3552	**0.6811**	0.3489	0.3673	0.6951	0.6384
35	0.5264	0.3858	0.4015	**0.7124**	0.3948	0.4130	0.7110	0.6546
40	0.5264	0.4184	0.4304	**0.7323**	0.4243	0.4433	0.7150	0.6677

Table G40: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample		**Approach**						
Size	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.4035	0.3109	0.3336	**0.5455**	0.3336	0.3336	**0.5455**	**0.5455**
25	0.4035	0.3492	0.3685	**0.5843**	0.3646	0.3727	0.5841	0.5749
30	0.4035	0.3873	0.4047	**0.6136**	0.3999	0.4130	0.6045	0.5984
35	0.4035	0.4262	0.4371	**0.6385**	0.4319	0.4475	0.6079	0.6122
40	0.4035	0.4732	0.4828	**0.6622**	0.4778	0.4935	0.6101	0.6426

Table G41: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample		**Approach**						
Size	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.3953	0.2433	0.2652	**0.4913**	0.2652	0.2652	**0.4913**	**0.4913**
25	0.3953	0.2881	0.3074	**0.5232**	0.3024	0.3102	0.5289	0.5117
30	0.3953	0.3140	0.3258	**0.5445**	0.3222	0.3332	0.5449	0.5187
35	0.3953	0.3463	0.3545	**0.5670**	0.3506	0.3645	0.5537	0.5317
40	0.3953	0.3712	0.3814	**0.5931**	0.3742	0.3892	0.5621	0.5474

Table G42: Estimated Power of Tests for Mixed Design under the Normal Distribution with unequal variance; k=5; Treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample		**Approach**						
Size	**L***	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.6936	0.3253	0.3653	**0.7718**	0.3653	0.3653	**0.7718**	**0.7718**
25	0.6936	0.3816	0.4138	**0.7988**	0.4062	0.4215	0.8128	0.7740
30	0.6936	0.4374	0.4625	**0.8264**	0.4548	0.4758	0.8386	0.7865
35	0.6936	0.4856	0.5043	**0.8411**	0.4969	0.5206	0.8446	0.7881
40	0.6936	0.5274	0.5433	**0.8642**	0.5358	0.5560	0.8581	0.8019

Table G43: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.6993	0.2206	0.2544	**0.6843**	0.2544	0.2544	**0.6843**	**0.6843**
25	0.6993	0.2545	0.2845	**0.7173**	0.2775	0.2899	0.7467	0.6798
30	0.6993	0.2861	0.3051	**0.7390**	0.3003	0.3151	0.7743	0.6646
35	0.6993	0.3072	0.3251	**0.7486**	0.3174	0.3368	0.7869	0.6546
40	0.6993	0.3399	0.3559	**0.7718**	0.3476	0.3700	0.8040	0.6572

Table G44: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
20	0.5278	0.3977	0.4299	**0.7066**	0.4299	0.4299	**0.7066**	**0.7066**
25	0.5278	0.4510	0.4787	**0.7475**	0.4732	0.4848	0.7458	0.7372
30	0.5278	0.5194	0.5388	**0.7781**	0.5325	0.5488	0.7661	0.7629
35	0.5278	0.5770	0.5911	**0.8158**	0.5849	0.6028	0.7843	0.7929
40	0.5278	0.6179	0.6292	**0.8335**	0.6229	0.6414	0.7850	0.8085

Table G45: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.5366	0.2631	0.2927	**0.6199**	0.2927	0.2927	**0.6199**	**0.6199**
25	0.5366	0.3104	0.3373	**0.6596**	0.3309	0.3436	0.6726	0.6377
30	0.5366	0.3501	0.3689	**0.6826**	0.3635	0.3785	0.6953	0.6450
35	0.5366	0.3906	0.4046	**0.7146**	0.3982	0.4170	0.7151	0.6605
40	0.5366	0.4217	0.4356	**0.7403**	0.4290	0.4479	0.7191	0.6719

Table G46: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Sample Size $n_a = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.3949	0.4545	0.4751	**0.6416**	0.4751	0.4751	**0.6416**	**0.6416**
25	0.4737	0.4545	0.4830	**0.6847**	0.4941	0.4779	0.6806	0.6800
30	0.5228	0.4545	0.4909	**0.7146**	0.5116	0.4778	0.6917	0.7111
35	0.5870	0.4545	0.4988	**0.7471**	0.5296	0.4790	0.7011	0.7393
40	0.6135	0.4545	0.5016	**0.7719**	0.5525	0.4768	0.7048	0.7659

Table G47: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.6955	0.7718	0.8039	**0.9467**	0.8039	0.8039	**0.9467**	**0.9467**
25	0.7832	0.7718	0.8108	**0.9621**	0.8211	0.8036	0.9603	0.9604
30	0.8581	0.7718	0.8194	**0.9732**	0.8409	0.8030	0.9671	0.9711
35	0.9010	0.7718	0.8287	**0.9841**	0.8636	0.8042	0.9702	0.9824
40	0.9329	0.7718	0.8351	**0.9901**	0.8826	0.8032	0.9723	0.9875

Table G48: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0; d5=0

Fixed Sample Size $n_a = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.5378	0.2701	0.2979	**0.6309**	0.2979	0.2979	**0.6309**	**0.6309**
25	0.6348	0.2701	0.3072	0.6846	0.3164	0.2995	0.6522	**0.7076**
30	0.7181	0.2701	0.3186	0.7352	0.3441	0.3011	0.6608	**0.7737**
35	0.7663	0.2701	0.3258	0.7699	0.3686	0.3005	0.6549	**0.8168**
40	0.8028	0.2701	0.3319	0.8023	0.3975	0.2985	0.6535	**0.8520**

Table G49: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.3977	0.3867	0.4109	**0.5989**	0.4109	0.4109	**0.5989**	**0.5989**
25	0.4638	0.3867	0.4162	0.6436	0.4265	0.4117	0.6322	**0.6451**
30	0.5224	0.3867	0.4248	0.6739	0.4425	0.4125	0.6450	**0.6740**
35	0.5728	0.3867	0.4280	0.6967	0.4620	0.4102	0.6438	**0.7051**
40	0.6226	0.3867	0.4382	0.7305	0.4881	0.4124	0.6482	**0.7435**

Table G50: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.1; d3=0.2; d4=0.3; d5=0.4

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.4045	0.2399	0.2616	**0.4966**	0.2616	0.2616	**0.4966**	**0.4966**
25	0.4678	0.2399	0.2674	0.5351	0.2760	0.2614	0.5112	**0.5479**
30	0.5238	0.2399	0.2739	0.5671	0.2929	0.2632	0.5155	**0.5934**
35	0.5794	0.2399	0.2809	0.6034	0.3106	0.2619	0.5155	**0.6410**
40	0.6255	0.2399	0.2833	0.6403	0.3294	0.2618	0.5148	**0.6838**

Table G51: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.7034	0.3314	0.3705	**0.7781**	0.3705	0.3705	**0.7781**	**0.7781**
25	0.7924	0.3314	0.3843	0.8234	0.3990	0.3729	0.7905	**0.8436**
30	0.8586	0.3314	0.3942	0.8622	0.4247	0.3714	0.7953	**0.8965**
35	0.9057	0.3314	0.4041	0.8974	0.4650	0.3715	0.7941	**0.9356**
40	0.9336	0.3314	0.4168	0.9210	0.5019	0.3709	0.7913	**0.9562**

Table G52: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.6946	0.2209	0.2559	**0.6895**	0.2559	0.2559	**0.6895**	**0.6895**
25	0.7924	0.2209	0.2671	0.7436	0.2778	0.2579	0.6989	**0.7787**
30	0.8544	0.2209	0.2753	0.7962	0.3038	0.2581	0.6968	**0.8505**
35	0.9052	0.2209	0.2844	0.8399	0.3376	0.2572	0.6926	**0.9073**
40	0.9343	0.2209	0.2954	0.8737	0.3733	0.2576	0.6842	**0.9335**

Table G53: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.5349	0.3923	0.4282	**0.7133**	0.4282	0.4282	**0.7133**	**0.7133**
25	0.6412	0.3923	0.4390	0.7643	0.4509	0.4303	0.7461	**0.7731**
30	0.7011	0.3923	0.4452	0.8011	0.4723	0.4282	0.7560	**0.8148**
35	0.7593	0.3923	0.4565	0.8324	0.5028	0.4297	0.7556	**0.8521**
40	0.8050	0.3923	0.4639	0.8559	0.5313	0.4284	0.7539	**0.8813**

Table G54: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.25; d3=0.50; d4=0.75; d5=1.0

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.5356	0.2680	0.2964	**0.6268**	0.2964	0.2964	**0.6268**	**0.6268**
25	0.6344	0.2680	0.3031	0.6774	0.3158	0.2969	0.6471	**0.7027**
30	0.7054	0.2680	0.3131	0.7295	0.3401	0.2978	0.6597	**0.7690**
35	0.7691	0.2680	0.3231	0.7617	0.3637	0.2984	0.6546	**0.8085**
40	0.8061	0.2680	0.3332	0.8059	0.3959	0.2983	0.6501	**0.8555**

Table G55: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Number of Blocks $n_b = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2073	0.2462	0.3064	**0.3528**	0.3064	0.3064	**0.3528**	**0.3528**
10	0.2073	0.3695	0.3847	**0.4467**	0.3783	0.4078	0.3872	0.4560
15	0.2073	0.4589	0.4712	0.5119	0.4657	0.4950	0.3751	**0.5328**
20	0.2073	0.5545	0.5615	0.5745	0.5550	0.5774	0.3635	**0.6023**
25	0.2073	0.6201	0.6274	0.6266	0.6208	0.6489	0.3530	**0.6674**
30	0.2073	0.6893	0.6937	0.6773	**0.6910**	0.7123	0.3456	**0.7238**
35	0.2073	0.7472	0.7491	0.7102	**0.7468**	0.7645	0.3380	**0.7744**
40	0.2073	0.7926	0.7939	0.7461	**0.7927**	0.8070	0.3295	**0.8142**

Table G56: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.3109	0.3843	0.5049	**0.6139**	0.5049	0.5049	**0.6139**	**0.6139**
10	0.3109	0.6421	0.6710	0.7584	0.6589	0.7070	0.6593	**0.7701**
15	0.3109	0.7937	0.8102	0.8455	0.8001	0.8317	0.6478	**0.8620**
20	0.3109	0.8954	0.9026	0.9046	0.8970	0.9179	0.6233	**0.9326**
25	0.3109	0.9445	0.9472	0.9404	0.9449	0.9547	0.6033	**0.9627**
30	0.3109	0.9725	0.9735	0.9621	0.9728	0.9788	0.5895	**0.9823**
35	0.3109	0.9870	0.9873	0.9765	0.9871	0.9892	0.5761	**0.9910**
40	0.3109	0.9919	0.9923	0.9838	0.9919	0.9940	0.5670	**0.9943**

Table G57: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed number of Blocks $n_b = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2388	0.2915	0.3812	**0.4529**	0.3812	0.3812	**0.4529**	**0.4529**
10	0.2388	0.4919	0.5147	0.5990	0.5063	0.5480	0.5044	**0.6102**
15	0.2388	0.6282	0.6461	0.6876	0.6353	0.6734	0.4876	**0.7168**
20	0.2388	0.7438	0.7542	0.7649	0.7454	0.7721	0.4724	**0.7980**
25	0.2388	0.8317	0.8379	0.8261	0.8328	0.8555	0.4566	**0.8700**
30	0.2388	0.8811	0.8837	0.8609	0.8820	0.8972	0.4411	**0.9064**
35	0.2388	0.9157	0.9164	0.8904	0.9156	0.9273	0.4288	**0.9315**
40	0.2388	0.9487	0.9500	0.9208	0.9487	0.9553	0.4221	**0.9597**

Table G58: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach						
			I	II	III	IV	V	VI
5	0.1647	0.1542	0.1994	**0.2423**	0.1994	0.1994	**0.2423**	**0.2423**
10	0.1647	0.2156	0.2245	0.2898	0.2218	0.2438	0.2674	**0.2784**
15	0.1647	0.2538	0.2621	0.3180	0.2587	0.2766	0.2649	**0.3067**
20	0.1647	0.3149	0.3203	0.3687	0.3156	0.3366	0.2609	**0.3610**
25	0.1647	0.3496	0.3547	0.3947	0.3503	0.3722	0.2568	**0.3897**
30	0.1647	0.3924	0.3970	0.4271	0.3933	0.4157	0.2512	**0.4309**
35	0.1647	0.4389	0.4399	0.4630	0.4386	0.4570	0.2495	**0.4681**
40	0.1647	0.4661	0.4682	0.4840	0.4665	0.4842	0.2460	**0.4947**

Table G59: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1686	0.1389	0.1756	**0.2265**	0.1756	0.1756	**0.2265**	**0.2265**
10	0.1686	0.1776	0.1864	**0.2636**	0.1829	0.2022	0.2542	0.2397
15	0.1686	0.2091	0.2166	**0.2932**	0.2124	0.2328	0.2554	0.2662
20	0.1686	0.2462	0.2522	**0.3190**	0.2466	0.2655	0.2530	0.2899
25	0.1686	0.2863	0.2913	**0.3508**	0.2872	0.3062	0.2499	0.3263
30	0.1686	0.3119	0.3146	**0.3797**	0.3129	0.3325	0.2460	0.3474
35	0.1686	0.3555	0.3575	**0.3995**	0.3555	0.3739	0.2432	0.3861
40	0.1686	0.3682	0.3706	**0.4150**	0.3682	0.3842	0.2409	0.3947

Table G60: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.3156	0.1640	0.2490	**0.4021**	0.2490	0.2490	**0.4021**	**0.4021**
10	0.3156	0.2718	0.2992	**0.4980**	0.2857	0.3341	0.4857	0.4381
15	0.3156	0.3431	0.3652	**0.5520**	0.3517	0.4032	0.4877	0.4747
20	0.3156	0.4239	0.4402	**0.6156**	0.4264	0.4727	0.4835	0.5289
25	0.3156	0.4971	0.5046	**0.6630**	0.4986	0.5412	0.4759	0.5796
30	0.3156	0.5568	0.5639	**0.7032**	0.5584	0.5985	0.4683	0.6287
35	0.3156	0.6101	0.6149	**0.7371**	0.6103	0.6494	0.4644	0.6717
40	0.3156	0.6682	0.6724	**0.7681**	0.6682	0.6997	0.4560	0.7190

Table G61: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.3208	0.1129	0.1887	**0.3471**	0.1887	0.1887	**0.3471**	**0.3471**
10	0.3208	0.1752	0.1942	**0.4009**	0.1863	0.2246	0.4245	0.3222
15	0.3208	0.2067	0.2225	**0.4407**	0.2126	0.2539	0.4421	0.3261
20	0.3208	0.2553	0.2669	**0.4824**	0.2576	0.2976	0.4416	0.3530
25	0.3208	0.2847	0.2939	**0.5138**	0.2866	0.3303	0.4385	0.3746
30	0.3208	0.3187	0.3267	**0.5413**	0.3201	0.3593	0.4371	0.3919
35	0.3208	0.3599	0.3647	**0.5752**	0.3602	0.3997	0.4335	0.4255
40	0.3208	0.4036	0.4086	**0.6047**	0.4043	0.4395	0.4310	0.4592

Table G62: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.2336	0.1948	0.2715	**0.3709**	0.2715	0.2715	**0.3709**	**0.3709**
10	0.2336	0.3186	0.3436	**0.4666**	0.3339	0.3773	0.4200	0.4505
15	0.2336	0.4108	0.4249	**0.5431**	0.4157	0.4537	0.4197	0.5137
20	0.2336	0.5018	0.5119	**0.6031**	0.5028	0.5376	0.4088	0.5823
25	0.2336	0.5797	0.5881	**0.6641**	0.5808	0.6174	0.3969	0.6437
30	0.2336	0.6442	0.6494	**0.6979**	0.6459	0.6729	0.3905	0.6958
35	0.2336	0.7073	0.7109	**0.7414**	0.7073	0.7329	0.3805	**0.7483**
40	0.2336	0.7577	0.7608	**0.7744**	0.7578	0.7830	0.3725	**0.7919**

Table G63: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.2887	0.1701	0.2513	**0.3896**	0.2513	0.2513	**0.3896**	**0.3896**
10	0.2887	0.2684	0.2928	**0.4733**	0.2819	0.3254	0.4627	0.4212
15	0.2887	0.3478	0.3657	**0.5438**	0.3554	0.4002	0.4696	0.4724
20	0.2887	0.4340	0.4470	**0.6032**	0.4359	0.4777	0.4572	0.5290
25	0.2887	0.5030	0.5110	**0.6516**	0.5048	0.5460	0.4549	0.5830
30	0.2887	0.5561	0.5638	**0.6887**	0.5579	0.6007	0.4433	0.6314
35	0.2887	0.6271	0.6305	**0.7268**	0.6276	0.6593	0.4365	0.6822
40	0.2887	0.6738	0.6769	**0.7624**	0.6738	0.7033	0.4282	0.7204

Table G64: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Sample Size $n_a = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.1994	0.2301	0.2884	**0.3406**	0.2884	0.2884	**0.3406**	**0.3406**
10	0.3061	0.2301	0.3310	0.4219	0.3906	0.2922	0.3777	**0.4159**
15	0.3925	0.2301	0.3899	0.4934	0.4966	0.2862	0.3694	**0.4970**
20	0.4885	0.2301	0.4279	0.5498	**0.5684**	0.2896	0.3576	0.5536
25	0.5820	0.2301	0.4904	0.6030	**0.6472**	0.2927	0.3492	0.6223
30	0.6345	0.2301	0.5175	0.6394	**0.6794**	0.2903	0.3401	0.6607
35	0.6971	0.2301	0.5770	0.6744	**0.7308**	0.2888	0.3345	0.7200
40	0.7423	0.2301	0.6036	0.7148	**0.7693**	0.2911	0.3277	0.7622

Table G65: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.3120	0.3895	0.5091	**0.6045**	0.5091	0.5091	**0.6045**	**0.6045**
10	0.5617	0.3895	0.5934	**0.7477**	0.6952	0.5140	0.6701	0.7385
15	0.7057	0.3895	0.6897	0.8346	**0.8382**	0.5116	0.6626	0.8306
20	0.8332	0.3895	0.7550	0.8891	**0.9072**	0.5124	0.6473	0.8925
25	0.9006	0.3895	0.8230	0.9250	**0.9495**	0.5125	0.6226	0.9329
30	0.9439	0.3895	0.8618	0.9482	**0.9674**	0.5145	0.6099	0.9590
35	0.9702	0.3895	0.9015	0.9646	**0.9816**	0.5168	0.6002	0.9785
40	0.9837	0.3895	0.9304	0.9775	**0.9907**	0.5173	0.5865	0.9885

Table G66: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.2388	0.2863	0.3799	**0.4568**	0.3799	0.3799	**0.4568**	**0.4568**
10	0.4227	0.2863	0.4428	**0.5815**	0.5340	0.3869	0.5173	0.5735
15	0.5303	0.2863	0.5255	0.6714	**0.6762**	0.3795	0.5003	0.6687
20	0.6802	0.2863	0.5898	0.7449	**0.7720**	0.3809	0.4897	0.7548
25	0.7669	0.2863	0.6659	0.7956	**0.8380**	0.3856	0.4729	0.8127
30	0.8419	0.2863	0.7123	0.8416	**0.8779**	0.3889	0.4638	0.8668
35	0.8830	0.2863	0.7728	0.8709	**0.9138**	0.3832	0.4539	0.9022
40	0.9137	0.2863	0.8038	0.8956	**0.9362**	0.3868	0.4417	0.9300

Table G67: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1700	0.1542	0.1941	**0.2413**	0.1941	0.1941	**0.2413**	**0.2413**
10	0.2552	0.1542	0.2188	**0.2945**	0.2607	0.1948	0.2507	**0.3116**
15	0.3119	0.1542	0.2668	0.3528	0.3579	0.1939	0.2511	**0.3793**
20	0.3954	0.1542	0.2904	0.3933	**0.4290**	0.1966	0.2400	0.4328
25	0.4715	0.1542	0.3383	0.4393	**0.4978**	0.1962	0.2324	0.4919
30	0.5331	0.1542	0.3677	0.4799	**0.5456**	0.1994	0.2314	0.5421
35	0.5773	0.1542	0.4139	0.5111	**0.5953**	0.1965	0.2285	0.5880
40	0.6278	0.1542	0.4376	0.5404	**0.6384**	0.1949	0.2213	0.6361

Table G68: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1612	0.1281	0.1655	**0.2175**	0.1655	0.1655	**0.2175**	**0.2175**
10	0.2531	0.1281	0.1900	0.2731	0.2376	0.1684	0.2272	**0.2970**
15	0.3069	0.1281	0.2356	0.3292	0.3335	0.1653	0.2198	**0.3632**
20	0.4046	0.1281	0.2662	0.3814	0.4193	0.1659	0.2139	**0.4354**
25	0.4630	0.1281	0.3064	0.4125	**0.4848**	0.1664	0.2023	0.4805
30	0.5295	0.1281	0.3376	0.4552	0.5412	0.1671	0.1966	**0.5438**
35	0.5653	0.1281	0.3787	0.4896	0.5770	0.1667	0.1945	**0.5729**
40	0.6197	0.1281	0.4085	0.5239	0.6296	0.1652	0.1892	**0.6303**

Table G69: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 5$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.3183	0.1714	0.2560	0.4151	0.2560	0.2560	**0.4151**	**0.4151**
10	0.5718	0.1714	0.3343	0.5602	0.4611	0.2628	0.4279	**0.6296**
15	0.6987	0.1714	0.4340	0.6715	0.6873	0.2527	0.4013	**0.7659**
20	0.8307	0.1714	0.5069	0.7569	0.8350	0.2563	0.3739	**0.8600**
25	0.9106	0.1714	0.6105	0.8227	0.9149	0.2579	0.3548	**0.9198**
30	0.9514	0.1714	0.6758	0.8669	0.9541	0.2585	0.3410	**0.9557**
35	0.9683	0.1714	0.7543	0.9010	0.9721	0.2574	0.3257	**0.9712**
40	0.9816	0.1714	0.8029	0.9243	0.9825	0.2587	0.3159	**0.9828**

Table G70: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.3188	0.1128	0.1834	**0.3401**	0.1834	0.1834	**0.3401**	**0.3401**
10	0.5663	0.1128	0.2496	0.4830	0.3724	0.1863	0.3359	**0.5791**
15	0.6993	0.1128	0.3377	0.5964	0.6181	0.1831	0.3089	**0.7386**
20	0.8332	0.1128	0.4121	0.6963	0.7953	0.1839	0.2852	**0.8431**
25	0.9091	0.1128	0.5187	0.7680	0.8988	0.1855	0.2713	**0.9107**
30	0.9450	0.1128	0.5852	0.8224	0.9390	0.1852	0.2550	**0.9442**
35	0.9681	0.1128	0.6758	0.8679	0.9663	0.1824	0.2463	**0.9688**
40	0.9844	0.1128	0.7403	0.9029	0.9847	0.1843	0.2347	**0.9848**

Table G71: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2427	0.1944	0.2724	**0.3749**	0.2724	0.2724	**0.3749**	**0.3749**
10	0.4278	0.1944	0.3270	0.4917	0.4200	0.2758	0.3965	**0.5179**
15	0.5278	0.1944	0.4138	0.5872	0.5955	0.2707	0.3889	**0.6294**
20	0.6737	0.1944	0.4683	0.6656	0.7164	0.2690	0.3684	**0.7239**
25	0.7662	0.1944	0.5518	0.7216	0.8014	0.2717	0.3527	**0.7951**
30	0.8361	0.1944	0.6004	0.7719	0.8593	0.2729	0.3392	**0.8523**
35	0.8833	0.1944	0.6781	0.8134	0.8949	0.2723	0.3350	**0.8919**
40	0.9172	0.1944	0.7182	0.8490	0.9283	0.2732	0.3214	**0.9253**

Table G72: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2925	0.1775	0.2600	**0.3979**	0.2600	0.2600	**0.3979**	**0.3979**
10	0.5100	0.1775	0.3313	0.5318	0.4423	0.2632	0.4151	**0.5837**
15	0.6444	0.1775	0.4325	0.6439	0.6617	0.2579	0.4017	**0.7226**
20	0.7855	0.1775	0.4949	0.7240	0.7978	0.2619	0.3725	**0.8187**
25	0.8647	0.1775	0.5843	0.7794	0.8738	0.2622	0.3523	**0.8784**
30	0.9185	0.1775	0.6491	0.8340	0.9249	0.2617	0.3376	**0.9267**
35	0.9467	0.1775	0.7256	0.8699	0.9523	0.2604	0.3267	**0.9517**
40	0.9664	0.1775	0.7737	0.9023	0.9693	0.2601	0.3158	**0.9687**

Table G73: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Number of Blocks $n_b = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.2473	0.3122	0.3388	**0.4484**	0.3388	0.3388	**0.4484**	**0.4484**
20	0.2473	0.3733	0.3858	0.4913	0.3826	0.3918	0.4746	**0.4966**
25	0.2473	0.4037	0.4160	0.5203	0.4112	0.4241	0.4761	**0.5242**
30	0.2473	0.4562	0.4669	0.5510	0.4609	0.4758	0.4727	**0.5640**
35	0.2473	0.5038	0.5105	0.5904	0.5063	0.5190	0.4784	**0.6029**
40	0.2473	0.5521	0.5578	0.6205	0.5546	0.5670	0.4708	**0.6370**

Table G74: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.6930	0.7983	0.8420	**0.9556**	0.8420	0.8420	**0.9556**	**0.9556**
20	0.6930	0.8905	0.9083	0.9766	0.9043	0.9143	0.9689	**0.9796**
25	0.6930	0.9441	0.9529	0.9876	0.9498	0.9565	0.9757	**0.9908**
30	0.6930	0.9740	0.9774	0.9933	0.9758	0.9796	0.9738	**0.9948**
35	0.6930	0.9854	0.9864	0.9967	0.9855	0.9886	0.9749	**0.9970**
40	0.6930	0.9921	0.9928	0.9972	0.9923	0.9939	0.9682	**0.9979**

Table G75: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.5400	0.6283	0.6823	**0.8618**	0.6823	0.6823	**0.8618**	**0.8618**
20	0.5400	0.7492	0.7710	0.9037	0.7668	0.7799	0.8859	**0.9072**
25	0.5400	0.8226	0.8401	0.9270	0.8342	0.8496	0.8954	**0.9318**
30	0.5400	0.8786	0.8894	0.9515	0.8845	0.8971	0.8925	**0.9570**
35	0.5400	0.9208	0.9259	0.9659	0.9220	0.9315	0.8907	**0.9722**
40	0.5400	0.9438	0.9472	0.9761	0.9449	0.9525	0.8857	**0.9795**

Table G76: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach I	II	III	IV	V	VI
15	0.3032	0.2583	0.2873	**0.4555**	0.2873	0.2873	**0.4555**	**0.4555**
20	0.3032	0.2972	0.3138	**0.4875**	0.3092	0.3208	0.4842	0.4765
25	0.3032	0.3464	0.3608	**0.5272**	0.3548	0.3716	0.5037	0.5078
30	0.3032	0.3992	0.4097	**0.5606**	0.4054	0.4199	0.5102	0.5437
35	0.3032	0.4304	0.4391	**0.5858**	0.4344	0.4511	0.5104	0.5603
40	0.3032	0.4747	0.4810	**0.6161**	0.4770	0.4947	0.5110	0.5945

Table G77: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.3015	0.2135	0.2363	**0.4126**	0.2363	0.2363	**0.4126**	**0.4126**
20	0.3015	0.2543	0.2680	**0.4462**	0.2651	0.2744	0.4501	0.4298
25	0.3015	0.2761	0.2896	**0.4633**	0.2840	0.2968	0.4560	0.4353
30	0.3015	0.3069	0.3172	**0.4915**	0.3125	0.3278	0.4698	0.4546
35	0.3015	0.3482	0.3571	**0.5230**	0.3511	0.3687	0.4699	0.4780
40	0.3015	0.3744	0.3810	**0.5444**	0.3771	0.3921	0.4707	0.4963

Table G78: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.6971	0.3503	0.4114	**0.8006**	0.4114	0.4114	**0.8006**	**0.8006**
20	0.6971	0.4170	0.4561	**0.8364**	0.4469	0.4725	0.8533	0.8018
25	0.6971	0.4847	0.5183	**0.8640**	0.5050	0.5395	0.8732	0.8189
30	0.6971	0.5589	0.5804	**0.8893**	0.5700	0.6004	0.8856	0.8283
35	0.6971	0.6110	0.6266	**0.9139**	0.6172	0.6501	0.8900	0.8502
40	0.6971	0.6610	0.6718	**0.9225**	0.6642	0.6936	0.8897	0.8567

Table G79: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.6946	0.2554	0.3046	**0.7374**	0.3046	0.3046	**0.7374**	**0.7374**
20	0.6946	0.3087	0.3433	**0.7669**	0.3349	0.3560	0.7979	0.7255
25	0.6946	0.3565	0.3841	**0.8027**	0.3708	0.4011	0.8280	0.7214
30	0.6946	0.4050	0.4256	**0.8232**	0.4158	0.4479	0.8445	0.7239
35	0.6946	0.4461	0.4636	**0.8471**	0.4531	0.4870	0.8503	0.7329
40	0.6946	0.4779	0.4943	**0.8593**	0.4837	0.5172	0.8520	0.7328

Table G80: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.5890	0.4505	0.5052	**0.7917**	0.5052	0.5052	**0.7917**	**0.7917**
20	0.5890	0.5422	0.5755	**0.8359**	0.5677	0.5877	0.8372	0.8265
25	0.5890	0.6247	0.6499	**0.8722**	0.6384	0.6634	0.8522	0.8512
30	0.5890	0.7021	0.7191	**0.8993**	0.7115	0.7345	0.8639	0.8767
35	0.5890	0.7603	0.7706	**0.9227**	0.7650	0.7843	0.8662	0.9006
40	0.5890	0.8038	0.8139	**0.9387**	0.8087	0.8281	0.8618	0.9198

Table G81: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.5283	0.3215	0.3682	**0.6756**	0.3682	0.3682	**0.6756**	**0.6756**
20	0.5283	0.3819	0.4117	**0.7235**	0.4041	0.4229	0.7292	0.6985
25	0.5283	0.4478	0.4750	**0.7612**	0.4645	0.4872	0.7577	0.7216
30	0.5283	0.5051	0.5232	**0.7912**	0.5146	0.5429	0.7655	0.7405
35	0.5283	0.5621	0.5761	**0.8139**	0.5680	0.5935	0.7651	0.7575
40	0.5283	0.6063	0.6189	**0.8433**	0.6108	0.6381	0.7676	0.7809

Table G82: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=.0.4

Fixed Sample Size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.2456	0.2994	0.3268	**0.4329**	0.3268	0.3268	**0.4329**	**0.4329**
20	0.3091	0.2994	0.3297	**0.4752**	0.3406	0.3222	0.4650	0.4699
25	0.3743	0.2994	0.3424	**0.5101**	0.3633	0.3255	0.4805	0.5057
30	0.4349	0.2994	0.3500	**0.5519**	0.3957	0.3252	0.4906	0.5430
35	0.4676	0.2994	0.3579	**0.5806**	0.4232	0.3263	0.4840	0.5719
40	0.4995	0.2994	0.3626	**0.6017**	0.4567	0.3238	0.4809	0.5958

Table G83: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.6935	0.7946	0.8401	**0.9554**	0.8401	0.8401	**0.9554**	**0.9554**
20	0.8350	0.7946	0.8529	**0.9757**	0.8669	0.8403	0.9735	0.9742
25	0.9056	0.7946	0.8649	**0.9870**	0.8955	0.8405	0.9788	0.9852
30	0.9447	0.7946	0.8771	**0.9919**	0.9262	0.8419	0.9781	0.9910
35	0.9713	0.7946	0.8881	**0.9946**	0.9493	0.8427	0.9784	**0.9946**
40	0.9821	0.7946	0.8954	**0.9973**	0.9689	0.8419	0.9770	**0.9973**

Table G84: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
15	0.3097	0.6279	0.6628	**0.7309**	0.6628	0.6628	**0.7309**	**0.7309**
20	0.4023	0.6279	0.6760	**0.7740**	0.6873	0.6645	0.7859	0.7502
25	0.4961	0.6279	0.6872	**0.8193**	0.7137	0.6651	0.8174	0.7755
30	0.5591	0.6279	0.6984	**0.8432**	0.7465	0.6654	0.8207	0.7922
35	0.6173	0.6279	0.7062	**0.8661**	0.7745	0.6650	0.8228	0.8125
40	0.6666	0.6279	0.7140	**0.8875**	0.8088	0.6663	0.8266	0.8346

Table G85: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3058	0.3216	0.3496	**0.5063**	0.3496	0.3496	**0.5063**	**0.5063**
20	0.3959	0.3216	0.3599	0.5459	0.3708	0.3494	0.5296	**0.5499**
25	0.4688	0.3216	0.3704	0.5930	0.3986	0.3517	0.5519	**0.5981**
30	0.5253	0.3216	0.3807	0.6223	0.4313	0.3509	0.5431	**0.6308**
35	0.5774	0.3216	0.3907	0.6607	0.4684	0.3508	0.5446	**0.6729**
40	0.6154	0.3216	0.3966	0.6842	0.5090	0.3510	0.5378	**0.6992**

Table G86: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2952	0.2031	0.2273	**0.3981**	0.2273	0.2273	**0.3981**	**0.3981**
20	0.3973	0.2031	0.2351	0.4529	0.2463	0.2286	0.4255	**0.4715**
25	0.4717	0.2031	0.2440	0.5003	0.2699	0.2287	0.4289	**0.5322**
30	0.5329	0.2031	0.2536	0.5283	0.3052	0.2294	0.4214	**0.5794**
35	0.5795	0.2031	0.2649	0.5714	0.3397	0.2278	0.4161	**0.6256**
40	0.6270	0.2031	0.2691	0.6005	0.3798	0.2273	0.4083	**0.6625**

Table G87: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.6872	0.3456	0.4052	**0.7955**	0.4052	0.4052	**0.7955**	**0.7955**
20	0.8262	0.3456	0.4264	0.8556	0.4543	0.4066	0.8164	**0.8821**
25	0.9070	0.3456	0.4473	0.9042	0.5099	0.4076	0.8162	**0.9399**
30	0.9452	0.3456	0.4679	0.9322	0.5838	0.4087	0.8086	**0.9637**
35	0.9698	0.3456	0.4921	0.9532	0.6570	0.4092	0.7961	**0.9794**
40	0.9831	0.3456	0.5056	0.9681	0.7364	0.4086	0.7858	**0.9897**

Table G88: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.6946	0.2554	0.3046	**0.7374**	0.3046	0.3046	**0.7374**	**0.7374**
20	0.8387	0.2554	0.3232	0.8139	0.3497	0.3070	0.7593	**0.8501**
25	0.8993	0.2554	0.3441	0.8652	0.4079	0.3074	0.7503	**0.9132**
30	0.9451	0.2554	0.3660	0.9021	0.4821	0.3070	0.7350	**0.9503**
35	0.9698	0.2554	0.3864	0.9300	0.5639	0.3075	0.7259	**0.9749**
40	0.9825	0.2554	0.4036	0.9518	0.6514	0.3098	0.7099	**0.9855**

Table G89: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.5742	0.4497	0.5050	**0.7836**	0.5050	0.5050	**0.7836**	**0.7836**
20	0.7169	0.4497	0.5247	0.8430	0.5486	0.5068	0.8175	**0.8561**
25	0.8135	0.4497	0.5408	0.8860	0.5950	0.5074	0.8281	**0.9022**
30	0.8698	0.4497	0.5607	0.9100	0.6517	0.5083	0.8184	**0.9291**
35	0.9189	0.4497	0.5776	0.9389	0.7156	0.5064	0.8149	**0.9582**
40	0.9420	0.4497	0.5899	0.9518	0.7684	0.5075	0.8058	**0.9680**

