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An Algorithm for the Construction of "D-Optimal" Experimental Designs, Applied to First-Order Models

T. J. Mitchell

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AN ALGORITHM FOR THE CONSTRUCTION OF "D-OPTIMAL" EXPERIMENTAL DESIGNS, APPLIED TO FIRST-ORDER MODELS

T. J. Mitchell

MAY 1972

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AN ALGORITHM FOR THE CONSTRUCTION OF "D-OPTIMAL" EXPERIMENTAL DESIGNS, APPLIED TO FIRST-ORDER MODELS

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ABSTRACT

This report describes an algorithm that has been developed to construct experimental designs which are "D-optimal." These are designs for which the determinant of $\underline{X}'\underline{X}$ is maximum, where $\underline{X}$ is the "matrix of independent variables" in the usual linear model $\underline{y} = \underline{X}\underline{\beta} + \underline{\varepsilon}$. The algorithm is applied here to the construction of D-optimal first-order designs over a cubic region of interest, which are necessarily fractions of 2-level factorial designs. Although the algorithm does not guarantee D-optimality, it appears to perform well in cases where D-optimal designs are known. The results suggest some general rules for the construction of such designs. Extensive tables of first-order designs which were constructed by the algorithm are given in an appendix.

1. INTRODUCTION

There has been considerable interest among statisticians in the problem of choosing an experimental design to satisfy a specific criterion. While it is usually more desirable in practice to choose a design that is good with respect to several criteria, without necessarily being optimal with respect to any one of them, the method of using a single criterion is an important way of constructing new designs.

I shall consider here the usual linear model $\underline{y} = \underline{X}\underline{\beta} + \underline{\varepsilon}$, where $\underline{y}$ is an $n \times 1$ vector of observations, $\underline{X}$ is an $n \times k$ estimation matrix (of rank k) of constants, $\underline{\beta}$ is the $k \times 1$ vector of coefficients to be estimated, and $\underline{\varepsilon}$ is an $n \times 1$ vector of independently and identically distributed random variables, each having mean 0 and unknown variance σ^2. The ith row of $\underline{X}$ is $\underline{f}(x_i)'$ where x_i is the ith design point and the

function f depends on the model. I shall denote the number of independent variables by p, so that x_i is a point in a p-dimensional region X in which it is feasible to perform experiments.

The least-squares estimate of $\underline{\beta}$ is $\hat{\underline{\beta}} = (\underline{X}'\underline{X})^{-1}\underline{X}'\underline{y}$, and the covariance matrix of $\hat{\underline{\beta}}$ is $(\underline{X}'\underline{X})^{-1}\sigma^2$. At any point $x \in X$, the predicted (or estimated) value of the "true" response is $\hat{y}(x) = \underline{f}(x)'\underline{\beta}$. If the model is correct, the expectation of $\hat{y}(x)$ is $\eta(x)$, the mean value of the response at the point x. The variance of $\hat{y}(x)$ is given by $v(x) = \underline{f}(x)'(\underline{X}'\underline{X})^{-1}\underline{f}(x)\sigma^2$.

Several criteria have been advanced for the purpose of comparing designs, and for constructing optimal designs. One of the most popular is the maximization of $|\underline{X}'\underline{X}|$. A brief discussion of this criterion is given by Box and Draper.[2] One of the attractive features of the $|\underline{X}'\underline{X}|$ criterion is that designs which are optimal with respect to it are invariably "good" in other respects (e.g., low variances for the parameters, low correlations among parameters, low maximum v(x) over X). Modifying slightly the nomenclature of Kiefer,[5] I shall refer to designs that maximize $|\underline{X}'\underline{X}|$, given a specified linear model and a value of n, as "D-optimal" designs.

There has been some attention given to constructing D-optimal designs for specified n but the problem is a very difficult one, even with the help of a computer. The most frequently encountered difficulties are

(i) the large number of variables (np) which must be handled;

(ii) the complex nature of the objective function $|\underline{X}'\underline{X}|$, especially the existence of several local maxima.

Further difficulties arise if each independent variable is required to take one of a specified number of levels, as for example, in a factorial type of experiment. This then becomes an integer programming problem.

Probably as a result of the computational difficulties, very few new designs in the literature owe their existence to the application of computer algorithms to the maximization of $|\underline{X}'\underline{X}|$.

The purpose of this report is to describe a new algorithm and to discuss its application to the construction of D-optimal designs for first-order linear models. Extensive tables of these designs are given in Appendix III. Although I shall try to be fairly explicit, I am assuming that the reader has a passing familiarity with the nomenclature of statistical experimental designs.

2. THE ALGORITHM

Originally,[8] the algorithm was created to exchange design points in the following way. Starting with a randomly chosen n-run design, the initial set of n runs is then improved by

(i) adding an (n+1)st run, chosen so that the maximum possible increase in $|\underline{X}'\underline{X}|$ is achieved, then

(ii) removing (subtracting) that run in the resulting design which results in the minimum possible decrease in $|\underline{X}'\underline{X}|$.

These two steps are accomplished by first adding to the original design that point at which $v(x)$ is maximum, then subtracting from the resulting (n+1)-run design that point at which $v(x)$ is minimum. It can easily be shown that the resulting n-run design has $|\underline{X}'\underline{X}|$ greater than or equal to that of the original. Similarly, one could attempt to improve the original design by subtracting a point first and then adding a point.

This basic algorithm has recently been modified to permit the replacement of more than one point of the original design at each iteration. The requirement that an (n+1)-point design be returned immediately to an

n-point design through the subtraction of a point has been relaxed. The algorithm is now permitted to make an "excursion" in which designs of various sizes are constructed (always by adding or subtracting a single point from the previous design in the excursion), eventually returning to an n-point design. If no improvement in the determinant is made, all the designs constructed on the excursion are ostracized by placing them in a set of "failure designs" called F. The set F is then used to guide the course of the next excursion, which always starts with the currently best n-point design. The choice of whether to begin an excursion with the addition or subtraction of a point is made randomly.

Letting D be the current design at any point during the course of an excursion, the rules for continuing the excursion are as follows:

(i) If the number of points in D exceeds n, subtract a point if D is not in F and add a point otherwise.

(ii) If the number of points in D is less than n, add a point if D is not in F and subtract a point otherwise.

(To determine whether or not D is in F, only the determinant of $\underline{X}'\underline{X}$ is examined. This is not a foolproof method for testing the equivalence of designs, since two different designs may have the same $|\underline{X}'\underline{X}|$. However, its use does not seem to impair the overall performance of the algorithm, and it takes only a fraction of the time that would be required by an exact test of equivalence.)

It is easy to see that, at the beginning, when the set F is empty, the algorithm simply adds and then subtracts (or subtracts and then adds) as it would in the initial, more restrictive version previously described. The rules are such that the excursion always proceeds in the direction

of an n-point design, unless it comes to a design in F, which has already led to failure. Then it reverses direction, after adding to F those designs constructed during the excursion up to that point.

Each time an excursion improves the currently best n-point design (i.e., increases $|\underline{X}'\underline{X}|$) the set F is cleared and a new start is made. Eventually, as it gets more and more difficult to do better, the excursions stray widely from the n-point level. To stop the algorithm, I have set limits on the minimum and maximum number of points permitted in a design constructed during an excursion. When the upper limit, for example, is encountered, that excursion is ended and future excursions are restricted to designs with n or less points. (This restriction is, of course, lifted when an improved n-point design is found, in which case the algorithm starts anew.) If both limits are encountered before an improved n-point design can be found, the algorithm stops.

The choice of these upper and lower limits on permissible design size is made arbitrarily. I have found that excursions that wander far away from the n-point level take up a good deal of computer time and seldom result in an improvement of the currently best design. On the other hand, narrowly spaced limits are too restrictive. I usually set these limits at $n \pm 6$, having found this to be a reasonable compromise.

What does one do when, during the course of an excursion, designs are constructed in which the number of runs is less than the number of parameters to be estimated? For such designs $|\underline{X}'\underline{X}|$ is 0, no matter where the design points are located. To avoid this problem, I actually attempt to maximize $D^* = |\underline{X}'\underline{X} + \epsilon\underline{I}|$, where ϵ is a small positive number, rather than $D = |\underline{X}'\underline{X}|$. (The choice of ϵ is discussed briefly in Appendix I.)

Although I have not studied the consequences of this very carefully, it appears that the set of points that maximizes D* also maximizes D. The advantage is that D* is never 0.

3. CONSTRUCTION OF FIRST-ORDER DESIGNS

This algorithm has been applied to the construction of designs for the first-order model

$$y = \beta_o + \beta_1 x_1 + \ldots + \beta_p x_p \tag{3.1}$$

over a cubic region of interest $-1 \le x_i \le 1$, $i = 1,2,\ldots,p$. (In a general situation, the original variables X_i may be such that $a_i \le X_i \le b_i$, $i = 1,2,\ldots,p$. However, one can easily construct the "coded" variables $x_i = (2X_i - a_i - b_i)/(b_i - a_i)$ in order to formulate the problem as I have done here. Note that this coding also necessitates the transformation of the coefficients in one's original first-order model to coefficients $\{\beta_i\}$ that are appropriate for the coded variables.) For this model, it is known that D-optimal designs are such that each x_i must be -1 or 1. One reason for considering this situation first is that there are so many cases for which the optimum design is known, so the algorithm can be tested. In particular, if n is a multiple of 4, the optimal design is orthogonal (i.e., $\underline{X}'\underline{X}$ is a diagonal matrix).

To test the algorithm, therefore, I considered the cases given in Table 1. Since the algorithm is not guaranteed to find a global optimum, I gave it ten different "tries" in each case. (In three of the more difficult cases, 20 tries were made.) The entries in the table indicate the ratio of successes (optimal designs) to tries and also, in parentheses, the average amount of computer time per try on the IBM 360/91.

Table 1. Ratio of Successes to Tries in Test Cases for First-Order Model

(Numbers in parentheses refer to computer time in seconds per try on the IBM 360/91)

	n			
p	8	12	16	20
2	10/10*	10/10*	10/10*	10/10*
3	10/10*	10/10*	10/10*	10/10*
4	10/10**	7/10**	7/10*	9/10*
5	7/10 (4.2)	2/10**	4/10**	2/10**
6	10/10 (5.7)	1/10 (6.0	1/10 (6.3)	1/10 (7.0)
7	10/10 (8.9)	2/10 (12.5)	1/20 (10.7)	1/20 (9.8)
8		2/10 (21.8)	0/20 (23.5)	
9		1/10 (50.1)		

*Computer time for all these designs averaged 1.1 sec per try.

**Computer time for all these designs averaged 2.3 sec per try.

The object of these test cases was to demonstrate the feasibility of the algorithm and to identify its limitations. These results were then used as a guide in applying the algorithm to the construction of designs for values of n not considered in Table 1. Altogether, designs were constructed for the following cases:

p	n	Number of Tries
≤6	p+1 through 20	10
7	8 through 12	10
7	13 through 16	20
8,9	p+1 through 12	10

The best designs found in these cases are the basis for the results given in the following section.

4. RESULTS

An investigation of the properties of the "best" designs constructed by the algorithm suggests the following rules for constructing D-optimal first-order designs. Except in Case 1, where the result is well known, these rules are only conjectures, as far as I know.

Case 1. $n = 4t$, where t is an integer.

In this case, any design that maximizes $|\underline{X}'\underline{X}|$ must be orthogonal, so $\underline{X}'\underline{X} = n\underline{I}$, where $\underline{I}$ is a k×k identity matrix. The determinant of $\underline{X}'\underline{X}$ is n^k. When n is a power of 2, any fractional factorial design of resolution III will do.[3] For n = 12, 20, 24, 28, ..., orthogonal designs are given by Plackett and Burman.[11]

Case 2. $n = 4t + 1$, where t is an integer.

Mood[9] suggested that designs constructed by adding one run to an orthogonal design are "very efficient" in this case. Without exception, designs declared D-optimal by the algorithm were of this form. The determinant of $\underline{X}'\underline{X}$ for such designs is given by $n^{k-1}(n+k)$. (See Appendix IIA.) It makes no difference to $|\underline{X}'\underline{X}|$ which run is added.

When $p = 4t$, it is not possible to apply Mood's suggestion. There are two such cases considered here, namely ($p = 4$, $n = 5$) and ($p = 8$, $n = 9$). In the former case, the best design found by the algorithm corresponded to the known optimal design.[2,9] I have not come across a published optimal design in the latter case.

Case 3. $n = 4t + 2$, where t is an integer.

Mood's[9] suggestion in this case is that designs constructed by adding two runs to an orthogonal design are optimal. Mood recommended that these two runs be either

(i) two rows of 1's, or

(ii) a row of two-dimensional Hadamard (i.e., orthogonal) matrices.

It is shown in Appendix IIB that the optimal way of augmenting an orthogonal design with two runs is to choose those runs so that the corresponding two rows of $\underline{X}$ are orthogonal (if p is odd) or as nearly orthogonal as possible (if p is even). Mood's choice (ii) is a particular way of doing this; his choice (i), however, is poor with respect to the $|\underline{X}'\underline{X}|$ criterion.

In every case where it is applicable, the rule of adding two points optimally to an orthogonal design, as discussed in Appendix IIB, yields a design whose $|\underline{X}'\underline{X}|$ matches that of the best design found by the algorithm. The value of the determinant is $n^{k-2}(n+k)^2$ if p is odd, and $n^{k-2}((n+k)^2 - 1)$ if p is even. It was also found that, except for $p \leq 3$, designs obtained by removing two points from an orthogonal design were not optimal.

When $p = 4t$ or $p = 4t + 1$, no orthogonal design in $4t$ runs exists, so the above rule does not apply for ($p = 4t$, $n = 4t + 2$) or ($p = 4t + 1$, $n = 4t + 2$). There were four such cases considered by the algorithm: ($p = 4$, $n = 6$), ($p = 5$, $n = 6$), ($p = 8$, $n = 10$), ($p = 9$, $n = 10$). In the second and fourth of these, the best design found by the algorithm had $|\underline{X}'\underline{X}|$ equal to the known optimum.[16] As far as I know, designs known to be optimal for the other two cases have not been published. It is interesting to note that in these four cases, the value of $|\underline{X}'\underline{X}|$ can be correctly calculated using the formulae in the preceding paragraph, even though these designs cannot be constructed by augmenting an orthogonal design with two runs.

Another point of interest here is that in this case (i.e., when n is of form $4t + 2$) the inverse of $\underline{X}'\underline{X}$ for the best design found by the algorithm

is always composed of two orthogonal blocks. These blocks are equal in size if p is odd, and as nearly equal as possible when p is even.

Case 4. $n = 4t + 3$, where t is an integer.

This is the most difficult case of all. It provided three instances: $(p = 6, n = 15)$, $(p = 6, n = 19)$, $(p = 7, n = 15)$, where the algorithm clearly failed to find an optimum design in the allotted number of tries. In all three of these instances, a design with greater $|\underline{X}'\underline{X}|$ could be constructed by removing a single run from an orthogonal design. (See Appendix IIC.) Mood[9] has, in fact, suggested that the removal of a run from an orthogonal design will yield an optimal design. This suggestion, although true in most cases, failed three times, for $(p = 6, n = 7)$, $(p = 8, n = 11)$, and $(p = 9, n = 11)$. In these three instances, the algorithm constructed designs with greater $|\underline{X}'\underline{X}|$.

Alternatively, one could consider adding three runs to an orthogonal design. Finding the optimal augmentation in this case is rather involved and I shall only remark here that, except for $p \leq 3$, this procedure never yielded an optimal design.

5. TABULATED FIRST-ORDER DESIGNS

Appendix III consists of first-order designs constructed by the algorithm for various values of p and n. These designs are all "best" in the sense that the algorithm could find none with larger $|\underline{X}'\underline{X}|$ in the number of tries allowed.

Only designs for which $n < 1 + p + p(p-1)/2$ are given in Appendix III, since these are probably the cases in which first-order designs have widest application. If $n \geq 1 + p + p(p-1)/2$, there exist second-order

designs, i.e., designs that permit the estimation of all two-factor interactions as well as main effects. If one has confidence in the first-order model, and needs a design with larger value of n than those given in Appendix III, one can still refer to the recommendations of Section 4.

Frequently several distinct "best" designs for given p and n were constructed by the algorithm. In each such case, no more than three of these are presented in Appendix III.

Since all "best" designs for given p and n have the same $|\underline{X}'\underline{X}|$, other criteria were used to order them in the table. A natural choice is the trace of $(\underline{X}'\underline{X})^{-1}$, or, equivalently, the average variance of the coefficients. However, this can be applied in only one case ($p = 9$, $n = 11$). For all other combinations of p and n considered, the average variance of the coefficients was found to be the same for all "best" designs. For that reason, an overall bias criterion, called the "confounding index," was used to rank the "best" designs. This index is defined and discussed below. The following information is presented in the tabulated designs of Appendix III.

Identification

The design identification consists of three integers. The first gives the number of variables (p) and the second gives the number of runs (n). The third integer is used to distinguish among designs with the same p and n. As explained above, the designs are ordered according to the confounding index; those with the lowest overall confounding are generally more desirable and are presented first.

Design Matrix

The design matrix gives the combinations of levels of the variables that are to be run in the experiment. Each row corresponds to a single run. It is assumed that each variable is "coded" (transformed) so that it takes values -1 or 1.

Variance of Fitted Response

This number, when multiplied by σ^2 (the error variance of the individual observations), gives the variance of the fitted response $\hat{y}$ at the corresponding design point. In practice, σ^2 is usually unknown and must be estimated statistically.

$\underline{X}'\underline{X}$ Inverse

This k×k matrix, when multiplied by σ^2, is the variance-covariance matrix for the k estimated coefficients in the first-order model (3.1). If c_{ij} denotes the element in row i and column j of this matrix, then the variance of the ith coefficient is $c_{ii}\ \sigma^2$, and the covariance of the ith and jth coefficients is $c_{ij}\ \sigma^2$. The correlation between the ith and jth coefficients is $c_{ij}/(c_{ii}\ c_{jj})^{\frac{1}{2}}$.

Determinant of $\underline{X}'\underline{X}$

This is the criterion used in the search for "best" designs. According to this criterion, the higher this determinant, the better is the design.

D-Efficiency

I have defined this to be $100(|\underline{X}'\underline{X}|^{1/k}/n)$. It is the relative number of runs (expressed as percent) required by a (possibly nonexistent) orthogonal design to achieve the same $|\underline{X}'\underline{X}|$. When divided by 100 and taken to the kth power, the D-efficiency becomes Webb's "estimation index."[13]

Average Variance of the Coefficients

This is $(1/k)$ trace $(\underline{X}'\underline{X})^{-1}$. It is actually $1/\sigma^2$ times the average variance of the coefficients. This criterion is frequently used as an alternative to the criterion of D-optimality used here.

T-Efficiency

This is defined to be $100(k/(n \text{ trace } (\underline{X}'\underline{X})^{-1}))$. This is the relative number of runs (expressed as percent) required by a (possibly nonexistent) orthogonal design to achieve the same trace $(\underline{X}'\underline{X})^{-1}$. When divided by 100, the T-efficiency is the same as Webb's "fitting index"[13] or Kishen's[6] measure of efficiency.