Table G90: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.5327	0.3179	0.3665	**0.6807**	0.3665	0.3665	**0.6807**	**0.6807**
20	0.6697	0.3179	0.3828	0.7458	0.4030	0.3659	0.7034	**0.7700**
25	0.7719	0.3179	0.4028	0.8025	0.4533	0.3691	0.7149	**0.8368**
30	0.8299	0.3179	0.4184	0.8362	0.5117	0.3667	0.7038	**0.8792**
35	0.8822	0.3179	0.4337	0.8737	0.5748	0.3673	0.6980	**0.9192**
40	0.9168	0.3179	0.4462	0.9001	0.6451	0.3683	0.6902	**0.9430**

Table G91: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Number of Blocks $n_b = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.4930	0.5533	0.5817	**0.7654**	0.5817	0.5817	**0.7654**	**0.7654**
25	0.4930	0.6264	0.6476	0.8026	0.6424	0.6518	0.7920	**0.8038**
30	0.4930	0.6883	0.7044	0.8406	0.6996	0.7131	0.8101	**0.8471**
35	0.4930	0.7376	0.7473	0.8575	0.7424	0.7566	0.8076	**0.8634**
40	0.4930	0.7841	0.7934	0.8849	0.7886	0.8015	0.8094	**0.8893**

Table G92: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.8370	0.8895	0.9123	**0.9896**	0.9123	0.9123	**0.9896**	**0.9896**
25	0.8370	0.9455	0.9554	0.9952	0.9534	0.9578	0.9932	**0.9956**
30	0.8370	0.9674	0.9726	0.9979	0.9711	0.9745	0.9947	**0.9978**
35	0.8370	0.9870	0.9888	0.9979	0.9879	0.9903	0.9952	**0.9983**
40	0.8370	0.9930	0.9936	**0.9993**	0.9934	0.9946	0.9952	0.9992

Table G93: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed number of Blocks $n_b = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.6730	0.3832	0.4238	**0.7937**	0.4238	0.4238	**0.7937**	**0.7937**
25	0.6730	0.4570	0.4915	**0.8183**	0.4844	0.4977	0.8262	0.8006
30	0.6730	0.4988	0.5253	**0.8420**	0.5176	0.5371	0.8470	0.8070
35	0.6730	0.5625	0.5808	**0.8654**	0.5741	0.5962	0.8599	0.8319
40	0.6730	0.6013	0.6180	**0.8836**	0.6098	0.6340	0.8648	0.8423

Table G94: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.4035	0.3109	0.3336	**0.5455**	0.3336	0.3336	**0.5455**	**0.5455**
25	0.4035	0.3492	0.3685	**0.5843**	0.3646	0.3727	0.5841	0.5749
30	0.4035	0.3873	0.4047	**0.6136**	0.3999	0.4130	0.6045	0.5984
35	0.4035	0.4262	0.4371	**0.6385**	0.4319	0.4475	0.6079	0.6122
40	0.4035	0.4732	0.4828	**0.6622**	0.4778	0.4935	0.6101	0.6426

Table G95: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.3953	0.2433	0.2652	**0.4913**	0.2652	0.2652	**0.4913**	**0.4913**
25	0.3953	0.2881	0.3074	**0.5232**	0.3024	0.3102	0.5289	0.5117
30	0.3953	0.3140	0.3258	**0.5445**	0.3222	0.3332	0.5449	0.5187
35	0.3953	0.3463	0.3545	**0.5670**	0.3506	0.3645	0.5537	0.5317
40	0.3953	0.3712	0.3814	**0.5931**	0.3742	0.3892	0.5621	0.5474

Table G96: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.8240	0.4271	0.4756	**0.8879**	0.4756	0.4756	**0.8879**	**0.8879**
25	0.8240	0.4941	0.5336	**0.9088**	0.5253	0.5430	0.9187	0.8950
30	0.8240	0.5529	0.5814	**0.9316**	0.5720	0.5981	0.9374	0.9050
35	0.8240	0.6165	0.6349	**0.9390**	0.6264	0.6515	0.9423	0.9036
40	0.8240	0.6617	0.6769	**0.9510**	0.6692	0.6937	0.9450	0.9149

Table G97: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.8361	0.2744	0.3180	**0.8095**	0.3180	0.3180	**0.8095**	**0.8095**
25	0.8361	0.3129	0.3497	**0.8404**	0.3413	0.3585	0.8634	0.8044
30	0.8361	0.3509	0.3776	**0.8551**	0.3700	0.3926	0.8880	0.7913
35	0.8361	0.4006	0.4223	**0.8719**	0.4133	0.4407	0.9036	0.7852
40	0.8361	0.4297	0.4490	**0.8917**	0.4385	0.4654	0.9150	0.7920

Table G98: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.6734	0.5004	0.5424	**0.8471**	0.5424	0.5424	**0.8471**	**0.8471**
25	0.6734	0.5816	0.6131	**0.8808**	0.6061	0.6206	0.8811	0.8719
30	0.6734	0.6516	0.6744	**0.9015**	0.6675	0.6865	0.8936	0.8940
35	0.6734	0.7097	0.7268	**0.9209**	0.7179	0.7395	0.9024	0.9071
40	0.6734	0.7554	0.7687	**0.9352**	0.7608	0.7817	0.9018	0.9209

Table G99: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.6775	0.3916	0.4352	**0.7943**	0.4352	0.4352	**0.7943**	**0.7943**
25	0.6775	0.4450	0.4767	**0.8204**	0.4696	0.4838	0.8324	0.8028
30	0.6775	0.5132	0.5388	**0.8520**	0.5316	0.5493	0.8564	0.8246
35	0.6775	0.5677	0.5842	**0.8729**	0.5778	0.5986	0.8668	0.8370
40	0.6775	0.6047	0.6196	**0.8942**	0.6113	0.6350	0.8723	0.8425

Table G100: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Sample Size $n_a = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.4947	0.5534	0.5803	**0.7630**	0.5803	0.5803	**0.7630**	**0.7630**
25	0.5722	0.5534	0.5886	**0.7939**	0.5969	0.5822	0.7882	0.7911
30	0.6344	0.5534	0.5932	**0.8205**	0.6167	0.5808	0.7998	0.8195
35	0.6963	0.5534	0.6033	**0.8515**	0.6392	0.5827	0.8112	0.8473
40	0.7392	0.5534	0.6089	**0.8706**	0.6627	0.5818	0.8084	0.8681

Table G101: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.8291	0.8893	0.9141	**0.9868**	0.9141	0.9141	**0.9868**	**0.9868**
25	0.9044	0.8893	0.9187	**0.9945**	0.9254	0.9144	0.9939	0.9942
30	0.9453	0.8893	0.9241	**0.9966**	0.9366	0.9154	0.9947	0.9963
35	0.9712	0.8893	0.9300	**0.9979**	0.9490	0.9142	0.9953	0.9973
40	0.9831	0.8893	0.9330	**0.9981**	0.9580	0.9149	0.9950	**0.9981**

Table G102: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.6715	0.3876	0.4282	**0.7892**	0.4282	0.4282	**0.7892**	**0.7892**
25	0.7735	0.3876	0.4380	0.8379	0.4518	0.4286	0.8105	**0.8535**
30	0.8403	0.3876	0.4518	0.8735	0.4812	0.4298	0.8198	**0.8991**
35	0.8846	0.3876	0.4612	0.9005	0.5169	0.4303	0.8143	**0.9278**
40	0.9128	0.3876	0.4720	0.9213	0.5546	0.4278	0.8111	**0.9491**

Table G103: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.3977	0.3867	0.4109	**0.5989**	0.4109	0.4109	**0.5989**	**0.5989**
25	0.4638	0.3867	0.4162	0.6436	0.4265	0.4117	0.6322	**0.6451**
30	0.5224	0.3867	0.4248	0.6739	0.4425	0.4125	0.6450	**0.6740**
35	0.5728	0.3867	0.4280	0.6967	0.4620	0.4102	0.6438	**0.7051**
40	0.6226	0.3867	0.4382	0.7305	0.4881	0.4124	0.6482	**0.7435**

Table G104: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.4; d5=0.4

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.4045	0.2399	0.2616	**0.4966**	0.2616	0.2616	**0.4966**	**0.4966**
25	0.4678	0.2399	0.2674	0.5351	0.2760	0.2614	0.5112	**0.5479**
30	0.5238	0.2399	0.2739	0.5671	0.2929	0.2632	0.5155	**0.5934**
35	0.5794	0.2399	0.2809	0.6034	0.3106	0.2619	0.5155	**0.6410**
40	0.6255	0.2399	0.2833	0.6403	0.3294	0.2618	0.5148	**0.6838**

Table G105: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.8333	0.4193	0.4702	**0.8912**	0.4702	0.4702	**0.8912**	**0.8912**
25	0.9046	0.4193	0.4843	0.9233	0.5013	0.4717	0.9006	**0.9382**
30	0.9446	0.4193	0.4982	0.9491	0.5391	0.4712	0.9070	**0.9661**
35	0.9690	0.4193	0.5121	0.9662	0.5791	0.4725	0.9052	**0.9823**
40	0.9831	0.4193	0.5239	0.9757	0.6277	0.4706	0.8985	**0.9900**

Table G106: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.8259	0.2739	0.3218	**0.8175**	0.3218	0.3218	**0.8175**	**0.8175**
25	0.9068	0.2739	0.3320	0.8694	0.3499	0.3203	0.8328	**0.8981**
30	0.9471	0.2739	0.3460	0.9077	0.3836	0.3210	0.8302	**0.9437**
35	0.9704	0.2739	0.3590	0.9349	0.4202	0.3213	0.8198	**0.9709**
40	0.9828	0.2739	0.3697	0.9556	0.4677	0.3210	0.8127	**0.9860**

Table G107: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.6722	0.5078	0.5513	**0.8498**	0.5513	0.5513	**0.8498**	**0.8498**
25	0.7714	0.5078	0.5595	0.8821	0.5753	0.5506	0.8679	**0.8902**
30	0.8344	0.5078	0.5703	0.9102	0.6050	0.5515	0.8760	**0.9218**
35	0.8792	0.5078	0.5840	0.9343	0.6412	0.5519	0.8843	**0.9448**
40	0.9167	0.5078	0.5942	0.9477	0.6746	0.5507	0.8778	**0.9619**

Table G108: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=1.0; d5=1.0

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.6793	0.3796	0.4221	**0.7858**	0.4221	0.4221	**0.7858**	**0.7858**
25	0.7688	0.3796	0.4346	0.8318	0.4503	0.4237	0.8068	**0.8477**
30	0.8415	0.3796	0.4459	0.8743	0.4801	0.4246	0.8223	**0.9035**
35	0.8841	0.3796	0.4595	0.8996	0.5121	0.4255	0.8120	**0.9294**
40	0.9141	0.3796	0.4682	0.9213	0.5483	0.4240	0.8058	**0.9499**

Table G109: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Number of Blocks $n_b = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1294	0.1548	0.1864	**0.2092**	0.1864	0.1864	**0.2092**	**0.2092**
10	0.1294	0.2222	0.2286	0.2634	0.2260	0.2434	0.2279	**0.2655**
15	0.1294	0.2764	0.2834	0.2989	0.2802	0.2940	0.2242	**0.3115**
20	0.1294	0.3207	0.3257	0.3296	0.3199	0.3348	0.2149	**0.3477**
25	0.1294	0.3655	0.3701	0.3665	0.3666	0.3822	0.2117	**0.3913**
30	0.1294	0.4237	0.4251	0.4097	0.4252	0.4397	0.2087	**0.4504**
35	0.1294	0.4541	0.4542	0.4350	0.4538	0.4696	0.2024	**0.4777**
40	0.1294	0.5012	0.5034	0.4595	0.5015	0.5174	0.1991	**0.5240**

Table G110: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2042	0.2534	0.3357	**0.4095**	0.3357	0.3357	**0.4095**	**0.4095**
10	0.2042	0.4339	0.4555	0.5421	0.4476	0.4890	0.4561	**0.5462**
15	0.2042	0.5781	0.5966	0.6353	0.5867	0.6248	0.4529	**0.6641**
20	0.2042	0.6886	0.6981	0.7126	0.6897	0.7218	0.4282	**0.7531**
25	0.2042	0.7797	0.7849	0.7741	0.7811	0.8064	0.4130	**0.8235**
30	0.2042	0.8406	0.8445	0.8131	0.8417	0.8583	0.4015	**0.8682**
35	0.2042	0.8932	0.8948	0.8609	0.8933	0.9055	0.3896	**0.9123**
40	0.2042	0.9189	0.9211	0.8809	0.9195	0.9287	0.3792	**0.9325**

Table G111: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed number of Blocks $n_b = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1702	0.2077	0.2697	**0.3199**	0.2697	0.2697	**0.3199**	**0.3199**
10	0.1702	0.3322	0.3472	0.4188	0.3432	0.3764	0.3502	**0.4253**
15	0.1702	0.4319	0.4473	0.4902	0.4389	0.4695	0.3418	**0.5087**
20	0.1702	0.5386	0.5474	0.5624	0.5386	0.5647	0.3308	**0.5925**
25	0.1702	0.6165	0.6226	0.6111	0.6175	0.6407	0.3200	**0.6591**
30	0.1702	0.6842	0.6878	0.6616	0.6858	0.7074	0.3055	**0.7195**
35	0.1702	0.7407	0.7425	0.7039	0.7407	0.7602	0.3013	**0.7677**
40	0.1702	0.7981	0.8003	0.7490	0.7981	0.8141	0.2930	**0.8220**

Table G112: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1253	0.1173	0.1441	**0.1708**	0.1441	0.1441	**0.1708**	**0.1708**
10	0.1253	0.1595	0.1633	0.2050	0.1626	0.1765	0.1932	**0.1972**
15	0.1253	0.1915	0.1968	0.2319	0.1941	0.2061	0.1945	**0.2220**
20	0.1253	0.2173	0.2220	0.2513	0.2179	0.2281	0.1911	**0.2438**
25	0.1253	0.2521	0.2555	0.2819	0.2530	0.2638	0.1898	**0.2757**
30	0.1253	0.2809	0.2826	0.3045	0.2818	0.2960	0.1863	**0.3052**
35	0.1253	0.3069	0.3081	0.3198	0.3068	0.3177	0.1839	**0.3258**
40	0.1253	0.3304	0.3313	0.3402	0.3304	0.3421	0.1823	**0.3489**

Table G113: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1267	0.1075	0.1358	**0.1623**	0.1358	0.1358	**0.1623**	**0.1623**
10	0.1267	0.1401	0.1447	**0.1906**	0.1438	0.1548	0.1875	0.1783
15	0.1267	0.1613	0.1669	**0.2111**	0.1642	0.1755	0.1900	0.1962
20	0.1267	0.1811	0.1861	**0.2275**	0.1813	0.1972	0.1839	0.2110
25	0.1267	0.2020	0.2040	**0.2500**	0.2023	0.2163	0.1825	0.2266
30	0.1267	0.2285	0.2303	**0.2671**	0.2290	0.2397	0.1796	0.2490
35	0.1267	0.2446	0.2460	**0.2783**	0.2447	0.2553	0.1797	0.2629
40	0.1267	0.2642	0.2660	**0.2917**	0.2646	0.2762	0.1783	0.2837

Table G114: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.2073	0.1301	0.1899	**0.2841**	0.1899	0.1899	**0.2841**	**0.2841**
10	0.2073	0.1841	0.1969	**0.3374**	0.1908	0.2201	0.3260	0.2936
15	0.2073	0.2394	0.2541	**0.3828**	0.2460	0.2742	0.3346	0.3246
20	0.2073	0.2883	0.2991	**0.4256**	0.2900	0.3222	0.3303	0.3607
25	0.2073	0.3266	0.3335	**0.4577**	0.3280	0.3631	0.3231	0.3916
30	0.2073	0.3736	0.3795	**0.4860**	0.3750	0.4036	0.3201	0.4277
35	0.2073	0.4192	0.4223	**0.5273**	0.4191	0.4488	0.3144	0.4693
40	0.2073	0.4571	0.4612	**0.5567**	0.4578	0.4839	0.3102	0.4993

Table G115: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.2099	0.0950	0.1394	**0.2310**	0.1394	0.1394	**0.2310**	**0.2310**
10	0.2099	0.1311	0.1444	**0.2710**	0.1398	0.1637	0.2817	0.2223
15	0.2099	0.1544	0.1640	**0.2998**	0.1593	0.1841	0.2996	0.2308
20	0.2099	0.1832	0.1907	**0.3271**	0.1840	0.2092	0.2967	0.2444
25	0.2099	0.2032	0.2084	**0.3544**	0.2045	0.2312	0.2938	0.2563
30	0.2099	0.2217	0.2270	**0.3756**	0.2233	0.2500	0.2899	0.2709
35	0.2099	0.2451	0.2475	**0.3863**	0.2452	0.2676	0.2886	0.2831
40	0.2099	0.2683	0.2713	**0.4041**	0.2689	0.2923	0.2883	0.3078

Table G116: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.1650	0.1418	0.1904	**0.2505**	0.1904	0.1904	**0.2505**	**0.2505**
10	0.1650	0.2179	0.2316	**0.3176**	0.2274	0.2530	0.2894	0.3027
15	0.1650	0.2757	0.2898	**0.3708**	0.2823	0.3088	0.2925	0.3477
20	0.1650	0.3430	0.3523	**0.4205**	0.3435	0.3699	0.2875	0.4014
25	0.1650	0.3962	0.4036	**0.4670**	0.3975	0.4254	0.2774	0.4483
30	0.1650	0.4472	0.4520	**0.4958**	0.4485	0.4748	0.2700	0.4930
35	0.1650	0.4988	0.5006	0.5324	0.4990	0.5214	0.2648	**0.5344**
40	0.1650	0.5442	0.5477	0.5649	0.5444	0.5685	0.2611	**0.5801**

Table G117: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.1611	0.1204	0.1663	**0.2348**	0.1663	0.1663	**0.2348**	**0.2348**
10	0.1611	0.1702	0.1804	**0.2785**	0.1768	0.1992	0.2634	0.2497
15	0.1611	0.2207	0.2309	**0.3205**	0.2249	0.2514	0.2669	0.2890
20	0.1611	0.2632	0.2699	**0.3580**	0.2646	0.2883	0.2656	0.3198
25	0.1611	0.3040	0.3099	**0.3924**	0.3049	0.3305	0.2593	0.3496
30	0.1611	0.3514	0.3559	**0.4251**	0.3537	0.3754	0.2547	0.3962
35	0.1611	0.3857	0.3885	**0.4597**	0.3859	0.4103	0.2520	0.4261
40	0.1611	0.4194	0.4223	**0.4791**	0.4197	0.4412	0.2480	0.4524

Table G118: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Sample Size $n_a = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.1197	0.1465	0.1778	**0.2027**	0.1778	0.1778	0.2027	0.2027
10	0.1930	0.1465	0.1972	**0.2447**	0.2258	0.1821	0.2202	0.2415
15	0.2219	0.1465	0.2286	0.2838	**0.2839**	0.1743	0.2158	0.2851
20	0.2871	0.1465	0.2455	0.3168	**0.3287**	0.1759	0.2119	0.3256
25	0.3344	0.1465	0.2845	0.3485	**0.3756**	0.1799	0.2072	0.3613
30	0.3821	0.1465	0.2941	0.3744	**0.4102**	0.1786	0.2011	0.3969
35	0.4197	0.1465	0.3424	0.4088	**0.4432**	0.1780	0.2024	0.4344
40	0.4430	0.1465	0.3535	0.4258	**0.4643**	0.1766	0.1967	0.4545

Table G119: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.2040	0.2596	0.3382	**0.4170**	0.3382	0.3382	**0.4170**	**0.4170**
10	0.3822	0.2596	0.3999	0.5337	0.4876	0.3486	0.4674	**0.5235**
15	0.4732	0.2596	0.4795	0.6164	**0.6212**	0.3416	0.4548	0.6118
20	0.6129	0.2596	0.5375	0.6918	**0.7187**	0.3410	0.4441	0.6948
25	0.7117	0.2596	0.6122	0.7457	**0.7880**	0.3445	0.4238	0.7622
30	0.7906	0.2596	0.6587	0.7957	**0.8373**	0.3466	0.4152	0.8209
35	0.8350	0.2596	0.7232	0.8339	**0.8696**	0.3429	0.4059	0.8570
40	0.8818	0.2596	0.7595	0.8609	**0.9081**	0.3455	0.3981	0.9004

Table G120: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.1593	0.2055	0.2667	**0.3197**	0.2667	0.2667	**0.3197**	**0.3197**
10	0.2937	0.2055	0.3105	0.4071	0.3722	0.2715	0.3599	**0.4036**
15	0.3509	0.2055	0.3709	0.4718	**0.4730**	0.2652	0.3508	0.4608
20	0.4694	0.2055	0.4132	0.5461	**0.5639**	0.2673	0.3384	0.5459
25	0.5526	0.2055	0.4672	0.5845	**0.6320**	0.2692	0.3271	0.6035
30	0.6341	0.2055	0.5111	0.6391	**0.6832**	0.2689	0.3190	0.6694
35	0.6884	0.2055	0.5685	0.6787	**0.7278**	0.2676	0.3175	0.7128
40	0.7365	0.2055	0.6064	0.7175	**0.7684**	0.2676	0.3071	0.7565

Table G121: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI	
5	0.1280	0.1188	0.1517	**0.1801**	0.1517	0.1517	**0.1801**	**0.1801**	
10	0.1851	0.1188	0.1630	**0.2120**	0.1942	0.1498	0.1887	**0.2220**	
15	0.2079	0.1188	0.1918	0.2497	0.2485	0.1453	0.1819	**0.2592**	
20	0.2876	0.1188	0.2171	0.2890	0.3103	0.1481	0.1829	**0.3124**	
25	0.3391	0.1188	0.2426	0.3096	**0.3550**	0.1479	0.1746	0.3521	
30	0.3826	0.1188	0.2609	0.3415	**0.3915**	0.1503	0.1714	0.3911	
35	0.4235	0.1188	0.2955	0.3641	**0.4300**	0.1479	0.1694	0.4250	
40	0.4540	0.1188	0.3130	0.3901	**0.4616**	0.1472	0.1651	0.4607	

Table G122: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1253	0.1084	0.1390	**0.1718**	0.1390	0.1390	**0.1718**	**0.1718**
10	0.1949	0.1084	0.1518	**0.2115**	0.1870	0.1369	0.1780	**0.2248**
15	0.2160	0.1084	0.1815	0.2389	0.2404	0.1327	0.1697	**0.2624**
20	0.2758	0.1084	0.1947	0.2682	0.2884	0.1311	0.1632	**0.3029**
25	0.3356	0.1084	0.2290	0.2983	**0.3488**	0.1328	0.1581	0.3448
30	0.3743	0.1084	0.2424	0.3184	**0.3787**	0.1332	0.1557	0.3778
35	0.4259	0.1084	0.2813	0.3532	**0.4306**	0.1317	0.1524	0.4281
40	0.4540	0.1084	0.2940	0.3785	**0.4611**	0.1323	0.1494	0.4578

Table G123: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 5$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2019	0.1348	0.1881	**0.2714**	0.1881	0.1881	**0.2714**	**0.2714**
10	0.3749	0.1348	0.2289	0.3809	0.3127	0.1902	0.2888	**0.4305**
15	0.4765	0.1348	0.2959	0.4663	0.4791	0.1816	0.2752	**0.5452**
20	0.6136	0.1348	0.3455	0.5451	0.6193	0.1864	0.2576	**0.6519**
25	0.7258	0.1348	0.4267	0.6098	0.7303	0.1864	0.2451	**0.7381**
30	0.7826	0.1348	0.4662	0.6561	0.7822	0.1883	0.2388	**0.7881**
35	0.8390	0.1348	0.5410	0.7109	**0.8436**	0.1867	0.2334	0.8423
40	0.8787	0.1348	0.5878	0.7486	**0.8845**	0.1854	0.2237	0.8846

Table G124: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 5$; (CRD $N\ (0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2092	0.0917	0.1398	**0.2289**	0.1398	0.1398	**0.2289**	**0.2289**
10	0.3748	0.0917	0.1765	0.3262	0.2518	0.1395	0.2293	**0.3920**
15	0.4725	0.0917	0.2283	0.4103	0.4260	0.1343	0.2082	**0.5217**
20	0.6209	0.0917	0.2821	0.4907	0.5797	0.1365	0.1988	**0.6350**
25	0.7133	0.0917	0.3522	0.5501	0.6961	0.1400	0.1926	**0.7140**
30	0.7927	0.0917	0.4035	0.6173	0.7798	0.1409	0.1813	**0.7915**
35	0.8444	0.0917	0.4773	0.6573	**0.8372**	0.1383	0.1741	0.8422
40	0.8802	0.0917	0.5241	0.7077	**0.8767**	0.1391	0.1679	0.8809

Table G125: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1572	0.1441	0.1956	**0.2551**	0.1956	0.1956	**0.2551**	**0.2551**
10	0.2853	0.1441	0.2326	0.3365	0.2930	0.1994	0.2777	**0.3579**
15	0.3596	0.1441	0.2887	0.4073	0.4130	0.1890	0.2702	**0.4446**
20	0.4734	0.1441	0.3217	0.4625	0.5103	0.1901	0.2542	**0.5171**
25	0.5576	0.1441	0.3838	0.5123	**0.5952**	0.1915	0.2446	0.5859
30	0.6274	0.1441	0.4201	0.5625	**0.6497**	0.1936	0.2380	0.6458
35	0.6873	0.1441	0.4773	0.6052	**0.7040**	0.1926	0.2318	0.6973
40	0.7410	0.1441	0.5161	0.6501	**0.7580**	0.1915	0.2232	0.7511

Table G126: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1619	0.1192	0.1642	**0.2244**	0.1642	0.1642	**0.2244**	**0.2244**
10	0.2792	0.1192	0.1945	0.2982	0.2539	0.1651	0.2387	**0.3281**
15	0.3594	0.1192	0.2495	0.3715	0.3780	0.1602	0.2304	**0.4276**
20	0.4672	0.1192	0.2790	0.4254	0.4814	0.1629	0.2193	**0.5055**
25	0.5493	0.1192	0.3395	0.4809	**0.5685**	0.1638	0.2068	0.5658
30	0.6356	0.1192	0.3822	0.5361	**0.6465**	0.1639	0.2010	0.6478
35	0.6904	0.1192	0.4457	0.5736	**0.6981**	0.1634	0.1969	0.6957
40	0.7361	0.1192	0.4731	0.6143	**0.7450**	0.1652	0.1936	0.7428

Table G127: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Number of Blocks $n_b = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
10	0.1841	0.2265	0.2435	**0.3034**	0.2435	0.2435	**0.3034**	**0.3034**
15	0.1841	0.2773	0.2930	0.3489	0.2894	0.2986	0.3301	**0.3485**
20	0.1841	0.3268	0.3347	0.3809	0.3313	0.3423	0.3265	**0.3929**
25	0.1841	0.3640	0.3708	0.4185	0.3662	0.3795	0.3240	**0.4270**
30	0.1841	0.4168	0.4234	0.4478	0.4199	0.4327	0.3205	**0.4732**
35	0.1841	0.4594	0.4646	0.4827	0.4610	0.4733	0.3122	**0.5079**
40	0.1841	0.4930	0.4974	0.5120	0.4937	0.5066	0.3027	**0.5419**

Table G128: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
10	0.3736	0.4469	0.5013	**0.6568**	0.5013	0.5013	**0.6568**	**0.6568**
15	0.3736	0.5701	0.6051	**0.7402**	0.5960	0.6196	0.6989	0.7455
20	0.3736	0.7010	0.7164	**0.8117**	0.7100	0.7358	0.7168	0.8258
25	0.3736	0.7798	0.7921	**0.8572**	0.7853	0.8061	0.7043	0.8712
30	0.3736	0.8364	0.8435	**0.8868**	0.8397	0.8578	0.6930	0.9048
35	0.3736	0.8884	0.8920	**0.9170**	0.8891	0.9024	0.6819	0.9317
40	0.3736	0.9247	0.9279	**0.9357**	0.9253	0.9352	0.6693	0.9544

Table G129: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed number of Blocks $n_b = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
10	0.2871	0.3381	0.3737	**0.5054**	0.3737	0.3737	**0.5054**	**0.5054**
15	0.2871	0.4473	0.4734	0.5849	0.4662	0.4848	0.5480	**0.5969**
20	0.2871	0.5334	0.5479	0.6408	0.5425	0.5663	0.5537	**0.6586**
25	0.2871	0.6105	0.6242	0.6970	0.6154	0.6396	0.5483	**0.7083**
30	0.2871	0.6930	0.7015	0.7421	0.6954	0.7164	0.5331	**0.7710**
35	0.2871	0.7389	0.7433	0.7756	0.7404	0.7585	0.5301	**0.8072**
40	0.2871	0.7952	0.8000	0.8172	0.7965	0.8112	0.5170	**0.8487**

Table G130: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach						
			I	II	III	IV	V	VI
10	0.1905	0.1662	0.1821	**0.2539**	0.1821	0.1821	**0.2539**	**0.2539**
15	0.1905	0.1942	0.2064	**0.2878**	0.2032	0.2121	0.2831	0.2774
20	0.1905	0.2183	0.2237	**0.3074**	0.2213	0.2331	0.2864	0.2964
25	0.1905	0.2534	0.2585	**0.3342**	0.2546	0.2686	0.2885	0.3169
30	0.1905	0.2736	0.2799	**0.3569**	0.2762	0.2896	0.2852	0.3336
35	0.1905	0.3057	0.3090	**0.3772**	0.3064	0.3188	0.2793	0.3586
40	0.1905	0.3295	0.3334	**0.3983**	0.3308	0.3438	0.2767	0.3787

Table G131: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.1878	0.1411	0.1543	**0.2340**	0.1543	0.1543	**0.2340**	**0.2340**
15	0.1878	0.1617	0.1726	**0.2538**	0.1707	0.1775	0.2577	0.2438
20	0.1878	0.1823	0.1865	**0.2744**	0.1849	0.1963	0.2628	0.2537
25	0.1878	0.2034	0.2096	**0.2978**	0.2057	0.2176	0.2662	0.2706
30	0.1878	0.2306	0.2351	**0.3154**	0.2325	0.2442	0.2691	0.2871
35	0.1878	0.2496	0.2521	**0.3319**	0.2500	0.2614	0.2655	0.2978
40	0.1878	0.2605	0.2647	**0.3460**	0.2614	0.2747	0.2629	0.3139

Table G132: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.3711	0.1854	0.2240	**0.4468**	0.2240	0.2240	**0.4468**	**0.4468**
15	0.3711	0.2325	0.2592	**0.4922**	0.2510	0.2713	0.5051	0.4517
20	0.3711	0.2817	0.2990	**0.5411**	0.2923	0.3168	0.5331	0.4719
25	0.3711	0.3336	0.3462	**0.5805**	0.3383	0.3670	0.5364	0.4991
30	0.3711	0.3765	0.3869	**0.6099**	0.3804	0.4105	0.5387	0.5188
35	0.3711	0.4232	0.4310	**0.6341**	0.4248	0.4530	0.5316	0.5436
40	0.3711	0.4606	0.4673	**0.6630**	0.4620	0.4888	0.5283	0.5747

Table G133: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 10$; (CRD $N(0, 3)$ and RCBD $N(0, 1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.3747	0.1296	0.1583	**0.3690**	0.1583	0.1583	**0.3690**	**0.3690**
15	0.3747	0.1541	0.1753	**0.4003**	0.1683	0.1859	0.4335	0.3538
20	0.3747	0.1830	0.1944	**0.4264**	0.1885	0.2101	0.4523	0.3427
25	0.3747	0.1996	0.2112	**0.4509**	0.2047	0.2257	0.4674	0.3425
30	0.3747	0.2226	0.2317	**0.4741**	0.2256	0.2488	0.4743	0.3537
35	0.3747	0.2482	0.2538	**0.4998**	0.2493	0.2692	0.4769	0.3604
40	0.3747	0.2716	0.2781	**0.5171**	0.2738	0.2976	0.4712	0.3736

Table G134: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.2807	0.2231	0.2577	**0.3966**	0.2577	0.2577	**0.3966**	**0.3966**
15	0.2807	0.2815	0.3056	0.4618	0.2986	0.3160	0.4540	**0.4460**
20	0.2807	0.3455	0.3596	0.5091	0.3538	0.3763	0.4662	**0.4858**
25	0.2807	0.3937	0.4069	0.5486	0.3986	0.4255	0.4610	**0.5240**
30	0.2807	0.4424	0.4529	0.5868	0.4468	0.4730	0.4568	**0.5615**
35	0.2807	0.4995	0.5057	0.6260	0.5006	0.5266	0.4503	**0.5951**
40	0.2807	0.5429	0.5490	0.6513	0.5442	0.5673	0.4440	**0.6241**

Table G135: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.2867	0.1768	0.2073	**0.3669**	0.2073	0.2073	**0.3669**	**0.3669**
15	0.2867	0.2203	0.2387	0.4042	0.2342	0.2498	0.4079	**0.3821**
20	0.2867	0.2733	0.2822	0.4479	0.2794	0.2963	0.4294	**0.4114**
25	0.2867	0.3103	0.3205	0.4831	0.3148	0.3339	0.4312	**0.4317**
30	0.2867	0.3444	0.3521	0.5122	0.3477	0.3679	0.4239	**0.4533**
35	0.2867	0.3729	0.3771	0.5345	0.3736	0.3983	0.4225	**0.4764**
40	0.2867	0.4196	0.4259	0.5646	0.4209	0.4433	0.4217	**0.5096**

Table G136: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Sample Size $n_a = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
10	0.1886	0.2194	0.2374	**0.3036**	0.2374	0.2374	**0.3036**	**0.3036**
15	0.2128	0.2194	0.2504	**0.3414**	0.2655	0.2395	0.3312	0.3374
20	0.2874	0.2194	0.2629	**0.3772**	0.3050	0.2378	0.3365	0.3729
25	0.3330	0.2194	0.2779	**0.4172**	0.3462	0.2420	0.3381	0.4050
30	0.3792	0.2194	0.2851	**0.4497**	0.4000	0.2436	0.3377	0.4418
35	0.4234	0.2194	0.2985	**0.4678**	0.4357	0.2421	0.3301	0.4703
40	0.4462	0.2194	0.3084	**0.4883**	0.4769	0.2418	0.3249	**0.4928**

Table G137: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.3782	0.4457	0.4984	**0.6524**	0.4984	0.4984	**0.6524**	**0.6524**
15	0.4735	0.4457	0.5307	**0.7301**	0.5681	0.5041	0.7069	0.7288
20	0.6211	0.4457	0.5662	**0.7978**	0.6579	0.5052	0.7299	0.7912
25	0.7191	0.4457	0.5876	**0.8431**	0.7312	0.5087	0.7180	0.8395
30	0.7824	0.4457	0.6056	**0.8685**	0.8046	0.5043	0.7074	0.8678
35	0.8449	0.4457	0.6395	**0.9027**	0.8682	0.5067	0.7007	0.9012
40	0.8829	0.4457	0.6649	**0.9223**	0.9112	0.5063	0.6905	**0.9276**