Maximum Variance of Fitted Response

This number is $1/\sigma^2$ times the maximum variance of the fitted response $\hat{y}(x)$ over the p-dimensional hypercube: $-1 \leq x_i \leq 1$, $i = 1,2,\ldots,p$. It is one indication of the suitability of the design for predicting the response at points not run in the experiment, assuming that the model is correct. (Note: The average variance of $\hat{y}(x)$ over the 2^p corners of the hypercube is just σ^2 trace $(\underline{X}'\underline{X})^{-1}$, which can be obtained directly from the average variance of the coefficients discussed above. If all the variables are quantitative, it may also be of interest to consider the average variance of $\hat{y}$ over the entire volume of the hypercube. This is $V(b_o) + \frac{1}{3}\sum_{i=1}^{p} V(b_i)$, which can be calculated using the diagonal elements of $(\underline{X}'\underline{X})^{-1}$.)

Alias Matrix

This matrix gives the bias associated with each coefficient if the true model is not of the form (3.1) but is instead of the form

$$E(y) = \beta_0 + \beta_1 x_1 + \ldots + \beta_p x_p + \beta_{12} x_1 x_2 + \beta_{13} x_1 x_3 + \ldots + \beta_{p-1,p} x_{p-1} x_p \quad . \tag{3.2}$$

That is, the true model may include not only the "main effects" of the p variables, but also their $\frac{1}{2}p(p-1)$ "two-factor interactions." In this case, if the first-order model (3.1) is assumed, but (3.2) is the true model, the expectation of each estimated coefficient $\hat{\beta}_i$ will be β_i plus some linear combination of all the β_{ij}'s. The coefficients in that linear combination are the elements of the column headed i in the alias matrix. Thus, for example, in design 4.6.2, the expected value of b_1 is $\beta_1 + .5\ \beta_{12} + .5\ \beta_{14} + .5\ \beta_{23} + .5\ \beta_{24} + .5\ \beta_{34}$. The sum of squares of these coefficients is given below each column, in the row marked "SS." This is a rough measure of the degree of aliasing, or "confounding," associated with the estimate of each coefficient.[1]

---

[1] If one is willing to embark on a temporary flight of fancy and assume that the two-factor interaction coefficients are drawn randomly from a population with mean 0 and variance γ^2, this sum of squares measure can be "justified" to some extent. The error in the expectation is then a random variable with mean 0 and variance $A_i\gamma^2$, where A_i is the sum of squares of the coefficients in column i of the alias matrix. Before using a first-order design, the experimenter should be reasonably confident that the size of the main effect coefficients $\{\beta_i\}$ he expects to detect is sufficiently large (relative to $\gamma\sqrt{A_i}$, the "standard error" caused by the interaction coefficients) to "stand out." The value of γ would have to be guessed by the experimenter and would depend on his prior feeling about the overall magnitude of the interactions. I would not now recommend this approach be taken too seriously, except as a first step toward making more precise the broad recommendation that it is all right to assume a first-order model if the two-factor interactions are "not too large" relative to the main effects. In particular situations, of course, enough may be known to identify a few potentially sizeable interactions, and the experiment can be designed to avoid confounding these with the main effects of greatest interest.

At this point, I should remark that any of the first-order designs given here, when "folded over,"[3,7,14] give designs in twice as many runs which possess the property that no main effect coefficient is aliased by a two-factor interaction coefficient. In other words, the alias matrix, as defined above, will be a matrix of 0's. To construct such a design in p variables and 2n runs, say, one would simply use the tables to find a design in p-1 variables and n runs and fold it over. Although such designs are generally not D-optimal, the loss in precision is small compared with the gain achieved by removing the bias caused by two-factor interactions. A more satisfactory alternative, if the experimenter is really worried about two-factor interactions, is to use a design that is D-optimal with respect to model (3.2). I have applied the algorithm discussed here to this problem in a few cases and hope to do a more thorough job in the near future.

Confounding Index

This is defined to be $\left(\sum_{i=1}^{p} A_i\right)/p$, which is the average value of the alias sum of squares over all main effect coefficients, excluding β_o. (One is rarely interested in the degree of confounding associated with β_o.)

APPENDIX I

CHOICE OF ϵ IN THE MAXIMIZATION OF $|\underline{X}'\underline{X} + \epsilon\underline{I}|$

Letting $D(\epsilon) = |\underline{X}'\underline{X} + \epsilon\underline{I}|$, we can expand this determinant by its diagonal elements[1] to obtain:

$$D(\epsilon) = D(0) + \epsilon^k + \sum_{j=1}^{k-1} \epsilon^j \quad \begin{pmatrix}\text{sum of all principal minors} \\ \text{of } \underline{X}'\underline{X} \text{ of order } k-j\end{pmatrix} .$$

Since any principal minor of $\underline{X}'\underline{X}$ of order k-j is just the determinant of $\underline{X}^{*\prime}\underline{X}^*$, where $\underline{X}^*$ is obtained from $\underline{X}$ by deleting j columns, its value cannot exceed n^{k-j}. Thus,

$$\begin{aligned} D(\epsilon) - D(0) &\leq \epsilon^k + \sum_{j=1}^{k-1} \epsilon^j \binom{k}{k-j} n^{k-j} \\ &= \sum_{j=1}^{k} \epsilon^j \binom{k}{k-j} n^{k-j} \\ &= (\epsilon + n)^k - n^k \\ &= n^k \left((1 + \epsilon/n)^k - 1\right) . \end{aligned}$$

To obtain a rough estimate of the proportional error, suppose $\underline{X}$ is orthogonal, so $D(0) = n^k$. Then the proportional error $(D(\epsilon) - D(0))/D(0)$ is $(1 + \epsilon/n)^k - 1$, or approximately $k\epsilon/n$ for small ϵ/n. In the construction of the designs given in this report, I chose $k\epsilon/n = .1$, i.e., $\epsilon = (.1n)/k$. For values of ϵ much smaller than this, I occasionally experienced computational difficulties within the algorithm.

APPENDIX II

A. ADDING ONE RUN TO AN ORTHOGONAL 2-LEVEL FIRST-ORDER DESIGN

Let $\underline{X}$ be the "matrix of independent variables" corresponding to an initial design. If a run at the point x_a is added to the initial design, the new matrix of independent variables is $\underline{\tilde{X}} = \begin{bmatrix} \underline{X} \\ \underline{f}(x_a)' \end{bmatrix}$. The following relationship between $|\underline{\tilde{X}}'\underline{\tilde{X}}|$ and $|\underline{X}'\underline{X}|$ can be shown:[14,15]

$$|\underline{\tilde{X}}'\underline{\tilde{X}}| = |\underline{X}'\underline{X}| \, (1 + \underline{f}(x_a)' \, (\underline{X}'\underline{X})^{-1} \, \underline{f}(x_a)) \quad . \tag{A2.1}$$

If $\underline{X}$ is an orthogonal $n \times k$ matrix whose elements are ± 1, then $|\underline{X}'\underline{X}| = n^k$ and $(\underline{X}'\underline{X})^{-1} = \frac{1}{n} \underline{I}$, where $\underline{I}$ is the $k \times k$ identity matrix. Thus, $|\underline{\tilde{X}}'\underline{\tilde{X}}| = n^k(1 + \frac{1}{n} \underline{f}(x_a)' \, \underline{f}(x_a))$. This is maximized when x_a is any of the 2^p corner points of the p-dimensional hypercube: $-1 \le x_i \le 1$. Thus, the maximum $|\underline{\tilde{X}}'\underline{\tilde{X}}|$ is $n^k(1 + k/n) = n^{k-1}(n + k)$.

B. ADDING TWO RUNS TO AN ORTHOGONAL 2-LEVEL FIRST-ORDER DESIGN

Beginning with the same formulation as above, we now suppose the initial design is augmented with m runs, so $X = \begin{bmatrix} \underline{X} \\ \underline{A}' \end{bmatrix}$ where $\underline{A}'$ is an $m \times k$ matrix. Let $\underline{V} = (\underline{X}'\underline{X})^{-1}$ and $\underline{\tilde{V}} = (\underline{\tilde{X}}'\underline{\tilde{X}})^{-1}$. By a theorem due to Plackett,[10]

$$\underline{\tilde{V}} = \underline{V} - \underline{VA} \, (\underline{I} + \underline{A}'\underline{VA})^{-1} \, \underline{A}'\underline{V} \quad . \tag{A2.2}$$

Now consider the partitioned matrix:

$$\underline{H} = \begin{bmatrix} \underline{V} & \underline{VA} \\ \underline{A}'\underline{V} & \underline{I} + \underline{A}'\underline{VA} \end{bmatrix} .$$

The determinant of $\underline{H}$ can be determined in two ways, using the fact that, for a general partitioned matrix,

$$\begin{vmatrix} \underline{A}_{11} & \underline{A}_{12} \\ \underline{A}_{21} & \underline{A}_{22} \end{vmatrix} = |\underline{A}_{22}| \; |\underline{A}_{11} - \underline{A}_{12} \underline{A}_{22}^{-1} \underline{A}_{21}|$$

$$= |\underline{A}_{11}| \; |\underline{A}_{22} - \underline{A}_{21} \underline{A}_{11}^{-1} \underline{A}_{12}| \quad ,$$

as long as $\underline{A}_{11}$ and $\underline{A}_{22}$ are nonsingular. Thus,

$$|\underline{H}| = |\underline{I} + \underline{A}'\underline{VA}| \; |\underline{V} - \underline{VA} \; (\underline{I} + \underline{A}'\underline{VA})^{-1} \underline{A}'\underline{V}| = |\underline{I} + \underline{A}'\underline{VA}| \; |\underline{\tilde{V}}| \tag{A2.3}$$

and

$$|\underline{H}| = |\underline{V}| \; |\underline{I} + \underline{A}'\underline{VA} - \underline{A}'\underline{VV}^{-1}\underline{VA}| = |\underline{V}| \quad . \tag{A2.4}$$

Combining (A2.3) and (A2.4), we obtain

$$|\underline{V}| = |\underline{I} + \underline{A}'\underline{VA}| \; |\underline{\tilde{V}}| \quad , \qquad \text{or}$$

$$|\underline{\tilde{X}}'\underline{\tilde{X}}| = |\underline{X}'\underline{X}| \; |\underline{I} + \underline{A}'(\underline{X}'\underline{X})^{-1}\underline{A}| \quad . \tag{A2.5}$$

This is a generalization of Wynn's[15] and Dykstra's[4] formula for a single-run augmentation.

In the special case considered here, $\underline{X}'\underline{X} = n\underline{I}$ and $\underline{A}' = \begin{bmatrix} \underline{a}_1' \\ \underline{a}_2' \end{bmatrix}$ so

$$|\underline{\tilde{X}}'\underline{\tilde{X}}| = n^k \; |\underline{I} + \frac{1}{n} \underline{A}'\underline{A}| \quad .$$

Let $\underline{A}'\underline{A} = \begin{bmatrix} a_{11} & a_{12} \\ a_{12} & a_{22} \end{bmatrix}$, where $a_{ij} = \underline{a}_j' \, \underline{a}_j$.

Then $|\underline{I} + \frac{1}{n} \underline{A}'\underline{A}| = \begin{vmatrix} 1 + a_{11}/n & a_{12}/n \\ a_{12}/n & 1 + a_{22}/n \end{vmatrix}$.

We need to choose $\underline{A}'$ to maximize this determinant. Since the model is of first order, we can restrict consideration to corners of the p-dimensional hypercube: $-1 \le x_i \le 1$, so $a_{11} = a_{22} = k$. Maximization of $|\underline{\tilde{X}}'\underline{\tilde{X}}|$ is therefore achieved by minimizing $|a_{12}|$.

(i) When k is even, this can be done by choosing $\underline{a}_1'$ and $\underline{a}_2'$ orthogonal to each other. In this case, $|\underline{\tilde{X}}'\underline{\tilde{X}}| = n^k (1 + k/n)^2 = n^{k-2}(n + k)^2$.

(ii) When k is odd, $\underline{a}_1'$ and $\underline{a}_2'$ should be chosen as nearly orthogonal as possible, so that $a_{12} = \pm 1$. In this case $|\underline{X}'\underline{X}| = n^k((1 + k/n)^2 - 1/n^2) = n^{k-2}((n + k)^2 - 1)$.

C. REMOVING ONE RUN FROM AN ORTHOGONAL 2-LEVEL FIRST-ORDER DESIGN

It can be readily verified if $\underline{\tilde{X}} = \begin{bmatrix} \underline{X} \\ \underline{A}' \end{bmatrix}$, then

$$\underline{V} = \underline{\tilde{V}} + \underline{\tilde{V}A}\,(\underline{I} - \underline{A}'\underline{\tilde{V}A})^{-1}\,\underline{A}'\underline{\tilde{V}} \qquad \text{(A2.6)}$$

where $\underline{V} = (\underline{X}'\underline{X})^{-1}$ and $\underline{\tilde{V}} = (\underline{\tilde{X}}'\underline{\tilde{X}})^{-1}$. Then if $\underline{A}'$ corresponds to the runs removed from an initial design, Eq. (A2.6) gives the new $(\underline{X}'\underline{X})^{-1}$ matrix in terms of the old.

We now consider the partitioned matrix:

$$\underline{H} = \begin{bmatrix} \underline{\tilde{V}} & -\underline{\tilde{V}A} \\ \underline{A}'\underline{\tilde{V}} & \underline{I} - \underline{A}'\underline{\tilde{V}A} \end{bmatrix},$$

from which we determine, using the same approach as in Appendix IIB above,

$$|\underline{\tilde{V}}| = |\underline{I} - \underline{A}'\underline{\tilde{V}A}|\;|\underline{V}|\;, \quad \text{or}$$

$$|\underline{X}'\underline{X}| = |\underline{\tilde{X}}'\underline{\tilde{X}}|\;|\underline{I} - \underline{A}'\,(\underline{\tilde{X}}'\underline{\tilde{X}})^{-1}\underline{A}|\;.$$

In the special case considered here, $\underline{\tilde{X}}'\underline{\tilde{X}} = n\underline{I}$, where n is the number of runs in the orthogonal design $\underline{\tilde{X}}$, and $\underline{A}' = \underline{f}(x_a)'$, where x_a is the point removed from $\underline{\tilde{X}}$. The determinant of the new design is therefore $n^k (1 - k/n) = n^{k-1} (n - k)$.

APPENDIX III. TABLES OF FIRST-ORDER DESIGNS

The "best" designs constructed by the algorithm are tabulated here. See Section 5 for a brief description of the information presented. Specific comments about individual cases are given in Table A1 below. Most of these comments are of an academic nature; however, those marked with an asterisk should be read by the user.

Table A1. Comments on Specific Designs Tabulated in This Appendix (Asterisks indicate cases in which an alternative design is recommended)

Number of Variables	Number of Runs	
2	3	Known optimal.[2,9]
3	4	Orthogonal, hence known optimal. The design given is a 2^{3-1} fractional factorial with generating relation I = 123. (See ref. 3.)
3	5	
3	6	
4	5	Known optimal.[2,9]
4	6	
4	7	The superiority of Design 4.7.1 over Design 4.7.2 with respect to confounding is due to the fact that the latter can be constructed by removing one run from a fractional factorial design of "resolution III" (see ref. 3), while the former can be constructed by removing one run from a design of "resolution IV."
4	8	Orthogonal, hence known optimal. Design 4.8.1 is the 2^{4-1} fractional factorial with generating relation I = 1234.

Table A1 (continued)

Number of Variables	Number of Runs	
4	9	Design 4.9.1 can be constructed by adding one run to a fractional factorial design of resolution IV, while the "base design" for Design 4.9.2 is a fractional factorial of resolution III.
4	10	*Design 4.10.1 can be constructed by adding two runs to a fractional factorial design of resolution IV. Note that one of the two additional runs is a repeat of one of the runs of the resolution IV base design. Less confounding could be achieved if the two additional runs were chosen so there were no duplicate runs.
5	6	Known optimal.[2,9,16] Note that this design is superior to Raghavarao's[12] best design for this case, since he has restricted attention to designs for which the variances of the coefficients are all equal, and the covariances of the coefficients are all equal.
5	7	
5	8	Orthogonal, hence known optimal. The generating relation for this fractional factorial design is I = 145 = -234.
5	9	
5	10	
5	11	
5	12	Orthogonal, hence known optimal.
5	13	
5	14	
5	15	*A design with less confounding could be constructed by removing one run from the 2^{5-1} fractional factorial design with generating relation I = 12345.

Table A1 (continued)

Number of Variables	Number of Runs	
6	7	Known optimal.[2,9] Cannot be constructed by removing a run from an orthogonal design.
6	8	Orthogonal, hence known optimal. The generating relation for this fractional factorial design is I = -123 = 146 = 245.
6	9	
6	10	
6	11	
6	12	Orthogonal, hence known optimal.
6	13	
6	14	
6	15	*<u>These designs are not D-optimal</u>. I would recommend instead dropping one run from the 2^{6-2} fractional factorial design with defining relation I = 1234 = 1256 = 3456.
6	16	*Orthogonal, hence known optimal. This is an example of a 16-run orthogonal design with partial confounding (as opposed to the "regular" fractional factorials, for which all the elements in the alias matrix are 0 or ± 1). A design with less confounding is the 2^{6-2} fractional factorial design with defining relation I = 1234 = 1256 = 3456.
6	17	*A design with less confounding could be constructed by adding one run to the 2^{6-2} design with defining relation I = 1234 = 1256 = 3456.
6	18	*A design with less confounding could be constructed by adding two runs to the 2^{6-2} design with defining relation I = 1234 = 1256 = 3456.

Table A1 (continued)

Number of Variables	Number of Runs	
6	19	*These designs are not D-optimal. I would recommend instead dropping one run from an orthogonal 20-run design.
6	20	Orthogonal, hence known optimal.
7	8	Orthogonal, hence known optimal. The generating relation for this fractional factorial design is I = -124 = -235 = -346 = -137.
7	9	
7	10	
7	11	
7	12	Orthogonal, hence known optimal.
7	13	
7	14	
7	15	*These designs are not D-optimal. I would recommend instead dropping one run from a 2^{7-3} fractional factorial of resolution IV, e.g., one with generating relation I = 1235 = 1246 = 1347.
7	16	*Orthogonal, hence known optimal. This is an example of a 16-run orthogonal design with both partial and complete confounding. A design with less confounding is the 2^{7-3} fractional factorial design with defining relation I = 1235 = 1246 = 1347.
8	9	
8	10	
8	11	Cannot be constructed by removing a run from an orthogonal design.
8	12	Orthogonal, hence known optimal.
9	10	Known optimal.[16]

Table A1 (continued)

Number of Variables	Number of Runs	
9	11	Cannot be constructed by removing a run from an orthogonal design.
9	12	Orthogonal, hence known optimal.