Table G138: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.1807	0.1759	0.2334	**0.3084**	0.2334	0.2334	**0.3084**	**0.3084**
15	0.2736	0.3319	0.3677	**0.4990**	0.3677	0.3677	0.4990	0.4990
20	0.3573	0.3319	0.3937	**0.5753**	0.4222	0.3728	0.5537	0.5701
25	0.4572	0.3319	0.4152	**0.6292**	0.4903	0.3715	0.5558	0.6182
30	0.5579	0.3319	0.4401	**0.6803**	0.5688	0.3760	0.5569	0.6742
35	0.6346	0.3319	0.4537	**0.7282**	0.6525	0.3761	0.5520	0.7320
40	0.6864	0.3319	0.4769	**0.7607**	0.7159	0.3747	0.5356	0.7599

Table G139: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Sample Size $n_a = 10$;(CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)									
Blocks			**Approach**						
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.1893	0.2202	0.2363	**0.3050**	0.2363	0.2363	**0.3050**	**0.3050**
15	0.2183	0.2202	0.2467	0.3451	0.2634	0.2379	0.3298	**0.3419**
20	0.2823	0.2202	0.2642	0.3742	0.3036	0.2374	0.3342	**0.3690**
25	0.3449	0.2202	0.2773	0.4183	0.3452	0.2421	0.3393	**0.4157**
30	0.3679	0.2202	0.2788	0.4359	0.3882	0.2413	0.3263	**0.4301**
35	0.4125	0.2202	0.2946	0.4619	0.4316	0.2418	0.3279	**0.4660**
40	0.4447	0.2202	0.3109	0.4929	0.4795	0.2431	0.3256	**0.4972**

Table G140: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.1858	0.1384	0.1519	**0.2345**	0.1519	0.1519	**0.2345**	**0.2345**
15	0.2136	0.1384	0.1597	0.2686	0.1718	0.1519	0.2436	**0.2810**
20	0.2884	0.1384	0.1723	0.3037	0.2114	0.1513	0.2467	**0.3270**
25	0.3439	0.1384	0.1850	0.3400	0.2488	0.1550	0.2410	**0.3725**
30	0.3778	0.1384	0.1882	0.3566	0.2918	0.1550	0.2312	**0.4000**
35	0.4301	0.1384	0.2001	0.3928	0.3493	0.1536	0.2325	**0.4506**
40	0.4631	0.1384	0.2160	0.4156	0.3982	0.1530	0.2286	**0.4762**

Table G141: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.3738	0.1887	0.2293	**0.4440**	0.2293	0.2293	**0.4440**	**0.4440**
15	0.4732	0.1887	0.2516	0.5244	0.2809	0.2286	0.4573	**0.5634**
20	0.6129	0.1887	0.2762	0.6045	0.3674	0.2301	0.4598	**0.6684**
25	0.7140	0.1887	0.3013	0.6701	0.4701	0.2338	0.4507	**0.7488**
30	0.7835	0.1887	0.3194	0.7175	0.5733	0.2313	0.4285	**0.8092**
35	0.8405	0.1887	0.3454	0.7646	0.6772	0.2319	0.4178	**0.8592**
40	0.8767	0.1887	0.3700	0.8033	0.7705	0.2295	0.4006	**0.8926**

Table G142: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.3845	0.1241	0.1538	**0.3717**	0.1538	0.1538	**0.3717**	**0.3717**
15	0.4742	0.1241	0.1726	0.4537	0.1978	0.1556	0.3756	**0.5134**
20	0.6124	0.1241	0.1929	0.5243	0.2784	0.1546	0.3664	**0.6239**
25	0.7217	0.1241	0.2121	0.6041	0.3692	0.1581	0.3503	**0.7241**
30	0.7826	0.1241	0.2302	0.6474	0.4772	0.1568	0.3311	**0.7814**
35	0.8447	0.1241	0.2553	0.7104	0.6059	0.1540	0.3242	**0.8455**
40	0.8717	0.1241	0.2818	0.7431	0.7052	0.1558	0.3088	**0.8779**

Table G143: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2819	0.2176	0.2468	**0.3945**	0.2468	0.2468	**0.3945**	**0.3945**
15	0.3557	0.2176	0.2676	0.4755	0.2917	0.2503	0.4313	**0.4866**
20	0.4686	0.2176	0.2876	0.5324	0.3635	0.2478	0.4350	**0.5659**
25	0.5594	0.2176	0.3070	0.5878	0.4390	0.2496	0.4245	**0.6330**
30	0.6313	0.2176	0.3220	0.6281	0.5243	0.2511	0.4130	**0.6853**
35	0.6890	0.2176	0.3458	0.6761	0.6094	0.2495	0.3991	**0.7354**
40	0.7283	0.2176	0.3652	0.7037	0.6788	0.2525	0.3912	**0.7679**

Table G144: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2761	0.1739	0.2060	**0.3576**	0.2060	0.2060	**0.3576**	**0.3576**
15	0.3495	0.1739	0.2231	0.4332	0.2485	0.2057	0.3854	**0.4579**
20	0.4746	0.1739	0.2449	0.4983	0.3166	0.2058	0.3869	**0.5431**
25	0.5646	0.1739	0.2680	0.5482	0.3891	0.2083	0.3740	**0.6128**
30	0.6250	0.1739	0.2734	0.5863	0.4771	0.2092	0.3691	**0.6653**
35	0.6826	0.1739	0.2984	0.6361	0.5609	0.2074	0.3564	**0.7141**
40	0.7422	0.1739	0.3203	0.6820	0.6543	0.2086	0.3439	**0.7686**

Table G145: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Number of Blocks $n_b = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.2214	0.2690	0.2904	**0.3930**	0.2904	0.2904	**0.3930**	**0.3930**
20	0.2214	0.3164	0.3260	0.4310	0.3240	0.3327	0.4164	**0.4368**
25	0.2214	0.3654	0.3758	0.4661	0.3716	0.3814	0.4246	**0.4674**
30	0.2214	0.4106	0.4192	0.4963	0.4147	0.4259	0.4244	**0.5009**
35	0.2214	0.4604	0.4652	0.5344	0.4622	0.4743	0.4258	**0.5442**
40	0.2214	0.5025	0.5075	0.5658	0.5047	0.5162	0.4187	**0.5786**

Table G146: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.4767	0.5793	0.6281	**0.8136**	0.6281	0.6281	**0.8136**	**0.8136**
20	0.4767	0.6897	0.7143	0.8619	0.7095	0.7242	0.8433	**0.8672**
25	0.4767	0.7798	0.7967	0.8982	0.7896	0.8047	0.8569	**0.9041**
30	0.4767	0.8404	0.8524	0.9277	0.8463	0.8617	0.8606	**0.9346**
35	0.4767	0.8926	0.8987	0.9485	0.8954	0.9047	0.8609	**0.9567**
40	0.4767	0.9232	0.9279	0.9607	0.9245	0.9337	0.8469	**0.9682**

Table G147: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.3463	0.4378	0.4784	**0.6468**	0.4784	0.4784	**0.6468**	**0.6468**
20	0.3463	0.5325	0.5557	0.7038	0.5507	0.5646	0.6853	**0.7090**
25	0.3463	0.6196	0.6354	0.7527	0.6292	0.6462	0.7001	**0.7623**
30	0.3463	0.6825	0.6950	0.7942	0.6897	0.7075	0.7033	**0.8072**
35	0.3463	0.7418	0.7509	0.8296	0.7449	0.7629	0.6985	**0.8413**
40	0.3463	0.7976	0.8028	0.8563	0.8000	0.8129	0.6899	**0.8752**

Table G148: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.2178	0.1931	0.2105	**0.3206**	0.2105	0.2105	**0.3206**	**0.3206**
20	0.2178	0.2187	0.2288	**0.3442**	0.2262	0.2345	0.3471	0.3370
25	0.2178	0.2559	0.2657	**0.3775**	0.2613	0.2719	0.3570	0.3620
30	0.2178	0.2843	0.2919	**0.4125**	0.2884	0.3009	0.3715	0.3930
35	0.2178	0.2989	0.3045	**0.4193**	0.3018	0.3129	0.3621	0.3956
40	0.2178	0.3381	0.3447	**0.4487**	0.3398	0.3539	0.3642	0.4235

Table G149: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)									
Sample			Approach						
Size	L*	FW*	I	II	III	IV	V	VI
15	0.2180	0.1606	0.1794	**0.2952**	0.1794	0.1794	**0.2952**	**0.2952**
20	0.2180	0.1825	0.1919	**0.3180**	0.1897	0.1959	0.3187	0.3052
25	0.2180	0.2000	0.2083	**0.3298**	0.2045	0.2137	0.3249	0.3099
30	0.2180	0.2239	0.2305	**0.3492**	0.2278	0.2381	0.3364	0.3220
35	0.2180	0.2492	0.2538	**0.3738**	0.2516	0.2597	0.3411	0.3362
40	0.2180	0.2606	0.2654	**0.3792**	0.2626	0.2737	0.3331	0.3435

Table G150: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.4766	0.2391	0.2808	**0.5834**	0.2808	0.2808	**0.5834**	**0.5834**
20	0.4766	0.2905	0.3181	**0.6278**	0.3102	0.3300	0.6439	0.5969
25	0.4766	0.3369	0.3557	**0.6619**	0.3477	0.3692	0.6712	0.6032
30	0.4766	0.3804	0.3963	**0.6927**	0.3883	0.4132	0.6860	0.6219
35	0.4766	0.4182	0.4294	**0.7199**	0.4238	0.4482	0.6877	0.6379
40	0.4766	0.4566	0.4665	**0.7437**	0.4604	0.4857	0.6904	0.6540

Table G151: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.4727	0.1530	0.1827	**0.4924**	0.1827	0.1827	**0.4924**	**0.4924**
20	0.4727	0.1806	0.2017	**0.5187**	0.1969	0.2101	0.5529	0.4744
25	0.4727	0.2070	0.2243	**0.5451**	0.2177	0.2360	0.5839	0.4634
30	0.4727	0.2201	0.2370	**0.5668**	0.2288	0.2506	0.6012	0.4566
35	0.4727	0.2493	0.2586	**0.5905**	0.2539	0.2752	0.6187	0.4561
40	0.4727	0.2677	0.2758	**0.6041**	0.2711	0.2916	0.6164	0.4602

Table G152: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.3573	0.2844	0.3176	**0.5277**	0.3176	0.3176	**0.5277**	**0.5277**
20	0.3573	0.3454	0.3650	**0.5843**	0.3615	0.3750	0.5859	0.5693
25	0.3573	0.4025	0.4201	**0.6307**	0.4128	0.4316	0.6069	0.6070
30	0.3573	0.4374	0.4539	**0.6529**	0.4466	0.4670	0.6111	0.6237
35	0.3573	0.4964	0.5058	**0.6931**	0.4999	0.5208	0.6106	0.6631
40	0.3573	0.5567	0.5645	**0.7223**	0.5599	0.5791	0.6117	0.6945

Table G153: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)									
Sample Size			Approach						
	L*	FW*	I	II	III	IV	V	VI
15	0.3647	0.2170	0.2487	**0.4843**	0.2487	0.2487	**0.4843**	**0.4843**
20	0.3647	0.2660	0.2845	**0.5161**	0.2793	0.2920	0.5263	0.4931
25	0.3647	0.3050	0.3224	**0.5635**	0.3145	0.3324	0.5615	0.5187
30	0.3647	0.3331	0.3486	**0.5858**	0.3408	0.3625	0.5587	0.5262
35	0.3647	0.3857	0.3957	**0.6163**	0.3902	0.4095	0.5679	0.5564
40	0.3647	0.4166	0.4263	**0.6447**	0.4200	0.4407	0.5653	0.5778

Table G154: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Sample Size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2091	0.2693	0.2899	**0.3863**	0.2899	0.2899	**0.3863**	**0.3863**
20	0.2718	0.2693	0.2958	**0.4112**	0.3049	0.2890	0.4089	0.4084
25	0.3360	0.2693	0.3068	**0.4610**	0.3275	0.2918	0.4338	0.4537
30	0.3779	0.2693	0.3154	**0.4844**	0.3524	0.2913	0.4322	0.4784
35	0.4241	0.2693	0.3229	**0.5144**	0.3801	0.2914	0.4360	0.5092
40	0.4485	0.2693	0.3256	**0.5427**	0.4101	0.2909	0.4295	0.5375

Table G156: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4806	0.5801	0.6262	**0.8073**	0.6262	0.6262	**0.8073**	**0.8073**
20	0.6114	0.5801	0.6420	**0.8582**	0.6614	0.6277	0.8511	0.8532
25	0.7184	0.5801	0.6565	**0.8955**	0.6975	0.6277	0.8648	0.8906
30	0.7844	0.5801	0.6729	**0.9149**	0.7454	0.6285	0.8660	0.9083
35	0.8416	0.5801	0.6884	**0.9389**	0.7917	0.6283	0.8663	0.9341
40	0.8806	0.5801	0.6959	**0.9543**	0.8376	0.6279	0.8650	0.9513

Table G157: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3477	0.4293	0.4704	**0.6455**	0.4704	0.4704	**0.6455**	**0.6455**
20	0.4610	0.4293	0.4835	**0.7000**	0.5001	0.4698	0.6893	0.6980
25	0.5631	0.4293	0.4972	**0.7468**	0.5347	0.4687	0.7073	0.7418
30	0.6329	0.4293	0.5112	**0.7855**	0.5786	0.4695	0.7145	0.7809
35	0.6920	0.4293	0.5255	**0.8190**	0.6268	0.4700	0.7080	0.8153
40	0.7345	0.4293	0.5330	**0.8414**	0.6708	0.4694	0.7000	0.8394

Table G158: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2132	0.1872	0.2049	**0.3159**	0.2049	0.2049	**0.3159**	**0.3159**
20	0.2918	0.1872	0.2109	0.3603	0.2170	0.2046	0.3419	**0.3688**
25	0.3350	0.1872	0.2172	0.3889	0.2381	0.2048	0.3487	**0.4022**
30	0.3787	0.1872	0.2237	0.4051	0.2606	0.2051	0.3387	**0.4294**
35	0.4160	0.1872	0.2313	0.4438	0.2848	0.2048	0.3417	**0.4674**
40	0.4566	0.1872	0.2329	0.4763	0.3162	0.2053	0.3389	**0.5027**

Table G159: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.25; d4=0.25; d5=0.25

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2162	0.1602	0.1769	**0.2976**	0.1769	0.1769	**0.2976**	**0.2976**
20	0.2770	0.1602	0.1836	0.3281	0.1910	0.1779	0.3085	**0.3413**
25	0.3406	0.1602	0.1902	0.3611	0.2095	0.1781	0.3152	**0.3801**
30	0.3750	0.1602	0.1950	0.3854	0.2243	0.1771	0.3089	**0.4171**
35	0.4211	0.1602	0.2019	0.4187	0.2498	0.1778	0.3057	**0.4581**
40	0.4498	0.1602	0.2036	0.4449	0.2803	0.1765	0.3016	**0.4898**

Table G160: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4779	0.2266	0.2670	**0.5819**	0.2670	0.2670	**0.5819**	**0.5819**
20	0.6161	0.2266	0.2844	0.6539	0.3013	0.2685	0.6052	**0.6831**
25	0.7098	0.2266	0.2976	0.7085	0.3452	0.2682	0.6024	**0.7610**
30	0.7821	0.2266	0.3108	0.7552	0.3947	0.2673	0.5953	**0.8185**
35	0.8441	0.2266	0.3295	0.8007	0.4608	0.2692	0.5895	**0.8698**
40	0.8791	0.2266	0.3384	0.8324	0.5247	0.2675	0.5728	**0.9037**

Table G161: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4856	0.1487	0.1800	**0.4971**	0.1800	0.1800	**0.4971**	**0.4971**
20	0.6182	0.1487	0.1899	0.5672	0.2058	0.1787	0.5100	**0.6136**
25	0.7212	0.1487	0.2040	0.6276	0.2394	0.1805	0.4972	**0.7132**
30	0.7823	0.1487	0.2112	0.6887	0.2808	0.1807	0.4846	**0.7828**
35	0.8398	0.1487	0.2262	0.7366	0.3392	0.1801	0.4725	**0.8390**
40	0.8770	0.1487	0.2331	0.7775	0.4067	0.1803	0.4549	**0.8845**

Table G162: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3609	0.2777	0.3131	**0.5416**	0.3131	0.3131	**0.5416**	**0.5416**
20	0.4638	0.2777	0.3260	0.5915	0.3400	0.3131	0.5657	**0.6041**
25	0.5428	0.2777	0.3349	0.6466	0.3723	0.3111	0.5779	**0.6634**
30	0.6281	0.2777	0.3523	0.6853	0.4220	0.3164	0.5754	**0.7148**
35	0.6857	0.2777	0.3663	0.7240	0.4702	0.3126	0.5667	**0.7621**
40	0.7383	0.2777	0.3702	0.7682	0.5277	0.3138	0.5631	**0.8051**

Table G163: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0.75; d4=0.75; d5=0.75

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3561	0.2159	0.2490	**0.4793**	0.2490	0.2490	**0.4793**	**0.4793**
20	0.4669	0.2159	0.2580	0.5342	0.2714	0.2485	0.5049	**0.5574**
25	0.5626	0.2159	0.2714	0.5982	0.3064	0.2508	0.5125	**0.6343**
30	0.6309	0.2159	0.2835	0.6388	0.3479	0.2533	0.5084	**0.6882**
35	0.6864	0.2159	0.2889	0.6742	0.3985	0.2490	0.4955	**0.7308**
40	0.7335	0.2159	0.3013	0.7161	0.4527	0.2511	0.4894	**0.7766**

Table G164: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Number of Blocks $n_b = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.2073	0.2462	0.3064	**0.3528**	0.3064	0.3064	**0.3528**	**0.3528**
10	0.2073	0.3695	0.3847	0.4467	0.3783	0.4078	0.3872	**0.4560**
15	0.2073	0.4589	0.4712	0.5119	0.4657	0.4950	0.3751	**0.5328**
20	0.2073	0.5545	0.5615	0.5745	0.5550	0.5774	0.3635	**0.6023**
25	0.2073	0.6201	0.6274	0.6266	0.6208	0.6489	0.3530	**0.6674**
30	0.2073	0.6893	0.6937	0.6773	0.6910	0.7123	0.3456	**0.7238**
35	0.2073	0.7472	0.7491	0.7102	0.7468	0.7645	0.3380	**0.7744**
40	0.2073	0.7926	0.7939	0.7461	0.7927	0.8070	0.3295	**0.8142**

Table G165: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1864	0.2315	0.3016	**0.3591**	0.3016	0.3016	**0.3591**	**0.3591**
10	0.1864	0.3841	0.4019	0.4766	0.3935	0.4283	0.4056	**0.4806**
15	0.1864	0.5120	0.5263	0.5623	0.5183	0.5495	0.3882	**0.5893**
20	0.1864	0.6157	0.6258	0.6375	0.6174	0.6464	0.3743	**0.6721**
25	0.1864	0.7054	0.7119	0.6957	0.7065	0.7336	0.3657	**0.7484**
30	0.1864	0.7595	0.7637	0.7396	0.7610	0.7804	0.3528	**0.7913**
35	0.1864	0.8206	0.8229	0.7844	0.8207	0.8371	0.3391	**0.8435**
40	0.1864	0.8624	0.8637	0.8220	0.8625	0.8738	0.3321	**0.8810**

Table G166: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed number of Blocks $n_b = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1544	0.1785	0.2298	**0.2784**	0.2298	0.2298	**0.2784**	**0.2784**
10	0.1544	0.2949	0.3082	0.3643	0.3035	0.3303	0.3117	**0.3735**
15	0.1544	0.3813	0.3950	0.4319	0.3879	0.4156	0.3033	**0.4509**
20	0.1544	0.4755	0.4826	0.4955	0.4757	0.5003	0.2956	**0.5258**
25	0.1544	0.5504	0.5555	0.5502	0.5509	0.5729	0.2832	**0.5923**
30	0.1544	0.6056	0.6081	0.5896	0.6069	0.6241	0.2745	**0.6400**
35	0.1544	0.6735	0.6753	0.6365	0.6732	0.6916	0.2656	**0.7020**
40	0.1544	0.7194	0.7211	0.6721	0.7198	0.7364	0.2612	**0.7447**

Table G167: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1395	0.1328	0.1661	**0.2006**	0.1661	0.1661	**0.2006**	**0.2006**
10	0.1395	0.1794	0.1850	**0.2385**	0.1837	0.1976	0.2218	0.2283
15	0.1395	0.2103	0.2175	**0.2677**	0.2147	0.2280	0.2206	0.2548
20	0.1395	0.2503	0.2545	**0.2921**	0.2503	0.2642	0.2172	0.2797
25	0.1395	0.2773	0.2818	**0.3174**	0.2781	0.2972	0.2111	0.3107
30	0.1395	0.3123	0.3153	**0.3418**	0.3136	0.3286	0.2100	0.3384
35	0.1395	0.3411	0.3414	**0.3675**	0.3409	0.3559	0.2096	0.3634
40	0.1395	0.3780	0.3804	**0.3921**	0.3783	0.3907	0.2063	**0.3970**

Table G168: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=.0.2

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach						
			I	II	III	IV	V	VI
5	0.1378	0.1140	0.1440	**0.1815**	0.1440	0.1440	**0.1815**	**0.1815**
10	0.1378	0.1433	0.1482	**0.2071**	0.1472	0.1602	0.2019	0.1877
15	0.1378	0.1713	0.1760	**0.2310**	0.1732	0.1845	0.2008	0.2080
20	0.1378	0.2037	0.2068	**0.2526**	0.2037	0.2178	0.2034	0.2348
25	0.1378	0.2239	0.2270	**0.2694**	0.2242	0.2414	0.1990	0.2550
30	0.1378	0.2420	0.2443	**0.2862**	0.2430	0.2567	0.1951	0.2683
35	0.1378	0.2690	0.2702	**0.3027**	0.2686	0.2811	0.1952	0.2890
40	0.1378	0.2953	0.2963	**0.3252**	0.2953	0.3071	0.1927	0.3128

Table G169: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 5$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1849	0.1192	0.1690	**0.2471**	0.1690	0.1690	**0.2471**	**0.2471**
10	0.1849	0.1678	0.1801	**0.2959**	0.1748	0.1990	0.2896	0.2580
15	0.1849	0.2058	0.2154	**0.3293**	0.2099	0.2370	0.2921	0.2834
20	0.1849	0.2514	0.2592	**0.3632**	0.2522	0.2791	0.2883	0.3123
25	0.1849	0.2921	0.2987	**0.3994**	0.2934	0.3204	0.2834	0.3473
30	0.1849	0.3213	0.3265	**0.4296**	0.3230	0.3522	0.2829	0.3747
35	0.1849	0.3596	0.3617	**0.4506**	0.3599	0.3841	0.2764	0.3977
40	0.1849	0.3914	0.3941	**0.4764**	0.3917	0.4164	0.2765	0.4301

Table G170: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 5$; (CRD $N(0, 3)$ and RCBD $N(0, 1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1879	0.0901	0.1316	**0.2086**	0.1316	0.1316	**0.2086**	**0.2086**
10	0.1879	0.1215	0.1307	**0.2427**	0.1272	0.1485	0.2544	0.2050
15	0.1879	0.1447	0.1527	**0.2644**	0.1480	0.1694	0.2618	0.2096
20	0.1879	0.1542	0.1607	**0.2797**	0.1548	0.1769	0.2639	0.2045
25	0.1879	0.1737	0.1773	**0.2983**	0.1743	0.1960	0.2622	0.2158
30	0.1879	0.2012	0.2044	**0.3235**	0.2024	0.2212	0.2595	0.2384
35	0.1879	0.2186	0.2208	**0.3369**	0.2186	0.2395	0.2571	0.2531
40	0.1879	0.2305	0.2327	**0.3464**	0.2306	0.2494	0.2544	0.2595

Table G171: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1521	0.1270	0.1691	**0.2234**	0.1691	0.1691	**0.2234**	**0.2234**
10	0.1521	0.1907	0.2009	**0.2813**	0.1975	0.2197	0.2600	0.2670
15	0.1521	0.2506	0.2624	**0.3265**	0.2560	0.2777	0.2595	0.3117
20	0.1521	0.2959	0.3033	**0.3655**	0.2962	0.3189	0.2532	0.3482
25	0.1521	0.3430	0.3488	**0.3945**	0.3439	0.3691	0.2498	0.3891
30	0.1521	0.3939	0.3977	**0.4412**	0.3951	0.4187	0.2408	0.4348
35	0.1521	0.4283	0.4301	**0.4631**	0.4281	0.4522	0.2362	**0.4655**
40	0.1521	0.4796	0.4828	**0.4993**	0.4800	0.5007	0.2380	**0.5118**

Table G172: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1547	0.1146	0.1546	**0.2118**	0.1546	0.1546	**0.2118**	**0.2118**
10	0.1547	0.1576	0.1683	**0.2488**	0.1635	0.1836	0.2455	0.2279
15	0.1547	0.1981	0.2055	**0.2846**	0.2018	0.2189	0.2451	0.2519
20	0.1547	0.2363	0.2425	**0.3171**	0.2368	0.2572	0.2394	0.2810
25	0.1547	0.2633	0.2688	**0.3442**	0.2646	0.2883	0.2397	0.3048
30	0.1547	0.2978	0.3013	**0.3660**	0.2991	0.3201	0.2344	0.3353
35	0.1547	0.3349	0.3363	**0.3974**	0.3345	0.3540	0.2317	0.3672
40	0.1547	0.3565	0.3587	**0.4126**	0.3567	0.3762	0.2298	0.3897

Table G173: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Sample Size $n_a = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1994	0.2301	0.2884	**0.3406**	0.2884	0.2884	**0.3406**	**0.3406**
10	0.3061	0.2301	0.3310	**0.4219**	0.3906	0.2922	0.3777	**0.4159**
15	0.3925	0.2301	0.3899	0.4934	0.4966	0.2862	0.3694	**0.4970**
20	0.4885	0.2301	0.4279	0.5498	**0.5684**	0.2896	0.3576	0.5536
25	0.5820	0.2301	0.4904	0.6030	**0.6472**	0.2927	0.3492	0.6223
30	0.6345	0.2301	0.5175	0.6394	**0.6794**	0.2903	0.3401	0.6607
35	0.6971	0.2301	0.5770	0.6744	**0.7308**	0.2888	0.3345	0.7200
40	0.7423	0.2301	0.6036	0.7148	**0.7693**	0.2911	0.3277	0.7622

Table G174: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.1951	0.2368	0.3040	**0.3687**	0.3040	0.3040	**0.3687**	**0.3687**
10	0.3293	0.2368	0.3563	**0.4652**	0.4274	0.3097	0.4105	0.4576
15	0.4183	0.2368	0.4308	0.5461	**0.5499**	0.3052	0.4043	0.5435
20	0.5338	0.2368	0.4680	0.6130	**0.6284**	0.3039	0.3888	0.6074
25	0.6393	0.2368	0.5409	0.6665	**0.7099**	0.3074	0.3785	0.6861
30	0.7083	0.2368	0.5830	0.7169	**0.7590**	0.3082	0.3670	0.7413
35	0.7612	0.2368	0.6428	0.7521	**0.7988**	0.3058	0.3575	0.7855
40	0.8126	0.2368	0.6826	0.7922	**0.8435**	0.3088	0.3518	0.8327

Table G175: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.1456	0.1822	0.2345	**0.2810**	0.2345	0.2345	**0.2810**	**0.2810**
10	0.2535	0.1822	0.2679	**0.3544**	0.3205	0.2373	0.3066	0.3487
15	0.3080	0.1822	0.3257	**0.4147**	**0.4151**	0.2332	0.3042	0.4086
20	0.4171	0.1822	0.3619	0.4733	**0.4931**	0.2367	0.3019	0.4764
25	0.4930	0.1822	0.4144	0.5201	**0.5633**	0.2364	0.2890	0.5343
30	0.5609	0.1822	0.4474	0.5621	**0.6050**	0.2388	0.2842	0.5905
35	0.6140	0.1822	0.4933	0.5946	**0.6469**	0.2330	0.2746	0.6333
40	0.6631	0.1822	0.5254	0.6308	**0.6925**	0.2360	0.2688	0.6813

Table G176: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.1395	0.1261	0.1580	**0.1968**	0.1580	0.1580	**0.1968**	**0.1968**
10	0.2130	0.1261	0.1745	0.2443	0.2124	0.1569	0.2020	**0.2552**
15	0.2359	0.1261	0.2132	0.2792	0.2804	0.1546	0.2000	**0.2962**
20	0.3148	0.1261	0.2290	0.3206	0.3426	0.1559	0.1897	**0.3471**
25	0.3778	0.1261	0.2727	0.3508	**0.3981**	0.1583	0.1886	0.3920
30	0.4220	0.1261	0.2892	0.3793	**0.4370**	0.1588	0.1815	0.4306
35	0.4678	0.1261	0.3294	0.4100	**0.4780**	0.1566	0.1810	0.4743
40	0.5063	0.1261	0.3489	0.4358	**0.5166**	0.1564	0.1788	0.5144

Table G177: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=.0.2

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1378	0.1143	0.1431	**0.1850**	0.1431	0.1431	**0.1850**	**0.1850**
10	0.2040	0.1143	0.1638	0.2244	0.1961	0.1458	0.1871	**0.2396**
15	0.2465	0.1143	0.1973	0.2713	0.2750	0.1408	0.1839	**0.2981**
20	0.3187	0.1143	0.2177	0.2983	0.3314	0.1449	0.1797	**0.3464**
25	0.3806	0.1143	0.2469	0.3254	**0.3889**	0.1416	0.1719	0.3874
30	0.4363	0.1143	0.2749	0.3650	**0.4402**	0.1431	0.1686	0.4400
35	0.4694	0.1143	0.3105	0.3924	**0.4729**	0.1446	0.1647	0.4707
40	0.5062	0.1143	0.3223	0.4132	**0.5096**	0.1412	0.1615	0.5092

Table G178: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1899	0.1197	0.1698	**0.2479**	0.1698	0.1698	**0.2479**	**0.2479**
10	0.3439	0.1197	0.2108	0.3387	0.2828	0.1709	0.2640	**0.3816**
15	0.4137	0.1197	0.2657	0.4127	0.4236	0.1644	0.2456	**0.4782**
20	0.5352	0.1197	0.3051	0.4783	0.5382	0.1653	0.2320	**0.5673**
25	0.6374	0.1197	0.3782	0.5386	0.6462	0.1700	0.2208	**0.6481**
30	0.7117	0.1197	0.4200	0.5899	0.7074	0.1662	0.2152	**0.7136**
35	0.7776	0.1197	0.4836	0.6445	0.7796	0.1658	0.2103	**0.7810**
40	0.8141	0.1197	0.5259	0.6782	0.8181	0.1670	0.2008	**0.8203**

Table G179: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5;

Fixed Sample Size $n_a = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1868	0.0871	0.1312	**0.2113**	0.1312	0.1312	**0.2113**	**0.2113**
10	0.3409	0.0871	0.1591	0.2901	0.2251	0.1315	0.2055	**0.3485**
15	0.4249	0.0871	0.2156	0.3669	0.3802	0.1265	0.1959	**0.4633**
20	0.5420	0.0871	0.2561	0.4273	0.5116	0.1275	0.1829	**0.5589**
25	0.6335	0.0871	0.3171	0.4897	0.6220	0.1281	0.1756	**0.6404**
30	0.7161	0.0871	0.3580	0.5452	0.6997	0.1301	0.1655	**0.7120**
35	0.7695	0.0871	0.4245	0.5937	0.7598	0.1283	0.1587	**0.7637**
40	0.8058	0.0871	0.4612	0.6315	0.8019	0.1282	0.1547	**0.8055**

Table G180: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1456	0.1306	0.1738	**0.2293**	0.1738	0.1738	**0.2293**	**0.2293**
10	0.2566	0.1306	0.2044	0.2932	0.2542	0.1796	0.2433	**0.3111**
15	0.3219	0.1306	0.2586	0.3642	0.3697	0.1728	0.2396	**0.3953**
20	0.4172	0.1306	0.2894	0.4136	0.4466	0.1745	0.2318	**0.4561**
25	0.4968	0.1306	0.3365	0.4501	**0.5270**	0.1754	0.2242	0.5204
30	0.5565	0.1306	0.3707	0.4972	**0.5789**	0.1762	0.2133	0.5720
35	0.6072	0.1306	0.4146	0.5281	**0.6221**	0.1728	0.2094	0.6185
40	0.6661	0.1306	0.4592	0.5751	**0.6833**	0.1745	0.2047	0.6793

Table G181: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1491	0.1102	0.1512	0.2055	0.1512	0.1512	0.2055	**0.2055**
10	0.2534	0.1102	0.1779	0.2715	0.2295	0.1536	0.2182	**0.2978**
15	0.3131	0.1102	0.2221	0.3252	**0.3314**	0.1455	0.2074	**0.3719**
20	0.4167	0.1102	0.2565	0.3824	**0.4260**	0.1495	0.1999	**0.4450**
25	0.4943	0.1102	0.3047	0.4293	**0.5111**	0.1499	0.1912	0.5088
30	0.5654	0.1102	0.3433	0.4785	**0.5727**	0.1493	0.1831	**0.5730**
35	0.6251	0.1102	0.3925	0.5135	**0.6287**	0.1482	0.1801	0.6283
40	0.6705	0.1102	0.4196	0.5474	**0.6802**	0.1479	0.1769	0.6787

Table G182: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Number of Blocks $n_b = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2154	0.2409	0.2626	**0.3434**	0.2626	0.2626	**0.3434**	**0.3434**
15	0.2154	0.3036	0.3210	0.3921	0.3169	0.3287	0.3768	**0.3977**
20	0.2154	0.3613	0.3704	0.4425	0.3666	0.3805	0.3816	**0.4467**
25	0.2154	0.4081	0.4151	0.4756	0.4115	0.4269	0.3726	**0.4807**
30	0.2154	0.4614	0.4681	0.5124	0.4643	0.4795	0.3671	**0.5266**
35	0.2154	0.5075	0.5114	0.5440	0.5086	0.5249	0.3630	**0.5692**
40	0.2154	0.5534	0.5568	0.5781	0.5536	0.5681	0.3561	**0.6069**

Table G183: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.3299	0.3854	0.4336	**0.5727**	0.4336	0.4336	**0.5727**	**0.5727**
15	0.3299	0.5073	0.5396	0.6546	0.5288	0.5536	0.6183	**0.6621**
20	0.3299	0.6123	0.6265	0.7228	0.6210	0.6478	0.6261	**0.7372**
25	0.3299	0.6970	0.7085	0.7749	0.7016	0.7233	0.6251	**0.7891**
30	0.3299	0.7728	0.7792	0.8205	0.7755	0.7929	0.6137	**0.8485**
35	0.3299	0.8300	0.8333	0.8555	0.8310	0.8450	0.6049	**0.8833**
40	0.3299	0.8635	0.8662	0.8817	0.8644	0.8767	0.5938	**0.9052**

Table G184: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed number of Blocks $n_b = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.2532	0.2963	0.3290	**0.4382**	0.3290	0.3290	**0.4382**	**0.4382**
15	0.2532	0.3778	0.4036	0.5143	0.3967	0.4136	0.4865	**0.5163**
20	0.2532	0.4769	0.4887	0.5770	0.4840	0.5045	0.4906	**0.5928**
25	0.2532	0.5492	0.5599	0.6220	0.5541	0.5758	0.4810	**0.6441**
30	0.2532	0.6089	0.6149	0.6632	0.6117	0.6326	0.4737	**0.6901**
35	0.2532	0.6667	0.6717	0.7058	0.6681	0.6858	0.4655	**0.7359**
40	0.2532	0.7164	0.7208	0.7393	0.7177	0.7310	0.4599	**0.7716**