DESIGN (2. 3. 1)

2 VARIABLES 3 PARAMETERS 3 RUNS

DESIGN MATRIX

X(1)	X(2)	VARIANCE OF FITTED RESPONSE
1.	1.	1.0000
-1.	1.	1.0000
-1.	-1.	1.0000

X'X INVERSE

0.5000	0.2500	-0.2500
0.2500	0.5000	-0.2500
-0.2500	-0.2500	0.5000

DET(X'X) = 0.1600000000D 02

D-EFFICIENCY= 84.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.5000

T-EFFICIENCY= 66.7

MAXIMUM VARIANCE OF FITTED RESPONSE= 3.0000

DESIGN (2. 3. 1)

ALIAS MATRIX

	0	1	2
12	1.0000	1.0000	-1.0000
SS	1.0000	1.0000	1.0000

CONFOUNDING INDEX= 1.0000

DESIGN (3. 4. 1)

3 VARIABLES 4 PARAMETERS 4 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	VARIANCE OF FITTED RESPONSE
1.	1.	1.	1.0000
1.	-1.	-1.	1.0000
-1.	1.	-1.	1.0000
-1.	-1.	1.	1.0000

X'X INVERSE

0.2500	0.0	0.0	0.0
0.0	0.2500	0.0	0.0
0.0	0.0	0.2500	0.0
0.0	0.0	0.0	0.2500

DET(X'X) = 0.2560000000D 03

D-EFFICIENCY= 100.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.2500

T-EFFICIENCY= 100.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.0000

DESIGN (3. 4. 1)

ALIAS MATRIX

	0	1	2	3
12	0.0	0.0	0.0	1.0000
13	0.0	0.0	1.0000	0.0
23	0.0	1.0000	0.0	0.0
SS	0.0	1.0000	1.0000	1.0000

CONFOUNDING INDEX= 1.0000

DESIGN (3. 5. 1)

3 VARIABLES 4 PARAMETERS 5 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	VARIANCE OF FITTED RESPONSE
1.	1.	-1.	0.5000
-1.	1.	-1.	0.8750
1.	1.	1.	0.8750
-1.	-1.	1.	0.8750
1.	-1.	-1.	0.8750

X'X INVERSE

0.2188	-0.0312	-0.0313	0.0313
-0.0313	0.2188	-0.0313	0.0313
-0.0313	-0.0313	0.2188	0.0313
0.0312	0.0313	0.0313	0.2188

DET(X'X) = 0.5120000000D 03

D-EFFICIENCY= 95.1

AVERAGE VARIANCE OF COEFFICIENTS= 0.2188

T-EFFICIENCY= 91.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.0000

DESIGN (3. 5. 1)

ALIAS MATRIX

	0	1	2	3
12	0.2500	0.2500	0.2500	0.7500
13	-0.2500	-0.2500	0.7500	0.2500
23	-0.2500	0.7500	-0.2500	0.2500
SS	0.1875	0.6875	0.6875	0.6875

CONFOUNDING INDEX= 0.6875

DESIGN (3. 6. 1)

3 VARIABLES 4 PARAMETERS 6 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	VARIANCE OF FITTED RESPONSE
1.	1.	1.	0.7500
1.	-1.	1.	0.5000
-1.	1.	1.	0.5000
1.	-1.	-1.	0.7500
-1.	-1.	1.	0.7500
-1.	1.	-1.	0.7500

X'X INVERSE

0.1875	0.0	0.0	-0.0625
0.0	0.1875	0.0625	0.0
0.0	0.0625	0.1875	0.0
-0.0625	0.0	0.0	0.1875

DET(X'X) = 0.1024000000D 04

D-EFFICIENCY= 94.3

AVERAGE VARIANCE OF COEFFICIENTS= 0.1875

T-EFFICIENCY= 88.9

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.0000

DESIGN (3. 6. 1)

ALIAS MATRIX

	0	1	2	3
12	-0.5000	0.0	0.0	0.5000
13	0.0	0.5000	0.5000	0.0
23	0.0	0.5000	0.5000	0.0
SS	0.2500	0.5000	0.5000	0.2500

CONFOUNDING INDEX= 0.4167

DESIGN (3. 6. 2)

3 VARIABLES 4 PARAMETERS 6 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	VARIANCE OF FITTED RESPONSE
-1.	1.	-1.	0.5000
-1.	1.	-1.	0.5000
-1.	-1.	1.	0.5000
1.	1.	1.	1.0000
1.	-1.	-1.	1.0000
-1.	-1.	1.	0.5000

X'X INVERSE

0.1875	0.0625	0.0	0.0
0.0625	0.1875	0.0	0.0
0.0	0.0	0.1875	0.0625
0.0	0.0	0.0625	0.1875

DET(X'X) = 0.1024000000D 04

D-EFFICIENCY= 94.3

AVERAGE VARIANCE OF COEFFICIENTS= 0.1875

T-EFFICIENCY= 88.9

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.0000

DESIGN (3. 6. 2)

ALIAS MATRIX

	0	1	2	3
12	0.0	0.0	0.0	1.0000
13	0.0	0.0	1.0000	-0.0000
23	0.0	1.0000	0.0	0.0
SS	0.0	1.0000	1.0000	1.0000

CONFOUNDING INDEX= 1.0000

DESIGN (4. 5. 1)

4 VARIABLES 5 PARAMETERS 5 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	VARIANCE OF FITTED RESPONSE
-1.	1.	-1.	-1.	1.0000
1.	1.	-1.	1.	1.0000
-1.	-1.	1.	1.	1.0000
1.	-1.	-1.	-1.	1.0000
1.	1.	1.	-1.	1.0000

X'X INVERSE

0.2222	-0.0278	-0.0278	0.0278	0.0278
-0.0278	0.2222	-0.0278	0.0278	0.0278
-0.0278	-0.0278	0.2222	0.0278	0.0278
0.0278	0.0278	0.0278	0.2222	-0.0278
0.0278	0.0278	0.0278	-0.0278	0.2222

DET(X'X) = 0.2304000000D 04

D-EFFICIENCY= 94.1

AVERAGE VARIANCE OF COEFFICIENTS= 0.2222

T-EFFICIENCY= 90.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.2222

DESIGN (4. 5. 1)

ALIAS MATRIX

	0	1	2	3	4
12	0.3333	0.3333	0.3333	0.6667	0.6667
13	-0.3333	-0.3333	0.6667	0.3333	-0.6667
14	-0.3333	-0.3333	0.6667	-0.6667	0.3333
23	-0.3333	0.6667	-0.3333	0.3333	-0.6667
24	-0.3333	0.6667	-0.3333	-0.6667	0.3333
34	0.3333	-0.6667	-0.6667	-0.3333	-0.3333
SS	0.6667	1.6667	1.6667	1.6667	1.6667

CONFOUNDING INDEX= 1.6667

DESIGN (4. 6. 1)

4 VARIABLES 5 PARAMETERS 6 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	VARIANCE OF FITTED RESPONSE
1.	-1.	-1.	1.	0.8000
-1.	1.	-1.	-1.	0.8000
1.	1.	1.	1.	0.9500
1.	-1.	1.	-1.	0.9500
-1.	-1.	1.	1.	0.9500
-1.	1.	1.	-1.	0.5500

X'X INVERSE

0.1875	0.0	0.0	-0.0625	0.0
0.0	0.2000	0.0500	0.0	-0.0500
0.0	0.0500	0.2000	0.0	0.0500
-0.0625	0.0	0.0	0.1875	0.0
0.0	-0.0500	0.0500	0.0	0.2000

DET(X'X) = 0.5120000000D 04

D-EFFICIENCY= 92.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.1950

T-EFFICIENCY= 85.5

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.2000

DESIGN (4. 6. 1)

ALIAS MATRIX

	0	1	2	3	4
12	-0.5000	-0.2000	0.2000	0.5000	0.8000
13	0.0	0.6000	0.4000	0.0	-0.4000
14	0.5000	0.2000	0.8000	-0.5000	0.2000
23	0.0	0.4000	0.6000	0.0	0.4000
24	-0.5000	0.8000	0.2000	0.5000	-0.2000
34	0.0	-0.4000	0.4000	0.0	0.6000
SS	0.7500	1.4000	1.4000	0.7500	1.4000

CONFOUNDING INDEX= 1.2375

DESIGN (4. 6. 2)

4 VARIABLES 5 PARAMETERS 6 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	VARIANCE OF FITTED RESPONSE
1.	-1.	-1.	-1.	0.9500
1.	1.	-1.	1.	0.5500
-1.	1.	1.	-1.	0.9500
1.	1.	1.	1.	0.8000
-1.	1.	-1.	1.	0.8000
-1.	-1.	1.	1.	0.9500

X'X INVERSE

0.2000	0.0	-0.0500	0.0	-0.0500
0.0	0.1875	0.0	0.0625	0.0
-0.0500	0.0	0.2000	0.0	-0.0500
0.0	0.0625	0.0	0.1875	0.0
-0.0500	0.0	-0.0500	0.0	0.2000

DET(X'X)= 0.5120000000D 04

D-EFFICIENCY= 92.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.1950

T-EFFICIENCY= 85.5

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.2000

DESIGN (4. 6. 2)

ALIAS MATRIX

	0	1	2	3	4
12	-0.2000	0.5000	-0.2000	0.5000	0.8000
13	-0.6000	0.0	0.4000	0.0	0.4000
14	-0.2000	0.5000	0.8000	0.5000	-0.2000
23	0.2000	0.5000	0.2000	0.5000	-0.8000
24	0.2000	0.5000	0.2000	-0.5000	0.2000
34	Q.2000	0.5000	-0.8000	0.5000	0.2000
SS	0.5600	1.2500	1.5600	1.2500	1.5600

CONFOUNDING INDEX= 1.4050

DESIGN (4. 7. 1)

4 VARIABLES 5 PARAMETERS 7 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	VARIANCE OF FITTED RESPONSE
1.	1.	-1.	1.	0.6667
-1.	-1.	1.	-1.	0.6667
1.	-1.	-1.	-1.	0.6667
-1.	-1.	-1.	1.	0.6667
1.	1.	1.	-1.	0.6667
-1.	1.	1.	1.	0.6667
1.	-1.	1.	1.	1.0000

X'X INVERSE

0.1667	-0.0417	0.0417	-0.0417	-0.0417
-0.0417	0.1667	-0.0417	0.0417	0.0417
0.0417	-0.0417	0.1667	-0.0417	-0.0417
-0.0417	0.0417	-0.0417	0.1667	0.0417
-0.0417	0.0417	-0.0417	0.0417	0.1667

DET(X'X) = 0.1228800000D 05

D-EFFICIENCY= 93.9

AVERAGE VARIANCE OF COEFFICIENTS= 0.1667

T-EFFICIENCY= 85.7

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.6667

DESIGN (4. 7. 1)

ALIAS MATRIX

	0	1	2	3	4
12	0.3333	-0.3333	0.3333	-0.3333	-0.3333
13	-0.3333	0.3333	-0.3333	0.3333	0.3333
14	-0.3333	0.3333	-0.3333	0.3333	0.3333
23	0.3333	-0.3333	0.3333	-0.3333	-0.3333
24	0.3333	-0.3333	0.3333	-0.3333	-0.3333
34	-0.3333	0.3333	-0.3333	0.3333	0.3333
SS	0.6667	0.6667	0.6667	0.6667	0.6667

CONFOUNDING INDEX= 0.6667

DESIGN (4. 7. 2)

4 VARIABLES 5 PARAMETERS 7 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	VARIANCE OF FITTED RESPONSE
1.	1.	-1.	1.	0.6667
-1.	1.	-1.	1.	0.6667
-1.	-1.	1.	1.	0.6667
-1.	-1.	-1.	-1.	1.0000
-1.	1.	1.	-1.	0.6667
1.	-1.	1.	1.	0.6667
1.	1.	1.	-1.	0.6667

X'X INVERSE

0.1667	0.0417	-0.0417	-0.0417	-0.0417
0.0417	0.1667	-0.0417	-0.0417	-0.0417
-0.0417	-0.0417	0.1667	0.0417	0.0417
-0.0417	-0.0417	0.0417	0.1667	0.0417
-0.0417	-0.0417	0.0417	0.0417	0.1667

DET(X'X) = 0.1228800000D 05

D-EFFICIENCY= 93.9

AVERAGE VARIANCE OF COEFFICIENTS= 0.1667

T-EFFICIENCY= 85.7

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.6667

DESIGN (4. 7. 2)

ALIAS MATRIX

	0	1	2	3	4
12	0.3333	0.3333	-0.3333	-0.3333	-0.3333
13	0.3333	0.3333	-0.3333	-0.3333	-0.3333
14	0.3333	0.3333	-0.3333	-0.3333	-0.3333
23	0.0	-0.0000	0.0000	0.0000	-1.0000
24	-0.0000	-0.0000	0.0000	-1.0000	0.0000
34	-0.0000	-0.0000	-1.0000	0.0000	0.0000
SS	0.3333	0.3333	1.3333	1.3333	1.3333

CONFOUNDING INDEX= 1.0833

DESIGN (4. 8. 1)

4 VARIABLES 5 PARAMETERS 8 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	VARIANCE OF FITTED RESPONSE
-1.	-1.	-1.	-1.	0.6250
-1.	1.	1.	-1.	0.6250
1.	1.	1.	1.	0.6250
-1.	-1.	1.	1.	0.6250
-1.	1.	-1.	1.	0.6250
1.	1.	-1.	-1.	0.6250
1.	-1.	-1.	1.	0.6250
1.	-1.	1.	-1.	0.6250

X'X INVERSE

0.1250	0.0	0.0	0.0	0.0
0.0	0.1250	0.0	0.0	0.0
0.0	0.0	0.1250	0.0	0.0
0.0	0.0	0.0	0.1250	0.0
0.0	0.0	0.0	0.0	0.1250

DET(X'X) = 0.3276800000D 05

D-EFFICIENCY= 100.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.1250

T-EFFICIENCY= 100.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.6250

DESIGN (4. 8. 1)

ALIAS MATRIX

	0	1	2	3	4
12	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0
34	0.0	0.0	0.0	0.0	0.0
SS	0.0	0.0	0.0	0.0	0.0

CONFOUNDING INDEX= 0.0

DESIGN (4. 8. 2)

4 VARIABLES 5 PARAMETERS 8 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	VARIANCE OF FITTED RESPONSE
-1.	-1.	1.	1.	0.6250
-1.	1.	-1.	1.	0.6250
1.	1.	1.	1.	0.6250
1.	1.	1.	-1.	0.6250
1.	-1.	-1.	-1.	0.6250
-1.	-1.	1.	-1.	0.6250
-1.	1.	-1.	-1.	0.6250
1.	-1.	-1.	1.	0.6250

X'X INVERSE

0.1250	0.0	0.0	0.0	0.0
0.0	0.1250	0.0	0.0	0.0
0.0	0.0	0.1250	0.0	0.0
0.0	0.0	0.0	0.1250	0.0
0.0	0.0	0.0	0.0	0.1250

DET(X'X) = 0.3276800000D 05

D-EFFICIENCY= 100.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.1250

T-EFFICIENCY= 100.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.6250

DESIGN (4. 8. 2)

ALIAS MATRIX

	0	1	2	3	4
12	0.0	0.0	0.0	1.0000	0.0
13	0.0	0.0	1.0000	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0
23	0.0	1.0000	0.0	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0
34	0.0	0.0	0.0	0.0	0.0
SS	0.0	1.0000	1.0000	1.0000	0.0

CONFOUNDING INDEX= 0.7500

DESIGN (4. 9. 1)

4 VARIABLES 5 PARAMETERS 9 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	VARIANCE OF FITTED RESPONSE
-1.	-1.	1.	1.	0.6154
1.	-1.	1.	-1.	0.6154
1.	-1.	-1.	1.	0.5385
-1.	-1.	-1.	-1.	0.6154
1.	1.	1.	1.	0.5385
1.	1.	-1.	-1.	0.5385
1.	1.	-1.	1.	0.3846
-1.	1.	-1.	1.	0.5385
-1.	1.	1.	-1.	0.6154

X'X INVERSE

0.1154	-0.0096	-0.0096	0.0096	-0.0096
-0.0096	0.1154	-0.0096	0.0096	-0.0096
-0.0096	-0.0096	0.1154	0.0096	-0.0096
0.0096	0.0096	0.0096	0.1154	0.0096
-0.0096	-0.0096	-0.0096	0.0096	0.1154

DET(X'X) = 0.5324800000D 05

D-EFFICIENCY= 98.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.1154

T-EFFICIENCY= 96.3

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.6154

DESIGN (4. 9. 1)

ALIAS MATRIX

	0	1	2	3	4
12	0.0769	0.0769	0.0769	-0.0769	0.0769
13	-0.0769	-0.0769	-0.0769	0.0769	-0.0769
14	0.0769	0.0769	0.0769	-0.0769	0.0769
23	-0.0769	-0.0769	-0.0769	0.0769	-0.0769
24	0.0769	0.0769	0.0769	-0.0769	0.0769
34	-0.0769	-0.0769	-0.0769	0.0769	-0.0769
SS	0.0355	0.0355	0.0355	0.0355	0.0355

CONFOUNDING INDEX= 0.0355

DESIGN (4. 9. 2)

4 VARIABLES 5 PARAMETERS 9 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	VARIANCE OF FITTED RESPONSE
-1.	-1.	-1.	-1.	0.5385
-1.	1.	1.	1.	0.6154
1.	1.	1.	-1.	0.6154
-1.	-1.	1.	-1.	0.3846
1.	-1.	1.	-1.	0.5385
-1.	1.	-1.	-1.	0.6154
1.	1.	-1.	1.	0.5385
1.	-1.	-1.	1.	0.6154
-1.	-1.	1.	1.	0.5385

X'X INVERSE

0.1154	0.0096	0.0096	-0.0096	0.0096
0.0096	0.1154	-0.0096	0.0096	-0.0096
0.0096	-0.0096	0.1154	0.0096	-0.0096
-0.0096	0.0096	0.0096	0.1154	0.0096
0.0096	-0.0096	-0.0096	0.0096	0.1154

DET(X'X)= 0.5324800000D 05

D-EFFICIENCY= 98.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.1154

T-EFFICIENCY= 96.3

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.6154

DESIGN (4. 9. 2)

ALIAS MATRIX

	0	1	2	3	4
12	0.0769	-0.0769	-0.0769	0.0769	-0.0769
13	-0.1538	0.1538	0.1538	-0.1538	-0.8462
14	0.1538	-0.1538	-0.1538	-0.8462	-0.1538
23	-0.0769	0.0769	0.0769	-0.0769	0.0769
24	0.0769	-0.0769	-0.0769	0.0769	-0.0769
34	-0.1538	-0.8462	0.1538	-0.1538	0.1538
SS	0.0888	0.7811	0.0888	0.7811	0.7811

CONFOUNDING INDEX= 0.6080

DESIGN (4.10. 1)

4 VARIABLES 5 PARAMETERS 10 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	VARIANCE OF FITTED RESPONSE
1.	1.	-1.	1.	0.3810
-1.	-1.	1.	1.	0.3810
1.	1.	1.	-1.	0.6071
-1.	1.	-1.	-1.	0.6071
1.	-1.	-1.	-1.	0.6071
1.	1.	-1.	1.	0.3810
-1.	-1.	-1.	1.	0.5238
1.	-1.	1.	1.	0.5238
-1.	1.	1.	1.	0.5238
-1.	-1.	1.	-1.	0.4643

X'X INVERSE

0.1042	0.0	0.0	0.0	-0.0208
0.0	0.1071	-0.0179	0.0179	0.0
0.0	-0.0179	0.1071	0.0179	0.0
0.0	0.0179	0.0179	0.1071	0.0
-0.0208	0.0	0.0	0.0	0.1042