Table G185: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.2137	0.1766	0.1918	**0.2857**	0.1918	0.1918	**0.2857**	**0.2857**
15	0.2137	0.2145	0.2274	**0.3177**	0.2240	0.2350	0.3125	0.3110
20	0.2137	0.2434	0.2506	**0.3356**	0.2474	0.2596	0.3122	0.3205
25	0.2137	0.2781	0.2868	**0.3683**	0.2819	0.2962	0.3238	0.3518
30	0.2137	0.3106	0.3161	**0.3984**	0.3129	0.3286	0.3194	0.3827
35	0.2137	0.3416	0.3448	**0.4187**	0.3422	0.3572	0.3106	0.4024
40	0.2137	0.3719	0.3768	**0.4480**	0.3728	0.3870	0.3125	0.4289

Table G186: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=.0.2

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.2115	0.1476	0.1646	**0.2589**	0.1646	0.1646	**0.2589**	**0.2589**
15	0.2115	0.1675	0.1821	**0.2823**	0.1783	0.1886	0.2844	0.2653
20	0.2115	0.1957	0.2025	**0.3012**	0.1997	0.2106	0.2906	0.2762
25	0.2115	0.2267	0.2347	**0.3218**	0.2298	0.2428	0.2939	0.2921
30	0.2115	0.2551	0.2598	**0.3458**	0.2573	0.2702	0.2991	0.3174
35	0.2115	0.2711	0.2740	**0.3632**	0.2716	0.2848	0.2939	0.3289
40	0.2115	0.2921	0.2965	**0.3843**	0.2933	0.3076	0.2922	0.3515

Table G187: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.3229	0.1698	0.2004	**0.3812**	0.2004	0.2004	**0.3812**	**0.3812**
15	0.3229	0.2097	0.2312	**0.4291**	0.2245	0.2425	0.4446	0.3963
20	0.3229	0.2456	0.2575	**0.4606**	0.2522	0.2737	0.4582	0.4047
25	0.3229	0.2921	0.3032	**0.4989**	0.2969	0.3198	0.4667	0.4304
30	0.3229	0.3270	0.3368	**0.5278**	0.3298	0.3569	0.4634	0.4536
35	0.3229	0.3643	0.3711	**0.5608**	0.3659	0.3882	0.4609	0.4758
40	0.3229	0.3962	0.4029	**0.5806**	0.3977	0.4205	0.4561	0.4966

Table G188: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.3382	0.1224	0.1456	**0.3301**	0.1456	0.1456	**0.3301**	**0.3301**
15	0.3382	0.1406	0.1577	**0.3643**	0.1513	0.1658	0.3933	0.3179
20	0.3382	0.1575	0.1659	**0.3761**	0.1620	0.1790	0.4043	0.2967
25	0.3382	0.1802	0.1904	**0.4079**	0.1841	0.2038	0.4260	0.3070
30	0.3382	0.1961	0.2040	**0.4180**	0.1988	0.2200	0.4219	0.3092
35	0.3382	0.2105	0.2151	**0.4291**	0.2118	0.2296	0.4166	0.3043
40	0.3382	0.2328	0.2376	**0.4585**	0.2337	0.2524	0.4244	0.3247

Table G189: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2568	0.1959	0.2222	**0.3559**	0.2222	0.2222	**0.3559**	**0.3559**
15	0.2568	0.2385	0.2594	**0.3965**	0.2542	0.2695	0.3905	0.3822
20	0.2568	0.2970	0.3067	**0.4439**	0.3033	0.3216	0.4113	0.4206
25	0.2568	0.3514	0.3620	**0.4912**	0.3553	0.3766	0.4145	0.4626
30	0.2568	0.3910	0.3982	**0.5179**	0.3945	0.4141	0.4079	0.4923
35	0.2568	0.4303	0.4346	**0.5499**	0.4322	0.4516	0.4017	0.5177
40	0.2568	0.4648	0.4705	**0.5697**	0.4661	0.4854	0.3947	0.5425

Table G190: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2530	0.1580	0.1803	**0.3116**	0.1803	0.1803	**0.3116**	**0.3116**
15	0.2530	0.1944	0.2145	**0.3516**	0.2093	0.2232	0.3551	0.3310
20	0.2530	0.2312	0.2423	**0.3850**	0.2369	0.2563	0.3725	0.3527
25	0.2530	0.2675	0.2767	**0.4206**	0.2705	0.2905	0.3750	0.3749
30	0.2530	0.2958	0.3036	**0.4392**	0.2989	0.3171	0.3707	0.3917
35	0.2530	0.3254	0.3298	**0.4666**	0.3266	0.3441	0.3686	0.4161
40	0.2530	0.3684	0.3734	**0.4967**	0.3698	0.3874	0.3648	0.4448

Table G191: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Sample Size $n_a = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2129	0.2442	0.2666	**0.3440**	0.2666	0.2666	**0.3440**	**0.3440**
15	0.2456	0.2442	0.2827	**0.3880**	0.3002	0.2683	0.3730	0.3810
20	0.3130	0.2442	0.2962	**0.4250**	0.3415	0.2675	0.3828	0.4212
25	0.3836	0.2442	0.3071	**0.4593**	0.3821	0.2690	0.3737	0.4585
30	0.4255	0.2442	0.3160	0.4902	0.4398	0.2675	0.3745	**0.4909**
35	0.4694	0.2442	0.3320	0.5198	0.4860	0.2696	0.3688	**0.5282**
40	0.5061	0.2442	0.3500	0.5533	0.5392	0.2712	0.3649	**0.5613**

Table G192: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)

Blocks	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
10	0.3344	0.3918	0.4377	**0.5879**	0.4377	0.4377	**0.5879**	**0.5879**
15	0.4148	0.3918	0.4657	**0.6589**	0.4980	0.4396	0.6368	0.6546
20	0.5391	0.3918	0.4925	**0.7164**	0.5762	0.4409	0.6407	0.7039
25	0.6384	0.3918	0.5177	**0.7601**	0.6495	0.4411	0.6342	0.7556
30	0.7161	0.3918	0.5334	**0.8069**	0.7328	0.4431	0.6303	**0.8069**
35	0.7699	0.3918	0.5617	0.8383	0.7978	0.4406	0.6232	**0.8404**
40	0.8145	0.3918	0.5885	0.8658	0.8519	0.4447	0.6156	**0.8709**

Table G193: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 10$; (CRD $T(3)$ and CRBD $T(3)$)

Blocks	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
10	0.1807	0.1759	0.2334	**0.3084**	0.2334	0.2334	**0.3084**	**0.3084**
15	0.2506	0.2874	0.3226	**0.4385**	0.3226	0.3226	0.4385	**0.4385**
20	0.3105	0.2874	0.3454	**0.5055**	0.3716	0.3241	0.4844	0.4998
25	0.4072	0.2874	0.3642	**0.5548**	0.4320	0.3226	0.4853	0.5472
30	0.4918	0.2874	0.3911	**0.6080**	0.5048	0.3265	0.4902	0.6000
35	0.5567	0.2874	0.4040	0.6489	0.5761	0.3277	0.4857	**0.6497**
40	0.6173	0.2874	0.4237	0.6906	0.6448	0.3259	0.4737	**0.6923**

Table G194: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)

Blocks	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
10	0.2067	0.2106	0.2296	**0.3112**	0.2296	0.2296	**0.3112**	**0.3112**
15	0.2483	0.2106	0.2454	0.3641	0.2635	0.2320	0.3452	**0.3667**
20	0.3134	0.2106	0.2607	0.3999	0.3056	0.2325	0.3446	**0.4027**
25	0.3812	0.2106	0.2727	0.4346	0.3531	0.2320	0.3450	**0.4426**
30	0.4227	0.2106	0.2804	0.4622	0.4010	0.2342	0.3367	**0.4773**
35	0.4660	0.2106	0.2947	0.4947	0.4581	0.2351	0.3306	**0.5129**
40	0.5062	0.2106	0.3125	0.5254	0.5079	0.2337	0.3259	**0.5522**

Table G195 Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=.0.2

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2122	0.1421	0.1572	**0.2534**	0.1572	0.1572	**0.2534**	**0.2534**
15	0.2484	0.1421	0.1705	0.2935	0.1879	0.1605	0.2653	**0.3120**
20	0.3192	0.1421	0.1809	0.3285	0.2217	0.1595	0.2612	**0.3601**
25	0.3813	0.1421	0.1958	0.3710	0.2698	0.1603	0.2594	**0.4128**
30	0.4243	0.1421	0.1992	0.3890	0.3168	0.1611	0.2499	**0.4440**
35	0.4795	0.1421	0.2175	0.4305	0.3768	0.1610	0.2510	**0.5028**
40	0.5089	0.1421	0.2269	0.4553	0.4343	0.1611	0.2399	**0.5297**

Table G196: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 10$; (CRD $N\ (0, 2)$ and RCBD $N\ (0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.3291	0.1651	0.1961	**0.3860**	0.1961	0.1961	**0.3860**	**0.3860**
15	0.4200	0.1651	0.2167	0.4619	0.2450	0.1968	0.4010	**0.5026**
20	0.5412	0.1651	0.2364	0.5276	0.3129	0.1964	0.3952	**0.5872**
25	0.6485	0.1651	0.2590	0.5909	0.3953	0.1975	0.3800	**0.6728**
30	0.7108	0.1651	0.2750	0.6391	0.5021	0.1994	0.3699	**0.7322**
35	0.7671	0.1651	0.3014	0.6835	0.5963	0.1987	0.3550	**0.7874**
40	0.8146	0.1651	0.3198	0.7253	0.6941	0.1971	0.3461	**0.8315**

Table G197: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 10$; (CRD $N\ (0, 3)$ and RCBD $N\ (0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.3366	0.1126	0.1365	**0.3274**	0.1365	0.1365	**0.3274**	**0.3274**
15	0.4219	0.1126	0.1558	0.4012	0.1799	0.1400	0.3288	**0.4493**
20	0.5434	0.1126	0.1717	0.4606	0.2429	0.1386	0.3218	**0.5537**
25	0.6408	0.1126	0.1916	0.5208	0.3183	0.1397	0.3041	**0.6403**
30	0.7200	0.1126	0.2060	0.5739	0.4206	0.1407	0.2924	**0.7162**
35	0.7684	0.1126	0.2222	0.6256	0.5213	0.1390	0.2813	**0.7685**
40	0.8078	0.1126	0.2485	0.6623	0.6237	0.1380	0.2686	**0.8058**

Table G198: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
10	0.2421	0.1925	0.2177	**0.3435**	0.2177	0.2177	**0.3435**	**0.3435**
15	0.2996	0.1925	0.2359	0.4127	0.2582	0.2215	0.3796	**0.4229**
20	0.4118	0.1925	0.2508	0.4676	0.3171	0.2174	0.3788	**0.4948**
25	0.4959	0.1925	0.2761	0.5167	0.3842	0.2239	0.3722	**0.5555**
30	0.5547	0.1925	0.2829	0.5542	0.4620	0.2196	0.3628	**0.6058**
35	0.6075	0.1925	0.3032	0.5922	0.5316	0.2215	0.3533	**0.6521**
40	0.6637	0.1925	0.3246	0.6384	0.6144	0.2224	0.3470	**0.7017**

Table G199: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2517	0.1618	0.1856	**0.3157**	0.1856	0.1856	**0.3157**	**0.3157**
15	0.3161	0.1618	0.2012	0.3798	0.2235	0.1890	0.3323	**0.4030**
20	0.4097	0.1618	0.2161	0.4302	0.2784	0.1863	0.3353	**0.4696**
25	0.5050	0.1618	0.2318	0.4836	0.3412	0.1881	0.3297	**0.5459**
30	0.5583	0.1618	0.2456	0.5254	0.4220	0.1885	0.3199	**0.5921**
35	0.6149	0.1618	0.2613	0.5594	0.4894	0.1884	0.3083	**0.6429**
40	0.6647	0.1618	0.2834	0.5955	0.5706	0.1886	0.3035	**0.6869**

Table G200: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Number of Blocks $n_b = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2473	0.3122	0.3388	**0.4484**	0.3388	0.3388	**0.4484**	**0.4484**
20	0.2473	0.3733	0.3858	0.4913	0.3826	0.3918	0.4746	**0.4966**
25	0.2473	0.4037	0.4160	0.5203	0.4112	0.4241	0.4761	**0.5242**
30	0.2473	0.4562	0.4669	0.5510	0.4609	0.4758	0.4727	**0.5640**
35	0.2473	0.5038	0.5105	0.5904	0.5063	0.5190	0.4784	**0.6029**
40	0.2473	0.5521	0.5578	0.6205	0.5546	0.5670	0.4708	**0.6370**

Table G201: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4191	0.5107	0.5580	**0.7402**	0.5580	0.5580	**0.7402**	**0.7402**
20	0.4191	0.6156	0.6377	0.7998	0.6332	0.6488	0.7792	**0.8025**
25	0.4191	0.6940	0.7108	0.8308	0.7027	0.7235	0.7853	**0.8376**
30	0.4191	0.7617	0.7749	0.8680	0.7697	0.7864	0.7855	**0.8789**
35	0.4191	0.8179	0.8260	0.8966	0.8214	0.8357	0.7797	**0.9048**
40	0.4191	0.8688	0.8743	0.9170	0.8708	0.8811	0.7770	**0.9315**

Table G202: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.3151	0.3732	0.4089	**0.5782**	0.4089	0.4089	**0.5782**	**0.5782**
20	0.3151	0.4831	0.5013	0.6457	0.4970	0.5102	0.6218	**0.6536**
25	0.3151	0.5415	0.5604	0.6895	0.5526	0.5707	0.6334	**0.6965**
30	0.3151	0.6082	0.6214	0.7276	0.6157	0.6340	0.6346	**0.7424**
35	0.3151	0.6646	0.6736	0.7579	0.6686	0.6847	0.6289	**0.7736**
40	0.3151	0.7163	0.7245	0.7927	0.7191	0.7350	0.6277	**0.8108**

Table G203: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=.0.2

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.2457	0.2148	0.2331	0.3589	0.2331	0.2331	**0.3589**	**0.3589**
20	0.2457	0.2510	0.2613	0.3956	0.2594	0.2675	0.3914	0.3881
25	0.2457	0.2858	0.2998	0.4214	0.2943	0.3060	0.4033	0.4097
30	0.2457	0.3154	0.3227	0.4453	0.3199	0.3310	0.4069	0.4290
35	0.2457	0.3386	0.3439	0.4672	0.3400	0.3536	0.4061	0.4419
40	0.2457	0.3753	0.3824	0.4896	0.3775	0.3915	0.4045	0.4686

Table G204: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=.0.2

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.2457	0.1735	0.1934	**0.3225**	0.1934	0.1934	**0.3225**	**0.3225**
20	0.2457	0.2029	0.2127	**0.3504**	0.2112	0.2168	0.3548	0.3367
25	0.2457	0.2191	0.2275	**0.3678**	0.2238	0.2342	0.3639	0.3425
30	0.2457	0.2497	0.2568	**0.3939**	0.2531	0.2648	0.3768	0.3594
35	0.2457	0.2668	0.2723	**0.4124**	0.2688	0.2826	0.3714	0.3788
40	0.2457	0.2894	0.2954	**0.4264**	0.2919	0.3055	0.3763	0.3854

Table G205: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 15$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
15	0.4257	0.2105	0.2430	**0.5166**	0.2430	0.2430	**0.5166**	**0.5166**
20	0.4257	0.2435	0.2669	**0.5480**	0.2621	0.2772	0.5673	0.5192
25	0.4257	0.2888	0.3091	**0.5930**	0.3006	0.3238	0.6013	0.5395
30	0.4257	0.3197	0.3361	**0.6142**	0.3281	0.3514	0.6073	0.5436
35	0.4257	0.3625	0.3716	**0.6438**	0.3663	0.3874	0.6149	0.5587
40	0.4257	0.3863	0.3975	**0.6602**	0.3903	0.4155	0.6146	0.5646

Table G206: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.4207	0.1403	0.1678	**0.4364**	0.1678	0.1678	**0.4364**	**0.4364**
20	0.4207	0.1686	0.1834	**0.4590**	0.1794	0.1898	0.4901	0.4146
25	0.4207	0.1760	0.1894	**0.4777**	0.1830	0.1977	0.5168	0.4039
30	0.4207	0.1889	0.2003	**0.4964**	0.1955	0.2122	0.5322	0.3976
35	0.4207	0.2177	0.2249	**0.5154**	0.2201	0.2374	0.5398	0.3964
40	0.4207	0.2331	0.2421	**0.5335**	0.2362	0.2580	0.5472	0.4022

Table G207: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.3031	0.2481	0.2775	**0.4674**	0.2775	0.2775	**0.4674**	**0.4674**
20	0.3031	0.3021	0.3203	**0.5091**	0.3163	0.3291	0.5084	0.4965
25	0.3031	0.3512	0.3667	**0.5513**	0.3609	0.3745	0.5282	0.5289
30	0.3031	0.3877	0.3984	**0.5792**	0.3929	0.4130	0.5275	0.5517
35	0.3031	0.4435	0.4519	**0.6097**	0.4473	0.4647	0.5283	0.5838
40	0.3031	0.4738	0.4826	**0.6382**	0.4777	0.4944	0.5301	0.6088

Table G208: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.3150	0.1893	0.2172	**0.4089**	0.2172	0.2172	**0.4089**	**0.4089**
20	0.3150	0.2322	0.2491	**0.4526**	0.2451	0.2569	0.4623	0.4331
25	0.3150	0.2616	0.2768	**0.4900**	0.2711	0.2858	0.4855	0.4539
30	0.3150	0.2982	0.3103	**0.5120**	0.3046	0.3221	0.4906	0.4652
35	0.3150	0.3264	0.3364	**0.5371**	0.3300	0.3479	0.4984	0.4786
40	0.3150	0.3654	0.3732	**0.5604**	0.3683	0.3857	0.4995	0.5031

Table G209: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Sample Size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.2456	0.2994	0.3268	**0.4329**	0.3268	0.3268	**0.4329**	**0.4329**
20	0.3091	0.2994	0.3297	**0.4752**	0.3406	0.3222	0.4650	0.4699
25	0.3743	0.2994	0.3424	**0.5101**	0.3633	0.3255	0.4805	0.5057
30	0.4349	0.2994	0.3500	**0.5519**	0.3957	0.3252	0.4906	0.5430
35	0.4676	0.2994	0.3579	**0.5806**	0.4232	0.3263	0.4840	0.5719
40	0.4995	0.2994	0.3626	**0.6017**	0.4567	0.3238	0.4809	0.5958

Table G210: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4217	0.5132	0.5582	**0.7338**	0.5582	0.5582	**0.7338**	**0.7338**
20	0.5406	0.5132	0.5754	**0.7920**	0.5923	0.5597	0.7795	0.7881
25	0.6390	0.5132	0.5873	**0.8249**	0.6216	0.5609	0.7884	0.8191
30	0.7149	0.5132	0.6027	**0.8618**	0.6722	0.5589	0.7988	0.8560
35	0.7604	0.5132	0.6158	**0.8848**	0.7144	0.5587	0.7944	0.8781
40	0.8179	0.5132	0.6242	**0.9057**	0.7592	0.5596	0.7885	0.9029

Table G211: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3028	0.3898	0.4244	**0.5665**	0.4244	0.4244	**0.5665**	**0.5665**
20	0.4157	0.3898	0.4385	**0.6342**	0.4525	0.4263	0.6246	0.6298
25	0.4955	0.3898	0.4490	**0.6777**	0.4811	0.4263	0.6383	0.6756
30	0.5619	0.3898	0.4614	**0.7196**	0.5231	0.4278	0.6441	0.7070
35	0.6170	0.3898	0.4742	**0.7493**	0.5641	0.4256	0.6428	0.7400
40	0.6618	0.3898	0.4765	**0.7807**	0.6099	0.4248	0.6381	0.7753

Table G212: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2421	0.2583	0.2847	**0.3973**	0.2847	0.2847	**0.3973**	**0.3973**
20	0.3210	0.2583	0.2902	0.4478	0.3018	0.2828	0.4336	**0.4490**
25	0.3716	0.2583	0.3008	0.4759	0.3244	0.2814	0.4401	**0.4785**
30	0.4230	0.2583	0.3107	0.5133	0.3537	0.2840	0.4438	**0.5168**
35	0.4642	0.2583	0.3182	0.5471	0.3854	0.2825	0.4488	**0.5502**
40	0.4988	0.2583	0.3207	0.5651	0.4163	0.2828	0.4367	**0.5768**

Table G213: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2471	0.1754	0.1951	**0.3276**	0.1951	0.1951	**0.3276**	**0.3276**
20	0.3192	0.1754	0.2014	**0.3657**	0.2097	0.1971	0.3456	**0.3773**
25	0.3810	0.1754	0.2107	0.4001	0.2302	0.1980	0.3524	**0.4215**
30	0.4174	0.1754	0.2153	0.4277	0.2521	0.1969	0.3444	**0.4645**
35	0.4666	0.1754	0.2223	0.4638	0.2808	0.1963	0.3410	**0.5068**
40	0.5037	0.1754	0.2241	0.4874	0.3099	0.1959	0.3347	**0.5396**

Table G214: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4197	0.2068	0.2440	**0.5092**	0.2440	0.2440	**0.5092**	**0.5092**
20	0.5453	0.2068	0.2551	0.5830	0.2694	0.2439	0.5359	**0.6125**
25	0.6299	0.2068	0.2675	0.6322	0.3042	0.2435	0.5346	**0.6840**
30	0.7117	0.2068	0.2785	0.6794	0.3500	0.2447	0.5216	**0.7497**
35	0.7723	0.2068	0.2913	0.7292	0.4054	0.2429	0.5243	**0.8027**
40	0.8128	0.2068	0.3003	0.7608	0.4659	0.2441	0.5091	**0.8347**

Table G215: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4205	0.1386	0.1673	**0.4395**	0.1673	0.1673	**0.4395**	**0.4395**
20	0.5498	0.1386	0.1740	0.5019	0.1868	0.1660	0.4483	**0.5460**
25	0.6361	0.1386	0.1849	0.5599	0.2163	0.1668	0.4394	**0.6354**
30	0.7159	0.1386	0.1953	0.6144	0.2559	0.1669	0.4313	**0.7103**
35	0.7669	0.1386	0.2079	0.6576	0.3012	0.1667	0.4183	**0.7721**
40	0.8142	0.1386	0.2113	0.6979	0.3646	0.1663	0.4074	**0.8171**

Table G216: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3143	0.2464	0.2802	**0.4754**	0.2802	0.2802	**0.4754**	**0.4754**
20	0.4023	0.2464	0.2879	0.5213	0.3018	0.2775	0.5006	**0.5301**
25	0.4869	0.2464	0.3008	0.5659	0.3342	0.2789	0.5003	**0.5884**
30	0.5468	0.2464	0.3120	0.6126	0.3712	0.2809	0.5020	**0.6415**
35	0.6214	0.2464	0.3241	0.6581	0.4152	0.2787	0.5059	**0.6943**
40	0.6643	0.2464	0.3322	0.6910	0.4649	0.2788	0.4971	**0.7351**

Table G217: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3129	0.1903	0.2193	**0.4148**	0.2193	0.2193	**0.4148**	**0.4148**
20	0.4072	0.1903	0.2279	0.4629	0.2400	0.2181	0.4362	**0.4801**
25	0.4941	0.1903	0.2373	0.5218	0.2655	0.2170	0.4442	**0.5587**
30	0.5589	0.1903	0.2460	0.5606	0.2995	0.2173	0.4369	**0.6109**
35	0.6155	0.1903	0.2562	0.5940	0.3426	0.2161	0.4320	**0.6541**
40	0.6615	0.1903	0.2627	0.6368	0.3871	0.2179	0.4224	**0.7029**

Table G218: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Number of Blocks $n_b = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.4930	0.5533	0.5817	**0.7654**	0.5817	0.5817	**0.7654**	**0.7654**
25	0.4930	0.6264	0.6476	0.8026	0.6424	0.6518	0.7920	**0.8038**
30	0.4930	0.6883	0.7044	0.8406	0.6996	0.7131	0.8101	**0.8471**
35	0.4930	0.7376	0.7473	0.8575	0.7424	0.7566	0.8076	**0.8634**
40	0.4930	0.7841	0.7934	0.8849	0.7886	0.8015	0.8094	**0.8893**

Table G219: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.5404	0.6142	0.6482	**0.8315**	0.6482	0.6482	**0.8315**	**0.8315**
25	0.5404	0.7023	0.7244	0.8751	0.7193	0.7303	0.8659	**0.8771**
30	0.5404	0.7736	0.7880	0.8985	0.7835	0.7957	0.8739	**0.9052**
35	0.5404	0.8189	0.8297	0.9236	0.8239	0.8378	0.8771	**0.9295**
40	0.5404	0.8680	0.8741	0.9447	0.8706	0.8830	0.8784	**0.9493**

Table G220: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed number of Blocks $n_b = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.4112	0.2352	0.2602	**0.5031**	0.2602	0.2602	**0.5031**	**0.5031**
25	0.4112	0.2598	0.2782	**0.5330**	0.2741	0.2831	0.5433	0.5166
30	0.4112	0.3010	0.3142	**0.5621**	0.3098	0.3222	0.5689	0.5281
35	0.4112	0.3272	0.3391	**0.5810**	0.3333	0.3491	0.5728	0.5412
40	0.4112	0.3615	0.3705	**0.6184**	0.3659	0.3814	0.5945	0.5703

Table G221: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.3138	0.2486	0.2649	**0.4296**	0.2649	0.2649	**0.4296**	**0.4296**
25	0.3138	0.2769	0.2935	**0.4518**	0.2902	0.2946	0.4544	0.4448
30	0.3138	0.3137	0.3241	**0.4846**	0.3214	0.3293	0.4761	0.4696
35	0.3138	0.3412	0.3477	**0.5046**	0.3449	0.3540	0.4784	0.4852
40	0.3138	0.3709	0.3772	**0.5258**	0.3738	0.3857	0.4823	0.5054

Table G222: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.3088	0.1950	0.2078	**0.3742**	0.2078	0.2078	**0.3742**	**0.3742**
25	0.3871	0.1950	0.2142	**0.4254**	0.2205	0.2100	0.4060	**0.4385**
30	0.4193	0.1950	0.2160	**0.4472**	0.2304	0.2085	0.4005	**0.4703**
35	0.4688	0.1950	0.2203	**0.4771**	0.2419	0.2097	0.3991	**0.5119**
40	0.4957	0.1950	0.2252	**0.5082**	0.2573	0.2091	0.3999	**0.5495**

Table G223: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.5450	0.2508	0.2816	**0.6121**	0.2816	0.2816	**0.6121**	**0.6121**
25	0.5450	0.2912	0.3144	**0.6502**	0.3095	0.3201	0.6639	0.6254
30	0.5450	0.3247	0.3451	**0.6798**	0.3380	0.3559	0.6907	0.6286
35	0.5450	0.3619	0.3759	**0.6995**	0.3703	0.3885	0.7052	0.6384
40	0.5450	0.4005	0.4133	**0.7211**	0.4062	0.4278	0.7160	0.6514

Table G224: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.5451	0.1781	0.2006	**0.5396**	0.2006	0.2006	**0.5396**	**0.5396**
25	0.5451	0.1981	0.2163	**0.5529**	0.2123	0.2213	0.5810	0.5169
30	0.5451	0.2144	0.2304	**0.5818**	0.2246	0.2386	0.6186	0.5132
35	0.5451	0.2329	0.2441	**0.5914**	0.2390	0.2526	0.6258	0.5004
40	0.5451	0.2581	0.2684	**0.6107**	0.2636	0.2789	0.6457	0.5025

Table G225: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 20$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.4161	0.3080	0.3338	**0.5730**	0.3338	0.3338	**0.5730**	**0.5730**
25	0.4161	0.3450	0.3669	**0.5967**	0.3624	0.3716	0.6010	0.5860
30	0.4161	0.3919	0.4095	**0.6375**	0.4036	0.4180	0.6250	0.6189
35	0.4161	0.4235	0.4335	**0.6564**	0.4291	0.4451	0.6274	0.6295
40	0.4161	0.4836	0.4964	**0.6946**	0.4902	0.5083	0.6439	0.6702

Table G226: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.4157	0.2365	0.2591	**0.5147**	0.2591	0.2591	**0.5147**	**0.5147**
25	0.4157	0.2663	0.2850	**0.5386**	0.2808	0.2893	0.5491	0.5224
30	0.4157	0.2971	0.3123	**0.5642**	0.3088	0.3203	0.5740	0.5328
35	0.4157	0.3275	0.3394	**0.5916**	0.3347	0.3502	0.5838	0.5490
40	0.4157	0.3642	0.3762	**0.6164**	0.3687	0.3864	0.5891	0.5615

Table G227: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Sample Size $n_a = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.4947	0.5534	0.5803	**0.7630**	0.5803	0.5803	**0.7630**	**0.7630**
25	0.5722	0.5534	0.5886	**0.7939**	0.5969	0.5822	0.7882	0.7911
30	0.6344	0.5534	0.5932	**0.8205**	0.6167	0.5808	0.7998	0.8195
35	0.6963	0.5534	0.6033	**0.8515**	0.6392	0.5827	0.8112	0.8473
40	0.7392	0.5534	0.6089	**0.8706**	0.6627	0.5818	0.8084	0.8681

Table G228: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.5410	0.6086	0.6428	**0.8334**	0.6428	0.6428	**0.8334**	**0.8334**
25	0.6442	0.6086	0.6519	**0.8686**	0.6647	0.6432	0.8660	0.8655
30	0.7086	0.6086	0.6634	**0.8966**	0.6889	0.6441	0.8803	0.8940
35	0.7692	0.6086	0.6717	**0.9139**	0.7156	0.6433	0.8836	0.9118
40	0.8104	0.6086	0.6790	**0.9332**	0.7393	0.6422	0.8857	0.9267

Table G229: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.4118	0.2294	0.2506	**0.5034**	0.2506	0.2506	**0.5034**	**0.5034**
25	0.5010	0.2294	0.2573	0.5565	0.2660	0.2529	0.5283	**0.5746**
30	0.5526	0.2294	0.2623	0.5939	0.2814	0.2511	0.5373	**0.6227**
35	0.6212	0.2294	0.2696	0.6403	0.3051	0.2523	0.5398	**0.6852**
40	0.6570	0.2294	0.2763	0.6646	0.3262	0.2497	0.5326	**0.7215**

Table G230: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2}-1)$ and RCBD $exp(1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.3129	0.0547	0.0605	**0.2073**	0.0605	0.0605	**0.2073**	**0.2073**
25	0.3793	0.0547	0.0626	**0.2407**	0.0656	0.0609	0.2098	0.2725
30	0.4301	0.0547	0.0634	**0.2716**	0.0707	0.0608	0.1997	0.3316
35	0.4648	0.0547	0.0656	**0.2892**	0.0795	0.0612	0.1917	0.3739
40	0.5046	0.0547	0.0702	**0.3161**	0.0870	0.0615	0.1855	0.4357

Table G231: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.2; d3=0.2; d4=0.2; d5=0.2

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.3088	0.1950	0.2078	**0.3742**	0.2078	0.2078	**0.3742**	**0.3742**
25	0.3871	0.1950	0.2142	**0.4254**	0.2205	0.2100	0.4060	**0.4385**
30	0.4193	0.1950	0.2160	**0.4472**	0.2304	0.2085	0.4005	**0.4703**
35	0.4688	0.1950	0.2203	**0.4771**	0.2419	0.2097	0.3991	**0.5119**
40	0.4957	0.1950	0.2252	**0.5082**	0.2573	0.2091	0.3999	**0.5495**

Table G232: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.5495	0.2527	0.2833	**0.6200**	0.2833	0.2833	**0.6200**	**0.6200**
25	0.6334	0.2527	0.2919	0.6712	0.3033	0.2850	0.6401	**0.6939**
30	0.7159	0.2527	0.3026	0.7149	0.3272	0.2854	0.6452	**0.7571**
35	0.7717	0.2527	0.3074	0.7592	0.3544	0.2835	0.6448	**0.8125**
40	0.8155	0.2527	0.3175	0.7911	0.3861	0.2847	0.6332	**0.8451**

Table G233: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.5561	0.1782	0.2033	**0.5388**	0.2033	0.2033	**0.5388**	**0.5388**
25	0.6370	0.1782	0.2096	0.5899	0.2180	0.2028	0.5427	**0.6234**
30	0.7116	0.1782	0.2156	0.6384	0.2357	0.2013	0.5454	**0.7005**
35	0.7757	0.1782	0.2228	0.6850	0.2580	0.2026	0.5404	**0.7678**
40	0.8075	0.1782	0.2279	0.7212	0.2827	0.2022	0.5284	**0.8146**

Table G234: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.4139	0.2906	0.3187	**0.5680**	0.3187	0.3187	**0.5680**	**0.5680**
25	0.4974	0.2906	0.3275	0.6145	0.3372	0.3194	0.5922	**0.6250**
30	0.5709	0.2906	0.3312	0.6496	0.3561	0.3180	0.6019	**0.6716**
35	0.6105	0.2906	0.3391	0.6855	0.3781	0.3181	0.6031	**0.7093**
40	0.6564	0.2906	0.3490	0.7121	0.4032	0.3183	0.5983	**0.7429**

Table G235: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.5; d4=0.5; d5=0.5

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.4073	0.2307	0.2532	**0.4994**	0.2532	0.2532	**0.4994**	**0.4994**
25	0.4973	0.2307	0.2584	0.5558	0.2665	0.2541	0.5294	**0.5713**
30	0.5474	0.2307	0.2670	0.5934	0.2846	0.2534	0.5272	**0.6265**
35	0.6113	0.2307	0.2735	0.6310	0.3056	0.2548	0.5324	**0.6744**
40	0.6614	0.2307	0.2793	0.6677	0.3279	0.2545	0.5291	**0.7201**

Table G236: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.25; d5=0.5

Fixed Number of Blocks $n_b = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.1121	0.1402	0.1732	**0.1879**	0.1732	0.1732	**0.1879**	**0.1879**
10	0.1121	0.1993	0.2029	0.2235	0.2020	0.2151	0.1978	**0.2373**
15	0.1121	0.2416	0.2476	0.2674	0.2441	0.2574	0.1963	**0.2775**
20	0.1121	0.2898	0.2964	0.2967	0.2898	0.3038	0.1880	**0.3177**
25	0.1121	0.3338	0.3364	0.3299	0.3342	0.3459	0.1891	**0.3565**
30	0.1121	0.3714	0.3738	0.3557	0.3729	0.3847	0.1816	**0.3911**
35	0.1121	0.4119	0.4117	0.3859	0.4113	0.4217	0.1775	**0.4325**
40	0.1121	0.4464	0.4484	0.4118	0.4462	0.4587	0.1750	**0.4648**

Table G237: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.1193	0.1506	0.1962	**0.2258**	0.1962	0.1962	**0.2258**	**0.2258**
10	0.1193	0.2356	0.2441	0.2920	0.2412	0.2626	0.2462	**0.2938**
15	0.1193	0.3257	0.3372	0.3632	0.3313	0.3528	0.2459	**0.3821**
20	0.1193	0.3899	0.3978	0.4000	0.3904	0.4131	0.2344	**0.4376**
25	0.1193	0.4601	0.4651	0.4582	0.4609	0.4844	0.2240	**0.4988**
30	0.1193	0.5344	0.5376	0.5091	0.5358	0.5560	0.2212	**0.5720**
35	0.1193	0.5815	0.5840	0.5393	0.5812	0.6006	0.2115	**0.6124**
40	0.1193	0.6390	0.6411	0.5802	0.6393	0.6565	0.2062	**0.6662**

Table G238: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed number of Blocks $n_b = 5$; (CRD $T(3)$ and CRBD $T(3)$)									
Sample Size	L*	FW*	Approach						
			I	II	III	IV	V	VI
5	0.0997	0.0945	0.1208	**0.1490**	0.1208	0.1208	**0.1490**	**0.1490**
10	0.0997	0.1329	0.1383	**0.1830**	0.1373	0.1516	0.1709	0.1750
15	0.0997	0.1645	0.1706	**0.2101**	0.1672	0.1795	0.1702	0.1986
20	0.0997	0.1911	0.1950	**0.2218**	0.1907	0.2017	0.1655	0.2156
25	0.0997	0.2242	0.2270	**0.2558**	0.2245	0.2378	0.1630	0.2490
30	0.0997	0.2387	0.2414	**0.2677**	0.2401	0.2535	0.1613	0.2613
35	0.0997	0.2735	0.2743	**0.2915**	0.2734	0.2833	0.1576	0.2903
40	0.0997	0.2899	0.2921	**0.3016**	0.2904	0.2998	0.1579	**0.3075**

Table G239: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.25; d5=0.5

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1184	0.1085	0.1388	**0.1637**	0.1388	0.1388	**0.1637**	**0.1637**
10	0.1184	0.1420	0.1452	0.1909	0.1436	0.1551	0.1808	**0.1826**
15	0.1184	0.1756	0.1809	0.2265	0.1788	0.1915	0.1874	**0.2098**
20	0.1184	0.2059	0.2081	0.2433	0.2057	0.2170	0.1845	**0.2309**
25	0.1184	0.2265	0.2304	0.2611	0.2273	0.2422	0.1786	**0.2539**
30	0.1184	0.2634	0.2653	0.2881	0.2645	0.2751	0.1772	**0.2857**
35	0.1184	0.2843	0.2839	0.3042	0.2838	0.2956	0.1767	**0.3057**
40	0.1184	0.3120	0.3135	0.3189	0.3124	0.3220	0.1719	**0.3275**

Table G240: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.25; d5=0.5

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1082	0.1009	0.1265	**0.1557**	0.1265	0.1265	**0.1557**	**0.1557**
10	0.1082	0.1326	0.1361	**0.1803**	0.1353	0.1482	0.1702	0.1724
15	0.1082	0.1523	0.1565	**0.1936**	0.1541	0.1654	0.1714	0.1801
20	0.1082	0.1705	0.1738	**0.2090**	0.1701	0.1830	0.1653	0.1964
25	0.1082	0.1983	0.2001	**0.2272**	0.1984	0.2078	0.1629	0.2165
30	0.1082	0.2064	0.2091	**0.2396**	0.2073	0.2186	0.1622	0.2313
35	0.1082	0.2308	0.2308	**0.2573**	0.2305	0.2421	0.1583	0.2477
40	0.1082	0.2530	0.2540	**0.2819**	0.2528	0.2645	0.1597	0.2717

Table G241: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1165	0.0911	0.1217	**0.1604**	0.1217	0.1217	**0.1604**	**0.1604**
10	0.1165	0.1266	0.1326	**0.1849**	0.1312	0.1454	0.1800	0.1716
15	0.1165	0.1471	0.1535	**0.2136**	0.1500	0.1653	0.1869	0.1900
20	0.1165	0.1763	0.1797	**0.2339**	0.1766	0.1891	0.1832	0.2081
25	0.1165	0.2038	0.2081	**0.2610**	0.2048	0.2205	0.1827	0.2344
30	0.1165	0.2174	0.2199	**0.2766**	0.2184	0.2342	0.1805	0.2450
35	0.1165	0.2415	0.2422	**0.2912**	0.2410	0.2563	0.1803	0.2663
40	0.1165	0.2618	0.2641	**0.3128**	0.2622	0.2788	0.1756	0.2883

Table G242: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1165	0.0727	0.1004	**0.1425**	0.1004	0.1004	**0.1425**	**0.1425**
10	0.1165	0.0930	0.0967	**0.1574**	0.0953	0.1050	0.1631	0.1378
15	0.1165	0.1082	0.1139	**0.1703**	0.1107	0.1209	0.1665	0.1412
20	0.1165	0.1185	0.1230	**0.1874**	0.1192	0.1322	0.1688	0.1494
25	0.1165	0.1342	0.1370	**0.1904**	0.1343	0.1476	0.1642	0.1588
30	0.1165	0.1421	0.1449	**0.2143**	0.1430	0.1581	0.1628	0.1676
35	0.1165	0.1573	0.1588	**0.2179**	0.1572	0.1682	0.1639	0.1775
40	0.1165	0.1616	0.1629	**0.2266**	0.1617	0.1719	0.1622	0.1797

Table G243: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
5	0.1019	0.0830	0.1084	**0.1345**	0.1084	0.1084	**0.1345**	**0.1345**
10	0.1019	0.1045	0.1060	**0.1572**	0.1052	0.1175	0.1519	0.1430
15	0.1019	0.1183	0.1244	**0.1685**	0.1212	0.1301	0.1521	0.1513
20	0.1019	0.1398	0.1427	**0.1863**	0.1401	0.1489	0.1519	0.1620
25	0.1019	0.1544	0.1571	**0.1980**	0.1549	0.1681	0.1493	0.1770
30	0.1019	0.1693	0.1724	**0.2146**	0.1707	0.1833	0.1478	0.1927
35	0.1019	0.1796	0.1808	**0.2205**	0.1795	0.1897	0.1465	0.1970
40	0.1019	0.1989	0.1998	**0.2348**	0.1989	0.2080	0.1448	0.2146

Table G244: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)									
Sample Size	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
5	0.1030	0.0718	0.0970	**0.1280**	0.0970	0.0970	**0.1280**	**0.1280**
10	0.1030	0.0961	0.0984	**0.1436**	0.0989	0.1080	0.1426	0.1289
15	0.1030	0.1061	0.1103	**0.1549**	0.1084	0.1161	0.1441	0.1353
20	0.1030	0.1205	0.1227	**0.1662**	0.1205	0.1289	0.1441	0.1412
25	0.1030	0.1307	0.1330	**0.1725**	0.1310	0.1398	0.1450	0.1496
30	0.1030	0.1399	0.1413	**0.1836**	0.1407	0.1487	0.1422	0.1571
35	0.1030	0.1446	0.1454	**0.1912**	0.1449	0.1528	0.1416	0.1591
40	0.1030	0.1508	0.1517	**0.1941**	0.1509	0.1582	0.1405	0.1631

Table G245: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects d2=0; d3=0; d4=0.25; d5=0.5

Fixed Sample Size $n_a = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
5	0.1076	0.1403	0.1699	**0.1839**	0.1699	0.1699	**0.1839**	**0.1839**
10	0.1643	0.1403	0.1812	0.2218	0.2092	0.1693	0.2032	**0.2193**
15	0.1847	0.1403	0.2098	0.2553	**0.2555**	0.1663	0.1992	0.2489
20	0.2538	0.1403	0.2301	0.2836	**0.2915**	0.1672	0.1995	0.2831
25	0.3038	0.1403	0.2687	0.3213	**0.3476**	0.1671	0.1951	0.3287
30	0.3479	0.1403	0.2768	0.3429	**0.3710**	0.1717	0.1919	0.3632
35	0.3769	0.1403	0.3120	0.3634	**0.4025**	0.1680	0.1893	0.3902
40	0.4080	0.1403	0.3219	0.3912	**0.4256**	0.1691	0.1867	0.4197

Table G246: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
5	0.1155	0.1475	0.1902	**0.2272**	0.1902	0.1902	**0.2272**	**0.2272**
10	0.2087	0.1475	0.2163	0.2931	0.2639	0.1907	0.2545	**0.2841**
15	0.2550	0.1475	0.2646	0.3452	**0.3454**	0.1862	0.2458	0.3421
20	0.3376	0.1475	0.2871	0.3950	**0.4096**	0.1876	0.2378	0.3974
25	0.4144	0.1475	0.3421	0.4340	**0.4696**	0.1865	0.2293	0.4454
30	0.4649	0.1475	0.3669	0.4683	**0.5047**	0.1886	0.2240	0.4923
35	0.5237	0.1475	0.4166	0.5078	**0.5538**	0.1867	0.2185	0.5413
40	0.5776	0.1475	0.4398	0.5462	**0.6069**	0.1870	0.2145	0.5982

Table G247: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.0988	0.0949	0.1222	**0.1452**	0.1222	0.1222	**0.1452**	**0.1452**
10	0.1603	0.0949	0.1354	0.1876	0.1651	0.1237	0.1598	**0.1969**
15	0.2039	0.0949	0.1732	0.2383	0.2405	0.1191	0.1604	**0.2547**
20	0.2615	0.0949	0.1860	0.2634	0.2846	0.1216	0.1524	**0.2877**
25	0.3122	0.0949	0.2230	0.2883	**0.3357**	0.1195	0.1478	0.3263
30	0.3541	0.0949	0.2350	0.3131	**0.3633**	0.1204	0.1410	0.3603
35	0.3964	0.0949	0.2688	0.3425	**0.4002**	0.1187	0.1384	0.3966
40	0.4354	0.0949	0.2879	0.3685	**0.4434**	0.1187	0.1360	0.4394

Table G248: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects d2=0; d3=0; d4=0.25; d5=0.5

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.1082	0.1134	0.1370	0.1621	0.1370	0.1370	**0.1621**	**0.1621**
10	0.1702	0.1134	0.1538	0.2010	0.1807	0.1407	0.1766	**0.2106**
15	0.1942	0.1134	0.1800	0.2304	0.2323	0.1357	0.1698	**0.2426**
20	0.2424	0.1134	0.1923	0.2574	0.2680	0.1380	0.1628	**0.2701**
25	0.3019	0.1134	0.2300	0.2870	**0.3242**	0.1406	0.1627	0.3145
30	0.3427	0.1134	0.2429	0.3092	**0.3505**	0.1395	0.1593	0.3482
35	0.3751	0.1134	0.2713	0.3302	**0.3833**	0.1394	0.1582	0.3797
40	0.4047	0.1134	0.2845	0.3556	**0.4073**	0.1385	0.1533	**0.4087**

Table G249: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.25; d5=0.5

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.1103	0.0994	0.1232	0.1463	0.1232	0.1232	**0.1463**	**0.1463**
10	0.1680	0.0994	0.1367	0.1882	0.1668	0.1241	0.1607	**0.1956**
15	0.1900	0.0994	0.1647	0.2136	0.2151	0.1193	0.1558	**0.2292**
20	0.2505	0.0994	0.1764	0.2419	0.2632	0.1218	0.1471	**0.2722**
25	0.3001	0.0994	0.2053	0.2663	**0.3169**	0.1218	0.1425	0.3089
30	0.3381	0.0994	0.2161	0.2873	**0.3376**	0.1225	0.1400	0.3382
35	0.3815	0.0994	0.2462	0.3153	**0.3786**	0.1200	0.1379	0.3777
40	0.4061	0.0994	0.2587	0.3296	**0.4083**	0.1224	0.1347	**0.4084**

Table G250: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1175	0.0943	0.1273	**0.1627**	0.1273	0.1273	**0.1627**	**0.1627**
10	0.2156	0.0943	0.1455	0.2184	0.1871	0.1282	0.1775	**0.2453**
15	0.2534	0.0943	0.1860	0.2658	0.2705	0.1259	0.1725	**0.3034**
20	0.3354	0.0943	0.2090	0.3112	0.3462	0.1271	0.1667	**0.3581**
25	0.4065	0.0943	0.2492	0.3481	0.4200	0.1270	0.1549	**0.4174**
30	0.4737	0.0943	0.2787	0.3848	0.4778	0.1284	0.1524	**0.4787**
35	0.5281	0.0943	0.3231	0.4286	**0.5393**	0.1286	0.1513	**0.5346**
40	0.5777	0.0943	0.3499	0.4534	**0.5789**	0.1282	0.1458	**0.5798**

Table G251: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1219	0.0762	0.1010	**0.1494**	0.1010	0.1010	**0.1494**	**0.1494**
10	0.2025	0.0762	0.1187	0.1941	0.1578	0.1029	0.1475	**0.2176**
15	0.2534	0.0762	0.1489	0.2287	0.2366	0.0982	0.1384	**0.2849**
20	0.3428	0.0762	0.1734	0.2729	0.3197	0.1008	0.1335	**0.3563**
25	0.4135	0.0762	0.2103	0.3058	0.4015	0.1031	0.1280	**0.4127**
30	0.4642	0.0762	0.2318	0.3444	0.4496	0.1004	0.1221	**0.4610**
35	0.5256	0.0762	0.2784	0.3790	0.5145	0.0997	0.1185	**0.5193**
40	0.5720	0.0762	0.3020	0.4192	0.5642	0.1003	0.1181	**0.5703**

Table G252: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1015	0.0802	0.1029	**0.1349**	0.1029	0.1029	**0.1349**	**0.1349**
10	0.1649	0.0802	0.1182	0.1657	0.1456	0.1064	0.1395	**0.1842**
15	0.1929	0.0802	0.1439	0.2038	0.2090	0.1018	0.1329	**0.2322**
20	0.2586	0.0802	0.1582	0.2311	0.2567	0.1007	0.1268	**0.2726**
25	0.3089	0.0802	0.1906	0.2596	0.3151	0.1044	0.1252	**0.3146**
30	0.3606	0.0802	0.2049	0.2829	0.3575	0.1031	0.1214	**0.3590**
35	0.3978	0.0802	0.2392	0.3121	0.3949	0.1035	0.1199	**0.3952**
40	0.4307	0.0802	0.2523	0.3359	0.4283	0.1011	0.1144	**0.4324**

Table G253: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
5	0.1012	0.0757	0.0990	**0.1288**	0.0990	0.0990	**0.1288**	**0.1288**
10	0.1624	0.0757	0.1117	0.1636	0.1382	0.1019	0.1332	**0.1802**
15	0.1969	0.0757	0.1420	0.2009	0.2050	0.0979	0.1311	**0.2304**
20	0.2556	0.0757	0.1559	0.2319	0.2579	0.0974	0.1261	**0.2702**
25	0.3192	0.0757	0.1822	0.2543	0.3162	0.0984	0.1199	**0.3203**
30	0.3598	0.0757	0.1974	0.2771	0.3523	0.0987	0.1179	**0.3561**
35	0.3915	0.0757	0.2304	0.3021	**0.3853**	0.0973	0.1153	**0.3852**
40	0.4393	0.0757	0.2448	0.3313	0.4305	0.0983	0.1117	**0.4334**

Table G254: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.25; d5=0.5

Fixed Number of Blocks $n_b = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.1717	0.1979	0.2147	**0.2734**	0.2147	0.2147	**0.2734**	**0.2734**
15	0.1717	0.2402	0.2526	0.3098	0.2487	0.2592	0.2933	**0.3101**
20	0.1717	0.2864	0.2917	0.3432	0.2902	0.3020	0.2915	**0.3512**
25	0.1717	0.3373	0.3432	0.3924	0.3394	0.3530	0.3035	**0.4008**
30	0.1717	0.3731	0.3783	0.4101	0.3760	0.3886	0.2875	**0.4293**
35	0.1717	0.4125	0.4154	0.4409	0.4131	0.4242	0.2854	**0.4622**
40	0.1717	0.4555	0.4604	0.4626	0.4566	0.4699	0.2830	**0.4993**

Table G255: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.2098	0.2496	0.2745	**0.3747**	0.2745	0.2745	**0.3747**	**0.3747**
15	0.2098	0.3120	0.3296	0.4263	0.3250	0.3387	0.4022	**0.4287**
20	0.2098	0.3963	0.4080	0.4910	0.4022	0.4229	0.4142	**0.5036**
25	0.2098	0.4562	0.4674	0.5405	0.4603	0.4810	0.4071	**0.5498**
30	0.2098	0.5231	0.5320	0.5860	0.5275	0.5479	0.3990	**0.6118**
35	0.2098	0.5828	0.5878	0.6242	0.5843	0.6025	0.3933	**0.6498**
40	0.2098	0.6306	0.6353	0.6520	0.6309	0.6473	0.3813	**0.6876**

Table G256: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed number of Blocks $n_b = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.1668	0.1324	0.1478	**0.2285**	0.1478	0.1478	**0.2285**	**0.2285**
15	0.1668	0.1608	0.1715	**0.2541**	0.1692	0.1763	0.2519	0.2434
20	0.1668	0.1913	0.1982	**0.2803**	0.1949	0.2081	0.2576	0.2697
25	0.1668	0.2192	0.2259	**0.3011**	0.2209	0.2331	0.2558	0.2839
30	0.1668	0.2473	0.2519	**0.3270**	0.2495	0.2643	0.2622	0.3127
35	0.1668	0.2688	0.2708	**0.3454**	0.2687	0.2810	0.2567	0.3206
40	0.1668	0.2927	0.2962	**0.3671**	0.2937	0.3054	0.2542	0.3429

Table G257: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.25; d5=0.5

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.0466	0.1525	**0.1489**	0.1126	**0.1489**	**0.1489**	0.1126	0.1126
15	0.0466	0.1826	0.1830	0.1313	**0.1845**	0.1833	0.1053	0.1526
20	0.0466	0.2096	0.2070	0.1500	**0.2091**	0.2078	0.1056	0.1848
25	0.0466	0.2245	0.2259	0.1577	**0.2259**	0.2251	0.0954	0.2083
30	0.0466	0.2541	0.2540	0.1690	**0.2549**	0.2534	0.0925	0.2372
35	0.0466	0.2931	0.2928	0.1964	**0.2929**	0.2915	0.0945	0.2791
40	0.0466	0.3142	0.3138	0.2055	**0.3139**	0.3123	0.0883	0.3025

Table G258: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.25; d5=0.5

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.0474	0.1263	**0.1237**	0.0981	**0.1237**	**0.1237**	0.0981	0.0981
15	0.0474	0.1489	0.1483	0.1126	**0.1498**	0.1495	0.0971	0.1251
20	0.0474	0.1786	0.1770	0.1303	**0.1787**	0.1768	0.0953	0.1583
25	0.0474	0.1937	0.1946	0.1395	**0.1941**	0.1933	0.0888	0.1793
30	0.0474	0.2090	0.2079	0.1441	0.2086	**0.2091**	0.0838	0.1982
35	0.0474	0.2346	0.2344	0.1639	**0.2344**	0.2343	0.0821	0.2210
40	0.0474	0.2454	0.2450	0.1636	**0.2448**	0.2447	0.0767	0.2367

Table G259: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.2108	0.1048	0.1199	**0.2197**	0.1199	0.1199	**0.2197**	**0.2197**
15	0.2108	0.1093	0.1195	**0.2305**	0.1172	0.1249	0.2513	0.2046
20	0.2108	0.1220	0.1274	**0.2514**	0.1254	0.1352	0.2619	0.2077
25	0.2108	0.1319	0.1387	**0.2606**	0.1347	0.1478	0.2646	0.2071
30	0.2108	0.1477	0.1522	**0.2783**	0.1500	0.1623	0.2715	0.2120
35	0.2108	0.1562	0.1584	**0.2834**	0.1567	0.1680	0.2649	0.2182
40	0.2108	0.1676	0.1710	**0.2984**	0.1680	0.1795	0.2684	0.2236

Table G260: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.2041	0.0980	0.1133	**0.2169**	0.1133	0.1133	**0.2169**	**0.2169**
15	0.2041	0.1082	0.1204	**0.2341**	0.1165	0.1253	0.2502	0.2081
20	0.2041	0.1151	0.1212	**0.2447**	0.1187	0.1291	0.2574	0.2067
25	0.2041	0.1328	0.1379	**0.2608**	0.1348	0.1480	0.2654	0.2130
30	0.2041	0.1479	0.1537	**0.2764**	0.1496	0.1627	0.2679	0.2149
35	0.2041	0.1555	0.1598	**0.2817**	0.1561	0.1718	0.2649	0.2198
40	0.2041	0.1635	0.1670	**0.2981**	0.1643	0.1752	0.2620	0.2168

Table G261: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.1642	0.1015	0.1114	**0.1957**	0.1114	0.1114	**0.1957**	**0.1957**
15	0.1642	0.1184	0.1265	**0.2133**	0.1241	0.1310	0.2158	0.1961
20	0.1642	0.1323	0.1363	**0.2230**	0.1344	0.1426	0.2266	0.1987
25	0.1642	0.1558	0.1603	**0.2461**	0.1574	0.1669	0.2313	0.2119
30	0.1642	0.1625	0.1655	**0.2578**	0.1637	0.1741	0.2270	0.2153
35	0.1642	0.1801	0.1830	**0.2685**	0.1807	0.1900	0.2223	0.2277
40	0.1642	0.1919	0.1951	**0.2770**	0.1929	0.2043	0.2237	0.2372

Table G262: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)									
Sample Size	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
10	0.1697	0.0917	0.1051	**0.1830**	0.1051	0.1051	**0.1830**	**0.1830**
15	0.1697	0.1009	0.1100	**0.1880**	0.1081	0.1154	0.1997	0.1760
20	0.1697	0.1203	0.1235	**0.2107**	0.1224	0.1299	0.2146	0.1832
25	0.1697	0.1303	0.1345	**0.2227**	0.1324	0.1433	0.2196	0.1879
30	0.1697	0.1399	0.1430	**0.2328**	0.1407	0.1487	0.2187	0.1895
35	0.1697	0.1515	0.1538	**0.2461**	0.1520	0.1617	0.2169	0.1990
40	0.1697	0.1555	0.1587	**0.2495**	0.1561	0.1669	0.2144	0.1987

Table G263: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects d2=0; d3=0; d4=0.25; d5=0.5

Fixed Sample Size $n_a = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
10	0.1686	0.1927	0.2082	**0.2738**	0.2082	0.2082	**0.2738**	**0.2738**
15	0.1925	0.1927	0.2184	**0.3042**	0.2312	0.2083	0.2891	**0.3001**
20	0.2556	0.1927	0.2279	0.3367	0.2667	0.2072	0.2970	**0.3382**
25	0.3016	0.1927	0.2389	0.3663	0.3013	0.2089	0.2936	**0.3593**
30	0.3375	0.1927	0.2459	0.3860	0.3453	0.2115	0.2915	**0.3905**
35	0.3849	0.1927	0.2582	0.4233	0.3899	0.2097	0.2900	**0.4299**
40	0.3998	0.1927	0.2703	0.4403	0.4306	0.2091	0.2841	**0.4416**

Table G264: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
10	0.2149	0.2481	0.2743	**0.3725**	0.2743	0.2743	**0.3725**	**0.3725**
15	0.2515	0.2481	0.2881	0.4246	0.3107	0.2747	0.4066	**0.4225**
20	0.3357	0.2481	0.3081	0.4762	0.3633	0.2753	0.4172	**0.4654**
25	0.4132	0.2481	0.3292	0.5237	0.4258	0.2792	0.4137	**0.5140**
30	0.4699	0.2481	0.3345	0.5564	0.4949	0.2797	0.4095	**0.5520**
35	0.5273	0.2481	0.3514	0.6025	0.5578	0.2787	0.3978	**0.5992**
40	0.5640	0.2481	0.3711	0.6271	0.6111	0.2765	0.3918	**0.6298**

Table G265: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.1671	0.1312	0.1458	**0.2226**	0.1458	0.1458	**0.2226**	**0.2226**
15	0.2013	0.1312	0.1551	0.2616	0.1685	0.1468	0.2374	**0.2728**
20	0.2620	0.1312	0.1691	0.2931	0.2057	0.1465	0.2410	**0.3121**
25	0.3101	0.1312	0.1781	0.3259	0.2406	0.1496	0.2322	**0.3544**
30	0.3566	0.1312	0.1831	0.3533	0.2920	0.1500	0.2288	**0.3852**
35	0.3952	0.1312	0.1961	0.3811	0.3361	0.1469	0.2245	**0.4199**
40	0.4442	0.1312	0.2061	0.4088	0.3912	0.1481	0.2186	**0.4678**

Table G266: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects d2=0; d3=0; d4=0.25; d5=0.5

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.1703	0.1488	0.1604	**0.2324**	0.1604	0.1604	**0.2324**	**0.2324**
15	0.1971	0.1488	0.1703	0.2663	0.1831	0.1618	0.2478	**0.2732**
20	0.2550	0.1488	0.1795	0.2984	0.2132	0.1615	0.2478	**0.3100**
25	0.2993	0.1488	0.1920	0.3139	0.2463	0.1650	0.2399	**0.3368**
30	0.3401	0.1488	0.1916	0.3459	0.2913	0.1630	0.2350	**0.3689**
35	0.3742	0.1488	0.2036	0.3692	0.3349	0.1630	0.2298	**0.4040**
40	0.4045	0.1488	0.2159	0.3962	0.3806	0.1634	0.2282	**0.4312**

Table G267: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.25; d5=0.5

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.1704	0.1278	0.1413	**0.2179**	0.1413	0.1413	**0.2179**	**0.2179**
15	0.1893	0.1278	0.1491	0.2424	0.1608	0.1408	0.2216	**0.2520**
20	0.2537	0.1278	0.1559	0.2742	0.1934	0.1376	0.2256	**0.2906**
25	0.3069	0.1278	0.1678	0.2984	0.2256	0.1402	0.2171	**0.3285**
30	0.3413	0.1278	0.1715	0.3188	0.2640	0.1414	0.2149	**0.3589**
35	0.3724	0.1278	0.1795	0.3487	0.3075	0.1397	0.2057	**0.3963**
40	0.4101	0.1278	0.1954	0.3755	0.3590	0.1414	0.2077	**0.4344**

Table G268: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2002	0.0977	0.1124	**0.2137**	0.1124	0.1124	**0.2137**	**0.2137**
15	0.2490	0.0977	0.1222	0.2598	0.1370	0.1114	0.2214	**0.2895**
20	0.3446	0.0977	0.1317	0.2959	0.1719	0.1117	0.2168	**0.3509**
25	0.4088	0.0977	0.1444	0.3344	0.2177	0.1142	0.2093	**0.4113**
30	0.4743	0.0977	0.1516	0.3726	0.2724	0.1123	0.2041	**0.4747**
35	0.5245	0.0977	0.1606	0.4088	0.3393	0.1135	0.1924	**0.5242**
40	0.5752	0.0977	0.1762	0.4397	0.4126	0.1138	0.1918	**0.5745**

Table G269: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2062	0.0995	0.1122	**0.2150**	0.1122	0.1122	**0.2150**	**0.2150**
15	0.2527	0.0995	0.1231	0.2591	0.1359	0.1141	0.2184	**0.2862**
20	0.3425	0.0995	0.1341	0.2989	0.1744	0.1129	0.2171	**0.3505**
25	0.4125	0.0995	0.1442	0.3384	0.2187	0.1156	0.2082	**0.4165**
30	0.4694	0.0995	0.1500	0.3751	0.2782	0.1148	0.2024	**0.4685**
35	0.5314	0.0995	0.1644	0.4148	0.3473	0.1153	0.1958	**0.5258**
40	0.5764	0.0995	0.1763	0.4456	0.4130	0.1153	0.1919	**0.5762**

Table G270: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.1588	0.1070	0.1194	**0.1919**	0.1194	0.1194	**0.1919**	**0.1919**
15	0.2015	0.1070	0.1302	0.2393	0.1419	0.1217	0.2109	**0.2538**
20	0.2661	0.1070	0.1373	0.2657	0.1702	0.1178	0.2083	**0.2924**
25	0.3167	0.1070	0.1459	0.2968	0.2089	0.1219	0.2017	**0.3363**
30	0.3599	0.1070	0.1511	0.3211	0.2519	0.1219	0.1958	**0.3736**
35	0.4036	0.1070	0.1590	0.3469	0.3014	0.1217	0.1862	**0.4141**
40	0.4333	0.1070	0.1714	0.3700	0.3532	0.1214	0.1811	**0.4466**

Table G271: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.1697	0.0905	0.1025	**0.1805**	0.1025	0.1025	**0.1805**	**0.1805**
15	0.1944	0.0905	0.1073	0.2131	0.1175	0.1010	0.1843	**0.2320**
20	0.2566	0.0905	0.1206	0.2445	0.1514	0.1017	0.1847	**0.2752**
25	0.3168	0.0905	0.1294	0.2739	0.1855	0.1045	0.1794	**0.3208**
30	0.3595	0.0905	0.1300	0.2912	0.2270	0.1035	0.1714	**0.3604**
35	0.3985	0.0905	0.1426	0.3192	0.2682	0.1029	0.1673	**0.3995**
40	0.4383	0.0905	0.1503	0.3501	0.3295	0.1036	0.1627	**0.4399**

Table G272: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects d2=0; d3=0; d4=0.25; d5=0.5

Fixed Number of Blocks $n_b = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2430	0.2954	0.3197	**0.4319**	0.3197	0.3197	**0.4319**	**0.4319**
20	0.2430	0.3628	0.3765	0.4805	0.3725	0.3826	0.4649	**0.4828**
25	0.2430	0.4125	0.4254	0.5134	0.4200	0.4310	0.4689	**0.5187**
30	0.2430	0.4687	0.4792	0.5541	0.4745	0.4858	0.4749	**0.5659**
35	0.2430	0.5145	0.5224	0.5921	0.5169	0.5321	0.4743	**0.6102**
40	0.2430	0.5442	0.5521	0.6093	0.5476	0.5604	0.4598	**0.6248**

Table G273: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3372	0.3164	0.3595	**0.5392**	0.3733	0.3484	**0.5313**	**0.5335**
20	0.3372	0.3878	0.4093	0.5936	0.4093	0.4093	0.5936	**0.5936**
25	0.3372	0.4575	0.4805	0.6427	0.4753	0.4858	0.6285	**0.6449**
30	0.3372	0.5203	0.5352	0.6804	0.5303	0.5440	0.6407	**0.6867**
35	0.3372	0.5879	0.5992	0.7223	0.5950	0.6078	0.6522	**0.7348**
40	0.3372	0.6314	0.6412	0.7472	0.6363	0.6514	0.6449	**0.7657**

Table G274: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.1873	0.1615	0.1766	**0.2861**	0.1766	0.1766	**0.2861**	**0.2861**
20	0.1873	0.1928	0.2018	**0.3131**	0.1993	0.2070	0.3140	0.3034
25	0.1873	0.2171	0.2276	**0.3428**	0.2236	0.2336	0.3261	0.3276
30	0.1873	0.2449	0.2512	**0.3641**	0.2482	0.2582	0.3333	0.3451
35	0.1873	0.2690	0.2745	**0.3870**	0.2711	0.2823	0.3297	0.3654
40	0.1873	0.2885	0.2949	**0.4049**	0.2907	0.3020	0.3296	0.3785

Table G275: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.25; d5=0.5

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)									
Sample Size			Approach						
	L*	FW*	I	II	III	IV	V	VI
15	0.1985	0.1769	0.1926	**0.2995**	0.1926	0.1926	**0.2995**	**0.2995**
20	0.1985	0.2036	0.2145	**0.3208**	0.2116	0.2195	0.3191	0.3143
25	0.1985	0.2325	0.2407	**0.3475**	0.2367	0.2465	0.3339	0.3356
30	0.1985	0.2556	0.2622	**0.3655**	0.2592	0.2685	0.3331	0.3474
35	0.1985	0.2837	0.2885	**0.3926**	0.2848	0.2977	0.3392	0.3712
40	0.1985	0.3125	0.3175	**0.4037**	0.3141	0.3252	0.3302	0.3956

Table G276: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.25; d5=0.5

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.1893	0.1449	0.1578	**0.2620**	0.1578	0.1578	**0.2620**	**0.2620**
20	0.1893	0.1688	0.1756	**0.2754**	0.1743	0.1797	0.2786	0.2679
25	0.1893	0.1919	0.2001	**0.3035**	0.1963	0.2048	0.2984	0.2854
30	0.1893	0.2105	0.2167	**0.3229**	0.2142	0.2234	0.3058	0.3008
35	0.1893	0.2327	0.2371	**0.3402**	0.2343	0.2453	0.3046	0.3131
40	0.1893	0.2451	0.2485	**0.3513**	0.2467	0.2574	0.3012	0.3194

Table G277: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3395	0.1460	0.1726	**0.3768**	0.1819	0.1658	**0.3474**	**0.3970**
20	0.3395	0.1802	0.1982	**0.4073**	0.1982	0.1982	0.4073	0.4073
25	0.3395	0.1904	0.2075	**0.4266**	0.2030	0.2107	0.4384	0.4120
30	0.3395	0.2177	0.2290	**0.4498**	0.2254	0.2352	0.4579	0.4174
35	0.3395	0.2377	0.2454	**0.4706**	0.2417	0.2533	0.4715	0.4244
40	0.3395	0.2639	0.2727	**0.4854**	0.2679	0.2801	0.4767	0.4318

Table G278: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3371	0.1044	0.1265	**0.3136**	0.1318	0.1218	**0.2790**	**0.3400**
20	0.3371	0.1223	0.1368	**0.3362**	0.1368	0.1368	0.3362	0.3362
25	0.3371	0.1337	0.1446	**0.3465**	0.1426	0.1462	0.3650	0.3253
30	0.3371	0.1418	0.1508	**0.3626**	0.1476	0.1560	0.3868	0.3164
35	0.3371	0.1524	0.1596	**0.3749**	0.1562	0.1658	0.3966	0.3135
40	0.3371	0.1741	0.1800	**0.3985**	0.1762	0.1870	0.4172	0.3235

Table G279: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.1896	0.1208	0.1372	**0.2431**	0.1372	0.1372	**0.2431**	**0.2431**
20	0.1896	0.1380	0.1470	**0.2683**	0.1448	0.1515	0.2719	0.2562
25	0.1896	0.1470	0.1538	**0.2750**	0.1515	0.1597	0.2795	0.2521
30	0.1896	0.1627	0.1687	**0.2920**	0.1660	0.1758	0.2866	0.2561
35	0.1896	0.1796	0.1839	**0.3019**	0.1815	0.1917	0.2899	0.2652
40	0.1896	0.1985	0.2026	**0.3193**	0.1997	0.2092	0.2931	0.2787

Table G280: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.2007	0.1033	0.1175	**0.2290**	0.1175	0.1175	**0.2290**	**0.2290**
20	0.2007	0.1138	0.1217	**0.2389**	0.1198	0.1252	0.2513	0.2231
25	0.2007	0.1264	0.1330	**0.2543**	0.1293	0.1365	0.2662	0.2245
30	0.2007	0.1286	0.1342	**0.2632**	0.1314	0.1392	0.2747	0.2174
35	0.2007	0.1475	0.1501	**0.2698**	0.1483	0.1558	0.2750	0.2259
40	0.2007	0.1567	0.1607	**0.2860**	0.1579	0.1661	0.2786	0.2340

Table G281: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects d2=0; d3=0; d4=0.25; d5=0.5

Fixed Sample Size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2477	0.2936	0.3189	**0.4353**	0.3189	0.3189	**0.4353**	**0.4353**
20	0.3111	0.2936	0.3280	**0.4700**	0.3394	0.3197	0.4614	0.4695
25	0.3834	0.2936	0.3412	**0.5165**	0.3650	0.3226	0.4862	0.5150
30	0.4239	0.2936	0.3480	**0.5408**	0.3939	0.3213	0.4880	0.5360
35	0.4702	0.2936	0.3557	**0.5697**	0.4244	0.3219	0.4824	0.5670
40	0.5003	0.2936	0.3617	**0.5949**	0.4595	0.3215	0.4831	0.5933

Table G282: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2481	0.3181	0.3505	**0.4941**	0.3505	0.3505	**0.4941**	**0.4941**
20	0.3372	0.3181	0.3588	**0.5432**	0.3719	0.3494	0.5358	0.5397
25	0.4136	0.3181	0.3705	**0.5819**	0.3986	0.3511	0.5452	0.5733
30	0.4754	0.3181	0.3804	**0.6204**	0.4317	0.3496	0.5456	0.6125
35	0.5295	0.3181	0.3892	**0.6584**	0.4724	0.3470	0.5461	0.6495
40	0.5732	0.3181	0.3954	**0.6963**	0.5157	0.3484	0.5465	0.6866