DET(X'X) = 0.8601600000D 05

D-EFFICIENCY= 97.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.1060

T-EFFICIENCY= 94.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.6071

DESIGN (4.10. 1)

ALIAS MATRIX

	0	1	2	3	4
12	0.1667	0.0	0.0	0.0	0.1667
13	-0.1667	0.0	0.0	0.0	-0.1667
14	0.0	0.1429	0.1429	-0.1429	0.0
23	-0.1667	0.0	0.0	0.0	-0.1667
24	0.0	0.1429	0.1429	-0.1429	0.0
34	0.0	-0.1429	-0.1429	0.1429	0.0
SS	0.0833	0.0612	0.0612	0.0612	0.0833

CONFOUNDING INDEX= 0.0668

DESIGN (4.10. 2)

4 VARIABLES 5 PARAMETERS 10 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	VARIANCE OF FITTED RESPONSE
-1.	-1.	1.	-1.	0.4643
1.	-1.	1.	1.	0.5238
1.	1.	-1.	-1.	0.6071
-1.	-1.	-1.	-1.	0.3810
-1.	1.	1.	-1.	0.6071
1.	-1.	1.	-1.	0.3810
1.	-1.	-1.	-1.	0.4643
-1.	1.	-1.	1.	0.5238
-1.	-1.	-1.	1.	0.5238
1.	1.	1.	1.	0.5238

X'X INVERSE

0.1071	0.0	0.0179	0.0	0.0179
0.0	0.1042	0.0	-0.0208	0.0
0.0179	0.0	0.1071	0.0	-0.0179
0.0	-0.0208	0.0	0.1042	0.0
0.0179	0.0	-0.0179	0.0	0.1071

DET(X'X)= 0.8601600000D 05

D-EFFICIENCY= 97.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.1060

T-EFFICIENCY= 94.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.6071

DESIGN (4.10. 2)

ALIAS MATRIX

	0	1	2	3	4
12	0.0	-0.1667	0.0	-0.1667	0.0
13	0.2857	0.0	-0.2857	0.0	0.7143
14	0.0	-0.3333	0.0	0.6667	0.0
23	0.0	-0.1667	0.0	-0.1667	0.0
24	0.1429	0.0	-0.1429	0.0	-0.1429
34	0.0	0.6667	0.0	-0.3333	0.0
SS	0.1020	0.6111	0.1020	0.6111	0.5306

CONFOUNDING INDEX= 0.4637

DESIGN (4.10. 3)

4 VARIABLES 5 PARAMETERS 10 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	VARIANCE OF FITTED RESPONSE
1.	-1.	1.	-1.	0.5238
1.	1.	-1.	1.	0.6071
1.	1.	1.	1.	0.4643
-1.	1.	1.	-1.	0.6071
-1.	-1.	-1.	1.	0.5238
-1.	-1.	-1.	-1.	0.3810
1.	-1.	1.	1.	0.3810
1.	-1.	-1.	-1.	0.5238
-1.	-1.	1.	1.	0.5238
-1.	1.	-1.	-1.	0.4643

X'X INVERSE

0.1042	0.0	0.0208	0.0	0.0
0.0	0.1071	0.0	-0.0179	-0.0179
0.0208	0.0	0.1042	0.0	0.0
0.0	-0,0179	0.0	0.1071	-0.0179
0.0	-0.0179	0.0	-0.0179	0.1071

DET(X'X)= 0.8601600000D 05

D-EFFICIENCY= 97.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.1060

T-EFFICIENCY= 94.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.6071

DESIGN (4.10. 3)

ALIAS MATRIX

	0	1	2	3	4
12	0.0	-0.2857	0.0	-0.2857	0.7143
13	0.1667	0.0	-0.1667	0.0	0.0
14	0.3333	0.0	0.6667	0.0	0.0
23	0.0	-0.1429	0.0	-0.1429	-0.1429
24	0.0	0.7143	0.0	-0.2857	-0.2857
34	0.1667	0.0	-0.1667	0.0	0.0
SS	0.1667	0.6122	0.5000	0.1837	0.6122

CONFOUNDING INDEX= 0.4770

DESIGN (5. 6. 1)

5 VARIABLES 6 PARAMETERS 6 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
-1.	-1.	-1.	-1.	1.	1.0000
-1.	1.	1.	1.	1.	1.0000
-1.	1.	-1.	1.	-1.	1.0000
1.	1.	1.	-1.	-1.	1.0000
-1.	-1.	1.	1.	-1.	1.0000
1.	-1.	-1.	1.	1.	1.0000

X'X INVERSE

0.2000	0.0500	0.0	0.0	-0.0500	0.0
0.0500	0.2000	0.0	0.0	0.0500	0.0
0.0	0.0	0.2000	-0.0500	0.0	0.0500
0.0	0.0	-0.0500	0.2000	0.0	0.0500
-0.0500	0.0500	0.0	0.0	0.2000	0.0
0.0	0.0	0.0500	0.0500	0.0	0.2000

DET(X'X) = 0.2560000000D 05

D-EFFICIENCY= 90.5

AVERAGE VARIANCE OF COEFFICIENTS= 0.2000

T-EFFICIENCY= 83.3

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.4000

DESIGN (5. 6. 1)

ALIAS MATRIX

	0	1	2	3	4	5
12	0.2000	-0.2000	-0.6000	0.4000	-0.8000	-0.4000
13	0.2000	-0.2000	0.4000	-0.6000	-0.8000	-0.4000
14	-0.2000	0.2000	-0.4000	-0.4000	-0.2000	0.4000
15	-0.2000	0.2000	-0.4000	-0.4000	0.8000	-0.6000
23	0.6000	0.4000	0.2000	0.2000	-0.4000	0.8000
24	-0.2000	-0.8000	0.6000	-0.4000	-0.2000	0.4000
25	-0.6000	-0.4000	-0.2000	0.8000	0.4000	0.2000
34	-0.2000	-0.8000	-0.4000	0.6000	-0.2000	0.4000
35	-0.6000	-0.4000	0.8000	-0.2000	0.4000	0.2000
45	0.2000	0.8000	0.4000	0.4000	0.2000	0.6000
SS	1.3600	2.5600	2.2400	2.2400	2.5600	2.2400

CONFOUNDING INDEX= 2.3680

DESIGN (5. 7. 1)

5 VARIABLES 6 PARAMETERS 7 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
-1.	-1.	1.	-1.	-1.	0.7500
1.	-1.	-1.	-1.	1.	1.0000
-1.	-1.	-1.	1.	-1.	0.7500
1.	-1.	1.	1.	1.	1.0000
1.	1.	1.	1.	-1.	1.0000
-1.	1.	1.	-1.	1.	0.7500
-1.	1.	-1.	1.	1.	0.7500

X'X INVERSE

0.1875	0.0625	0.0625	-0.0625	-0.0625	-0.0625
0.0625	0.1875	0.0625	-0.0625	-0.0625	-0.0625
0.0625	0.0625	0.1875	-0.0625	-0.0625	-0.0625
-0.0625	-0.0625	-0.0625	0.1875	0.0625	0.0625
-0.0625	-0.0625	-0.0625	0.0625	0.1875	0.0625
-0.0625	-0.0625	-0.0625	0.0625	0.0625	0.1875

DET(X'X) = 0.6553600000D 05

D-EFFICIENCY= 90.7

AVERAGE VARIANCE OF COEFFICIENTS= 0.1875

T-EFFICIENCY= 76.2

MAXIMUM VARIANCE OF FITTED RESPONSE= 3.0000

DESIGN (5. 7. 1)

ALIAS MATRIX

	0	1	2	3	4	5
12	-0.0000	-0.0000	-0.0000	0.0000	0.0000	-1.0000
13	0.0000	0.0000	0.0000	-0.0000	1.0000	-0.0000
14	0.0000	0.0000	0.0000	1.0000	-0.0000	-0.0000
15	0.0000	0.0000	-1.0000	-0.0000	-0.0000	-0.0000
23	0.5000	0.5000	0.5000	-0.5000	-0.5000	-0.5000
24	0.5000	0.5000	0.5000	-0.5000	-0.5000	-0.5000
25	0.0000	-1.0000	0.0000	-0.0000	-0.0000	-0.0000
34	-0.0000	1.0000	-0.0000	0.0000	0.0000	0.0000
35	-0.5000	-0.5000	-0.5000	0.5000	0.5000	0.5000
45	-0.5000	-0.5000	-0.5000	0.5000	0.5000	0.5000
SS	1.0000	3.0000	2.0000	2.0000	2.0000	2.0000

CONFOUNDING INDEX= 2.2000

DESIGN (5. 8. 1)

5 VARIABLES 6 PARAMETERS 8 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
1.	1.	-1.	1.	1.	0.7500
1.	-1.	1.	1.	1.	0.7500
-1.	1.	1.	-1.	1.	0.7500
1.	1.	1.	-1.	-1.	0.7500
-1.	-1.	1.	1.	-1.	0.7500
-1.	1.	-1.	1.	-1.	0.7500
1.	-1.	-1.	-1.	-1.	0.7500
-1.	-1.	-1.	-1.	1.	0.7500

X'X INVERSE

0.1250	0.0	0.0	0.0	0.0	0.0
0.0	0.1250	0.0	0.0	0.0	0.0
0.0	0.0	0.1250	0.0	0.0	0.0
0.0	0.0	0.0	0.1250	0.0	0.0
0.0	0.0	0.0	0.0	0.1250	0.0
0.0	0.0	0.0	0.0	0.0	0.1250

DET(X'X)= 0.2621440000D 06

D-EFFICIENCY= 100.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.1250

T-EFFICIENCY= 100.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.7500

DESIGN (5. 8. 1)

ALIAS MATRIX

	0	1	2	3	4	5
12	0.0	0.0	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	1.0000
15	0.0	0.0	0.0	0.0	1.0000	0.0
23	0.0	0.0	0.0	0.0	-1.0000	0.0
24	0.0	0.0	0.0	-1.0000	0.0	0.0
25	0.0	0.0	0.0	0.0	0.0	0.0
34	0.0	0.0	-1.0000	0.0	0.0	0.0
35	0.0	0.0	0.0	0.0	0.0	0.0
45	0.0	1.0000	0.0	0.0	0.0	0.0
SS	0.0	1.0000	1.0000	1.0000	2.0000	1.0000

CONFOUNDING INDEX= 1.2000

DESIGN (5. 9. 1)

5 VARIABLES 6 PARAMETERS 9 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
1.	-1.	-1.	-1.	-1.	0.7143
-1.	-1.	-1.	-1.	1.	0.7143
1.	-1.	1.	1.	-1.	0.7143
-1.	1.	-1.	1.	-1.	0.7500
1.	-1.	-1.	1.	1.	0.4286
1.	1.	1.	-1.	1.	0.7500
-1.	-1.	1.	1.	1.	0.7143
-1.	1.	1.	-1.	-1.	0.6071
1.	1.	-1.	1.	1.	0.6071

X'X INVERSE

0.1161	-0.0089	0.0089	0.0089	-0.0089	-0.0089
-0.0089	0.1161	0.0089	0.0089	-0.0089	-0.0089
0.0089	0.0089	0.1161	-0.0089	0.0089	0.0089
0.0089	0.0089	-0.0089	0.1161	0.0089	0.0089
-0.0089	-0.0089	0.0089	0.0089	0.1161	-0.0089
-0.0089	-0.0089	0.0089	0.0089	-0.0089	0.1161

DET(X'X) = 0.4587520000D 06

D-EFFICIENCY= 97.6

AVERAGE VARIANCE OF COEFFICIENTS= 0.1161

T-EFFICIENCY= 95.7

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.7500

DESIGN (5. 9. 1)

ALIAS MATRIX

	0	1	2	3	4	5
12	-0.1429	-0.1429	0.1429	0.1429	-0.1429	0.8571
13	-0.0714	-0.0714	0.0714	0.0714	-0.0714	-0.0714
14	0.0714	0.0714	-0.0714	-0.0714	0.0714	0.0714
15	0.1429	0.1429	0.8571	-0.1429	0.1429	0.1429
23	0.1429	0.1429	-0.1429	-0.1429	-0.8571	0.1429
24	-0.1429	-0.1429	0.1429	-0.8571	-0.1429	-0.1429
25	-0.1429	0.8571	0.1429	0.1429	-0.1429	-0.1429
34	-0.1429	-0.1429	-0.8571	0.1429	-0.1429	-0.1429
35	-0.0714	-0.0714	0.0714	0.0714	-0.0714	-0.0714
45	0.0714	0.0714	-0.0714	-0.0714	0.0714	0.0714
SS	0.1429	0.8571	1.5714	0.8571	0.8571	0.8571

CONFOUNDING INDEX= 1.0000

DESIGN (5. 9. 2)

5 VARIABLES 6 PARAMETERS 9 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
-1.	1.	-1.	1.	1.	0.7500
1.	1.	1.	1.	-1.	0.7143
1.	1.	-1.	-1.	1.	0.6071
-1.	1.	1.	-1.	-1.	0.7143
-1.	-1.	1.	-1.	1.	0.7143
-1.	-1.	-1.	1.	-1.	0.7500
1.	1.	-1.	-1.	-1.	0.4286
1.	-1.	1.	1.	1.	0.7143
1.	-1.	-1.	-1.	-1.	0.6071

X'X INVERSE

0.1161	-0.0089	-0.0089	0.0089	0.0089	0.0089
-0.0089	0.1161	-0.0089	0.0089	0.0089	0.0089
-0.0089	-0.0089	0.1161	0.0089	0.0089	0.0089
0.0089	0.0089	0.0089	0.1161	-0.0089	-0.0089
0.0089	0.0089	0.0089	-0.0089	0.1161	-0.0089
0.0089	0.0089	0.0089	-0.0089	-0.0089	0.1161

DET(X'X) = 0.4587520000D 06

D-EFFICIENCY= 97.6

AVERAGE VARIANCE OF COEFFICIENTS= 0.1161

T-EFFICIENCY= 95.7

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.7500

DESIGN (5. 9. 2)

ALIAS MATRIX

	0	1	2	3	4	5
12	0.0714	0.0714	0.0714	-0.0714	-0.0714	-0.0714
13	0.0000	0.0000	0.0000	-0.0000	1.0000	0.0000
14	0.0000	-0.0000	-0.0000	1.0000	0.0000	0.0000
15	-0.0714	-0.0714	-0.0714	0.0714	0.0714	0.0714
23	-0.1429	-0.1429	-0.1429	0.1429	0.1429	-0.8571
24	-0.0714	-0.0714	-0.0714	0.0714	0.0714	0.0714
25	-0.1429	-0.1429	-0.1429	-0.8571	0.1429	0.1429
34	0.0000	1.0000	0.0000	-0.0000	-0.0000	-0.0000
35	0.1429	0.1429	-0.8571	-0.1429	-0.1429	-0.1429
45	0.0714	0.0714	0.0714	-0.0714	-0.0714	-0.0714
SS	0.0816	1.0816	0.7959	1.7959	1.0816	0.7959

CONFOUNDING INDEX= 1.1102

DESIGN (5.10. 1)

5 VARIABLES 6 PARAMETERS 10 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
-1.	-1.	1.	-1.	1.	0.4286
1.	-1.	-1.	-1.	-1.	0.7143
-1.	1.	-1.	-1.	1.	0.7143
1.	-1.	1.	1.	1.	0.7143
1.	1.	1.	-1.	-1.	0.4286
-1.	1.	1.	1.	-1.	0.7143
1.	1.	1.	-1.	1.	0.5714
-1.	-1.	-1.	1.	1.	0.5714
-1.	-1.	1.	-1.	-1.	0.5714
1.	1.	-1.	1.	-1.	0.5714

X'X INVERSE

0.1071	0.0	0.0	-0.0179	0.0179	0.0
0.0	0.1071	-0.0179	0.0	0.0	0.0179
0.0	-0.0179	0.1071	0.0	0.0	0.0179
-0.0179	0.0	0.0	0.1071	0.0179	0.0
0.0179	0.0	0.0	0.0179	0.1071	0.0
0.0	0.0179	0.0179	0.0	0.0	0.1071

DET(X'X) = 0.8028160000D 06

D-EFFICIENCY= 96.4

AVERAGE VARIANCE OF COEFFICIENTS= 0.1071

T-EFFICIENCY= 93.3

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.7143

DESIGN (5.10. 1)

ALIAS MATRIX

	0	1	2	3	4	5
12	0.1429	0.0	0.0	0.1429	-0.1429	0.0
13	0.0	0.2857	0.2857	0.0	0.0	0.7143
14	0.0	-0.1429	-0.1429	0.0	0.0	0.1429
15	-0.2857	0.0	0.0	0.7143	0.2857	0.0
23	0.0	0.1429	0.1429	0.0	0.0	-0.1429
24	0.0	-0.2857	-0.2857	0.0	0.0	-0.7143
25	-0.2857	0.0	0.0	-0.2857	-0.7143	0.0
34	-0.1429	0.0	0.0	-0.1429	0.1429	0.0
35	0.0	0.7143	-0.2857	0.0	0.0	0.2857
45	0.0	0.2857	-0.7143	0.0	0.0	-0.2857
SS	0.2041	0.7959	0.7959	0.6327	0.6327	1.2245

CONFOUNDING INDEX= 0.8163

DESIGN (5.10. 2)

5 VARIABLES 6 PARAMETERS 10 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
-1.	-1.	1.	1.	1.	0.7143
1.	1.	1.	1.	-1.	0.4286
-1.	1.	-1.	1.	1.	0.7143
1.	-1.	-1.	1.	1.	0.4286
1.	1.	1.	-1.	1.	0.7143
-1.	-1.	-1.	-1.	-1.	0.7143
-1.	1.	1.	-1.	-1.	0.5714
1.	1.	-1.	1.	-1.	0.5714
1.	-1.	1.	1.	-1.	0.5714
1.	-1.	-1.	-1.	1.	0.5714

X'X INVERSE

0.1071	-0.0179	0.0	0.0	-0.0179	0.0
-0.0179	0.1071	0.0	0.0	-0.0179	0.0
0.0	0.0	0.1071	-0.0179	0.0	0.0179
0.0	0.0	-0.0179	0.1071	0.0	0.0179
-0.0179	-0.0179	0.0	0.0	0.1071	0.0
0.0	0.0	0.0179	0.0179	0.0	0.1071

DET(X'X)= 0.8028160000D 06

D-EFFICIENCY= 96.4

AVERAGE VARIANCE OF COEFFICIENTS= 0.1071

T-EFFICIENCY= 93.3

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.7143

DESIGN (5.10. 2)

ALIAS MATRIX

	0	1	2	3	4	5
12	0.0	0.0	0.1429	0.1429	0.0	-0.1429
13	0.0	0.0	0.1429	0.1429	0.0	-0.1429
14	0.1429	0.1429	-0.1429	-0.1429	0.1429	-0.8571
15	0.1429	0.1429	-0.1429	-0.1429	-0.8571	0.1429
23	0.2857	0.2857	0.0	0.0	-0.7143	0.0
24	0.0	0.0	0.2857	-0.7143	0.0	-0.2857
25	-0.1429	-0.1429	0.0	0.0	-0.1429	0.0
34	0.0	0.0	-0.7143	0.2857	0.0	-0.2857
35	-0.1429	-0.1429	0.0	0.0	-0.1429	0.0
45	0.1429	-0.8571	-0.1429	-0.1429	0.1429	0.1429
SS	0.1837	0.8980	0.6939	0.6939	1.3265	0.9796