Table G283: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.1962	0.1606	0.1788	**0.2985**	0.1788	0.1788	**0.2985**	**0.2985**
20	0.2619	0.1606	0.1840	0.3291	0.1917	0.1775	0.3134	**0.3387**
25	0.3150	0.1606	0.1915	0.3614	0.2095	0.1795	0.3207	**0.3790**
30	0.3613	0.1606	0.1971	0.3966	0.2326	0.1772	0.3166	**0.4164**
35	0.4041	0.1606	0.2013	0.4195	0.2561	0.1784	0.3118	**0.4544**
40	0.4404	0.1606	0.2017	0.4503	0.2844	0.1768	0.3080	**0.4917**

Table G284: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.25; d5=0.5

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.1950	0.1489	0.1648	**0.2669**	0.1648	0.1648	**0.2669**	**0.2669**
20	0.2604	0.1489	0.1689	0.2991	0.1768	0.1639	0.2814	**0.3101**
25	0.3013	0.1489	0.1771	0.3198	0.1906	0.1653	0.2775	**0.3376**
30	0.3438	0.1489	0.1822	0.3536	0.2131	0.1661	0.2798	**0.3820**
35	0.3746	0.1489	0.1846	0.3673	0.2293	0.1641	0.2702	**0.4051**
40	0.4017	0.1489	0.1863	0.3930	0.2547	0.1632	0.2736	**0.4344**

Table G285: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.25; d5=0.5

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.1834	0.1769	0.1914	**0.2854**	0.1914	0.1914	**0.2854**	**0.2854**
20	0.2513	0.1769	0.2000	0.3258	0.2063	0.1945	0.3122	**0.3322**
25	0.3078	0.1769	0.2050	0.3589	0.2240	0.1933	0.3204	**0.3695**
30	0.3441	0.1769	0.2114	0.3765	0.2414	0.1937	0.3170	**0.3971**
35	0.3803	0.1769	0.2170	0.4060	0.2623	0.1937	0.3153	**0.4286**
40	0.4086	0.1769	0.2173	0.4243	0.2863	0.1918	0.3078	**0.4586**

Table G286: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 15$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2486	0.1436	0.1664	**0.3262**	0.1664	0.1664	**0.3262**	**0.3262**
20	0.3395	0.1436	0.1729	0.3743	0.1815	0.1654	0.3441	**0.3964**
25	0.4087	0.1436	0.1808	0.4114	0.2001	0.1659	0.3426	**0.4501**
30	0.4736	0.1436	0.1858	0.4537	0.2286	0.1643	0.3378	**0.5054**
35	0.5272	0.1436	0.1965	0.4884	0.2620	0.1657	0.3319	**0.5585**
40	0.5697	0.1436	0.1980	0.5240	0.2991	0.1658	0.3278	**0.6010**

Table G287: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2525	0.1109	0.1253	**0.2798**	0.1253	0.1253	**0.2798**	**0.2798**
20	0.3371	0.1109	0.1326	0.3206	0.1407	0.1261	0.2904	**0.3494**
25	0.4136	0.1109	0.1362	0.3614	0.1551	0.1261	0.2864	**0.4161**
30	0.4749	0.1109	0.1449	0.3979	0.1801	0.1266	0.2785	**0.4693**
35	0.5149	0.1109	0.1494	0.4273	0.2052	0.1264	0.2694	**0.5169**
40	0.5656	0.1109	0.1544	0.4648	0.2389	0.1256	0.2636	**0.5725**

Table G288: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.1916	0.1238	0.1382	**0.2464**	0.1382	0.1382	**0.2464**	**0.2464**
20	0.2588	0.1238	0.1422	0.2797	0.1490	0.1376	0.2586	**0.2958**
25	0.3154	0.1238	0.1485	0.3117	0.1640	0.1379	0.2646	**0.3423**
30	0.3548	0.1238	0.1524	0.3392	0.1827	0.1380	0.2578	**0.3742**
35	0.3978	0.1238	0.1585	0.3634	0.2045	0.1377	0.2563	**0.4169**
40	0.4354	0.1238	0.1616	0.3962	0.2332	0.1382	0.2501	**0.4652**

Table G289: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.1951	0.1015	0.1139	**0.2315**	0.1139	0.1139	**0.2315**	**0.2315**
20	0.2596	0.1015	0.1184	0.2577	0.1246	0.1143	0.2341	**0.2779**
25	0.3109	0.1015	0.1233	0.2816	0.1362	0.1142	0.2297	**0.3187**
30	0.3585	0.1015	0.1278	0.3134	0.1539	0.1146	0.2296	**0.3651**
35	0.4140	0.1015	0.1316	0.3425	0.1738	0.1144	0.2266	**0.4135**
40	0.4371	0.1015	0.1352	0.3673	0.2015	0.1153	0.2210	**0.4458**

Table G290: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.25; d5=0.5

Fixed Number of Blocks $n_b = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample		Approach						
Size	L*	FW*	I	II	III	IV	V	VI
20	0.2543	0.2890	0.3048	**0.4231**	0.3048	0.3048	**0.4231**	**0.4231**
25	0.2543	0.3412	0.3538	0.4624	0.3520	0.3563	0.4507	**0.4636**
30	0.2543	0.3687	0.3791	0.4811	0.3760	0.3849	0.4485	**0.4867**
35	0.2543	0.4166	0.4238	0.5173	0.4210	0.4318	0.4658	**0.5258**
40	0.2543	0.4451	0.4524	0.5383	0.4491	0.4594	0.4616	**0.5513**

Table G291: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.3454	0.3886	0.4130	**0.5920**	0.4130	0.4130	**0.5920**	**0.5920**
25	0.3454	0.4621	0.4843	0.6464	0.4796	0.4890	0.6358	**0.6539**
30	0.3454	0.5176	0.5341	0.6864	0.5293	0.5413	0.6479	**0.6946**
35	0.3454	0.5823	0.5944	0.7217	0.5893	0.6020	0.6543	**0.7318**
40	0.3454	0.6322	0.6433	0.7519	0.6368	0.6525	0.6563	**0.7645**

Table G292: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed number of Blocks $n_b = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.2614	0.1160	0.1267	**0.2745**	0.1267	0.1267	**0.2745**	**0.2745**
25	0.2614	0.1255	0.1356	**0.2841**	0.1332	0.1376	0.2970	0.2682
30	0.2614	0.1352	0.1421	**0.2994**	0.1399	0.1454	0.3185	0.2719
35	0.2614	0.1501	0.1549	**0.3123**	0.1524	0.1592	0.3257	0.2734
40	0.2614	0.1553	0.1609	**0.3175**	0.1583	0.1666	0.3262	0.2680

Table G293: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.25; d5=0.5

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.2555	0.2106	0.2226	**0.3535**	0.2226	0.2226	0.3535	0.3535
25	0.2555	0.2327	0.2454	**0.3810**	0.2421	0.2479	0.3812	0.3773
30	0.2555	0.2587	0.2678	**0.4022**	0.2658	0.2725	0.3865	0.3933
35	0.2555	0.2858	0.2919	**0.4154**	0.2891	0.2976	0.3886	0.4009
40	0.2555	0.3136	0.3206	**0.4430**	0.3157	0.3259	0.3952	0.4277

Table G294: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.25; d5=0.5

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.2559	0.1738	0.1851	**0.3173**	0.1851	0.1851	**0.3173**	**0.3173**
25	0.2559	0.1923	0.2032	**0.3344**	0.2005	0.2058	0.3389	0.3278
30	0.2559	0.2113	0.2202	**0.3554**	0.2179	0.2239	0.3554	0.3418
35	0.2559	0.2347	0.2413	**0.3783**	0.2388	0.2459	0.3679	0.3521
40	0.2559	0.2497	0.2567	**0.3867**	0.2536	0.2632	0.3616	0.3602

Table G295: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.3414	0.1705	0.1860	**0.4073**	0.1860	0.1860	**0.4073**	**0.4073**
25	0.3414	0.2028	0.2173	**0.4211**	0.2137	0.2201	0.4338	0.4005
30	0.3414	0.2226	0.2351	**0.4547**	0.2317	0.2419	0.4641	0.4187
35	0.3414	0.2414	0.2494	**0.4703**	0.2447	0.2572	0.4717	0.4245
40	0.3414	0.2777	0.2859	**0.4965**	0.2811	0.2951	0.4787	0.4480

Table G296: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.3468	0.1160	0.1279	**0.3302**	0.1279	0.1279	**0.3302**	**0.3302**
25	0.3468	0.1407	0.1541	**0.3634**	0.1513	0.1554	0.3819	0.3426
30	0.3468	0.1397	0.1509	**0.3662**	0.1476	0.1568	0.3961	0.3216
35	0.3468	0.1595	0.1643	**0.3795**	0.1624	0.1704	0.4093	0.3238
40	0.3468	0.1651	0.1708	**0.3963**	0.1679	0.1783	0.4209	0.3183

Table G297: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.2529	0.1358	0.1448	**0.2938**	0.1448	0.1448	**0.2938**	**0.2938**
25	0.2529	0.1497	0.1600	**0.3160**	0.1577	0.1619	0.3219	0.3031
30	0.2529	0.1576	0.1652	**0.3212**	0.1625	0.1694	0.3317	0.2962
35	0.2529	0.1817	0.1872	**0.3399**	0.1850	0.1913	0.3429	0.3012
40	0.2529	0.1920	0.1972	**0.3600**	0.1942	0.2037	0.3562	0.3184

Table G298: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size		Approach						
	L*	FW*	I	II	III	IV	V	VI
20	0.2549	0.1152	0.1247	**0.2702**	0.1247	0.1247	**0.2702**	**0.2702**
25	0.2549	0.1301	0.1390	**0.2863**	0.1369	0.1410	0.2971	0.2737
30	0.2549	0.1344	0.1421	**0.2939**	0.1398	0.1479	0.3116	0.2671
35	0.2549	0.1522	0.1570	**0.3126**	0.1549	0.1607	0.3253	0.2715
40	0.2549	0.1518	0.1570	**0.3174**	0.1542	0.1621	0.3242	0.2670

Table G299: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects d2=0; d3=0; d4=0.25; d5=0.5

Fixed Sample Size $n_a = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.2629	0.2928	0.3103	**0.4307**	0.3103	0.3103	**0.4307**	**0.4307**
25	0.2976	0.2928	0.3132	**0.4528**	0.3214	0.3100	0.4530	0.4492
30	0.3340	0.2928	0.3182	**0.4803**	0.3319	0.3110	0.4612	0.4812
35	0.3788	0.2928	0.3229	**0.5113**	0.3429	0.3100	0.4717	0.5047
40	0.4040	0.2928	0.3297	**0.5281**	0.3616	0.3106	0.4719	0.5191

Table G300: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.3395	0.3966	0.4196	**0.5978**	0.4196	0.4196	**0.5978**	**0.5978**
25	0.4151	0.3966	0.4294	**0.6406**	0.4385	0.4226	0.6334	0.6341
30	0.4722	0.3966	0.4342	**0.6697**	0.4560	0.4208	0.6511	0.6656
35	0.5268	0.3966	0.4434	**0.7083**	0.4802	0.4227	0.6577	0.7017
40	0.5731	0.3966	0.4508	**0.7347**	0.5007	0.4192	0.6601	0.7243

Table G301: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.2556	0.1120	0.1212	**0.2738**	0.1212	0.1212	**0.2738**	**0.2738**
25	0.3080	0.1120	0.1259	0.2995	0.1298	0.1226	0.2772	**0.3170**
30	0.3606	0.1120	0.1258	0.3276	0.1364	0.1206	0.2800	**0.3592**
35	0.4024	0.1120	0.1319	0.3544	0.1480	0.1229	0.2773	**0.4045**
40	0.4326	0.1120	0.1351	0.3775	0.1579	0.1218	0.2705	**0.4397**

Table G302: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects d2=0; d3=0; d4=0.25; d5=0.5

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.2422	0.1688	0.1805	**0.3122**	0.1805	0.1805	**0.3122**	**0.3122**
25	0.2935	0.1688	0.1829	0.3388	0.1876	0.1807	0.3231	**0.3465**
30	0.3415	0.1688	0.1849	0.3691	0.1963	0.1793	0.3318	**0.3920**
35	0.3774	0.1688	0.1912	0.3964	0.2105	0.1804	0.3342	**0.4250**
40	0.4042	0.1688	0.1930	0.4119	0.2186	0.1796	0.3286	**0.4529**

Table G303: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects d2=0; d3=0; d4=0.25; d5=0.5

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3}-1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.2524	0.2106	0.2215	**0.3484**	0.2215	0.2215	**0.3484**	**0.3484**
25	0.2999	0.2106	0.2258	0.3869	0.2315	0.2233	0.3735	**0.3903**
30	0.3331	0.2106	0.2308	0.4103	0.2418	0.2236	0.3805	**0.4166**
35	0.3739	0.2106	0.2346	0.4319	0.2534	0.2232	0.3798	**0.4443**
40	0.4071	0.2106	0.2390	0.4615	0.2681	0.2238	0.3839	**0.4769**

Table G304: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.3332	0.1767	0.1944	**0.3996**	0.1944	0.1944	**0.3996**	**0.3996**
25	0.4104	0.1767	0.1981	0.4479	0.2060	0.1946	0.4225	**0.4679**
30	0.4707	0.1767	0.2042	0.4805	0.2195	0.1940	0.4247	**0.5179**
35	0.5437	0.1767	0.2089	0.5318	0.2346	0.1933	0.4301	**0.5791**
40	0.5650	0.1767	0.2151	0.5477	0.2510	0.1942	0.4180	**0.6115**

Table G305: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.3339	0.1234	0.1391	**0.3328**	0.1391	0.1391	**0.3328**	**0.3328**
25	0.4175	0.1234	0.1446	0.3791	0.1504	0.1416	0.3460	**0.4053**
30	0.4706	0.1234	0.1459	0.4171	0.1577	0.1389	0.3517	**0.4638**
35	0.5301	0.1234	0.1502	0.4481	0.1706	0.1393	0.3386	**0.5243**
40	0.5734	0.1234	0.1553	0.4844	0.1869	0.1401	0.3364	**0.5767**

Table G306: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 20$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.2595	0.1293	0.1406	**0.2880**	0.1406	0.1406	**0.2880**	**0.2880**
25	0.3130	0.1293	0.1439	0.3297	0.1482	0.1410	0.3114	**0.3432**
30	0.3677	0.1293	0.1457	0.3524	0.1576	0.1400	0.3076	**0.3834**
35	0.4037	0.1293	0.1514	0.3820	0.1700	0.1404	0.3080	**0.4264**
40	0.4369	0.1293	0.1537	0.4133	0.1811	0.1411	0.3051	**0.4646**

Table G307: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0; d3=0; d4=0.5; d5=1.0

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.2588	0.1140	0.1236	**0.2744**	0.1236	0.1236	**0.2744**	**0.2744**
25	0.3163	0.1140	0.1280	0.3026	0.1327	0.1251	0.2817	**0.3178**
30	0.3691	0.1140	0.1309	0.3345	0.1409	0.1246	0.2846	**0.3704**
35	0.3977	0.1140	0.1348	0.3539	0.1523	0.1235	0.2812	**0.4008**
40	0.4295	0.1140	0.1370	0.3777	0.1629	0.1240	0.2699	**0.4438**

Table G308: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Number of Blocks $n_b = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.2289	0.2842	0.3598	**0.4074**	0.3598	0.3598	**0.4074**	**0.4074**
10	0.2289	0.4272	0.4453	0.5123	0.4383	0.4726	0.4437	**0.5258**
15	0.2289	0.5537	0.5667	0.6028	0.5603	0.5876	0.4367	**0.6257**
20	0.2289	0.6523	0.6616	0.6714	0.6532	0.6823	0.4196	**0.7104**
25	0.2289	0.7274	0.7325	0.7290	0.7284	0.7522	0.4072	**0.7684**
30	0.2289	0.7919	0.7955	0.7784	0.7931	0.8114	0.4004	**0.8247**
35	0.2289	0.8448	0.8460	0.8187	0.8449	0.8580	0.3894	**0.8655**
40	0.2289	0.8755	0.8766	0.8381	0.8757	0.8867	0.3781	**0.8923**

Table G309: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1704	0.2089	0.2689	**0.3181**	0.2689	0.2689	**0.3181**	**0.3181**
10	0.1704	0.3239	0.3411	0.4050	0.3343	0.3646	0.3377	**0.4114**
15	0.1704	0.4347	0.4489	0.4903	0.4412	0.4703	0.3403	**0.5107**
20	0.1704	0.5388	0.5463	0.5564	0.5398	0.5643	0.3250	**0.5911**
25	0.1704	0.6127	0.6191	0.6163	0.6144	0.6397	0.3137	**0.6579**
30	0.1704	0.6839	0.6880	0.6555	0.6854	0.7054	0.3032	**0.7192**
35	0.1704	0.7349	0.7377	0.6978	0.7349	0.7545	0.2956	**0.7647**
40	0.1704	0.7927	0.7952	0.7432	0.7930	0.8086	0.2882	**0.8172**

Table G310: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed number of Blocks $n_b = 5$; (CRD $T(3)$ and CRBD $T(3)$)									
Sample			Approach						
Size	L*	FW*	I	II	III	IV	V	VI
5	0.1386	0.1979	0.2459	**0.2730**	0.2459	0.2459	**0.2730**	**0.2730**
10	0.1386	0.3117	0.3223	0.3619	0.3183	0.3440	0.3020	**0.3762**
15	0.1386	0.4003	0.4140	0.4314	0.4060	0.4332	0.2933	**0.4617**
20	0.1386	0.4925	0.4985	0.4893	0.4928	0.5129	0.2785	**0.5350**
25	0.1386	0.5786	0.5819	0.5454	0.5799	0.6008	0.2694	**0.6154**
30	0.1386	0.6461	0.6495	0.6002	0.6474	0.6679	0.2596	**0.6747**
35	0.1386	0.7030	0.7040	0.6411	0.7026	0.7192	0.2539	**0.7282**
40	0.1386	0.7451	0.7470	0.6728	0.7455	0.7606	0.2493	**0.7669**

Table G311: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.2312	0.1987	0.2614	**0.3442**	0.2614	0.2614	**0.3442**	**0.3442**
10	0.2312	0.2997	0.3172	**0.4286**	0.3116	0.3441	0.3914	0.4057
15	0.2312	0.3800	0.3946	**0.4885**	0.3868	0.4202	0.3898	0.4693
20	0.2312	0.4742	0.4836	**0.5603**	0.4755	0.5078	0.3862	0.5412
25	0.2312	0.5346	0.5420	**0.5980**	0.5358	0.5640	0.3782	0.5870
30	0.2312	0.5895	0.5944	0.6325	0.5903	0.6178	0.3669	**0.6357**
35	0.2312	0.6499	0.6522	0.6757	0.6498	0.6713	0.3633	**0.6840**
40	0.2312	0.6952	0.6976	0.6999	0.6955	0.7154	0.3551	**0.7255**

Table G312: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Number of Blocks $n_b = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
5	0.2259	0.1717	0.2279	**0.3112**	0.2279	0.2279	**0.3112**	**0.3112**
10	0.2259	0.2489	0.2640	**0.3809**	0.2575	0.2880	0.3571	0.3510
15	0.2259	0.3078	0.3206	**0.4302**	0.3130	0.3482	0.3601	0.3951
20	0.2259	0.3748	0.3825	**0.4751**	0.3756	0.4024	0.3510	0.4358
25	0.2259	0.4294	0.4365	**0.5211**	0.4305	0.4597	0.3499	0.4857
30	0.2259	0.4807	0.4849	**0.5580**	0.4820	0.5087	0.3462	0.5274
35	0.2259	0.5306	0.5330	**0.5881**	0.5301	0.5544	0.3367	0.5697
40	0.2259	0.5723	0.5758	**0.6127**	0.5726	0.5961	0.3306	0.6088

Table G313: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
			Approach					
Sample Size	L*	FW*	I	II	III	IV	V	VI
5	0.1632	0.1108	0.1521	**0.2150**	0.1521	0.1521	**0.2150**	**0.2150**
10	0.1632	0.2033	0.2151	**0.3039**	0.2111	0.2319	0.2817	0.2795
15	0.1632	0.2550	0.2685	**0.3534**	0.2611	0.2909	0.2789	0.3298
20	0.1632	0.3228	0.3335	**0.3970**	0.3242	0.3486	0.2736	0.3795
25	0.1632	0.3719	0.3785	**0.4377**	0.3730	0.4010	0.2652	0.4214
30	0.1632	0.4153	0.4195	**0.4690**	0.4168	0.4403	0.2592	0.4578
35	0.1632	0.4550	0.4583	**0.5041**	0.4549	0.4820	0.2507	0.4961
40	0.1632	0.5060	0.5089	**0.5335**	0.5062	0.5296	0.2503	**0.5417**

Table G314: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
			Approach					
Sample Size	L*	FW*	I	II	III	IV	V	VI
5	0.1619	0.0845	0.1193	**0.1840**	0.1193	0.1193	**0.1840**	**0.1840**
10	0.1619	0.2033	0.2171	**0.3017**	0.2119	0.2377	0.2808	0.2812
15	0.1619	0.2550	0.2676	**0.3483**	0.2601	0.2892	0.2783	0.3284
20	0.1619	0.3228	0.3321	**0.3966**	0.3239	0.3495	0.2748	0.3784
25	0.1619	0.3719	0.3782	**0.4437**	0.3738	0.3999	0.2706	0.4216
30	0.1619	0.4153	0.4185	**0.4710**	0.4164	0.4399	0.2635	0.4591
35	0.1619	0.4550	0.4569	**0.4989**	0.4549	0.4800	0.2556	0.4937
40	0.1619	0.5060	0.5090	0.5350	0.5063	0.5286	0.2545	**0.5392**

Table G315: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
			Approach					
Sample Size	L*	FW*	I	II	III	IV	V	VI
5	0.1293	0.1348	0.1752	**0.2132**	0.1752	0.1752	**0.2132**	**0.2132**
10	0.1293	0.2125	0.2207	0.2750	0.2166	0.2376	0.2408	**0.2676**
15	0.1293	0.2561	0.2640	0.3075	0.2597	0.2798	0.2335	**0.3047**
20	0.1293	0.3260	0.3313	0.3606	0.3268	0.3435	0.2276	**0.3667**
25	0.1293	0.3535	0.3579	0.3889	0.3543	0.3755	0.2170	**0.3916**
30	0.1293	0.4073	0.4124	0.4257	0.4088	0.4295	0.2168	**0.4416**
35	0.1293	0.4553	0.4556	0.4528	0.4551	0.4729	0.2143	**0.4834**
40	0.1293	0.5047	0.5076	0.4903	0.5047	0.5206	0.2083	**0.5285**

Table G316: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1287	0.1174	0.1555	**0.1978**	0.1555	0.1555	**0.1978**	**0.1978**
10	0.1287	0.1682	0.1753	**0.2365**	0.1745	0.1898	0.2201	0.2235
15	0.1287	0.1994	0.2085	**0.2686**	0.2032	0.2223	0.2190	0.2516
20	0.1287	0.2496	0.2551	**0.3079**	0.2497	0.2669	0.2154	0.2887
25	0.1287	0.2810	0.2872	**0.3337**	0.2821	0.3062	0.2061	0.3224
30	0.1287	0.3207	0.3239	**0.3649**	0.3220	0.3396	0.2062	0.3559
35	0.1287	0.3488	0.3504	**0.3891**	0.3488	0.3652	0.2032	0.3772
40	0.1287	0.3928	0.3962	0.4179	0.3930	0.4113	0.2020	**0.4184**

Table G317: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Sample Size $n_a = 5$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.2286	0.2767	0.3503	**0.4034**	0.3503	0.3503	**0.4034**	**0.4034**
10	0.3710	0.2767	0.3953	**0.5067**	0.4648	0.3554	0.4466	0.4977
15	0.4571	0.2767	0.4707	0.5853	**0.5876**	0.3521	0.4462	0.5785
20	0.5790	0.2767	0.5161	0.6538	**0.6770**	0.3499	0.4340	0.6567
25	0.6730	0.2767	0.5801	0.6957	**0.7425**	0.3547	0.4215	0.7193
30	0.7411	0.2767	0.6166	0.7383	**0.7869**	0.3554	0.4120	0.7700
35	0.7934	0.2767	0.6798	0.7859	**0.8290**	0.3543	0.4033	0.8151
40	0.8334	0.2767	0.7149	0.8159	**0.8629**	0.3549	0.3971	0.8531

Table G318: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 5$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks	L*	FW*	Approach					
			I	II	III	IV	V	VI
5	0.1659	0.1964	0.2541	0.3101	**0.2541**	0.2541	**0.3101**	**0.3101**
10	0.2784	0.1964	0.2921	0.3894	**0.3534**	0.2588	0.3436	0.3820
15	0.3455	0.1964	0.3569	0.4656	**0.4679**	0.2522	0.3340	0.4557
20	0.4761	0.1964	0.4047	0.5349	**0.5598**	0.2597	0.3290	0.5448
25	0.5598	0.1964	0.4596	0.5778	**0.6249**	0.2577	0.3175	0.5990
30	0.6319	0.1964	0.4966	0.6305	**0.6804**	0.2578	0.3107	0.6591
35	0.6814	0.1964	0.5586	0.6656	**0.7182**	0.2560	0.3033	0.7057
40	0.7286	0.1964	0.5896	0.7094	**0.7633**	0.2566	0.2958	0.7517

Table G319: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 5$; (CRD $T(3)$ and CRBD $T(3)$)								
			Approach					
Blocks	L*	FW*	I	II	III	IV	V	VI
5	0.1309	0.1921	0.2360	**0.2626**	0.2360	0.2360	**0.2626**	**0.2626**
10	0.2182	0.1921	0.2648	**0.3314**	0.3124	0.2429	0.3044	0.3151
15	0.2524	0.1921	0.3126	0.3767	**0.3785**	0.2360	0.2979	0.3502
20	0.3483	0.1921	0.3394	0.4362	**0.4394**	0.2381	0.2911	0.4172
25	0.4204	0.1921	0.3931	0.4752	**0.5018**	0.2409	0.2808	0.4670
30	0.4900	0.1921	0.4196	0.5225	**0.5446**	0.2415	0.2754	0.5249
35	0.5292	0.1921	0.4673	0.5481	**0.5752**	0.2367	0.2742	0.5547
40	0.5769	0.1921	0.4875	0.5806	**0.6099**	0.2412	0.2688	0.5992

Table G320: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Sample Size $n_a = 5$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
			Approach					
Blocks	L*	FW*	I	II	III	IV	V	VI
5	0.2279	0.2095	0.2755	**0.3419**	0.2755	0.2755	0.3419	**0.3419**
10	0.3704	0.2095	0.3174	**0.4345**	0.3887	0.2766	0.3711	**0.4542**
15	0.4565	0.2095	0.3858	0.5178	0.5263	0.2710	0.3631	**0.5446**
20	0.5826	0.2095	0.4298	0.5897	0.6323	0.2724	0.3489	**0.6379**
25	0.6741	0.2095	0.4963	0.6410	**0.7150**	0.2758	0.3426	0.7060
30	0.7443	0.2095	0.5409	0.6878	**0.7723**	0.2780	0.3308	0.7661
35	0.7901	0.2095	0.6015	0.7277	**0.8111**	0.2744	0.3233	0.8030
40	0.8396	0.2095	0.6346	0.7612	**0.8525**	0.2740	0.3163	0.8491

Table G321: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Sample Size $n_a = 5$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
			Approach					
Blocks	L*	FW*	I	II	III	IV	V	VI
5	0.2326	0.1733	0.2332	**0.3187**	0.2332	0.2332	**0.3187**	**0.3187**
10	0.3826	0.1733	0.2736	0.4095	0.3502	0.2341	0.3332	**0.4434**
15	0.4527	0.1733	0.3395	0.4831	0.4916	0.2283	0.3168	**0.5291**
20	0.5713	0.1733	0.3875	0.5429	0.5950	0.2313	0.3045	**0.6126**
25	0.6783	0.1733	0.4540	0.6035	**0.6982**	0.2342	0.2930	0.6963
30	0.7480	0.1733	0.4961	0.6554	**0.7629**	0.2331	0.2820	0.7620
35	0.7997	0.1733	0.5627	0.7051	**0.8073**	0.2316	0.2763	0.8044
40	0.8389	0.1733	0.5965	0.7363	**0.8480**	0.2329	0.2696	0.8449

Table G322: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 5$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1738	0.1108	0.1546	**0.2254**	0.1546	0.1546	**0.2254**	**0.2254**
10	0.2848	0.1108	0.1854	0.3030	0.2509	0.1564	0.2339	**0.3316**
15	0.3508	0.1108	0.2398	0.3608	0.3684	0.1515	0.2208	**0.4136**
20	0.4771	0.1108	0.2722	0.4248	0.4790	0.1531	0.2067	**0.5112**
25	0.5579	0.1108	0.3297	0.4734	0.5718	0.1528	0.1966	**0.5740**
30	0.6302	0.1108	0.3668	0.5128	0.6306	0.1544	0.1909	**0.6363**
35	0.6861	0.1108	0.4217	0.5623	0.6899	0.1516	0.1828	**0.6881**
40	0.7342	0.1108	0.4540	0.5979	0.7396	0.1536	0.1784	**0.7379**

Table G323: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 5$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1646	0.0845	0.1164	**0.1820**	0.1164	0.1164	**0.1820**	**0.1820**
10	0.2849	0.0845	0.1459	0.2552	0.2037	0.1211	0.1877	**0.3001**
15	0.3532	0.0845	0.1876	0.3126	0.3243	0.1165	0.1715	**0.3939**
20	0.4652	0.0845	0.2201	0.3669	0.4373	0.1162	0.1622	**0.4809**
25	0.5627	0.0845	0.2810	0.4280	0.5535	0.1183	0.1589	**0.5660**
30	0.6239	0.0845	0.3030	0.4606	0.6110	0.1184	0.1494	**0.6196**
35	0.6940	0.0845	0.3705	0.5164	0.6847	0.1163	0.1457	**0.6907**
40	0.7328	0.0845	0.3984	0.5568	0.7277	0.1183	0.1393	**0.7314**

Table G324: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1354	0.1340	0.1781	**0.2190**	0.1781	0.1781	**0.2190**	**0.2190**
10	0.2225	0.1340	0.1975	0.2706	0.2421	0.1777	0.2330	**0.2789**
15	0.2681	0.1340	0.2432	0.3241	0.3269	0.1720	0.2265	**0.3409**
20	0.3488	0.1340	0.2651	0.3645	**0.3925**	0.1740	0.2153	0.3914
25	0.4314	0.1340	0.3191	0.4163	**0.4689**	0.1768	0.2133	0.4543
30	0.4823	0.1340	0.3390	0.4450	**0.5057**	0.1755	0.2074	0.4968
35	0.5493	0.1340	0.3911	0.4871	**0.5684**	0.1761	0.2069	0.5601
40	0.5780	0.1340	0.4132	0.5169	**0.5980**	0.1766	0.2006	0.5905

Table G325: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 5$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
5	0.1314	0.1172	0.1544	**0.1937**	0.1544	0.1544	**0.1937**	**0.1937**
10	0.2147	0.1172	0.1766	0.2469	0.2185	0.1546	0.2107	**0.2585**
15	0.2635	0.1172	0.2182	0.3012	0.3050	0.1508	0.2047	**0.3268**
20	0.3510	0.1172	0.2415	0.3458	0.3773	0.1523	0.1970	**0.3855**
25	0.4262	0.1172	0.2900	0.3891	**0.4517**	0.1545	0.1908	0.4418
30	0.4843	0.1172	0.3086	0.4240	**0.4985**	0.1546	0.1831	0.4922
35	0.5258	0.1172	0.3485	0.4485	**0.5399**	0.1526	0.1807	0.5374
40	0.5740	0.1172	0.3809	0.4892	**0.5869**	0.1528	0.1776	0.5816

Table G326: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Number of Blocks $n_b = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.3754	0.4317	0.4756	**0.6215**	0.4756	0.4756	**0.6215**	**0.6215**
15	0.3754	0.5444	0.5725	0.6989	0.5643	0.5871	0.6631	**0.7033**
20	0.3754	0.6484	0.6628	0.7569	0.6568	0.6812	0.6695	**0.7690**
25	0.3754	0.7336	0.7463	0.8062	0.7383	0.7614	0.6644	**0.8233**
30	0.3754	0.7959	0.8031	0.8431	0.7986	0.8188	0.6524	**0.8672**
35	0.3754	0.8394	0.8442	0.8719	0.8406	0.8564	0.6388	**0.8928**
40	0.3754	0.8820	0.8840	0.8939	0.8822	0.8930	0.6324	**0.9192**

Table G327: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.2866	0.3324	0.3730	**0.5014**	0.3730	0.3730	**0.5014**	**0.5014**
15	0.2866	0.4302	0.4591	0.5819	0.4523	0.4694	0.5492	**0.5883**
20	0.2866	0.5358	0.5520	0.6489	0.5446	0.5697	0.5564	**0.6578**
25	0.2866	0.6120	0.6246	0.7001	0.6174	0.6424	0.5494	**0.7161**
30	0.2866	0.6757	0.6842	0.7410	0.6800	0.7019	0.5368	**0.7675**
35	0.2866	0.7487	0.7529	0.7871	0.7496	0.7679	0.5299	**0.8144**
40	0.2866	0.7921	0.7953	0.8136	0.7926	0.8069	0.5206	**0.8431**

Table G328: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed number of Blocks $n_b = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.2149	0.3063	0.3332	**0.4166**	0.3332	0.3332	**0.4166**	**0.4166**
15	0.2149	0.4065	0.4272	0.5006	0.4217	0.4386	0.4605	**0.5189**
20	0.2149	0.4899	0.5020	0.5535	0.4981	0.5159	0.4559	**0.5876**
25	0.2149	0.5748	0.5831	0.6100	0.5787	0.5962	0.4505	**0.6500**
30	0.2149	0.6363	0.6440	0.6616	0.6394	0.6587	0.4379	**0.7083**
35	0.2149	0.7094	0.7135	0.7087	0.7100	0.7243	0.4408	**0.7674**
40	0.2149	0.7603	0.7649	0.7412	0.7609	0.7756	0.4211	**0.8065**

Table G329: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.3657	0.3024	0.3411	**0.5204**	0.3411	0.3411	**0.5204**	**0.5204**
15	0.3657	0.3856	0.4137	**0.5832**	0.4061	0.4269	0.5683	0.5687
20	0.3657	0.4684	0.4852	**0.6469**	0.4773	0.5032	0.5906	0.6283
25	0.3657	0.5354	0.5470	**0.6881**	0.5408	0.5635	0.5901	0.6657
30	0.3657	0.5891	0.6004	**0.7207**	0.5933	0.6184	0.5790	0.7025
35	0.3657	0.6539	0.6618	**0.7564**	0.6564	0.6788	0.5723	0.7420
40	0.3657	0.6871	0.6924	**0.7859**	0.6882	0.7110	0.5671	0.7658

Table G330: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Number of Blocks $n_b = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
10	0.3699	0.2574	0.2940	**0.4806**	0.2940	0.2940	**0.4806**	**0.4806**
15	0.3699	0.3141	0.3393	**0.5377**	0.3318	0.3519	0.5313	0.5116
20	0.3699	0.3691	0.3859	**0.5754**	0.3795	0.4044	0.5445	0.5355
25	0.3699	0.4263	0.4393	**0.6154**	0.4317	0.4572	0.5490	0.5652
30	0.3699	0.4734	0.4826	**0.6533**	0.4774	0.5036	0.5433	0.5941
35	0.3699	0.5339	0.5411	**0.6875**	0.5357	0.5602	0.5381	0.6376
40	0.3699	0.5696	0.5763	**0.7078**	0.5708	0.5968	0.5360	0.6636

Table G331: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,2)$ and RCBD $N(0,1)$)									
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.2080	0.1319	0.1515	**0.2519**	0.1515	0.1515	**0.2519**	**0.2519**
15	0.2080	0.1548	0.1702	**0.2819**	0.1655	0.1768	0.2863	0.2676
20	0.2080	0.1784	0.1867	**0.3047**	0.1823	0.1967	0.2957	0.2743
25	0.2080	0.1992	0.2057	**0.3264**	0.2019	0.2156	0.2973	0.2807
30	0.2080	0.2214	0.2272	**0.3423**	0.2240	0.2393	0.2962	0.2993
35	0.2080	0.2444	0.2477	**0.3711**	0.2447	0.2601	0.2930	0.3174
40	0.2080	0.2631	0.2673	**0.3778**	0.2638	0.2791	0.2909	0.3246

Table G332: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 10$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.2075	0.0926	0.1057	**0.2124**	0.1057	0.1057	**0.2124**	**0.2124**
15	0.2075	0.1067	0.1168	**0.2336**	0.1147	0.1221	0.2484	0.2063
20	0.2075	0.1237	0.1292	**0.2492**	0.1264	0.1364	0.2618	0.2110
25	0.2075	0.1301	0.1355	**0.2528**	0.1320	0.1427	0.2622	0.1984
30	0.2075	0.1438	0.1494	**0.2749**	0.1463	0.1580	0.2656	0.2082
35	0.2075	0.1538	0.1564	**0.2794**	0.1547	0.1660	0.2668	0.2132
40	0.2075	0.1701	0.1727	**0.2908**	0.1706	0.1810	0.2603	0.2247

Table G333: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	II	III	IV	V	VI
10	0.2188	0.2033	0.2268	**0.3304**	0.2268	0.2268	**0.3304**	**0.3304**
15	0.2188	0.2550	0.2760	**0.3854**	0.2702	0.2861	0.3729	0.3819
20	0.2188	0.3228	0.3337	**0.4331**	0.3298	0.3464	0.3777	0.4258
25	0.2188	0.3719	0.3816	**0.4728**	0.3750	0.3949	0.3817	0.4652
30	0.2188	0.4153	0.4217	**0.5071**	0.4180	0.4384	0.3711	0.5045
35	0.2188	0.4550	0.4609	**0.5340**	0.4567	0.4768	0.3659	0.5320
40	0.2188	0.5060	0.5118	0.5723	0.5075	0.5256	0.3622	**0.5754**

Table G334: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
10	0.2204	0.1669	0.1884	**0.3034**	0.1884	0.1884	**0.3034**	**0.3034**
15	0.2204	0.2043	0.2204	**0.3436**	0.2157	0.2267	0.3375	0.3294
20	0.2204	0.2553	0.2644	**0.3828**	0.2607	0.2745	0.3564	0.3601
25	0.2204	0.2909	0.2984	**0.4107**	0.2938	0.3126	0.3524	0.3909
30	0.2204	0.3193	0.3256	**0.4361**	0.3217	0.3410	0.3462	0.4061
35	0.2204	0.3468	0.3508	**0.4574**	0.3471	0.3651	0.3432	0.4228
40	0.2204	0.3885	0.3949	**0.4860**	0.3894	0.4073	0.3397	0.4578

Table G335: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Sample Size $n_a = 10$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
10	0.3752	0.4251	0.4710	**0.6160**	0.4710	0.4710	**0.6160**	0.6160
15	0.4628	0.4251	0.5004	**0.6907**	0.5334	0.4756	0.6630	0.6857
20	0.5773	0.4251	0.5236	**0.7417**	0.6022	0.4731	0.6717	0.7326
25	0.6761	0.4251	0.5514	**0.7894**	0.6811	0.4764	0.6696	0.7892
30	0.7533	0.4251	0.5674	0.8273	0.7606	0.4764	0.6615	**0.8317**
35	0.7911	0.4251	0.5929	0.8539	0.8148	0.4763	0.6504	**0.8552**
40	0.8378	0.4251	0.6183	0.8789	0.8662	0.4757	0.6460	**0.8890**

Table G336: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 10$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks	L*	FW*	Approach I	Approach II	Approach III	Approach IV	Approach V	Approach VI
10	0.2835	0.3371	0.3761	**0.5096**	0.3761	0.3761	**0.5096**	**0.5096**
15	0.3510	0.3371	0.3992	**0.5749**	0.4271	0.3792	0.5538	0.5697
20	0.4717	0.3371	0.4255	**0.6390**	0.5026	0.3791	0.5657	0.6310
25	0.5553	0.3371	0.4497	**0.6844**	0.5787	0.3821	0.5639	0.6783
30	0.6294	0.3371	0.4618	**0.7243**	0.6530	0.3836	0.5513	0.7246
35	0.6906	0.3371	0.4842	**0.7646**	0.7228	0.3800	0.5428	0.7688
40	0.7251	0.3371	0.5091	**0.7895**	0.7737	0.3800	0.5333	0.7918

Table G337: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 10$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.2197	0.3139	0.3419	**0.4277**	0.3419	0.3419	**0.4277**	**0.4277**
15	0.2585	0.3139	0.3613	**0.4785**	0.3824	0.3428	0.4727	0.4626
20	0.3588	0.3139	0.3825	**0.5382**	0.4441	0.3432	0.4897	0.5101
25	0.4189	0.3139	0.4010	**0.5733**	0.4928	0.3469	0.4827	0.5408
30	0.4817	0.3139	0.4149	**0.6177**	0.5622	0.3489	0.4862	0.5895
35	0.5311	0.3139	0.4298	**0.6445**	0.6102	0.3453	0.4761	0.6135
40	0.5744	0.3139	0.4537	**0.6838**	0.6692	0.3474	0.4733	0.6587

Table G338: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.3692	0.3050	0.3463	**0.5250**	0.3463	0.3463	**0.5250**	**0.5250**
15	0.4596	0.3050	0.3713	0.6028	0.4072	0.3510	0.5605	**0.6181**
20	0.5873	0.3050	0.3999	0.6643	0.4856	0.3485	0.5625	**0.6881**
25	0.6678	0.3050	0.4215	0.7088	0.5666	0.3500	0.5513	**0.7402**
30	0.7469	0.3050	0.4411	0.7571	0.6564	0.3520	0.5434	**0.8026**
35	0.7978	0.3050	0.4699	0.7980	0.7384	0.3504	0.5355	**0.8386**
40	0.8348	0.3050	0.4961	0.8286	0.8067	0.3523	0.5247	**0.8706**

Table G339: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Sample Size $n_a = 10$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
10	0.3659	0.2456	0.2826	**0.4716**	0.2826	0.2826	**0.4716**	**0.4716**
15	0.4644	0.2456	0.3096	0.5562	0.3414	0.2873	0.5039	**0.5792**
20	0.5837	0.2456	0.3345	0.6242	0.4207	0.2859	0.5052	**0.6679**
25	0.6788	0.2456	0.3647	0.6714	0.5136	0.2895	0.4959	**0.7231**
30	0.7485	0.2456	0.3803	0.7239	0.6105	0.2894	0.4818	**0.7889**
35	0.7950	0.2456	0.4034	0.7635	0.6895	0.2884	0.4685	**0.8285**
40	0.8331	0.2456	0.4313	0.7904	0.7683	0.2874	0.4579	**0.8577**

Table G340: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 10$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2010	0.1310	0.1455	**0.2444**	0.1455	0.1455	**0.2444**	**0.2444**
15	0.2497	0.1310	0.1597	0.2973	0.1755	0.1484	0.2631	**0.3176**
20	0.3457	0.1310	0.1707	0.3441	0.2175	0.1477	0.2656	**0.3834**
25	0.4050	0.1310	0.1834	0.3818	0.2662	0.1476	0.2568	**0.4349**
30	0.4764	0.1310	0.1923	0.4266	0.3327	0.1504	0.2505	**0.4976**
35	0.5282	0.1310	0.2023	0.4545	0.3845	0.1484	0.2411	**0.5450**
40	0.5789	0.1310	0.2185	0.4917	0.4653	0.1490	0.2335	**0.5901**

Table G341: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 10$; (CRD $N(0, 3)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2095	0.0953	0.1102	**0.2168**	0.1102	0.1102	**0.2168**	**0.2168**
15	0.2564	0.0953	0.1225	0.2648	0.1378	0.1105	0.2265	**0.2899**
20	0.3440	0.0953	0.1352	0.3020	0.1769	0.1110	0.2204	**0.3598**
25	0.4138	0.0953	0.1476	0.3377	0.2183	0.1135	0.2092	**0.4137**
30	0.4742	0.0953	0.1556	0.3725	0.2821	0.1122	0.2071	**0.4750**
35	0.5289	0.0953	0.1662	0.4185	0.3500	0.1128	0.1991	**0.5282**
40	0.5695	0.0953	0.1837	0.4399	0.4132	0.1131	0.1964	**0.5721**

Table G342: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 10$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2137	0.2093	0.2354	**0.3336**	0.2354	0.2354	**0.3336**	**0.3336**
15	0.2671	0.2093	0.2518	0.3958	0.2735	0.2377	0.3685	**0.4031**
20	0.3572	0.2093	0.2691	0.4437	0.3196	0.2356	0.3705	**0.4511**
25	0.4273	0.2093	0.2861	0.4849	0.3744	0.2407	0.3624	**0.4996**
30	0.4717	0.2093	0.2902	0.5139	0.4378	0.2403	0.3556	**0.5373**
35	0.5314	0.2093	0.3096	0.5601	0.5124	0.2398	0.3534	**0.5843**
40	0.5753	0.2093	0.3272	0.5926	0.5717	0.2374	0.3464	**0.6254**

Table G343: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 10$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
10	0.2095	0.1689	0.1924	**0.2938**	0.1924	0.1924	**0.2938**	**0.2938**
15	0.2577	0.1689	0.2033	0.3493	0.2210	0.1921	0.3190	**0.3616**
20	0.3594	0.1689	0.2215	0.3975	0.2725	0.1943	0.3240	**0.4273**
25	0.4165	0.1689	0.2356	0.4425	0.3263	0.1937	0.3179	**0.4700**
30	0.4910	0.1689	0.2434	0.4881	0.3960	0.1965	0.3085	**0.5347**
35	0.5329	0.1689	0.2586	0.5161	0.4589	0.1928	0.2994	**0.5687**
40	0.5764	0.1689	0.2748	0.5425	0.5225	0.1956	0.2939	**0.6072**

Table G344: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Number of Blocks $n_b = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4642	0.5532	0.5963	**0.7684**	0.5963	0.5963	**0.7684**	**0.7684**
20	0.4642	0.6488	0.6733	0.8190	0.6671	0.6829	0.7988	**0.8229**
25	0.4642	0.7309	0.7469	0.8530	0.7411	0.7580	0.8071	**0.8615**
30	0.4642	0.7912	0.8011	0.8853	0.7953	0.8114	0.8107	**0.8955**
35	0.4642	0.8341	0.8401	0.9086	0.8364	0.8490	0.8062	**0.9140**
40	0.4642	0.8777	0.8823	0.9253	0.8797	0.8888	0.8015	**0.9331**

Table G345: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3490	0.4397	0.4772	**0.6432**	0.4772	0.4772	**0.6432**	**0.6432**
20	0.3490	0.5324	0.5542	0.7005	0.5494	0.5631	0.6817	**0.7046**
25	0.3490	0.6183	0.6356	0.7548	0.6289	0.6466	0.6983	**0.7655**
30	0.3490	0.6703	0.6815	0.7908	0.6762	0.6947	0.6917	**0.7993**
35	0.3490	0.7389	0.7461	0.8237	0.7420	0.7584	0.6864	**0.8397**
40	0.3490	0.7896	0.7949	0.8511	0.7919	0.8053	0.6860	**0.8691**

Table G346: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2683	0.4006	0.4367	**0.5526**	0.4367	0.4367	**0.5526**	**0.5526**
20	0.2683	0.4855	0.5035	0.6126	0.4997	0.5124	**0.5832**	0.6275
25	0.2683	0.5721	0.5858	0.6660	0.5794	0.5953	**0.5956**	0.6930
30	0.2683	0.6340	0.6434	0.7053	0.6392	0.6538	**0.5978**	0.7343
35	0.2683	0.6998	0.7078	0.7522	0.7029	0.7177	**0.5921**	0.7867
40	0.2683	0.7581	0.7645	0.7846	0.7606	0.7731	**0.5880**	0.8266

Table G347: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.4633	0.3889	0.4307	**0.6667**	0.4307	0.4307	**0.6667**	**0.6667**
20	0.4633	0.4681	0.4941	**0.7163**	0.4874	0.5043	0.7110	0.7043
25	0.4633	0.5301	0.5485	**0.7556**	0.5415	0.5598	0.7335	0.7337
30	0.4633	0.6027	0.6172	**0.7972**	0.6094	0.6311	0.7446	0.7760
35	0.4633	0.6529	0.6641	**0.8180**	0.6573	0.6787	0.7370	0.7998
40	0.4633	0.6933	0.7017	**0.8405**	0.6960	0.7127	0.7353	0.8167

Table G348: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Number of Blocks $n_b = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
10	0.3699	0.2574	0.2940	**0.4806**	0.2940	0.2940	**0.4806**	**0.4806**
15	0.3699	0.3141	0.3393	**0.5377**	0.3318	0.3519	0.5313	0.5116
20	0.3699	0.3691	0.3859	**0.5754**	0.3795	0.4044	0.5445	0.5355
25	0.3699	0.4263	0.4393	**0.6154**	0.4317	0.4572	0.5490	0.5652
30	0.3699	0.4734	0.4826	**0.6533**	0.4774	0.5036	0.5433	0.5941
35	0.3699	0.5339	0.5411	**0.6875**	0.5357	0.5602	0.5381	0.6376
40	0.3699	0.5696	0.5763	**0.7078**	0.5708	0.5968	0.5360	0.6636

Table G349: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 15$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.4639	0.1832	0.2212	**0.4971**	0.2333	0.2101	**0.4576**	**0.5258**
20	0.4639	0.2222	0.2468	**0.5340**	0.2468	0.2468	0.5340	0.5340
25	0.4639	0.2479	0.2702	**0.5604**	0.2660	0.2745	0.5764	0.5346
30	0.4639	0.2765	0.2924	**0.5869**	0.2866	0.3005	0.6005	0.5467
35	0.4639	0.3121	0.3224	**0.6100**	0.3177	0.3325	0.6162	0.5529
40	0.4639	0.3386	0.3504	**0.6356**	0.3437	0.3632	0.6228	0.5683

Table G350: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 15$; (CRD $N(0, 3)$ and RCBD $N\ 0, 1)$)								
Sample			Approach					
Size	L*	FW*	I	II	III	IV	V	VI
15	0.4730	0.1270	0.1548	**0.4268**	0.1631	0.1480	0.3815	**0.4689**
20	0.4730	0.1507	0.1702	**0.4604**	0.1702	0.1702	**0.4604**	**0.4604**
25	0.4730	0.1606	0.1753	**0.4755**	0.1713	0.1786	**0.5011**	0.4434
30	0.4730	0.1757	0.1890	**0.4935**	0.1845	0.1963	**0.5298**	0.4297
35	0.4730	0.2032	0.2107	**0.5118**	0.2073	0.2198	**0.5532**	0.4293
40	0.4730	0.2139	0.2225	**0.5312**	0.2182	0.2323	**0.5641**	0.4284

Table G351: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.2632	0.2546	0.2810	**0.4346**	0.2810	0.2810	**0.4346**	**0.4346**
20	0.2632	0.3102	0.3260	**0.4795**	0.3218	0.3340	0.4744	0.4760
25	0.2632	0.3644	0.3783	**0.5228**	0.3729	0.3866	0.4959	0.5164
30	0.2632	0.4069	0.4176	**0.5580**	0.4118	0.4278	0.5010	0.5448
35	0.2632	0.4604	0.4691	**0.5960**	0.4636	0.4820	0.4962	0.5881
40	0.2632	0.4990	0.5071	**0.6240**	0.5019	0.5188	0.4946	0.6188

Table G352: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 15$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.2697	0.2041	0.2296	**0.3920**	0.2296	0.2296	**0.3920**	**0.3920**
20	0.2697	0.2463	0.2626	**0.4274**	0.2588	0.2700	0.4273	0.4184
25	0.2697	0.2824	0.2954	**0.4561**	0.2899	0.3018	0.4443	0.4323
30	0.2697	0.3135	0.3242	**0.4839**	0.3193	0.3338	0.4470	0.4582
35	0.2697	0.3565	0.3639	**0.5160**	0.3586	0.3782	0.4540	0.4866
40	0.2697	0.3878	0.3938	**0.5404**	0.3902	0.4063	0.4532	0.5028

Table G353: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Sample Size $n_a = 15$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.4691	0.5508	0.5899	**0.7622**	0.5899	0.5899	**0.7622**	**0.7622**
20	0.5796	0.5508	0.6048	**0.8060**	0.6219	0.5918	0.7983	0.8036
25	0.6727	0.5508	0.6177	**0.8461**	0.6564	0.5913	0.8163	0.8420
30	0.7364	0.5508	0.6317	**0.8736**	0.6940	0.5908	0.8156	0.8701
35	0.7998	0.5508	0.6445	**0.9009**	0.7426	0.5901	0.8113	0.8996
40	0.8353	0.5508	0.6540	**0.9172**	0.7829	0.5913	0.8101	0.9142

Table G354: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 15$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks	L*	FW*	Approach					
			I	II	III	IV	V	VI
15	0.2835	0.3371	0.3761	**0.5096**	0.3761	0.3761	**0.5096**	**0.5096**
20	0.3492	0.4371	0.4783	**0.6418**	0.4783	0.4783	0.6418	0.6418
25	0.4658	0.4371	0.4904	**0.6975**	0.5063	0.4766	0.6882	0.6930
30	0.5555	0.4371	0.5052	**0.7466**	0.5401	0.4784	0.7063	0.7344
35	0.6284	0.4371	0.5180	**0.7865**	0.5856	0.4782	0.7180	0.7753
40	0.6858	0.4371	0.5306	**0.8088**	0.6250	0.4771	0.7065	0.8065

Table G355: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 15$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2632	0.4018	0.4341	**0.5540**	0.4341	0.4341	**0.5540**	**0.5540**
20	0.3436	0.4018	0.4450	**0.6003**	0.4579	0.4344	0.5958	0.5875
25	0.4289	0.4018	0.4524	**0.6451**	0.4828	0.4329	0.6173	0.6273
30	0.4877	0.4018	0.4643	**0.6822**	0.5190	0.4370	0.6247	0.6603
35	0.5402	0.4018	0.4750	**0.7127**	0.5572	0.4336	0.6280	0.6879
40	0.5775	0.4018	0.4817	**0.7409**	0.5954	0.4343	0.6206	0.7122

Table G356: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4497	0.3976	0.4395	**0.6635**	0.4395	0.4395	**0.6635**	**0.6635**
20	0.5876	0.3976	0.4540	0.7318	0.4696	0.4410	0.7052	**0.7428**
25	0.6706	0.3976	0.4664	0.7654	0.5069	0.4386	0.7018	**0.7852**
30	0.7401	0.3976	0.4779	0.8101	0.5541	0.4387	0.7048	**0.8307**
35	0.7974	0.3976	0.4929	0.8391	0.6047	0.4376	0.6999	**0.8670**
40	0.8400	0.3976	0.5034	0.8633	0.6543	0.4391	0.6870	**0.8920**

Table G357: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Sample Size $n_a = 15$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.4661	0.3135	0.3546	**0.6168**	0.3546	0.3546	**0.6168**	**0.6168**
20	0.5840	0.3135	0.3686	0.6719	0.3855	0.3572	0.6413	**0.6933**
25	0.6806	0.3135	0.3841	0.7283	0.4262	0.3564	0.6502	**0.7599**
30	0.7459	0.3135	0.3976	0.7658	0.4728	0.3560	0.6429	**0.8102**
35	0.7964	0.3135	0.4107	0.8008	0.5253	0.3557	0.6377	**0.8441**
40	0.8319	0.3135	0.4194	0.8265	0.5820	0.3555	0.6228	**0.8701**

Table G358: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 15$; (CRD $N(0, 2)$ and RCBD $N(0, 1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.3455	0.1895	0.2189	**0.4400**	0.2189	0.2189	**0.4400**	**0.4400**
20	0.4639	0.1895	0.2273	0.5043	0.2400	0.2183	0.4629	**0.5311**
25	0.5610	0.1895	0.2380	0.5587	0.2675	0.2201	0.4704	**0.6085**
30	0.6339	0.1895	0.2467	0.6055	0.3036	0.2189	0.4616	**0.6706**
35	0.6816	0.1895	0.2603	0.6376	0.3503	0.2178	0.4490	**0.7134**
40	0.7224	0.1895	0.2660	0.6744	0.3979	0.2197	0.4384	**0.7589**

Table G359: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 15$; (CRD $N(0,3)$ and RCBD $N(0,1)$)									
Blocks			Approach						
	L*	FW*	I	II	III	IV	V	VI
15	0.3613	0.1207	0.1444	**0.3712**	0.1444	0.1444	**0.3712**	**0.3712**
20	0.4730	0.1207	0.1557	0.4257	0.1648	0.1449	0.3805	**0.4634**
25	0.5569	0.1207	0.1611	0.4754	0.1879	0.1436	0.3730	**0.5409**
30	0.6204	0.1207	0.1708	0.5243	0.2225	0.1444	0.3684	**0.6132**
35	0.6836	0.1207	0.1799	0.5667	0.2609	0.1439	0.3538	**0.6832**
40	0.7304	0.1207	0.1845	0.6047	0.3063	0.1435	0.3428	**0.7322**

Table G360: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 15$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2585	0.2651	0.2915	**0.4448**	0.2915	0.2915	**0.4448**	**0.4448**
20	0.3555	0.2651	0.2986	0.4942	0.3108	0.2906	0.4743	**0.5026**
25	0.4216	0.2651	0.3108	0.5338	0.3345	0.2921	0.4842	**0.5428**
30	0.4918	0.2651	0.3175	0.5757	0.3724	0.2911	0.4922	**0.5906**
35	0.5290	0.2651	0.3279	0.6049	0.4011	0.2899	0.4807	**0.6184**
40	0.5811	0.2651	0.3300	0.6413	0.4462	0.2903	0.4751	**0.6613**

Table G361: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 15$; (CRD $(T(3) * \sqrt{3})$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
15	0.2703	0.2001	0.2284	**0.3903**	0.2284	0.2284	**0.3903**	**0.3903**
20	0.3462	0.2001	0.2368	0.4313	0.2476	0.2284	0.4066	**0.4438**
25	0.4180	0.2001	0.2444	0.4802	0.2695	0.2300	0.4202	**0.5010**
30	0.4847	0.2001	0.2546	0.5145	0.3004	0.2281	0.4172	**0.5484**
35	0.5284	0.2001	0.2644	0.5531	0.3350	0.2285	0.4114	**0.5914**
40	0.5729	0.2001	0.2684	0.5771	0.3743	0.2294	0.4048	**0.6251**

Table G362: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Number of Blocks $n_b = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.5891	0.6414	0.6751	**0.8569**	0.6751	0.6751	**0.8569**	**0.8569**
25	0.5891	0.7297	0.7498	0.8889	0.7459	0.7541	0.8806	**0.8904**
30	0.5891	0.7935	0.8070	0.9123	0.8024	0.8143	0.8907	**0.9160**
35	0.5891	0.8414	0.8510	0.9331	0.8469	0.8591	0.8942	**0.9376**
40	0.5891	0.8776	0.8851	0.9491	0.8813	0.8916	0.8948	**0.9527**

Table G363: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.4661	0.5322	0.5617	**0.7548**	0.5617	0.5617	**0.7548**	**0.7548**
25	0.4661	0.6147	0.6375	0.8069	0.6338	0.6429	0.7936	**0.8128**
30	0.4661	0.6751	0.6935	0.8298	0.6875	0.7013	0.7981	**0.8361**
35	0.4661	0.7444	0.7542	0.8645	0.7497	0.7623	0.8062	**0.8723**
40	0.4661	0.7859	0.7947	0.8844	0.7901	0.8035	0.8072	**0.8928**

Table G364: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed number of Blocks $n_b = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.3518	0.5033	0.5251	**0.6584**	0.5251	0.5251	**0.6584**	**0.6584**
25	0.3518	0.5848	0.6047	0.7129	0.6004	0.6087	0.6900	**0.7231**
30	0.3518	0.6364	0.6514	0.7503	0.6470	0.6583	0.6994	**0.7684**
35	0.3518	0.7030	0.7130	0.7853	0.7087	0.7199	0.7047	**0.8052**
40	0.3518	0.7538	0.7617	0.8163	0.7580	0.7679	0.7057	**0.8411**

Table G365: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.5901	0.4664	0.5007	**0.7733**	0.5007	0.5007	**0.7733**	**0.7733**
25	0.5901	0.5240	0.5546	**0.8011**	0.5483	0.5607	0.8042	0.7932
30	0.5901	0.5901	0.6099	**0.8306**	0.6036	0.6226	0.8221	0.8222
35	0.5901	0.6450	0.6593	**0.8549**	0.6530	0.6686	0.8335	0.8374
40	0.5901	0.6992	0.7108	**0.8823**	0.7044	0.7237	0.8361	0.8678

Table G366: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Number of Blocks $n_b = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Sample Size	L*	Approach						
		FW*	I	II	III	IV	V	VI
20	0.5772	0.3805	0.4122	**0.7086**	0.4122	0.4122	**0.7086**	**0.7086**
25	0.5772	0.4270	0.4550	**0.7431**	0.4487	0.4615	0.7497	0.7287
30	0.5772	0.4784	0.5004	**0.7713**	0.4945	0.5121	0.7698	0.7431
35	0.5772	0.5261	0.5411	**0.7987**	0.5340	0.5540	0.7802	0.7667
40	0.5772	0.5717	0.5852	**0.8204**	0.5778	0.5966	0.7872	0.7835

Table G367: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Sample Size	L*	Approach FW*	I	II	III	IV	V	VI
20	0.4685	0.2178	0.2425	**0.5306**	0.2425	0.2425	**0.5306**	**0.5306**
25	0.4685	0.2580	0.2788	**0.5628**	0.2751	0.2821	0.5763	0.5403
30	0.4685	0.2825	0.2987	**0.5904**	0.2936	0.3076	0.6078	0.5500
35	0.4685	0.3050	0.3173	**0.6099**	0.3109	0.3284	0.6170	0.5475
40	0.4685	0.3355	0.3493	**0.6366**	0.3421	0.3594	0.6264	0.5634

Table G368: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Sample Size	L*	Approach FW*	I	II	III	IV	V	VI
20	0.4598	0.1517	0.1713	**0.4448**	0.1713	0.1713	**0.4448**	**0.4448**
25	0.4598	0.1567	0.1711	**0.4658**	0.1676	0.1750	0.4918	0.4361
30	0.4598	0.1716	0.1849	**0.4770**	0.1813	0.1930	0.5158	0.4197
35	0.4598	0.1917	0.2018	**0.5028**	0.1966	0.2138	0.5377	0.4194
40	0.4598	0.1983	0.2093	**0.5071**	0.2033	0.2196	0.5452	0.4066

Table G369: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{2}\right)$ and CRBD $T(3)$)								
Sample Size	L*	Approach FW*	I	II	III	IV	V	VI
20	0.3457	0.3173	0.3402	**0.5325**	0.3402	0.3402	**0.5325**	**0.5325**
25	0.3457	0.3643	0.3826	**0.5713**	0.3783	0.3866	0.5637	0.5668
30	0.3457	0.4160	0.4296	**0.6061**	0.4250	0.4385	0.5822	0.5998
35	0.3457	0.4564	0.4685	**0.6436**	0.4636	0.4771	0.5898	0.6331
40	0.3457	0.5037	0.5157	**0.6662**	0.5093	0.5240	0.5920	0.6570

Table G370: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Number of Blocks $n_b = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Sample Size	L*	Approach FW*	I	II	III	IV	V	VI
20	0.3548	0.2475	0.2687	**0.4821**	0.2687	0.2687	**0.4821**	**0.4821**
25	0.3548	0.2805	0.2997	**0.5143**	0.2955	0.3036	0.5165	0.4984
30	0.3548	0.3194	0.3328	**0.5398**	0.3295	0.3395	0.5354	0.5171
35	0.3548	0.3528	0.3630	**0.5595**	0.3583	0.3708	0.5400	0.5347
40	0.3548	0.3885	0.3967	**0.5887**	0.3925	0.4059	0.5480	0.5536

Table G371: Estimated powers of tests for mixed design under the exponential distribution with equal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Sample Size $n_a = 20$; (CRD $exp(1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.5890	0.6463	0.6764	**0.8581**	0.6764	0.6764	**0.8581**	**0.8581**
25	0.6689	0.6463	0.6857	**0.8887**	0.6964	0.6783	0.8838	0.8865
30	0.7491	0.6463	0.6961	**0.9140**	0.7199	0.6784	0.8988	0.9106
35	0.7913	0.6463	0.7052	**0.9323**	0.7448	0.6788	0.9031	0.9274
40	0.8323	0.6463	0.7116	**0.9427**	0.7657	0.6776	0.9010	0.9394

Table G372: Estimated powers of tests for mixed design under the normal distribution with equal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 20$; (CRD $N(0,1)$ and RCBD $N(0,1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.2835	0.3371	0.3761	**0.5096**	0.3761	0.3761	**0.5096**	**0.5096**
25	0.3492	0.4371	0.4783	**0.6418**	0.4783	0.4783	0.6418	0.6418
30	0.4649	0.5377	0.5721	**0.7575**	0.5721	0.5721	0.7575	0.7575
35	0.5623	0.5377	0.5766	**0.7981**	0.5879	0.5694	0.7928	0.7955
40	0.6298	0.5377	0.5847	**0.8312**	0.6105	0.5692	0.8107	0.8272

Table G373: Estimated powers of tests for mixed design under the t distribution with equal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 20$; (CRD $T(3)$ and CRBD $T(3)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.3555	0.5042	0.5313	**0.6707**	0.5313	0.5313	**0.6707**	**0.6707**
25	0.4258	0.5042	0.5400	**0.7073**	0.5495	0.5336	0.7092	0.6953
30	0.4825	0.5042	0.5447	**0.7381**	0.5653	0.5311	0.7297	0.7201
35	0.5355	0.5042	0.5535	**0.7658**	0.5901	0.5314	0.7404	0.7402
40	0.5803	0.5042	0.5612	**0.7949**	0.6108	0.5326	0.7481	0.7673

Table G374: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{2}) - (\sqrt{2} - 1)$ and RCBD $exp(1)$)								
Blocks			Approach					
	L*	FW*	I	II	III	IV	V	VI
20	0.5860	0.4620	0.4968	**0.7676**	0.4968	0.4968	**0.7676**	**0.7676**
25	0.6761	0.4620	0.5066	0.8128	0.5197	0.4985	0.7971	**0.8177**
30	0.7433	0.4620	0.5157	0.8456	0.5461	0.4994	0.8090	**0.8580**
35	0.8004	0.4620	0.5272	0.8728	0.5775	0.4998	0.8103	**0.8860**
40	0.8373	0.4620	0.5358	0.8942	0.6040	0.4986	0.8070	**0.9133**

Table G375: Estimated powers of tests for mixed design under the exponential distribution with unequal variance; k=5; treatments effects: d2=0.5; d3=0.2; d4=0.7; d5=0.1

Fixed Sample Size $n_a = 20$; (CRD $exp(\sqrt{3}) - (\sqrt{3} - 1)$ and RCBD $exp(1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.5871	0.3706	0.4070	**0.7156**	0.4070	0.4070	**0.7156**	**0.7156**
25	0.6741	0.3706	0.4148	0.7625	0.4262	0.4059	0.7396	**0.7807**
30	0.7359	0.3706	0.4261	0.7945	0.4551	0.4068	0.7417	**0.8221**
35	0.7934	0.3706	0.4352	0.8346	0.4848	0.4070	0.7437	**0.8618**
40	0.8405	0.3706	0.4461	0.8616	0.5143	0.4079	0.7418	**0.8924**

Table G376: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 20$; (CRD $N(0,2)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.4657	0.2219	0.2445	**0.5301**	0.2445	0.2445	**0.5301**	**0.5301**
25	0.5648	0.2219	0.2494	0.5910	0.2575	0.2452	0.5555	**0.6170**
30	0.6286	0.2219	0.2568	0.6315	0.2777	0.2442	0.5558	**0.6749**
35	0.6863	0.2219	0.2614	0.6700	0.2982	0.2442	0.5537	**0.7286**
40	0.7363	0.2219	0.2712	0.7065	0.3225	0.2452	0.5470	**0.7747**

Table G377: Estimated power of tests for mixed design under the normal distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 20$; (CRD $N(0,3)$ and RCBD $N(0,1)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.4683	0.1399	0.1567	**0.4463**	0.1567	0.1567	**0.4463**	**0.4463**
25	0.5597	0.1399	0.1639	0.5080	0.1709	0.1596	0.4641	**0.5412**
30	0.6350	0.1399	0.1703	0.5543	0.1849	0.1587	0.4648	**0.6157**
35	0.6847	0.1399	0.1741	0.5962	0.2036	0.1594	0.4557	**0.6777**
40	0.7319	0.1399	0.1799	0.6346	0.2283	0.1581	0.4468	**0.7325**

Table G378: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 20$; (CRD $(T(3) * \sqrt{2})$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.3557	0.3175	0.3404	**0.5432**	0.3404	0.3404	**0.5432**	**0.5432**
25	0.4236	0.3175	0.3478	0.5791	0.3560	0.3432	0.5658	**0.5816**
30	0.4801	0.3175	0.3522	0.6152	0.3741	0.3409	0.5795	**0.6232**
35	0.5312	0.3175	0.3618	0.6484	0.3933	0.3413	0.5835	**0.6597**
40	0.5883	0.3175	0.3695	0.6866	0.4192	0.3419	0.5906	**0.7015**

Table G379: Estimated powers of tests for mixed design under the t distribution with unequal variance; k=5; treatments effects: d2=0.7; d3=0.2; d4=0.6; d5=0.3

Fixed Sample Size $n_a = 20$; (CRD $\left(T(3) * \sqrt{3}\right)$ and CRBD $T(3)$)								
Blocks			**Approach**					
	L*	**FW***	**I**	**II**	**III**	**IV**	**V**	**VI**
20	0.3514	0.2552	0.2764	**0.4838**	0.2764	0.2764	**0.4838**	**0.4838**
25	0.4219	0.2552	0.2850	0.5219	0.2931	0.2787	0.5027	**0.5320**
30	0.4796	0.2552	0.2894	0.5560	0.3068	0.2768	0.5093	**0.5765**
35	0.5382	0.2552	0.2963	0.5974	0.3283	0.2779	0.5188	**0.6275**
40	0.5742	0.2552	0.3035	0.6277	0.3462	0.2765	0.5171	**0.6627**