CONFOUNDING INDEX= 0.9184

DESIGN (5.10. 3)

5 VARIABLES 6 PARAMETERS 10 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
1.	-1.	-1.	1.	-1.	0.7143
1.	1.	1.	-1.	-1.	0.7143
1.	-1.	1.	1.	1.	0.7143
-1.	1.	1.	1.	1.	0.4286
-1.	1.	1.	1.	-1.	0.5714
-1.	1.	-1.	1.	1.	0.5714
-1.	-1.	-1.	-1.	1.	0.4286
1.	1.	-1.	-1.	1.	0.7143
-1.	-1.	-1.	-1.	-1.	0.5714
-1.	-1.	1.	-1.	1.	0.5714

X'X INVERSE

0.1071	0.0179	0.0	0.0	0.0	-0.0179
0.0179	0.1071	0.0	0.0	0.0	0.0179
0.0	0.0	0.1071	-0.0179	-0.0179	0.0
0.0	0.0	-0.0179	0.1071	-0.0179	0.0
0.0	0.0	-0.0179	-0.0179	0.1071	0.0
-0.0179	0.0179	0.0	0.0	0.0	0.1071

DET(X'X)= 0.8028160000D 06

D-EFFICIENCY= 96.4

AVERAGE VARIANCE OF COEFFICIENTS= 0.1071

T-EFFICIENCY= 93.3

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.7143

DESIGN (5.10. 3)

ALIAS MATRIX

	0	1	2	3	4	5
12	0.0	0.0	0.0	-0.0000	-1.0000	0.0
13	0.0	0.0	-0.1429	-0.1429	-0.1429	0.0
14	0.0	0.0	-1.0000	-0.0000	-0.0000	0.0
15	-0.1429	0.1429	0.0	0.0	0.0	-0.1429
23	0.2857	-0.2857	0.0	0.0	0.0	-0.7143
24	0.0000	-1.0000	0.0	0.0	0.0	0.0000
25	0.0	0.0	0.2857	-0.7143	0.2857	0.0
34	0.1429	-0.1429	0.0	0.0	0.0	0.1429
35	0.0	0.0	-0.7143	0.2857	0.2857	0.0
45	0.0	0.0	0.1429	0.1429	0.1429	0.0
SS	0.1224	1.1224	1.6327	0.6327	1.2041	0.5510

CONFOUNDING INDEX= 1.0286

DESIGN (5.11. 1)

5 VARIABLES 6 PARAMETERS 11 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
-1.	-1.	-1.	-1.	-1.	0.5556
1.	1.	-1.	-1.	-1.	0.5556
-1.	1.	-1.	1.	-1.	0.5556
1.	1.	1.	-1.	-1.	0.5000
-1.	-1.	1.	1.	-1.	0.5556
-1.	1.	1.	1.	1.	0.5556
1.	-1.	1.	1.	-1.	0.5000
1.	-1.	1.	-1.	1.	0.5000
1.	-1.	-1.	1.	1.	0.7222
-1.	-1.	-1.	-1.	1.	0.5000
-1.	1.	1.	-1.	1.	0.5000

X'X INVERSE

0.0972	0.0139	0.0139	-0.0139	0.0139	0.0139
0.0139	0.0972	0.0139	-0.0139	0.0139	0.0139
0.0139	0.0139	0.0972	-0.0139	0.0139	0.0139
-0.0139	-0.0139	-0.0139	0.0972	-0.0139	-0.0139
0.0139	0.0139	0.0139	-0.0139	0.0972	0.0139
0.0139	0.0139	0.0139	-0.0139	0.0139	0.0972

DET(X'X) = 0.1492992000D 07

D-EFFICIENCY= 97.2

AVERAGE VARIANCE OF COEFFICIENTS= 0.0972

T-EFFICIENCY= 93.5

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.0000

DESIGN (5.11. 1)

ALIAS MATRIX

	0	1	2	3	4	5
12	-0.2222	-0.2222	-0.2222	-0.1111	-0.5556	-0.5556
13	0.0000	0.0000	-0.3333	-0.0000	-0.3333	-0.3333
14	-0.1111	-0.1111	-0.4444	-0.2222	-0.1111	0.2222
15	-0.1111	-0.1111	-0.4444	-0.2222	0.2222	-0.1111
23	0.1111	-0.2222	0.1111	-0.1111	-0.2222	0.4444
24	-0.1111	-0.4444	-0.1111	-0.2222	-0.1111	0.2222
25	-0.2222	-0.5556	-0.2222	0.5556	0.1111	-0.2222
34	0.0000	-0.3333	-0.3333	-0.0000	0.0000	-0.3333
35	0.1111	-0.2222	0.4444	-0.1111	-0.2222	0.1111
45	-0.0000	0.3333	0.3333	-0.3333	-0.0000	-0.0000
SS	0.1605	0.9012	1.0494	0.6049	0.6049	0.9012

CONFOUNDING INDEX= 0.8123

DESIGN (5.11. 2)

5 VARIABLES 6 PARAMETERS 11 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
-1.	1.	-1.	-1.	1.	0.5556
-1.	1.	-1.	1.	-1.	0.5556
1.	1.	1.	-1.	-1.	0.5000
-1.	-1.	1.	-1.	-1.	0.5000
1.	-1.	-1.	1.	1.	0.5000
-1.	-1.	-1.	-1.	1.	0.5000
-1.	-1.	1.	1.	-1.	0.5556
1.	1.	-1.	1.	-1.	0.5000
1.	-1.	-1.	-1.	-1.	0.7222
1.	-1.	1.	1.	1.	0.5556
1.	1.	1.	-1.	1.	0.5556

X'X INVERSE

0.0972	-0.0139	0.0139	0.0139	0.0139	0.0139
-0.0139	0.0972	-0.0139	-0.0139	-0.0139	-0.0139
0.0139	-0.0139	0.0972	0.0139	0.0139	0.0139
0.0139	-0.0139	0.0139	0.0972	0.0139	0.0139
0.0139	-0.0139	0.0139	0.0139	0.0972	0.0139
0.0139	-0.0139	0.0139	0.0139	0.0139	0.0972

DET(X'X) = 0.1492992000D 07

D-EFFICIENCY= 97.2

AVERAGE VARIANCE OF COEFFICIENTS= 0.0972

T-EFFICIENCY= 93.5

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.0000

DESIGN (5.11. 2)

ALIAS MATRIX

	0	1	2	3	4	5
12	0.1111	-0.1111	0.1111	0.4444	-0.2222	-0.2222
13	0.2222	-0.2222	0.5556	0.2222	-0.1111	0.5556
14	0.1111	-0.1111	-0.2222	-0.2222	0.1111	0.4444
15	0.2222	-0.2222	-0.1111	0.5556	0.5556	0.2222
23	-0.2222	0.5556	-0.2222	-0.2222	-0.5556	0.1111
24	-0.2222	-0.1111	-0.2222	-0.5556	-0.2222	-0.5556
25	-0.1111	-0.2222	-0.1111	0.2222	-0.4444	-0.1111
34	-0.1111	-0.2222	-0.4444	-0.1111	-0.1111	0.2222
35	-0.1111	0.4444	0.2222	-0.1111	0.2222	-0.1111
45	-0.2222	0.5556	-0.5556	0.1111	-0.2222	-0.2222
SS	0.3086	1.0494	1.0494	1.0494	1.0494	1.0494

CONFOUNDING INDEX= 1.0494

DESIGN (5.12. 1)

5 VARIABLES 6 PARAMETERS 12 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
1.	1.	1.	1.	1.	0.5000
1.	1.	-1.	-1.	-1.	0.5000
-1.	1.	-1.	1.	-1.	0.5000
-1.	1.	1.	-1.	-1.	0.5000
-1.	-1.	1.	-1.	-1.	0.5000
-1.	1.	1.	1.	1.	0.5000
1.	-1.	1.	1.	-1.	0.5000
-1.	-1.	-1.	1.	1.	0.5000
1.	1.	-1.	-1.	1.	0.5000
-1.	-1.	-1.	-1.	1.	0.5000
1.	-1.	1.	-1.	1.	0.5000
1.	-1.	-1.	1.	-1.	0.5000

X'X INVERSE

0.0833	0.0	0.0	0.0	0.0	0.0
0.0	0.0833	0.0	0.0	0.0	0.0
0.0	0.0	0.0833	0.0	0.0	0.0
0.0	0.0	0.0	0.0833	0.0	0.0
0.0	0.0	0.0	0.0	0.0833	0.0
0.0	0.0	0.0	0.0	0.0	0.0833

DET(X'X)= 0.2985984000D 07

D-EFFICIENCY= 100.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.0833

T-EFFICIENCY= 100.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.5000

DESIGN (5.12. 1)

ALIAS MATRIX

	0	1	2	3	4	5
12	0.0	0.0	0.0	-0.3333	-0.3333	0.3333
13	0.0	0.0	-0.3333	0.0	0.3333	0.3333
14	0.0	0.0	-0.3333	0.3333	0.0	-0.3333
15	0.0	0.0	0.3333	0.3333	-0.3333	0.0
23	0.0	-0.3333	0.0	0.0	0.3333	0.3333
24	0.0	-0.3333	0.0	0.3333	0.0	0.3333
25	0.0	0.3333	0.0	0.3333	0.3333	0.0
34	0.0	0.3333	0.3333	0.0	0.0	0.3333
35	0.0	0.3333	0.3333	0.0	0.3333	0.0
45	0.0	-0.3333	0.3333	0.3333	0.0	0.0
SS	0.0	0.6667	0.6667	0.6667	0.6667	0.6667

CONFOUNDING INDEX= 0.6667

DESIGN (5.13. 1)

5 VARIABLES 6 PARAMETERS 13 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
1.	-1.	1.	-1.	1.	0.4259
-1.	1.	-1.	1.	1.	0.4259
-1.	-1.	-1.	1.	-1.	0.5000
-1.	1.	1.	1.	-1.	0.5000
1.	1.	-1.	-1.	-1.	0.4815
1.	-1.	-1.	-1.	-1.	0.4259
-1.	-1.	-1.	-1.	1.	0.5000
-1.	1.	1.	-1.	1.	0.5000
-1.	-1.	1.	-1.	-1.	0.4259
1.	-1.	1.	1.	1.	0.4815
1.	1.	-1.	1.	1.	0.4815
1.	1.	1.	-1.	-1.	0.4259
1.	-1.	1.	1.	-1.	0.4259

X'X INVERSE

0.0787	-0.0046	0.0046	-0.0046	0.0046	0.0046
-0.0046	0.0787	0.0046	-0.0046	0.0046	0.0046
0.0046	0.0046	0.0787	0.0046	-0.0046	-0.0046
-0.0046	-0.0046	0.0046	0.0787	0.0046	0.0046
0.0046	0.0046	-0.0046	0.0046	0.0787	-0.0046
0.0046	0.0046	-0.0046	0.0046	-0.0046	0.0787

DET(X'X) = 0.4478976000D 07

D-EFFICIENCY= 98.8

AVERAGE VARIANCE OF COEFFICIENTS= 0.0787

T-EFFICIENCY= 97.7

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.5000

DESIGN (5.13. 1)

ALIAS MATRIX

	0	1	2	3	4	5
12	-0.0741	-0.0741	0.0741	-0.4074	-0.2593	-0.2593
13	0.0741	0.0741	-0.4074	0.0741	0.2593	0.2593
14	-0.0741	-0.0741	-0.2593	0.2593	0.0741	0.4074
15	-0.0741	-0.0741	-0.2593	0.2593	0.4074	0.0741
23	-0.0741	-0.4074	0.0741	-0.0741	-0.2593	-0.2593
24	0.1111	-0.2222	-0.1111	-0.2222	-0.1111	0.2222
25	0.1111	-0.2222	-0.1111	-0.2222	0.2222	-0.1111
34	-0.1111	0.2222	-0.2222	-0.1111	0.1111	-0.2222
35	-0.1111	0.2222	-0.2222	-0.1111	-0.2222	0.1111
45	0.0741	0.4074	0.2593	-0.2593	-0.0741	-0.0741
SS	0.0823	0.5514	0.5021	0.5021	0.5021	0.5021

CONFOUNDING INDEX= 0.5119

DESIGN (5.13. 2)

5 VARIABLES 6 PARAMETERS 13 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
-1.	1.	-1.	1.	1.	0.4259
-1.	1.	1.	-1.	1.	0.4259
1.	1.	-1.	-1.	1.	0.4259
-1.	-1.	1.	-1.	1.	0.4815
1.	1.	-1.	-1.	1.	0.4259
-1.	1.	1.	1.	-1.	0.5000
1.	1.	1.	1.	-1.	0.4815
-1.	1.	-1.	-1.	-1.	0.4259
1.	-1.	1.	1.	1.	0.4815
-1.	-1.	-1.	1.	1.	0.4815
1.	-1.	-1.	1.	-1.	0.4815
-1.	-1.	-1.	-1.	-1.	0.4815
1.	-1.	1.	-1.	-1.	0.4815

X'X INVERSE

0.0787	0.0046	-0.0046	0.0046	0.0046	-0.0046
0.0046	0.0787	0.0046	-0.0046	-0.0046	0.0046
-0.0046	0.0046	0.0787	0.0046	0.0046	-0.0046
0.0046	-0.0046	0.0046	0.0787	-0.0046	0.0046
0.0046	-0.0046	0.0046	-0.0046	0.0787	0.0046
-0.0046	0.0046	-0.0046	0.0046	0.0046	0.0787

DET(X'X) = 0.4478976000D 07

D-EFFICIENCY= 98.8

AVERAGE VARIANCE OF COEFFICIENTS= 0.0787

T-EFFICIENCY= 97.7

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.5000

DESIGN (5.13. 2)

ALIAS MATRIX

	0	1	2	3	4	5
12	-0.1111	0.1111	-0.1111	-0.2222	-0.2222	0.2222
13	0.1111	-0.1111	-0.2222	-0.1111	0.2222	-0.2222
14	0.1111	-0.1111	-0.2222	0.2222	-0.1111	-0.2222
15	-0.1111	0.1111	0.2222	-0.2222	-0.2222	-0.1111
23	-0.0370	-0.2963	-0.0370	0.0370	0.3704	-0.3704
24	-0.0370	-0.2963	-0.0370	0.3704	0.0370	-0.3704
25	0.0370	0.2963	0.0370	-0.3704	-0.3704	0.0370
34	0.0741	0.2593	0.4074	-0.0741	-0.0741	-0.2593
35	-0.0741	-0.2593	-0.4074	0.0741	-0.2593	-0.0741
45	-0.0741	-0.2593	-0.4074	-0.2593	0.0741	-0.0741
SS	0.0700	0.5144	0.6626	0.5144	0.5144	0.5144

CONFOUNDING INDEX= 0.5440

DESIGN (5.13. 3)

5 VARIABLES 6 PARAMETERS 13 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
1.	1.	1.	-1.	-1.	0.4815
1.	-1.	-1.	-1.	1.	0.5000
-1.	1.	-1.	-1.	-1.	0.4815
-1.	-1.	1.	1.	1.	0.4815
-1.	-1.	-1.	-1.	-1.	0.4259
1.	1.	-1.	1.	1.	0.4259
-1.	-1.	1.	-1.	-1.	0.3333
-1.	1.	-1.	1.	1.	0.4815
1.	1.	1.	1.	-1.	0.5000
-1.	1.	1.	-1.	1.	0.4815
1.	-1.	1.	-1.	1.	0.4815
1.	-1.	-1.	1.	-1.	0.5000
-1.	-1.	1.	1.	-1.	0.4259

X'X INVERSE

0.0787	0.0046	0.0046	-0.0046	0.0046	0.0046
0.0046	0.0787	-0.0046	0.0046	-0.0046	-0.0046
0.0046	-0.0046	0.0787	0.0046	-0.0046	-0.0046
-0.0046	0.0046	0.0046	0.0787	0.0046	0.0046
0.0046	-0.0046	-0.0046	0.0046	0.0787	-0.0046
0.0046	-0.0046	-0.0046	0.0046	-0.0046	0.0787

DET(X'X) = 0.4478976000D 07

D-EFFICIENCY= 98.8

AVERAGE VARIANCE OF COEFFICIENTS= 0.0787

T-EFFICIENCY= 97.7

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.5000

DESIGN (5.13. 3)

ALIAS MATRIX

	0	1	2	3	4	5
12	0.0370	-0.0370	-0.0370	0.3704	0.2963	-0.3704
13	-0.0741	0.0741	0.4074	-0.0741	-0.2593	-0.2593
14	0.0741	-0.0741	0.2593	-0.2593	-0.0741	-0.4074
15	0.0370	-0.0370	-0.3704	-0.2963	-0.3704	-0.0370
23	-0.0741	0.4074	0.0741	-0.0741	-0.2593	-0.2593
24	0.1111	0.2222	-0.1111	-0.2222	-0.1111	0.2222
25	0.0741	-0.4074	-0.0741	-0.2593	0.2593	-0.0741
34	-0.1111	-0.2222	-0.2222	-0.1111	0.1111	-0.2222
35	-0.1111	-0.2222	-0.2222	-0.1111	-0.2222	0.1111
45	0.0741	-0.4074	0.2593	-0.2593	-0.0741	-0.0741
SS	0.0672	0.6598	0.5610	0.5117	0.5117	0.5610

CONFOUNDING INDEX= 0.5610

DESIGN (5.14. 1)

5 VARIABLES 6 PARAMETERS 14 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
-1.	-1.	1.	-1.	1.	0.4815
-1.	1.	-1.	-1.	1.	0.4074
1.	1.	-1.	1.	-1.	0.4815
1.	-1.	1.	-1.	-1.	0.3333
-1.	-1.	1.	1.	-1.	0.4815
1.	-1.	-1.	-1.	-1.	0.4074
1.	-1.	-1.	1.	1.	0.4815
-1.	1.	1.	1.	-1.	0.4815
1.	1.	1.	-1.	1.	0.4815
-1.	-1.	-1.	-1.	-1.	0.4074
-1.	1.	-1.	1.	1.	0.4074
1.	-1.	1.	1.	1.	0.4074
1.	1.	1.	-1.	-1.	0.4074
-1.	1.	-1.	-1.	-1.	0.3333

X'X INVERSE

0.0741	0.0	0.0	0.0	0.0093	0.0093
0.0	0.0741	0.0093	-0.0093	0.0	0.0
0.0	0.0093	0.0741	0.0093	0.0	0.0
0.0	-0.0093	0.0093	0.0741	0.0	0.0
0.0093	0.0	0.0	0.0	0.0741	-0.0093
0.0093	0.0	0.0	0.0	-0.0093	0.0741

DET(X'X)= 0.6718464000D 07

D-EFFICIENCY= 98.1

AVERAGE VARIANCE OF COEFFICIENTS= 0.0741

T-EFFICIENCY= 96.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.4815

DESIGN (5.14. 1)

ALIAS MATRIX

	0	1	2	3	4	5
12	-0.1852	-0.0370	0.0370	0.2963	-0.1481	-0.1481
13	0.1111	0.0370	0.2963	0.0370	-0.4444	0.2222
14	0.0370	-0.1111	-0.2222	-0.4444	-0.0370	0.2963
15	0.0370	-0.1852	-0.1481	0.1481	0.2963	-0.0370
23	-0.1852	0.2963	0.0370	-0.0370	-0.1481	-0.1481
24	-0.0370	-0.1481	-0.1852	-0.1481	0.0370	-0.2963
25	-0.0370	-0.1481	-0.1852	-0.1481	-0.2963	0.0370
34	-0.0370	-0.4444	-0.2222	-0.1111	0.0370	-0.2963
35	-0.0370	0.1481	-0.1481	-0.1852	-0.2963	0.0370
45	0.1111	0.2963	-0.2963	-0.3704	-0.1111	-0.1111
SS	0.1015	0.4883	0.3896	0.5377	0.5213	0.3731

CONFOUNDING INDEX= 0.4620

DESIGN (5.14. 2)

5 VARIABLES 6 PARAMETERS 14 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
1.	-1.	1.	-1.	1.	0.3333
1.	1.	-1.	-1.	-1.	0.4815
-1.	1.	-1.	1.	1.	0.4815
1.	-1.	1.	1.	-1.	0.4074
-1.	1.	1.	-1.	1.	0.4815
1.	-1.	-1.	1.	1.	0.4815
1.	1.	1.	1.	1.	0.4074
-1.	-1.	1.	1.	-1.	0.4815
-1.	-1.	-1.	-1.	-1.	0.4815
1.	1.	1.	1.	-1.	0.3333
1.	-1.	-1.	-1.	1.	0.4074
-1.	-1.	1.	-1.	1.	0.4074
1.	1.	1.	-1.	-1.	0.4074
-1.	1.	-1.	1.	-1.	0.4074

X'X INVERSE

0.0741	-0.0093	0.0	-0.0093	0.0	0.0
-0.0093	0.0741	0.0	-0.0093	0.0	0.0
0.0	0.0	0.0741	0.0	-0.0093	0.0093
-0.0093	-0.0093	0.0	0.0741	0.0	0.0
0.0	0.0	-0.0093	0.0	0.0741	0.0093
0.0	0.0	0.0093	0.0	0.0093	0.0741

DET(X'X) = 0.6718464000D 07

D-EFFICIENCY= 98.1

AVERAGE VARIANCE OF COEFFICIENTS= 0.0741

T-EFFICIENCY= 96.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.4815

DESIGN (5.14. 2)

ALIAS MATRIX

	0	1	2	3	4	5
12	-0.0370	-0.0370	0.1111	0.2963	-0.2222	-0.4444
13	0.1111	0.1111	0.2222	0.1111	0.2222	-0.2222
14	-0.0370	-0.0370	-0.1481	0.2963	0.1852	0.1481
15	0.0370	0.0370	-0.4444	-0.2963	0.2222	0.1111
23	-0.0370	0.2963	0.1852	-0.0370	-0.1481	0.1481
24	0.1852	-0.1481	0.0370	-0.1481	0.0370	0.2963
25	-0.1111	-0.4444	-0.0370	0.2222	0.2963	0.0370
34	-0.0370	0.2963	-0.2222	-0.0370	0.1111	-0.4444
35	0.0370	-0.2963	0.2222	0.0370	-0.4444	0.1111
45	-0.1111	0.2222	0.2963	-0.4444	-0.0370	0.0370
SS	0.0796	0.5487	0.5048	0.5487	0.5048	0.6036

CONFOUNDING INDEX= 0.5421

DESIGN (5.14. 3)

5 VARIABLES 6 PARAMETERS 14 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
1.	1.	1.	-1.	1.	0.4815
1.	-1.	-1.	1.	-1.	0.4815
-1.	-1.	1.	-1.	-1.	0.4815
1.	1.	1.	1.	1.	0.4074
-1.	1.	-1.	-1.	-1.	0.4815
-1.	1.	1.	1.	-1.	0.4074
1.	-1.	-1.	-1.	1.	0.4074
1.	-1.	-1.	-1.	-1.	0.4074
-1.	-1.	-1.	1.	1.	0.4074
-1.	-1.	1.	1.	1.	0.4074
-1.	1.	-1.	1.	1.	0.4074
1.	1.	1.	1.	-1.	0.4074
-1.	-1.	1.	-1.	1.	0.4074
-1.	1.	-1.	-1.	1.	0.4074

X'X INVERSE

0.0741	0.0093	0.0	0.0	0.0	-0.0093
0.0093	0.0741	0.0	0.0	0.0	0.0093
0.0	0.0	0.0741	-0.0093	-0.0093	0.0
0.0	0.0	-0.0093	0.0741	-0.0093	0.0
0.0	0.0	-0.0093	-0.0093	0.0741	0.0
-0.0093	0.0093	0.0	0.0	0.0	0.0741

DET(X'X) = 0.6718464000D 07

D-EFFICIENCY= 98.1

AVERAGE VARIANCE OF COEFFICIENTS= 0.0741

T-EFFICIENCY= 96.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.4815

DESIGN (5.14. 3)

ALIAS MATRIX

	0	1	2	3	4	5
12	-0.0370	0.0370	-0.2593	0.7407	0.0741	0.2963
13	-0.0370	0.0370	0.7407	-0.2593	0.0741	0.2963
14	0.0370	-0.0370	0.1481	0.1481	-0.1852	-0.2963
15	-0.1111	0.1111	0.2963	0.2963	-0.3704	-0.1111
23	0.2593	0.7407	-0.0370	-0.0370	0.2963	-0.0741
24	0.1852	0.1481	-0.0370	0.2963	-0.0370	-0.1481
25	0.0370	0.2963	0.1852	-0.1481	-0.1481	0.0370
34	0.1852	0.1481	0.2963	-0.0370	-0.0370	-0.1481
35	0.0370	0.2963	-0.1481	0.1852	-0.1481	0.0370
45	-0.0370	-0.2963	-0.1481	-0.1481	0.1852	-0.0370
SS	0.1564	0.8724	0.8944	0.8944	0.3512	0.3292

CONFOUNDING INDEX= 0.6683

DESIGN (5.15. 1)

5 VARIABLES 6 PARAMETERS 15 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
1.	1.	1.	-1.	-1.	0.4000
-1.	1.	1.	1.	1.	0.4750
1.	-1.	1.	1.	-1.	0.4000
-1.	-1.	1.	1.	-1.	0.3750
-1.	-1.	-1.	-1.	-1.	0.4750
-1.	-1.	1.	-1.	1.	0.3750
-1.	1.	-1.	1.	-1.	0.3750
1.	-1.	1.	-1.	1.	0.4000
1.	-1.	-1.	1.	-1.	0.3750
1.	1.	-1.	1.	1.	0.4750
-1.	1.	1.	-1.	-1.	0.3750
-1.	1.	-1.	-1.	1.	0.3750
-1.	-1.	-1.	1.	1.	0.3750
1.	-1.	-1.	-1.	1.	0.3750
1.	1.	-1.	-1.	-1.	0.3750

X'X INVERSE

0.0688	0.0062	0.0062	0.0062	0.0062	0.0062
0.0062	0.0688	0.0062	0.0062	0.0062	0.0062
0.0062	0.0062	0.0688	0.0062	0.0062	0.0062
0.0062	0.0062	0.0062	0.0688	0.0062	0.0062
0.0062	0.0062	0.0062	0.0062	0.0688	0.0062
0.0062	0.0062	0.0062	0.0062	0.0062	0.0688

DET(X'X) = 0.1048576000D 08

D-EFFICIENCY= 98.6

AVERAGE VARIANCE OF COEFFICIENTS= 0.0688

T-EFFICIENCY= 97.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.6000

DESIGN (5.15. 1)

ALIAS MATRIX

	0	1	2	3	4	5
12	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000
13	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000
14	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000
15	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000
23	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000
24	-0.0500	-0.0500	-0.0500	-0.0500	-0.0500	0.4500
25	-0.0500	-0.0500	-0.0500	-0.0500	0.4500	-0.0500
34	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000
35	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000
45	-0.0500	-0.0500	0.4500	-0.0500	-0.0500	-0.0500
SS	0.0775	0.0775	0.2775	0.0775	0.2775	0.2775

CONFOUNDING INDEX= 0.1975

DESIGN (5.15. 2)

5 VARIABLES 6 PARAMETERS 15 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	VARIANCE OF FITTED RESPONSE
1.	-1.	-1.	1.	1.	0.3750
-1.	1.	1.	1.	-1.	0.4750
-1.	-1.	1.	-1.	1.	0.4000
-1.	-1.	1.	-1.	-1.	0.3750
-1.	1.	-1.	-1.	1.	0.4000
1.	1.	1.	1.	1.	0.4750
1.	1.	1.	-1.	1.	0.4000
-1.	-1.	1.	1.	-1.	0.4000
1.	-1.	-1.	1.	-1.	0.4000
-1.	1.	-1.	-1.	-1.	0.3750
1.	-1.	-1.	-1.	-1.	0.3750
1.	-1.	1.	-1.	1.	0.3750
1.	1.	-1.	-1.	-1.	0.4000
-1.	1.	-1.	1.	1.	0.3750
-1.	-1.	-1.	1.	1.	0.4000

X'X INVERSE

0.0688	0.0062	0.0062	0.0062	0.0062	-0.0062
0.0062	0.0688	0.0062	0.0062	0.0062	-0.0062
0.0062	0.0062	0.0688	0.0062	0.0062	-0.0062
0.0062	0.0062	0.0062	0.0688	0.0062	-0.0062
0.0062	0.0062	0.0062	0.0062	0.0688	-0.0062
-0.0062	-0.0062	-0.0062	-0.0062	-0.0062	0.0688

DET(X'X) = 0.1048576000D 08

D-EFFICIENCY= 98.6

AVERAGE VARIANCE OF COEFFICIENTS= 0.0688

T-EFFICIENCY= 97.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.6000

DESIGN (5.15. 2)

ALIAS MATRIX

	0	1	2	3	4	5
12	-0.0500	-0.0500	-0.0500	0.4500	-0.0500	0.0500
13	-0.1000	-0.1000	0.4000	-0.1000	-0.1000	0.6000
14	-0.1000	-0.1000	-0.1000	-0.1000	-0.1000	0.1000
15	0.1500	0.1500	0.1500	0.6500	0.1500	-0.1500
23	-0.0000	0.5000	-0.0000	-0.0000	0.5000	0.0000
24	-0.0500	-0.0500	-0.0500	0.4500	-0.0500	0.0500
25	0.1000	0.1000	0.1000	0.1000	0.1000	-0.1000
34	-0.0000	-0.0000	0.5000	-0.0000	-0.0000	-0.5000
35	0.1000	0.6000	0.1000	0.1000	-0.4000	-0.1000
45	0.0500	0.0500	0.0500	-0.4500	0.0500	-0.0500
SS	0.0700	0.6700	0.4700	1.0700	0.4700	0.6700

CONFOUNDING INDEX= 0.6700

DESIGN (6. 7. 1)

6 VARIABLES 7 PARAMETERS 7 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
1.	1.	1.	1.	1.	1.	1.0000
-1.	1.	1.	-1.	-1.	1.	1.0000
1.	-1.	-1.	-1.	1.	-1.	1.0000
-1.	-1.	1.	1.	1.	1.	1.0000
1.	-1.	-1.	1.	-1.	1.	1.0000
1.	-1.	1.	1.	-1.	-1.	1.0000
-1.	1.	-1.	1.	1.	-1.	1.0000

X'X INVERSE

0.1852	-0.0185	0.0185	-0.0185	-0.0648	-0.0278	-0.0185
-0.0185	0.1852	0.0648	0.0185	-0.0185	0.0278	0.0185
0.0185	0.0648	0.1852	-0.0185	0.0185	-0.0278	-0.0185
-0.0185	0.0185	-0.0185	0.1852	-0.0185	0.0278	-0.0648
-0.0648	-0.0185	0.0185	-0.0185	0.1852	-0.0278	-0.0185
-0.0278	0.0278	-0.0278	0.0278	-0.0278	0.1667	0.0278
-0.0185	0.0185	-0.0185	-0.0648	-0.0185	0.0278	0.1852

DET(X'X)= 0.3317760000D 06

D-EFFICIENCY= 87.8

AVERAGE VARIANCE OF COEFFICIENTS= 0.1825

I-EFFICIENCY= 78.3

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.6667

DESIGN (6. 7. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	-0.7778	0.1111	-0.1111	0.4444	0.2222	0.6667	0.4444
13	-0.3333	0.3333	0.6667	0.3333	0.6667	0.0000	-0.6667
14	0.1111	0.5556	0.4444	0.2222	0.1111	-0.6667	0.2222
15	0.1111	0.5556	0.4444	0.2222	-0.8889	0.3333	0.2222
16	-0.3333	0.3333	0.6667	-0.6667	0.6667	0.0000	0.3333
23	0.3333	0.6667	0.3333	-0.3333	-0.6667	-0.0000	0.6667
24	-0.1111	0.4444	0.5556	-0.2222	-0.1111	0.6667	-0.2222
25	-0.1111	0.4444	0.5556	-0.2222	0.8889	-0.3333	-0.2222
26	0.3333	0.6667	0.3333	0.6667	-0.6667	-0.0000	-0.3333
34	-0.1111	0.4444	-0.4444	0.7778	-0.1111	0.6667	-0.2222
35	-0.5556	0.2222	-0.2222	-0.1111	0.4444	0.3333	0.8889
36	0.5556	-0.2222	0.2222	0.1111	-0.4444	0.6667	0.1111
45	0.1111	-0.4444	0.4444	0.2222	0.1111	0.3333	0.2222
46	-0.1111	0.4444	-0.4444	-0.2222	-0.1111	0.6667	0.7778
56	-0.5556	0.2222	-0.2222	0.8889	0.4444	0.3333	-0.1111
SS	2.0617	2.8765	2.8765	3.0247	4.0617	3.2222	3.0247

CONFOUNDING INDEX= 3.1811

DESIGN (6. 8. 1)

6 VARIABLES 7 PARAMETERS 8 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
-1.	-1.	-1.	-1.	1.	1.	0.8750
1.	-1.	1.	1.	-1.	1.	0.8750
1.	1.	-1.	-1.	-1.	-1.	0.8750
-1.	-1.	-1.	1.	-1.	-1.	0.8750
1.	-1.	1.	-1.	1.	-1.	0.8750
-1.	1.	1.	-1.	-1.	1.	0.8750
1.	1.	-1.	1.	1.	1.	0.8750
-1.	1.	1.	1.	1.	-1.	0.8750

X'X INVERSE

0.1250	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.1250	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.1250	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.1250	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.1250	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.1250	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.1250

DET(X'X)= 0.2097152000D 07

D-EFFICIENCY= 100.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.1250

T-EFFICIENCY= 100.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.8750

DESIGN (6. 8. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.0	0.0	0.0	-1.0000	0.0	0.0	0.0
13	0.0	0.0	-1.0000	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	1.0000
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	1.0000	0.0	0.0
23	0.0	-1.0000	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0	1.0000	0.0
25	0.0	0.0	0.0	0.0	1.0000	0.0	0.0
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0
34	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35	0.0	0.0	0.0	0.0	0.0	0.0	-1.0000
36	0.0	0.0	0.0	0.0	0.0	-1.0000	0.0
45	0.0	0.0	1.0000	0.0	0.0	0.0	0.0
46	0.0	1.0000	0.0	0.0	0.0	0.0	0.0
56	0.0	0.0	0.0	-1.0000	0.0	0.0	0.0
SS	0.0	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000

CONFOUNDING INDEX= 2.0000

DESIGN (6. 9. 1)

6 VARIABLES 7 PARAMETERS 9 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
1.	-1.	1.	-1.	1.	1.	0.8667
1.	-1.	-1.	1.	-1.	-1.	0.8667
-1.	1.	1.	1.	-1.	1.	0.8667
1.	1.	-1.	1.	1.	1.	0.8000
1.	1.	-1.	-1.	-1.	1.	0.4667
-1.	1.	-1.	-1.	1.	-1.	0.8667
-1.	-1.	-1.	-1.	-1.	1.	0.8000
1.	1.	1.	-1.	-1.	-1.	0.8000
-1.	-1.	1.	1.	1.	-1.	0.6667

X'X INVERSE

0.1167	-0.0083	-0.0083	0.0083	0.0083	0.0083	-0.0083
-0.0083	0.1167	-0.0083	0.0083	0.0083	0.0083	-0.0083
-0.0083	-0.0083	0.1167	0.0083	0.0083	0.0083	-0.0083
0.0083	0.0083	0.0083	0.1167	-0.0083	-0.0083	0.0083
0.0083	0.0083	0.0083	-0.0083	0.1167	-0.0083	0.0083
0.0083	0.0083	0.0083	-0.0083	-0.0083	0.1167	0.0083
-0.0083	-0.0083	-0.0083	0.0083	0.0083	0.0083	0.1167

DET(X'X) = 0.3932160000D 07

D-EFFICIENCY= 97.2

AVERAGE VARIANCE OF COEFFICIENTS= 0.1167

T-EFFICIENCY= 95.2

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.8667

DESIGN (6. 9. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.0667	0.0667	0.0667	-0.0667	-0.0667	-0.0667	0.0667
13	-0.1333	-0.1333	-0.1333	0.1333	-0.8667	0.1333	-0.1333
14	-0.1333	-0.1333	-0.1333	-0.8667	0.1333	0.1333	-0.1333
15	-0.1333	-0.1333	-0.1333	0.1333	0.1333	0.1333	0.8667
16	0.1333	0.1333	0.1333	-0.1333	-0.1333	0.8667	0.1333
23	-0.1333	-0.1333	-0.1333	0.1333	0.1333	-0.8667	-0.1333
24	-0.1333	-0.1333	-0.1333	0.1333	0.1333	0.1333	0.8667
25	-0.1333	-0.1333	-0.1333	-0.8667	0.1333	0.1333	-0.1333
26	0.1333	0.1333	0.1333	-0.1333	0.8667	-0.1333	0.1333
34	0.1333	-0.8667	0.1333	-0.1333	-0.1333	-0.1333	0.1333
35	0.1333	0.1333	-0.8667	-0.1333	-0.1333	-0.1333	0.1333
36	-0.0667	-0.0667	-0.0667	0.0667	0.0667	0.0667	-0.0667
45	0.0667	0.0667	0.0667	-0.0667	-0.0667	-0.0667	0.0667
46	-0.1333	-0.1333	0.8667	0.1333	0.1333	0.1333	-0.1333
56	-0.1333	0.8667	-0.1333	0.1333	0.1333	0.1333	-0.1333
SS	0.2267	1.6933	1.6933	1.6933	1.6933	1.6933	1.6933

CONFOUNDING INDEX= 1.6933

DESIGN (6. 9. 2)

6 VARIABLES 7 PARAMETERS 9 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
1.	-1.	1.	-1.	-1.	1.	0.4667
1.	1.	-1.	-1.	-1.	-1.	0.8667
1.	1.	1.	-1.	1.	1.	0.8000
-1.	1.	1.	1.	-1.	-1.	0.8667
-1.	1.	-1.	1.	1.	1.	0.8000
1.	-1.	1.	1.	1.	-1.	0.8667
1.	-1.	-1.	1.	-1.	1.	0.8000
-1.	-1.	-1.	-1.	1.	-1.	0.8667
-1.	-1.	1.	-1.	-1.	1.	0.6667