APPENDIX H. SAS SCRIPT DISTRIBUTIONS RCBD PORTION

```
/*Exponential distribution Three Populations*/

data extracta(keep=sample rep grp y1);
array seeds{3} seed1-seed3; *** Initialize 3 indept streams. ***;
do i=1 to 3;
seeds{i}=int(ranuni(0)*1E9); *** Use clock to initialize. ***;
end;
do sample=1 to &samples;
do rep=1 to &n;
do grp = 'trt1','trt2','trt3';
y1 = RANEXP(SEED1)*&mu1;
y1= RANEXP(SEED2)*&mu2;
y1= RANEXP(SEED3)*&mu3;
output;end;end;end;run;


/*Normal distribution Three Populations */

data extracta(keep=sample rep trt Y1);
array seeds{3} seed1-seed3; *** Initialize 3 indept streams ***;
do i=1 to 3;
seeds{i}=int(ranuni(0)*1E9); *** Use clock to initialize. ***;
end;
do sample=1 to &samples;
do rep=1 to &n;
call rannor(seed1,Z1);
call rannor(seed2,Z2);
call rannor(seed3,Z3);

Y1=&mu1+&sd1*z1; trt=1; output; *** Adjust values from Z1 to Y ***;
Y1=&mu2+&sd2*z2; trt=2; output; *** Adjust values from Z2 to Y ***;
Y1=&mu3+&sd3*z3; trt=3; output; *** Adjust values from Z3 to Y ***;

end;end;run;


/*T distribution with three degrees of freedom Three Populations */

data extract_page(keep=sample rep grp y1);
array seeds{3} seed1-seed3; *** Initialize 3 indept streams ***;
do i=1 to 3;
seeds{i}=int(ranuni(0)*1E9); *** Use clock to initialize. ***;
end;
do sample=1 to &samples;
do rep=1 to &n;
do grp = 'trt1','trt2','trt3';
y1 = RAND('T',3);
y1 = RAND('T',3);
y1 = RAND('T',3);

output;end;end;end;run;
```

APPENDIX I. SAS SCRIPT DISTRIBUTIONS CRD PORTION

```
/*Exponential distribution Three Populations*/

%macro wolfE1(samples,n,mu1,mu2,mu3,k,d1,d2);
titlE2 "Parameters Are: # samples=&samples, n=&n, mu1=&mu1, mu2=&mu2,
mu3=&mu3,k=&k,d1=&d1, d2=&d2 ";

data GEN(keep=sample rep grp Y1);
array seeds{3} seed1-seed3; *** Initialize 3 indept streams. ***;
do i=1 to 3;
seeds{i}=int(ranuni(0)*1E9); *** Use clock to initialize. ***;
end;
do sample=1 to &samples;
do rep=1 to &n;
do grp = 'trt1','trt2','trt3';
y1 = RANEXP(SEED1)*&mu1;
y1= RANEXP(SEED2)*&mu2;
y1= RANEXP(SEED3)*&mu3;
output;end;end;end;run;


proc sql noprint;create table GENEXP as select *,
/*case when y1 then (y1-(SQRT(3)-1)) end as  y_edit*/
case when y1 then (y1-(SQRT(2)-1)) end as  y_edit
from GEN;quit;

proc sql noprint;
create table extractr as select *,
case when grp='trt2' then y_edit+&d1
     when grp='trt3' then y_edit+&d2
     else y_edit end as y
from GENEXP ;quit;
%mend wolfE1;
%wolfE1(10000,5,sqrt(2),sqrt(2),sqrt(2),3,0,0);
*%wolfE1(10000,5,sqrt(3),sqrt(3),sqrt(3),3,0,0);

Normal distribution Three Populations;

%macro wolfE3(samples,n,mu1,sd1,mu2,sd2,mu3,sd3,k,d1,d2);
titlE2 "Parameters Are: # samples=&samples, n=&n, mu1=&mu1, sd1=&sd1,
mu2=&mu2, sd2=&sd2,mu3=&mu3, sd3=&sd3,k=&k,d1=&d1, d2=&d2";

data gen_nor(keep=sample rep trt Y1);
array seeds{3} seed1-seed3; *** Initialize 3indept streams. ***;
do i=1 to 3;
seeds{i}=int(ranuni(0)*1E9); *** Use clock to initialize. ***;
end;
do sample=1 to &samples;
do rep=1 to &n;
call rannor(seed1,Z1);
call rannor(seed2,Z2);
call rannor(seed3,Z3);

Y1=&mu1+&sd1*z1; trt=1; output; *** Adjust values from Z1 to Y ***;
Y1=&mu2+&sd2*z2; trt=2; output; *** Adjust values from Z2 to Y ***;
```

```
Y1=&mu3+&sd3*z3; trt=3; output; *** Adjust values from Z3 to Y ***;
end;end;run;

proc sql noprint; create table gen_nor1 as
select *,
case when trt=2 then y1+&d1
     when trt=3 then y1+&d2
     else y1 end as y
from gen_nor;quit;
%mend wolfE3;
%wolfE3(10000,5,0,3,0,3,0,3,3,0.5,0.5);
/*%wolfE3(10000,5,0,2,0,2,0,2,3,0.5,0.5);*/


/*T distribution Three Populations*/

%macro wolfE2(samples,n,k,d1,d2);
titlE2 "Parameters Are: # samples=&samples, n=&n, k=&k, d1=&d1, d2=&d2";

data GEN2(keep=sample rep grp y1);
array seeds{3} seed1-seed3; *** Initialize 3 indept streams. ***;
do i=1 to 3;
seeds{i}=int(ranuni(0)*1E9); *** Use clock to initialize. ***;
end;
do sample=1 to &samples;
do rep=1 to &n;
do grp = 'trt1','trt2','trt3';
y1 = RAND('T',3);
y1 = RAND('T',3);
y1 = RAND('T',3);
output;end;end;end;
run;

proc sql noprint;
create table GEN_T as select *,
/*     case when grp='trt1' then (SQRT(3)*y1)*/
/*        when grp='trt2' then (SQRT(3)*y1)*/
/*          when grp='trt3' then (SQRT(3)*y1) end as y_edit*/
case when grp='trt1' then (SQRT(2)*y1)
     when grp='trt2' then (SQRT(2)*y1)
       when grp='trt3' then (SQRT(2)*y1) end as y_edit
from GEN2; quit;

proc sql noprint;
create table GEN_T1 as
select *,
case when grp='trt2' then y_edit+&d1
     when grp='trt3' then y_edit+&d2
     else y_edit end as y
from GEN_T; quit;

%mend wolfE2;
%wolfE2(10000,5,3,0.3,1.0);
```

APPENDIX J. SAS SCRIPT PROPOSED TEST STATISTICS

```
/*Manipulation of the Proposed six tests statistics*/

* APPROACH I;

PROC SQL NOPRINT;
CREATE TABLE LIB.app_I AS
select
a.sample,
((sum(a.l_statistic,b.sum_trt) +
sum(a.l_stat,b.mean_wf))/sqrt(a.l_var+b.var_wf)) as z,
case when calculated z>=1.645 then 'Approach I' else 'N' end as flag
FROM WF_final5 b, FinalpagE10 a
where a.sample=b.sample ;QUIT;

*APPROACH II;

PROC SQL NOPRINT;
CREATE TABLE LIB.app_II AS
select
a.sample,
(b.page_l+a.wf)/sqrt(2) as z ,
case when calculated z>=1.645 then 'Approach II' else 'N' end as flag
FROM WF_final5 a, FinalpagE10 b where a.sample=b.sample QUIT;

*APPROACH III;

PROC SQL NOPRINT;
CREATE TABLE LIB.app_III AS
select
a.sample,
(&n1.*a.l_statistic)/(&n2.+&n1.)+(&n2.*b.sum_trt)/(&n1.+&n2.) as SUM_FWL,
(&n1.*a.l_stat)/(&n2.+&n1.) + (&n2.*b.mean_wf)/(&n2.+&n1.) as asymp_mean,
sqrt((&n1.**2*(a.l_var)/((&n2.+&n1.)**2)) +
(&n2.**2*(b.var_wf)/((&n2.+&n1.)**2))) as VAR_WL,
(Calculated SUM_FWL - Calculated asymp_mean)/(calculated VAR_WL) as z,
case when calculated z>=1.645 then 'Approach III' else 'N' end as flag
FROM WF_final5 b, FinalpagE10 a where a.sample=b.sample QUIT;

*APPROACH IV;

PROC SQL NOPRINT;
CREATE TABLE LIB.app_IV AS
select
a.sample,
(&n2.*a.l_statistic)/(&n2.+&n1.)+(&n1.*b.sum_trt)/(&n1.+&n2.) as SUM_FWL,
(&n2.*a.l_stat)/(&n2.+&n1.)+(&n1.*b.mean_wf)/(&n2.+&n1.) as asymp_mean,
sqrt(((&n2.**2*a.l_var)/((&n2.+&n1.)**2))+((&n1.**2*b.var_wf)/((&n2.+&n1.)**2
))) as VAR_WL,
(Calculated SUM_FWL - Calculated asymp_mean)/(calculated VAR_WL) as z,
case when calculated z>=1.645 then 'Approach IV' else 'N' end as flag
FROM WF_final5 b, FinalpagE10 a where a.sample=b.sample; QUIT;
```

```
/*APPROACH V */

PROC SQL NOPRINT;
CREATE TABLE LIB.app_V AS
select
a.sample,
((&n1.* b.page_l)/(&n2.+&n1.)+(&n2.*
a.wf)/(&n1.+&n2.))/(sqrt((&n2.**2+&n1.**2)/ (&n2.+&n1.)**2))as z ,
case when calculated z>=1.645 then 'Approach VI' else 'N' end as flag
FROM WF_final&n1 a, Finalpage&n2 b where a.sample=b.sample; quit;


/*APPROACH VI ***/

PROC SQL NOPRINT;
CREATE TABLE LIB.app_Vi AS
select
a.sample,
((&n2.* b.page_l)/(&n2.+&n1.)+(&n1.*
a.wf)/(&n1.+&n2.))/(sqrt((&n2.**2+&n1.**2)/ (&n2.+&n1.)**2))as z ,
case when calculated z>=1.645 then 'Approach VI' else 'N' end as flag
FROM WF_final&n1 a, Finalpage&n2 b where a.sample=b.sample; quit;
```

APPENDIX K. SAS PROGRAM OBTAINING EXPECTATIONS AND VARIANCES FOR THREE TO TEN TREATMENTS INCLUSIVE

```
%macro summ(samples, k);
/** Generate all permutations of k treatments **/
data perm&k (drop=i);
array a{&k};
do i = 1 to &k; a[i]=i; end; /** initialize **/
do i = 1 to fact(&k);
   call allperm(i, of a[*]);
   output;end;run;
%mend summ;
%macro summ1(samples, firstk,lastk,inc);
%do k=&firstk %to &lastk %by &inc.;
%summ(&samples,&k);
%end;
%mend summ1;
%summ1(1,3,10,1);

*Computing Modified Page's Test Statistic L for one block and k treatments;
proc sql noprint;
create table OUTPUT as
select DISTINCT 3 as treatment ,a1+(a2*2)+(a3*2)as L from PERM3
union
select DISTINCT 4 as treatment , a1+(a2*2)+(a3*2)+(a4*2)as L from PERM4
union
select DISTINCT 5 as treatment , a1+(a2*2)+(a3*2)+(a4*2)+(a5*2) as L from
PERM5
union
select DISTINCT 6 as treatment , a1+(a2*2)+(a3*2)+(a4*2)+(a5*2)+(a6*2)as L
from PERM6
union
select DISTINCT 7 as treatment ,
a1+(a2*2)+(a3*2)+(a4*2)+(a5*2)+(a6*2)+(a7*2)as L from PERM7
union
select DISTINCT 8 as treatment ,
a1+(a2*2)+(a3*2)+(a4*2)+(a5*2)+(a6*2)+(a7*2)+(a8*2)as L from PERM8
union
select DISTINCT 9 as treatment ,
a1+(a2*2)+(a3*2)+(a4*2)+(a5*2)+(a6*2)+(a7*2)+(a8*2)+(a9*2) as L from PERM9
union
select DISTINCT 10 as treatment ,
a1+(a2*2)+(a3*2)+(a4*2)+(a5*2)+(a6*2)+(a7*2)+(a8*2)+(a9*2)+(a10*2) as L from
PERM10;quit;

proc sql noprint;
create table SUMM as select DISTINCT treatment, l, AVG(l) as Expectation
from OUTPUT group by treatment;

proc sql noprint; create table FINAL as
select distinct Treatment LABEL="Number of Treatments", Expectation,
sum((l-Expectation)**2)/COUNT(L) as variance format=comma9.2
from SUMM  group by treatment, Expectation; quit;
```

APPENDIX L. SIMULATION SAS SCRIPT

```
/*Extracting data to be used in the analysis assuming a Exponential distribution*/

LIBNAME LIB 'J:\exponential\five';
%macro pages1(samples,n,mu1,mu2,mu3,k,d1,d2);
titlE2 "Parameters Are: # samples=&samples, n=&n, mu1=&mu1, mu2=&mu2, mu3=&mu3,k=&k,d1=&d1,
d2=&d2 ";
data extracta(keep=sample rep grp y1);
array seeds{3} seed1-seed3; *** Initialize 3 indept streams. ***;
do i=1 to 3;
seeds{i}=int(ranuni(0)*1E9); *** Use clock to initialize. ***;
end;
do sample=1 to &samples;
do rep=1 to &n;
do grp = 'trt1','trt2','trt3';
y1 = RANEXP(SEED1)*&mu1;
y1= RANEXP(SEED2)*&mu2;
y1= RANEXP(SEED3)*&mu3;
output;
end;
end;
end;
run;

proc sql noprint;
create table extractb as
select *,
case when grp='trt2' then y1+&d1
    when grp='trt3' then y1+&d2
    else y1 end as y
from extracta;
quit;

 /*SORTING ALL THE SAMPLES */
proc SORT data=extractb out =page_sort;BY sample rep  ;RUN;

 /*RANKING ALL THE SAMPLES */
proc rank data=page_sort OUT=page_RANK;BY sample rep ;var Y ;ranks YRANKS ;RUN;

 /*GROUPING THE k to j INTO ONE GROUP AND THE RESULT IS TWO SAMPLES*/
data PAGE_group;set page_RANK;if grp='trt2' or grp='trt3' then group='treatment';else group='control';
run;



/* COMPUTING SUMS FOR THE TWO TREATMENT GROUPS: CONTROL AND TREATMENT */
proc MEANS data= PAGE_group SUM MAXDEC=2 noprint;CLASS sample group;VAR YRANKS;
output out=PAGE_sums(where= (_type_=3) ) sum=ctrl_trt;RUN;

/* COMPUTING SUMMATION OF THE WEIGHTED RANKS OF PAGE'S TEST */
data final;set PAGE_sums;if group='control' then l=ctrl_trt*1; else if group='treatment' then l=ctrl_trt*2;
run;
```

```
 /*computing Pages test statistic*/
proc means data= final sum maxdec=2 noprint;class sample;var l;/*Pages test statistic*/
output out=page_stat(where= (_type_=1)) sum=l_statistic; run;

 /* Standarding pages statistic to obtain the z score*/
data Finalpage&n; set page_stat ;l_stat = 10*&n ;l_var = 0.67*&n;l_std=sqrt(l_var);
page_l=(l_statistic-l_stat )/l_std ;if  page_l>=1.645 then flag='Pages'; else flag='N';run;
%mend pages1;

%macro wolfE1(samples,n,mu1,mu2,mu3,k,d1,d2);
titlE2 "Parameters Are: # samples=&samples, n=&n, mu1=&mu1, mu2=&mu2, mu3=&mu3,k=&k,d1=&d1,
d2=&d2 ";
data extractc(keep=sample rep grp Y1);
array seeds{3} seed1-seed3; *** Initialize 3 indept streams. ***;
do i=1 to 3;
seeds{i}=int(ranuni(0)*1E9); *** Use clock to initialize. ***;
end;
do sample=1 to &samples;
do rep=1 to &n;
do grp = 'trt1','trt2','trt3';
y1 = RANEXP(SEED1)*&mu1;
y1= RANEXP(SEED2)*&mu2;
y1= RANEXP(SEED3)*&mu3;
output;
end;
end;
end;
run;
proc sql noprint;
create table extractd as
select *,
/*case when y1 then (y1-(SQRT(3)-1)) end as  y_edit*/

case when y1 then (y1-(SQRT(2)-1)) end as  y_edit from extractc; quit;

proc sql noprint; create table extracte as select *,

case when grp='trt2' then y_edit+&d1
        when grp='trt3' then y_edit+&d2
        else y_edit end as y
from extractd;quit;

/*Fligner Wolfe */

/*SORTING ALL THE SAMPLES */

proc SORT data=extracte  out =WF_SORT;BY  sample grp rep;RUN;

/*GROUPING THE k to j INTO ONE GROUP AND THE RESULT IS TWO SAMPLES*/
data WF_GROUP; set WF_SORT ;if grp='trt2' or grp='trt3' then group='treatment'; else group='control';
run;

/*RANKING ALL THE SAMPLES */
proc rank data=WF_GROUP OUT=WF_RANK; BY sample; var Y ;ranks YRANKS; RUN;
/* COMPUTING SUMS FOR THE TREATMENT -Fligner Wolfe statistic */
proc MEANS data= WF_RANK(where= (group='treatment')) SUM MAXDEC=2 noprint;
```

```
CLASS sample group;VAR YRANKS;
output out=WF_sums(where= (_type_=3)) sum=sum_trt ;
RUN;
data WF_final&n;
set WF_sums;
n&n=&n*&k; /* number of observations*/
a&n=&n;
b&n=n&n-a&n;
mean_wf =(b&n*(n&n+1)/2); /* large sample approximation of the mean*/
var_wf=(a&n*b&n*(n&n+1)/12); /* large sample approximation of the variance*/
sd_wf=sqrt(a&n*b&n*(n&n+1)/12); /* large sample approximation of the standard deviation*/
wf=(sum_trt-mean_wf)/sd_wf; /* large sample approximation of FW test */
if wf>=1.645 then flag='Fligner Wolfe'; else flag='N';
run;
%mend wolfE1;

%macro TEST1(samples,firstn,lastn,inc);
%do n=&firstn %to &lastn %by &inc.;
%pages1(&samples,&n,1,1,1,3,0.5,0.5);
%end;
%mend TEST1;
%TEST1(10000,5,40,5);
/*%wolfE1(10000,5,sqrt(3),sqrt(3),sqrt(3),3,0.5,0.5);*/
%wolfE1(10000,5,sqrt(2),sqrt(2),sqrt(2),3,0.5,0.5);

/*Data manipulation*/
%macro Final1(n1,n2,k);
/*Manipulation of the Proposed six tests statistics*/

* APPROACH I;

PROC SQL NOPRINT;
CREATE TABLE app_I AS
select
a.sample,
((sum(a.l_statistic,b.sum_trt) +
sum(a.l_stat,b.mean_wf))/sqrt(a.l_var+b.var_wf)) as z,
case when calculated z>=1.645 then 'Approach I' else 'N' end as flag
FROM WF_final5 b, FinalpagE10 a
where a.sample=b.sample ;QUIT;

*APPROACH II;

PROC SQL NOPRINT;
CREATE TABLE app_II AS
select
a.sample,
(b.page_l+a.wf)/sqrt(2) as z ,
case when calculated z>=1.645 then 'Approach II' else 'N' end as flag
FROM WF_final5 a, FinalpagE10 b where a.sample=b.sample QUIT;

*APPROACH III;

PROC SQL NOPRINT;
CREATE TABLE app_III AS
select
```

```
a.sample,
(&n1.*a.l_statistic)/(&n2.+&n1.)+(&n2.*b.sum_trt)/(&n1.+&n2.) as SUM_FWL,
(&n1.*a.l_stat)/(&n2.+&n1.) + (&n2.*b.mean_wf)/(&n2.+&n1.) as asymp_mean,
sqrt((&n1.**2*(a.l_var)/((&n2.+&n1.)**2)) +
(&n2.**2*(b.var_wf)/((&n2.+&n1.)**2))) as VAR_WL,
(Calculated SUM_FWL - Calculated asymp_mean)/(calculated VAR_WL) as z,
case when calculated z>=1.645 then 'Approach III' else 'N' end as flag
FROM WF_final5 b, FinalpagE10 a where a.sample=b.sample QUIT;

*APPROACH IV;

PROC SQL NOPRINT;
CREATE TABLE app_IV AS
select
a.sample,
(&n2.*a.l_statistic)/(&n2.+&n1.)+(&n1.*b.sum_trt)/(&n1.+&n2.) as SUM_FWL,
(&n2.*a.l_stat)/(&n2.+&n1.)+(&n1.*b.mean_wf)/(&n2.+&n1.) as asymp_mean,
sqrt(((&n2.**2*a.l_var)/((&n2.+&n1.)**2))+((&n1.**2*b.var_wf)/((&n2.+&n1.)**2
))) as VAR_WL,
(Calculated SUM_FWL - Calculated asymp_mean)/(calculated VAR_WL) as z,
case when calculated z>=1.645 then 'Approach IV' else 'N' end as flag
FROM WF_final5 b, FinalpagE10 a where a.sample=b.sample; QUIT;

/*APPROACH V */

PROC SQL NOPRINT;
CREATE TABLE app_V AS
select
a.sample,
((&n1.* b.page_l)/(&n2.+&n1.)+(&n2.*
a.wf)/(&n1.+&n2.))/(sqrt((&n2.**2+&n1.**2)/ (&n2.+&n1.)**2))as z ,
case when calculated z>=1.645 then 'Approach VI' else 'N' end as flag
FROM WF_final&n1 a, Finalpage&n2 b where a.sample=b.sample; quit;


/*APPROACH VI ***/

PROC SQL NOPRINT;
CREATE TABLE app_VI AS
select
a.sample,
((&n2.* b.page_l)/(&n2.+&n1.)+(&n1.*
a.wf)/(&n1.+&n2.))/(sqrt((&n2.**2+&n1.**2)/ (&n2.+&n1.)**2))as z ,
case when calculated z>=1.645 then 'Approach VI' else 'N' end as flag
FROM WF_final&n1 a, Finalpage&n2 b where a.sample=b.sample; quit;

/* PAGES*/
proc freq data=Finalpage&n1 noprint;tables flag/  out=a;run;

/*Fligner Wolfe*/
proc freq data=WF_final&n2 noprint;tables flag/  out=b;run;
proc freq data= app_I noprint;tables flag /  out=c;run;
proc freq data= app_II noprint;tables flag/  out=d;run;
proc freq data=app_III noprint;tables flag/  out=e;run;
proc freq data=app_IV noprint;tables flag/  out=f ;run;
proc freq data=app_V noprint;tables flag/  out=g ;run;
proc freq data=app_VI noprint;tables flag /  out=h;run;
```

```
data LIB.all_&n1(keep=flag percent);
length flag $ 15;
set a b c d e f g h;
if flag='N' then delete;
run;

%mend Final1;

%macro final2(n1,firstn,lastn,inc);
%do n1=&firstn %to &lastn %by &inc;
%Final1(&n1,5,3);
%end;
%mend final2;
%final2(5,5,40,5);



data LIB.allblks (keep=flag percent);
set LIB.all_5 LIB.all_10 LIB.all_15 LIB.all_20 LIB.all_25 LIB.all_30 LIB.all_35 LIB.all_40;
run;

%macro pages2(samples,n,mu1,mu2,mu3,k,d1,d2);
titlE2 "Parameters Are: # samples=&samples, n=&n, mu1=&mu1, mu2=&mu2, mu3=&mu3,k=&k,d1=&d1,
d2=&d2 ";
data extractx(keep=sample rep grp y1);
array seeds{3} seed1-seed3; *** Initialize 3 indept streams. ***;
do i=1 to 3;
seeds{i}=int(ranuni(0)*1E9); *** Use clock to initialize. ***;
end;
do sample=1 to &samples;
do rep=1 to &n;
do grp = 'trt1','trt2','trt3';
y1 = RANEXP(SEED1)*&mu1;
y1= RANEXP(SEED2)*&mu2;
y1= RANEXP(SEED3)*&mu3;
output;
end;
end;
end;

run;
proc sql noprint;
create table extracty as
select *,
case when grp='trt2' then y1+&d1
    when grp='trt3' then y1+&d2
    else y1 end as y
from extractx
;
quit;
 /*SORTING ALL THE SAMPLES */
proc SORT data=extracty out =page_sort;
BY sample rep  ;
RUN;
 /*RANKING ALL THE SAMPLES */
```

```
proc rank data=page_sort OUT=page_RANK;
BY sample rep ;
var Y ;
ranks YRANKS ;RUN;
 /*GROUPING THE k to j INTO ONE GROUP AND THE RESULT IS TWO SAMPLES*/
data PAGE_group;
set page_RANK;
if grp='trt2' or grp='trt3' then group='treatment';
else group='control';
run;

/* COMPUTING SUMS FOR THE TWO TREATMENT GROUPS: CONTROL AND TREATMENT */
proc MEANS data= PAGE_group SUM MAXDEC=2 noprint;
CLASS sample group;
VAR YRANKS;
output out=PAGE_sums(where= (_type_=3) ) sum=ctrl_trt;
RUN;

/* COMPUTING SUMMATION OF THE WEIGHTED RANKS OF PAGE'S TEST */
data final;
set PAGE_sums;
if group='control' then l=ctrl_trt*1; else if group='treatment' then l=ctrl_trt*2;
run;
 /*computing Pages test statistic*/
proc means data= final sum maxdec=2 noprint;
class sample;
var l;
/*Pages test statistic*/
output out=page_stat(where= (_type_=1)) sum=l_statistic;
run;
 /* Standarding pages statistic to obtain the z score*/
data Finalpage&n;
set page_stat ;
l_stat = 10*&n ;
l_var = 0.67*&n;
l_std=sqrt(l_var);
page_l=(l_statistic-l_stat )/l_std ;
if  page_l>=1.645 then flag='Pages'; else flag='N';
run;
%mend pages2;
%macro wolfE2(samples,n,mu1,mu2,mu3,k,d1,d2);
titlE2 "Parameters Are: # samples=&samples, n=&n, mu1=&mu1, mu2=&mu2, mu3=&mu3,k=&k,d1=&d1,
d2=&d2 ";
data extractp(keep=sample rep grp Y1);
array seeds{3} seed1-seed3; *** Initialize 3 indept streams. ***;
do i=1 to 3;
seeds{i}=int(ranuni(0)*1E9); *** Use clock to initialize. ***;
end;
do sample=1 to &samples;
do rep=1 to &n;
do grp = 'trt1','trt2','trt3';
y1 = RANEXP(SEED1)*&mu1;
y1= RANEXP(SEED2)*&mu2;
y1= RANEXP(SEED3)*&mu3;
output;
end;
```

```
end;
end;
run;
proc sql noprint;
create table extractq as
select *,
/*case when y1 then (y1-(SQRT(3)-1)) end as  y_edit*/
case when y1 then (y1-(SQRT(2)-1)) end as  y_edit
from extractp;quit;

proc sql noprint;
create table extractr as
select *,
case when grp='trt2' then y_edit+&d1
    when grp='trt3' then y_edit+&d2
    else y_edit end as y
from extractq;quit;

/*Fligner Wolfe */
/*SORTING ALL THE SAMPLES */
proc SORT data=extractr  out =WF_SORT;
BY  sample grp rep;
RUN;
/*GROUPING THE k to j INTO ONE GROUP AND THE RESULT IS TWO SAMPLES*/
data WF_GROUP;
set WF_SORT ;
if grp='trt2' or grp='trt3' then group='treatment';
else group='control';
run;
/*RANKING ALL THE SAMPLES */
proc rank data=WF_GROUP OUT=WF_RANK;
BY sample ;
var Y ;
ranks YRANKS ;
RUN;
/* COMPUTING SUMS FOR THE TREATMENT -Fligner Wolfe statistic */
proc MEANS data= WF_RANK(where= (group='treatment')) SUM MAXDEC=2 noprint;
CLASS sample group;
VAR YRANKS;
output out=WF_sums(where= (_type_=3)) sum=sum_trt ;
RUN;
data WF_final&n;
set WF_sums;
n&n=&n*&k; /* number of observations*/
a&n=&n;
b&n=n&n-a&n;
mean_wf =(b&n*(n&n+1)/2); /* large sample approximation of the mean*/
var_wf=(a&n*b&n*(n&n+1)/12); /* large sample approximation of the variance*/
sd_wf=sqrt(a&n*b&n*(n&n+1)/12); /* large sample approximation of the standard deviation*/
wf=(sum_trt-mean_wf)/sd_wf; /* large sample approximation of FW test */
if wf>=1.645 then flag='Fligner Wolfe'; else flag='N';
run;
%mend wolfE2;
%macro TEST2(samples,firstn,lastn,inc);
%do n=&firstn %to &lastn %by &inc;
%wolfE2(&samples,&n,sqrt(2),sqrt(2),sqrt(2),3,0.5,0.5);
```

```
/*%wolfE2(&samples,&n,sqrt(3),sqrt(3),sqrt(3),3,0.5,0.5);*/
%end;
%mend TEST2;
%TEST2(10000,5,40,5);
%pages2(10000,5,1,1,1,3,0.5,0.5);

%macro Final3(n2,n1,k);
PROC SQL NOPRINT;

/*Manipulation of the Proposed six tests statistics*/

* APPROACH I;

PROC SQL NOPRINT;
CREATE TABLE app_I AS
select
a.sample,
((sum(a.l_statistic,b.sum_trt) +
sum(a.l_stat,b.mean_wf))/sqrt(a.l_var+b.var_wf)) as z,
case when calculated z>=1.645 then 'Approach I' else 'N' end as flag
FROM WF_final5 b, FinalpagE10 a
where a.sample=b.sample ;QUIT;

*APPROACH II;

PROC SQL NOPRINT;
CREATE TABLE app_II AS
select
a.sample,
(b.page_l+a.wf)/sqrt(2) as z ,
case when calculated z>=1.645 then 'Approach II' else 'N' end as flag
FROM WF_final5 a, FinalpagE10 b where a.sample=b.sample QUIT;

*APPROACH III;

PROC SQL NOPRINT;
CREATE TABLE app_III AS
select
a.sample,
(&n1.*a.l_statistic)/(&n2.+&n1.)+(&n2.*b.sum_trt)/(&n1.+&n2.) as SUM_FWL,
(&n1.*a.l_stat)/(&n2.+&n1.) + (&n2.*b.mean_wf)/(&n2.+&n1.) as asymp_mean,
sqrt((&n1.**2*(a.l_var)/((&n2.+&n1.)**2)) +
(&n2.**2*(b.var_wf)/((&n2.+&n1.)**2))) as VAR_WL,
(Calculated SUM_FWL - Calculated asymp_mean)/(calculated VAR_WL) as z,
case when calculated z>=1.645 then 'Approach III' else 'N' end as flag
FROM WF_final5 b, FinalpagE10 a where a.sample=b.sample QUIT;

*APPROACH IV;

PROC SQL NOPRINT;
CREATE TABLE app_IV AS
select
a.sample,
(&n2.*a.l_statistic)/(&n2.+&n1.)+(&n1.*b.sum_trt)/(&n1.+&n2.) as SUM_FWL,
(&n2.*a.l_stat)/(&n2.+&n1.)+(&n1.*b.mean_wf)/(&n2.+&n1.) as asymp_mean,
sqrt(((&n2.**2*a.l_var)/((&n2.+&n1.)**2))+((&n1.**2*b.var_wf)/((&n2.+&n1.)**2
))) as VAR_WL,
```

```
(Calculated SUM_FWL - Calculated asymp_mean)/(calculated VAR_WL) as z,
case when calculated z>=1.645 then 'Approach IV' else 'N' end as flag
FROM WF_final5 b, FinalpageE10 a where a.sample=b.sample; QUIT;

/*APPROACH V */

PROC SQL NOPRINT;
CREATE TABLE app_V AS
select
a.sample,
((&n1.* b.page_l)/(&n2.+&n1.)+(&n2.*
a.wf)/(&n1.+&n2.))/(sqrt((&n2.**2+&n1.**2)/ (&n2.+&n1.)**2))as z ,
case when calculated z>=1.645 then 'Approach VI' else 'N' end as flag
FROM WF_final&n1 a, Finalpage&n2 b where a.sample=b.sample; quit;


/*APPROACH VI ***/

PROC SQL NOPRINT;
CREATE TABLE app_VI AS
select
a.sample,
((&n2.* b.page_l)/(&n2.+&n1.)+(&n1.*
a.wf)/(&n1.+&n2.))/(sqrt((&n2.**2+&n1.**2)/ (&n2.+&n1.)**2))as z ,
case when calculated z>=1.645 then 'Approach VI' else 'N' end as flag
FROM WF_final&n1 a, Finalpage&n2 b where a.sample=b.sample; quit;

/* PAGES*/
proc freq data=Finalpage&n1 noprint;tables flag/  out=o;run;

/*Fligner Wolfe*/
proc freq data=WF_final&n2 noprint;tables flag/  out=p;run;
proc freq data= app_I noprint;tables flag /  out=q;run;
proc freq data= app_II noprint;tables flag/  out=r;run;
proc freq data=app_III noprint;tables flag/  out=s;run;
proc freq data=app_IV noprint;tables flag/  out=t ;run;
proc freq data=app_V noprint;tables flag/  out=u ;run;
proc freq data=app_VI noprint;tables flag /  out=v;run;


data LIB.all_trt&n2(keep=flag percent);
length flag $15;
set o p q r s t u v;
if flag='N' then delete;
run;
%mend Final3;

%macro final4(n2,firstn,lastn,inc);
%do n2=&firstn %to &lastn %by &inc;
%Final3(&n2,5,3);
%end;
%mend final4;
%final4(5,5,40,5);

proc import datafile=" J:\exponential \Final\test.txt"
                            out=lib.statistic ;
```

```
                 run;
data LIB.alltrt (keep=flag percent);
set LIB.all_trt5 LIB.all_trt10 LIB.all_trt15 LIB.all_trt20 LIB.all_trt25 LIB.all_trt30 LIB.all_trt35 LIB.all_trt40;
run;

proc sort data=LIB.allblks; by flag;run;

proc transpose data=LIB.allblks  out=lib.block_size prefix=Blocks; by flag; run;

data LIB.split;
  set lib.block_size;
  array s{8} Blocks1-Blocks8;
  do Time=1 to 8;
    POWER=s{time};
    output;
  end;
  drop Blocks1-Blocks8 _NAME_ _LABEL_ ;
run;

PROC SQL;
CREATE TABLE lib.FINAL_BLKS as
SELECT FLAG,TIME, POWER,BLKS
FROM LIB.split a, LIB.Statistic B
WHERE B.NAME=A.TIME
;
QUIT;

proc sort data=LIB.alltrt; by flag;run;
proc transpose data=LIB.alltrt  out=lib.treatment_size prefix=treatment_size;
by flag;run;
data LIB.treatment;
  set lib.treatment_size;
  array s{8} treatment_sizE1-treatment_sizE8;
  do Time=1 to 8;
    POWER=s{time};
    output;
  end;
  drop treatment_sizE1-treatment_sizE8 _NAME_ _LABEL_ ;
run;

PROC SQL;
CREATE TABLE lib.FINAL_TRT as SELECT FLAG,TIME, POWER,BLKS
FROM LIB.treatment a, LIB.Statistic B
WHERE B.NAME=A.TIME;QUIT;

PROC SQL;
CREATE TABLE lib.FINAL as SELECT
NAME, c.Test_Statistic as test2 LABEL='Test statistic',
treatment_sizE1,treatment_sizE2,treatment_sizE3,treatment_sizE4,treatment_sizE5,treatment_sizE6,trea
tment_sizE7,treatment_sizE8,c.Test_Statistic as test ,
Blocks1,Blocks2,        Blocks3,        Blocks4,Blocks5,        Blocks6,        Blocks7,Blocks8
FROM lib.treatment_size a, lib.block_size B, LIB.Statistic C
WHERE C.TEST_STATISTIC=A.FLAG AND C.TEST_STATISTIC=B.FLAG
ORDER BY NAME;QUIT;
```

```
PROC EXPORT DATA=lib.FINAL
    outfile=" J:\exponential \Final\report5.csv"
    dbms=csv
    replace;
run;
```