X'X INVERSE

0.1167	-0.0083	0.0083	-0.0083	0.0083	0.0083	-0.0083
-0.0083	0.1167	0.0083	-0.0083	0.0083	0.0083	-0.0083
0.0083	0.0083	0.1167	0.0083	-0.0083	-0.0083	0.0083
-0.0083	-0.0083	0.0083	0.1167	0.0083	0.0083	-0.0083
0.0083	0.0083	-0.0083	0.0083	0.1167	-0.0083	0.0083
0.0083	0.0083	-0.0083	0.0083	-0.0083	0.1167	0.0083
-0.0083	-0.0083	0.0083	-0.0083	0.0083	0.0083	0.1167

DET(X'X) = 0.3932160000D 07

D-EFFICIENCY= 97.2

AVERAGE VARIANCE OF COEFFICIENTS= 0.1167

T-EFFICIENCY= 95.2

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.8667

DESIGN (6. 9. 2)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	-0.1333	-0.1333	0.1333	-0.1333	-0.8667	0.1333	-0.1333
13	0.1333	0.1333	-0.1333	0.1333	-0.1333	0.8667	0.1333
14	-0.1333	-0.1333	-0.8667	-0.1333	0.1333	0.1333	-0.1333
15	-0.1333	-0.1333	0.1333	0.8667	0.1333	0.1333	-0.1333
16	0.0667	0.0667	-0.0667	0.0667	-0.0667	-0.0667	0.0667
23	-0.0667	-0.0667	0.0667	-0.0667	0.0667	0.0667	-0.0667
24	0.1333	-0.8667	-0.1333	0.1333	-0.1333	-0.1333	0.1333
25	-0.0000	-0.0000	0.0	-0.0000	0.0000	-0.0000	1.0000
26	-0.0000	0.0000	0.0000	0.0000	-0.0000	1.0000	-0.0000
34	0.0000	0.0000	0.0	0.0000	-0.0000	0.0000	-1.0000
35	-0.1333	0.8667	0.1333	-0.1333	0.1333	0.1333	-0.1333
36	0.0000	-0.0000	-0.0000	0.0000	-1.0000	-0.0000	0.0000
45	0.0667	0.0667	-0.0667	0.0667	-0.0667	-0.0667	0.0667
46	-0.0000	-0.0000	0.0000	-1.0000	0.0000	0.0000	-0.0000
56	-0.0000	-0.0000	1.0000	-0.0000	0.0000	0.0000	-0.0000
SS	0.1200	1.5867	1.8533	1.8533	1.8533	1.8533	2.1200

CONFOUNDING INDEX= 1.8533

DESIGN (6.10. 1)

6 VARIABLES 7 PARAMETERS 10 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
-1.	1.	-1.	1.	-1.	-1.	0.7946
1.	-1.	1.	1.	1.	1.	0.6071
-1.	-1.	-1.	-1.	1.	1.	0.6518
1.	1.	1.	-1.	1.	-1.	0.7946
1.	1.	1.	1.	-1.	1.	0.6518
1.	-1.	-1.	-1.	-1.	1.	0.6518
1.	1.	-1.	-1.	1.	1.	0.6071
1.	-1.	-1.	1.	1.	-1.	0.7946
-1.	-1.	1.	-1.	-1.	-1.	0.7946
-1.	1.	1.	1.	1.	1.	0.6518

X'X INVERSE

0.1094	-0.0156	0.0	0.0	0.0	-0.0156	-0.0156
-0.0156	0.1094	0.0	0.0	0.0	-0.0156	-0.0156
0.0	0.0	0.1071	-0.0179	-0.0179	0.0	0.0
0.0	0.0	-0.0179	0.1071	-0.0179	0.0	0.0
0.0	0.0	-0.0179	-0.0179	0.1071	0.0	0.0
-0.0156	-0.0156	0.0	0.0	0.0	0.1094	-0.0156
-0.0156	-0.0156	0.0	0.0	0.0	-0.0156	0.1094

DET(X'X)= 0.7340032000D 07

D-EFFICIENCY= 95.7

AVERAGE VARIANCE OF COEFFICIENTS= 0.1094

T-EFFICIENCY= 92.2

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.8571

DESIGN (6.10. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.0	0.0	0.2857	0.2857	-0.7143	0.0	0.0
13	0.0	0.0	0.1429	0.1429	0.1429	0.0	0.0
14	0.0	0.0	-0.7143	0.2857	0.2857	0.0	0.0
15	0.2500	0.2500	0.0	0.0	0.0	0.2500	-0.7500
16	0.2500	0.2500	0.0	0.0	0.0	-0.7500	0.2500
23	0.1250	0.1250	0.0	0.0	0.0	0.1250	0.1250
24	0.3750	-0.6250	0.0	0.0	0.0	-0.6250	0.3750
25	0.0	0.0	0.2857	0.2857	-0.7143	0.0	0.0
26	0.0	0.0	0.1429	0.1429	0.1429	0.0	0.0
34	-0.0000	0.0000	0.0	0.0	0.0	0.0000	1.0000
35	0.0	0.0	0.1429	0.1429	0.1429	0.0	0.0
36	0.0	0.0	0.0	0.0000	1.0000	0.0	0.0
45	0.0	0.0	-0.7143	0.2857	0.2857	0.0	0.0
46	0.0	0.0	0.0000	1.0000	0.0000	0.0	0.0
56	0.2500	-0.7500	0.0	0.0	0.0	0.2500	0.2500
SS	0.3437	1.0938	1.2449	1.3878	2.2449	1.0937	1.8438

CONFOUNDING INDEX= 1.4848

DESIGN (6.10. 2)

6 VARIABLES 7 PARAMETERS 10 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
1.	-1.	-1.	1.	-1.	-1.	0.7946
1.	-1.	-1.	-1.	1.	1.	0.6518
-1.	-1.	1.	-1.	-1.	1.	0.6518
-1.	1.	1.	-1.	-1.	-1.	0.6518
1.	1.	-1.	-1.	1.	-1.	0.6518
-1.	-1.	1.	1.	1.	-1.	0.7946
-1.	1.	-1.	1.	-1.	-1.	0.6071
1.	1.	1.	1.	-1.	1.	0.7946
-1.	1.	-1.	1.	1.	1.	0.7946
1.	1.	1.	1.	1.	-1.	0.6071

X'X INVERSE

0.1094	0.0	-0.0156	0.0	-0.0156	0.0	0.0156
0.0	0.1071	0.0	0.0179	0.0	-0.0179	0.0
-0.0156	0.0	0.1094	0.0	-0.0156	0.0	0.0156
0.0	0.0179	0.0	0.1071	0.0	0.0179	0.0
-0.0156	0.0	-0.0156	0.0	0.1094	0.0	0.0156
0.0	-0.0179	0.0	0.0179	0.0	0.1071	0.0
0.0156	0.0	0.0156	0.0	0.0156	0.0	0.1094

DET(X'X) = 0.7340032000D 07

D-EFFICIENCY= 95.7

AVERAGE VARIANCE OF COEFFICIENTS= 0.1084

T-EFFICIENCY= 92.2

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.8571

DESIGN (6.10. 2)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.0	0.2857	0.0	0.7143	0.0	0.2857	0.0
13	-0.3750	0.0	0.6250	0.0	0.6250	0.0	0.3750
14	0.0	0.4286	0.0	0.5714	0.0	-0.5714	0.0
15	0.2500	0.0	0.2500	0.0	-0.7500	0.0	-0.2500
16	0.0	-0.1429	0.0	0.1429	0.0	-0.1429	0.0
23	0.0	0.7143	0.0	0.2857	0.0	-0.2857	0.0
24	0.2500	0.0	0.2500	0.0	0.2500	0.0	0.7500
25	0.0	0.1429	0.0	-0.1429	0.0	0.1429	0.0
26	-0.2500	0.0	-0.2500	0.0	0.7500	0.0	0.2500
34	0.0	0.5714	0.0	0.4286	0.0	0.5714	0.0
35	-0.3750	0.0	-0.3750	0.0	0.6250	0.0	-0.6250
36	0.0	0.2857	0.0	-0.2857	0.0	-0.7143	0.0
45	0.0	-0.5714	0.0	0.5714	0.0	0.4286	0.0
46	-0.2500	0.0	0.7500	0.0	-0.2500	0.0	0.2500
56	0.0	-0.2857	0.0	-0.7143	0.0	-0.2857	0.0
SS	0.5312	1.6327	1.2813	2.0612	2.0312	1.6327	1.2813

CONFOUNDING INDEX= 1.6534

DESIGN (6.10. 3)

6 VARIABLES 7 PARAMETERS 10 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
1.	1.	1.	1.	1.	-1.	0.7946
-1.	-1.	-1.	-1.	1.	-1.	0.8571
1.	1.	-1.	-1.	-1.	-1.	0.8571
-1.	1.	-1.	1.	1.	1.	0.7143
1.	-1.	1.	-1.	1.	1.	0.6518
-1.	-1.	-1.	1.	-1.	1.	0.4643
-1.	1.	1.	-1.	-1.	1.	0.7946
-1.	-1.	1.	1.	-1.	-1.	0.7946
1.	-1.	-1.	1.	-1.	1.	0.6071
1.	-1.	1.	-1.	-1.	1.	0.4643

X'X INVERSE

0.1094	0.0	0.0156	0.0	0.0	0.0156	-0.0156
0.0	0.1071	0.0	-0.0179	0.0179	0.0	0.0
0.0156	0.0	0.1094	0.0	0.0	-0.0156	0.0156
0.0	-0.0179	0.0	0.1071	0.0179	0.0	0.0
0.0	0.0179	0.0	0.0179	0.1071	0.0	0.0
0.0156	0.0	-0.0156	0.0	0.0	0.1094	0.0156
-0.0156	0.0	0.0156	0.0	0.0	0.0156	0.1094

DET(X'X) = 0.7340032000D 07

D-EFFICIENCY= 95.7

AVERAGE VARIANCE OF COEFFICIENTS= 0.1084

T-EFFICIENCY= 92.2

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.8571

DESIGN (6.10. 3)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.1250	-0.1429	-0.1250	-0.1429	0.1429	-0.1250	-0.8750
13	0.2500	0.0	-0.2500	0.0	0.0	0.7500	0.2500
14	-0.1250	0.0	0.1250	0.0	0.0	0.1250	-0.1250
15	0.0	-0.2857	0.0	0.7143	0.2857	0.0	0.0
16	-0.1250	0.1429	-0.8750	0.1429	-0.1429	0.1250	-0.1250
23	0.0	-0.1429	0.0	-0.1429	0.1429	0.0	0.0
24	0.1250	0.1429	-0.1250	0.1429	-0.1429	0.8750	0.1250
25	0.1250	0.1429	-0.1250	0.1429	0.8571	-0.1250	0.1250
26	-0.1250	-0.8571	0.1250	0.1429	-0.1429	0.1250	-0.1250
34	0.0000	0.0	0.0000	0.0	0.0	0.0000	-1.0000
35	0.0	0.7143	0.0	-0.2857	0.2857	0.0	0.0
36	0.0	0.0	0.0	0.0000	-1.0000	0.0	0.0
45	0.1250	0.1429	0.8750	0.1429	-0.1429	-0.1250	0.1250
46	0.0	-0.0000	0.0	-1.0000	0.0000	0.0	0.0
56	-0.1250	0.0	0.1250	0.0	0.0	0.1250	-0.1250
SS	0.1875	1.4490	1.6875	1.7347	2.0204	1.4375	1.9375

CONFOUNDING INDEX= 1.7111

DESIGN (6.11. 1)

6 VARIABLES 7 PARAMETERS 11 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
-1.	1.	1.	-1.	1.	-1.	0.7333
-1.	1.	-1.	1.	-1.	1.	0.7333
1.	-1.	-1.	-1.	-1.	-1.	0.6000
1.	-1.	1.	-1.	-1.	1.	0.7333
-1.	-1.	1.	1.	-1.	-1.	0.6000
1.	1.	1.	1.	1.	-1.	0.6000
1.	-1.	1.	1.	1.	1.	0.6000
-1.	-1.	-1.	1.	1.	1.	0.6000
1.	1.	-1.	-1.	1.	1.	0.6000
1.	1.	-1.	1.	-1.	-1.	0.6000
-1.	-1.	-1.	-1.	1.	-1.	0.6000

X'X INVERSE

0.1000	-0.0167	0.0167	0.0167	-0.0167	-0.0167	0.0167
-0.0167	0.1000	-0.0167	-0.0167	0.0167	0.0167	-0.0167
0.0167	-0.0167	0.1000	0.0167	-0.0167	-0.0167	0.0167
0.0167	-0.0167	0.0167	0.1000	-0.0167	-0.0167	0.0167
-0.0167	0.0167	-0.0167	-0.0167	0.1000	0.0167	-0.0167
-0.0167	0.0167	-0.0167	-0.0167	0.0167	0.1000	-0.0167
0.0167	-0.0167	0.0167	0.0167	-0.0167	-0.0167	0.1000

DET(X'X) = 0.1492992000D 08

D-EFFICIENCY= 96.3

AVERAGE VARIANCE OF COEFFICIENTS= 0.1000

T-EFFICIENCY= 90.9

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.4000

DESIGN (6.11. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	-0.0667	0.0667	-0.0667	-0.4000	0.4000	0.4000	-0.4000
13	0.0667	-0.0667	-0.2667	0.0667	0.2667	0.2667	0.4000
14	-0.2000	0.2000	0.1333	0.1333	0.2000	0.5333	-0.5333
15	-0.0667	0.0667	0.2667	0.2667	0.4000	0.0667	0.2667
16	0.2000	-0.2000	-0.1333	0.5333	-0.5333	0.1333	0.2000
23	-0.2000	-0.1333	-0.2000	-0.2000	-0.1333	0.5333	-0.5333
24	0.0667	0.2667	0.0667	-0.2667	-0.0667	-0.4000	-0.2667
25	0.2000	0.1333	0.2000	0.5333	-0.5333	-0.2000	-0.1333
26	-0.0667	-0.2667	-0.0667	-0.4000	-0.2667	-0.2667	-0.0667
34	-0.0667	0.4000	-0.4000	-0.0667	0.0667	0.4000	-0.4000
35	0.0667	0.2667	0.4000	0.0667	0.2667	-0.0667	-0.2667
36	-0.2000	0.5333	-0.5333	-0.2000	-0.1333	-0.1333	-0.2000
45	-0.2000	0.5333	-0.5333	0.1333	0.2000	0.2000	0.1333
46	0.0667	-0.4000	-0.2667	-0.2667	-0.0667	0.2667	0.0667
56	-0.0667	0.4000	-0.4000	-0.4000	0.4000	0.0667	-0.0667
SS	0.2800	1.3911	1.3911	1.3911	1.3911	1.3911	1.3911

CONFOUNDING INDEX= 1.3911

DESIGN (6.12. 1)

6 VARIABLES 7 PARAMETERS 12 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
-1.	1.	1.	1.	1.	1.	0.5833
-1.	-1.	-1.	-1.	-1.	-1.	0.5833
-1.	1.	-1.	1.	1.	-1.	0.5833
1.	1.	-1.	-1.	1.	-1.	0.5833
1.	-1.	-1.	1.	1.	1.	0.5833
1.	-1.	-1.	1.	-1.	1.	0.5833
1.	1.	1.	1.	-1.	-1.	0.5833
-1.	1.	-1.	-1.	-1.	1.	0.5833
1.	1.	1.	-1.	-1.	1.	0.5833
-1.	-1.	1.	-1.	1.	1.	0.5833
-1.	-1.	1.	1.	-1.	-1.	0.5833
1.	-1.	1.	-1.	1.	-1.	0.5833

X'X INVERSE

0.0833	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0833	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0833	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0833	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0833	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0833	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0833

DET(X'X) = 0.3583180800D 08

D-EFFICIENCY= 100.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.0833

T-EFFICIENCY= 100.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.5833

DESIGN (6.12. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.0	0.0	0.0	0.3333	-0.3333	-0.3333	-0.3333
13	0.0	0.0	0.3333	0.0	-0.3333	-0.3333	-0.3333
14	0.0	0.0	-0.3333	-0.3333	0.0	-0.3333	0.3333
15	0.0	0.0	-0.3333	-0.3333	-0.3333	0.0	-0.3333
16	0.0	0.0	-0.3333	-0.3333	0.3333	-0.3333	0.0
23	0.0	0.3333	0.0	0.0	0.3333	-0.3333	0.3333
24	0.0	-0.3333	0.0	0.3333	0.0	0.3333	-0.3333
25	0.0	-0.3333	0.0	-0.3333	0.3333	0.0	-0.3333
26	0.0	-0.3333	0.0	0.3333	-0.3333	-0.3333	0.0
34	0.0	-0.3333	0.3333	0.0	0.0	-0.3333	-0.3333
35	0.0	-0.3333	-0.3333	0.0	-0.3333	0.0	0.3333
36	0.0	-0.3333	0.3333	0.0	-0.3333	0.3333	0.0
45	0.0	-0.3333	0.3333	-0.3333	0.0	0.0	0.3333
46	0.0	0.3333	-0.3333	-0.3333	0.0	0.3333	0.0
56	0.0	-0.3333	-0.3333	0.3333	0.3333	0.0	0.0
SS	0.0	1.1111	1.1111	1.1111	1.1111	1.1111	1.1111

CONFOUNDING INDEX= 1.1111

DESIGN (6.13. 1)

6 VARIABLES 7 PARAMETERS 13 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
1.	1.	-1.	1.	-1.	1.	0.5439
-1.	-1.	-1.	1.	-1.	-1.	0.5439
1.	-1.	1.	-1.	1.	-1.	0.5439
1.	1.	-1.	-1.	1.	-1.	0.5439
1.	1.	1.	1.	-1.	-1.	0.5439
-1.	-1.	1.	-1.	-1.	1.	0.5789
-1.	1.	1.	1.	1.	1.	0.5789
1.	-1.	-1.	-1.	-1.	1.	0.5789
-1.	1.	1.	-1.	-1.	-1.	0.5789
-1.	-1.	-1.	-1.	1.	-1.	0.3684
1.	-1.	1.	1.	1.	1.	0.5789
-1.	1.	-1.	-1.	1.	1.	0.5439
-1.	-1.	-1.	1.	1.	-1.	0.4737

X'X INVERSE

0.0789	0.0044	0.0044	0.0044	0.0044	-0.0044	0.0044
0.0044	0.0789	-0.0044	-0.0044	-0.0044	0.0044	-0.0044
0.0044	-0.0044	0.0789	-0.0044	-0.0044	0.0044	-0.0044
0.0044	-0.0044	-0.0044	0.0789	-0.0044	0.0044	-0.0044
0.0044	-0.0044	-0.0044	-0.0044	0.0789	0.0044	-0.0044
-0.0044	0.0044	0.0044	0.0044	0.0044	0.0789	0.0044
0.0044	-0.0044	-0.0044	-0.0044	-0.0044	0.0044	0.0789

DET(X'X)= 0.5673369600D 08

D-EFFICIENCY= 98.6

AVERAGE VARIANCE OF COEFFICIENTS= 0.0789

T-EFFICIENCY= 97.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.5789

DESIGN (6.13. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.0526	-0.0526	-0.0526	-0.3860	0.2807	-0.2807	-0.3860
13	0.0175	-0.0175	-0.3509	-0.0175	0.3158	0.3509	-0.3509
14	0.1228	-0.1228	0.2105	0.2105	-0.1228	-0.2105	0.2105
15	-0.0877	0.0877	-0.2456	0.4211	-0.2456	-0.0877	-0.2456
16	0.0526	-0.0526	-0.3860	-0.3860	0.2807	-0.2807	-0.0526
23	0.0526	-0.3860	-0.0526	-0.0526	0.2807	-0.2807	-0.3860
24	0.1228	0.2105	-0.1228	0.2105	-0.1228	-0.2105	0.2105
25	-0.0877	-0.2456	0.0877	-0.2456	-0.2456	-0.0877	0.4211
26	0.0175	-0.3509	-0.0175	-0.3509	0.3158	0.3509	-0.0175
34	0.0877	0.2456	0.2456	-0.0877	-0.0877	0.4211	0.2456
35	-0.0175	0.3509	-0.3158	0.0175	0.3509	-0.0175	0.3509
36	0.0175	-0.3509	-0.3509	-0.0175	0.3158	0.3509	-0.0175
45	-0.0526	-0.2807	-0.2807	0.3860	0.0526	-0.0526	0.3860
46	0.0877	0.2456	0.2456	0.2456	-0.0877	0.4211	-0.0877
56	-0.0175	-0.3158	0.3509	0.3509	0.3509	-0.0175	0.0175
SS	0.0736	0.9508	0.9508	1.0911	0.9508	1.0677	1.0911

CONFOUNDING INDEX= 1.0170

DESIGN (6.13. 2)

6 VARIABLES 7 PARAMETERS 13 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
-1.	-1.	-1.	1.	-1.	1.	0.5439
1.	1.	1.	-1.	1.	1.	0.5439
1.	-1.	-1.	-1.	-1.	-1.	0.5789
1.	1.	1.	1.	1.	-1.	0.3684
-1.	1.	1.	-1.	-1.	-1.	0.5789
1.	1.	-1.	1.	-1.	1.	0.5789
-1.	1.	1.	1.	-1.	-1.	0.5439
1.	-1.	1.	1.	1.	-1.	0.4737
1.	-1.	1.	-1.	-1.	1.	0.5789
1.	1.	-1.	1.	1.	-1.	0.4737
-1.	-1.	-1.	-1.	1.	-1.	0.5789
-1.	-1.	1.	1.	1.	1.	0.5789
-1.	1.	-1.	-1.	1.	1.	0.5789

X'X INVERSE

0.0789	-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	0.0044
-0.0044	0.0789	-0.0044	-0.0044	-0.0044	-0.0044	0.0044
-0.0044	-0.0044	0.0789	-0.0044	-0.0044	-0.0044	0.0044
-0.0044	-0.0044	-0.0044	0.0789	-0.0044	-0.0044	0.0044
-0.0044	-0.0044	-0.0044	-0.0044	0.0789	-0.0044	0.0044
-0.0044	-0.0044	-0.0044	-0.0044	-0.0044	0.0789	0.0044
0.0044	0.0044	0.0044	0.0044	0.0044	0.0044	0.0789

DET(X'X) = 0.5673369600D 08

D-EFFICIENCY= 98.6

AVERAGE VARIANCE OF COEFFICIENTS= 0.0789

T-EFFICIENCY= 97.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.5789

DESIGN (6.13. 2)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.0526	0.0526	0.0526	-0.2807	0.3860	0.3860	0.2807
13	0.0877	0.0877	-0.2456	0.0877	-0.2456	0.4211	0.2456
14	0.0175	0.0175	0.3509	-0.3158	0.0175	0.3509	-0.3509
15	-0.0175	-0.0175	0.3158	0.3158	0.3158	-0.0175	-0.3158
16	-0.0526	-0.0526	0.2807	0.2807	-0.3860	-0.3860	0.0526
23	0.0877	-0.2456	0.0877	0.0877	-0.2456	-0.2456	-0.4211
24	0.0526	0.3860	0.0526	-0.2807	0.0526	-0.2807	-0.3860
25	0.0877	0.4211	0.0877	-0.2456	-0.2456	0.0877	0.2456
26	-0.0526	0.2807	-0.0526	-0.3860	-0.3860	0.2807	0.0526
34	0.0526	-0.2807	-0.2807	0.0526	0.0526	0.3860	-0.3860
35	0.0526	0.3860	-0.2807	0.0526	0.3860	0.0526	0.2807
36	-0.0526	0.2807	-0.3860	-0.0526	-0.3860	0.2807	0.0526
45	0.0175	0.3509	-0.3158	0.3509	0.0175	0.0175	-0.3509
46	0.0175	-0.3158	-0.3158	-0.3158	0.0175	-0.3158	-0.0175
56	-0.0526	-0.3860	0.2807	0.2807	-0.3860	-0.0526	0.0526
SS	0.0465	1.1576	0.9705	0.9705	1.1810	1.1576	1.1108

CONFOUNDING INDEX= 1.0913

DESIGN (6.13. 3)

6 VARIABLES 7 PARAMETERS 13 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
-1.	1.	1.	-1.	1.	1.	0.5789
-1.	-1.	1.	-1.	1.	-1.	0.4737
-1.	1.	-1.	1.	1.	-1.	0.5439
1.	-1.	1.	-1.	1.	-1.	0.5439
-1.	1.	1.	1.	-1.	-1.	0.5439
-1.	-1.	-1.	1.	1.	1.	0.5439
1.	-1.	-1.	1.	1.	-1.	0.5439
1.	1.	-1.	-1.	-1.	1.	0.4737
-1.	-1.	-1.	-1.	-1.	1.	0.5789
-1.	-1.	1.	1.	-1.	-1.	0.4737
1.	1.	-1.	-1.	-1.	-1.	0.5439
1.	-1.	1.	1.	-1.	1.	0.5789
1.	1.	1.	1.	1.	1.	0.5789

X'X INVERSE

0.0789	0.0044	0.0044	-0.0044	-0.0044	-0.0044	0.0044
0.0044	0.0789	-0.0044	0.0044	0.0044	0.0044	-0.0044
0.0044	-0.0044	0.0789	0.0044	0.0044	0.0044	-0.0044
-0.0044	0.0044	0.0044	0.0789	-0.0044	-0.0044	0.0044
-0.0044	0.0044	0.0044	-0.0044	0.0789	-0.0044	0.0044
-0.0044	0.0044	0.0044	-0.0044	-0.0044	0.0789	0.0044
0.0044	-0.0044	-0.0044	0.0044	0.0044	0.0044	0.0789

DET(X'X) = 0.5673369600D 08

D-EFFICIENCY= 98.6

AVERAGE VARIANCE OF COEFFICIENTS= 0.0789

T-EFFICIENCY= 97.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.5789

DESIGN (6.13. 3)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.1228	-0.1228	-0.1228	-0.2105	-0.2105	-0.2105	0.2105
13	-0.0877	0.0877	-0.2456	-0.0877	0.2456	0.2456	0.4211
14	-0.0877	0.0877	-0.2456	0.2456	-0.0877	0.2456	0.4211
15	-0.1228	0.1228	-0.2105	0.2105	0.2105	-0.1228	-0.2105
16	0.0526	-0.0526	0.2807	0.3860	0.3860	-0.2807	-0.0526
23	-0.0877	-0.2456	0.0877	-0.0877	0.2456	0.2456	0.4211
24	-0.1228	-0.2105	0.1228	0.2105	-0.1228	0.2105	-0.2105
25	-0.0877	-0.2456	0.0877	0.2456	0.2456	-0.0877	0.4211
26	0.0526	0.2807	-0.0526	0.3860	-0.2807	0.3860	-0.0526
34	0.1579	0.1754	0.1754	0.1579	0.1579	-0.8421	0.1754
35	0.1579	0.1754	0.1754	0.1579	-0.8421	0.1579	0.1754
36	-0.0526	0.3860	0.3860	-0.0526	0.2807	0.2807	0.0526
45	0.1579	0.1754	0.1754	-0.8421	0.1579	0.1579	0.1754
46	-0.0877	0.4211	-0.2456	0.2456	-0.0877	0.2456	0.0877
56	-0.0877	-0.2456	0.4211	0.2456	0.2456	-0.0877	0.0877
SS	0.1745	0.7710	0.7710	1.4494	1.4260	1.4260	0.9581

CONFOUNDING INDEX= 1.1336

DESIGN (6.14. 1)

6 VARIABLES 7 PARAMETERS 14 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
-1.	-1.	-1.	-1.	1.	1.	0.5000
1.	1.	1.	-1.	1.	-1.	0.5407
1.	1.	-1.	1.	1.	-1.	0.5407
-1.	-1.	1.	-1.	1.	-1.	0.5407
1.	1.	-1.	-1.	1.	1.	0.5000
1.	-1.	1.	1.	1.	1.	0.5407
-1.	-1.	-1.	1.	1.	-1.	0.5407
-1.	1.	1.	1.	-1.	1.	0.4407
1.	-1.	-1.	-1.	-1.	-1.	0.4667
1.	-1.	1.	1.	-1.	-1.	0.5407
-1.	1.	-1.	-1.	-1.	-1.	0.4667
1.	-1.	-1.	-1.	-1.	1.	0.5000
-1.	1.	-1.	1.	-1.	1.	0.4407
-1.	1.	1.	-1.	-1.	1.	0.4407

X'X INVERSE

0.0741	0.0	0.0	0.0093	0.0093	0.0	0.0
0.0	0.0750	0.0083	0.0	0.0	-0.0083	0.0083
0.0	0.0083	0.0750	0.0	0.0	0.0083	-0.0083
0.0093	0.0	0.0	0.0741	-0.0093	0.0	0.0
0.0093	0.0	0.0	-0.0093	0.0741	0.0	0.0
0.0	-0.0083	0.0083	0.0	0.0	0.0750	0.0083
0.0	0.0083	-0.0083	0.0	0.0	0.0083	0.0750

DET(X'X) = 0.8957952000D 08

D-EFFICIENCY= 97.7

AVERAGE VARIANCE OF COEFFICIENTS= 0.0746

T-EFFICIENCY= 95.7

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.5741

DESIGN (5.14. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	-0.1852	-0.1333	0.1333	-0.1481	-0.1481	0.8667	-0.2000
13	0.0370	-0.2000	-0.1333	-0.0370	0.2963	0.1333	-0.1333
14	0.0370	-0.2000	-0.1333	0.2963	-0.0370	0.1333	-0.1333
15	0.1852	0.1333	0.8667	0.1481	0.1481	0.1333	0.2000
16	-0.1852	-0.0667	-0.2667	-0.1481	-0.1481	0.2667	0.0667
23	-0.0370	-0.1333	-0.2000	0.0370	-0.2963	-0.1333	0.1333
24	-0.0370	-0.1333	-0.2000	-0.2963	0.0370	-0.1333	0.1333
25	-0.1852	0.8667	0.1333	-0.1481	-0.1481	-0.1333	-0.2000
26	0.1852	-0.2667	-0.0667	0.1481	0.1481	-0.2667	-0.0667
34	0.1111	0.3333	-0.3333	-0.1111	-0.1111	-0.3333	0.3333
35	-0.0370	0.1333	-0.1333	0.0370	-0.2963	-0.2000	-0.1333
36	0.0370	-0.1333	0.1333	-0.0370	0.2963	-0.1333	-0.2000
45	-0.0370	0.1333	-0.1333	-0.2963	0.0370	-0.2000	-0.1333
46	0.0370	-0.1333	0.1333	0.2963	-0.0370	-0.1333	-0.2000
56	-0.1852	0.2667	-0.2667	-0.1481	-0.1481	-0.0667	0.0667
SS	0.2291	1.2311	1.2311	0.5007	0.5007	1.2311	0.4311

CONFOUNDING INDEX= 0.8543

DESIGN (6.14. 2)

6 VARIABLES 7 PARAMETERS 14 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
-1.	1.	1.	-1.	1.	1.	0.5000
1.	1.	-1.	1.	-1.	-1.	0.5407
1.	-1.	1.	1.	-1.	1.	0.5407
-1.	-1.	1.	-1.	-1.	-1.	0.4407
1.	1.	1.	-1.	-1.	-1.	0.5741
-1.	-1.	-1.	1.	1.	-1.	0.5741
-1.	-1.	-1.	-1.	-1.	1.	0.4667
1.	-1.	-1.	-1.	1.	-1.	0.5407
-1.	1.	-1.	-1.	-1.	1.	0.5000
1.	1.	-1.	1.	1.	1.	0.4407
1.	-1.	1.	-1.	1.	1.	0.5000
-1.	1.	1.	1.	1.	-1.	0.5741
-1.	-1.	1.	1.	-1.	1.	0.4407
1.	1.	-1.	-1.	1.	1.	0.3667

X'X INVERSE

0.0741	0.0	0.0	0.0	0.0093	0.0	-0.0093
0.0	0.0750	-0.0083	0.0083	0.0	-0.0083	0.0
0.0	-0.0083	0.0750	0.0083	0.0	-0.0083	0.0
0.0	0.0083	0.0083	0.0750	0.0	0.0083	0.0
0.0093	0.0	0.0	0.0	0.0741	0.0	0.0093
0.0	-0.0083	-0.0083	0.0083	0.0	0.0750	0.0
-0.0093	0.0	0.0	0.0	0.0093	0.0	0.0741

DET(X'X) = 0.8957952000D-08

D-EFFICIENCY= 97.7

AVERAGE VARIANCE OF COEFFICIENTS= 0.0746

T-EFFICIENCY= 95.7

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.5741

DESIGN (6.14. 2)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.1852	0.0000	0.0000	-0.3333	0.1481	-0.3333	-0.1481
13	-0.1852	0.0667	-0.2667	-0.0667	-0.1481	-0.2667	0.1481
14	-0.0370	-0.1333	0.2000	-0.2000	0.0370	-0.4667	0.2963
15	0.0370	0.0	-0.3333	-0.3333	-0.3704	0.0	0.3704
16	0.0370	0.1333	-0.2000	0.2000	0.2963	0.4667	0.0370
23	-0.1111	-0.3333	0.0000	-0.0000	-0.2222	0.3333	-0.4444
24	0.0370	0.1333	-0.2000	-0.1333	-0.0370	0.1333	-0.2963
25	0.1111	-0.2667	0.0667	0.2667	0.2222	0.0667	0.4444
26	-0.0370	-0.2667	0.0667	-0.4000	-0.2963	0.4000	-0.0370
34	-0.0370	-0.1333	-0.1333	-0.2000	0.0370	-0.1333	0.2963
35	-0.1852	-0.3333	0.3333	-0.0000	-0.1481	0.0000	0.1481
36	0.0370	0.2000	-0.4667	0.1333	0.2963	0.2000	0.0370
45	0.0370	-0.4667	0.2000	-0.2000	-0.0370	-0.1333	-0.2963
46	-0.1111	0.4000	-0.2667	0.2667	0.1111	-0.2667	-0.1111
56	-0.0370	0.4000	0.4000	0.2667	-0.2963	0.0667	-0.0370
SS	0.1523	1.0178	0.9289	0.7956	0.6708	1.0622	0.9671

CONFOUNDING INDEX= 0.9071

DESIGN (6.14. 3)

6 VARIABLES 7 PARAMETERS 14 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
1.	-1.	1.	-1.	-1.	-1.	0.5407
1.	-1.	-1.	-1.	1.	1.	0.4407
-1.	-1.	1.	1.	1.	1.	0.5407
1.	1.	1.	-1.	1.	-1.	0.5407
-1.	1.	-1.	1.	-1.	-1.	0.5741
-1.	1.	1.	-1.	-1.	1.	0.5000
-1.	-1.	-1.	-1.	-1.	1.	0.5407
-1.	1.	-1.	-1.	1.	-1.	0.5407
1.	1.	1.	1.	-1.	1.	0.5000
1.	1.	-1.	-1.	1.	1.	0.4407
-1.	-1.	1.	1.	1.	-1.	0.4667
1.	1.	-1.	1.	-1.	1.	0.4667
1.	-1.	-1.	1.	1.	-1.	0.4667
1.	-1.	-1.	-1.	-1.	-1.	0.4407

X'X INVERSE

0.0750	-0.0083	0.0	0.0083	0.0083	0.0	0.0
-0.0083	0.0750	0.0	0.0083	0.0083	0.0	0.0
0.0	0.0	0.0741	0.0	0.0	0.0093	-0.0093
0.0083	0.0083	0.0	0.0750	-0.0083	0.0	0.0
0.0083	0.0083	0.0	-0.0083	0.0750	0.0	0.0
0.0	0.0	0.0093	0.0	0.0	0.0741	0.0093
0.0	0.0	-0.0093	0.0	0.0	0.0093	0.0741

DET(X'X) = 0.8957952000D 08

D-EFFICIENCY= 97.7

AVERAGE VARIANCE OF COEFFICIENTS= 0.0746

T-EFFICIENCY= 95.7

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.5741

DESIGN (6.14. 3)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.0667	0.0667	0.1111	0.2667	0.2667	0.2222	0.4444
13	-0.1333	-0.1333	0.2963	0.1333	-0.2000	-0.2963	-0.3704
14	-0.1333	-0.1333	0.2222	-0.2000	0.1333	-0.2222	0.2222
15	-0.0667	-0.0667	0.1481	-0.2667	-0.2667	0.1852	0.1481
16	0.0000	0.0000	0.4444	-0.3333	0.3333	0.2222	0.1111
23	-0.0667	0.2667	-0.1852	0.0667	-0.2667	-0.1481	0.1481
24	-0.0667	0.2667	-0.2593	-0.2667	0.0667	-0.7407	0.0741
25	-0.2667	0.0667	0.0370	-0.0667	-0.7333	-0.0370	-0.2963
26	0.1333	0.4667	-0.0370	0.2000	0.2000	-0.2963	-0.0370
34	0.1333	-0.2000	-0.2963	-0.1333	-0.1333	0.2963	0.3704
35	0.0667	-0.2667	-0.1481	-0.0667	0.2667	-0.1852	-0.1481
36	0.0667	-0.2667	0.1481	-0.0667	0.2667	-0.1481	-0.1852
45	0.0667	-0.2667	-0.7407	0.2667	-0.0667	-0.2593	-0.0741
46	0.0	0.3333	0.1481	0.3333	0.0	-0.1481	-0.1852
56	-0.2000	0.1333	-0.2963	-0.1333	-0.1333	-0.0370	0.0370
SS	0.2133	0.7911	1.2634	0.6578	1.1467	1.1646	0.7695

CONFOUNDING INDEX= 0.9655

DESIGN (6.15. 1)

6 VARIABLES 7 PARAMETERS 15 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
1.	-1.	1.	-1.	-1.	1.	0.4858
-1.	1.	1.	1.	1.	-1.	0.4574
1.	-1.	-1.	-1.	1.	1.	0.4574
1.	1.	-1.	1.	1.	1.	0.4858
1.	1.	1.	-1.	1.	1.	0.4858
-1.	-1.	1.	-1.	1.	-1.	0.4858
-1.	1.	-1.	-1.	-1.	1.	0.4894
-1.	-1.	-1.	-1.	-1.	-1.	0.4149
1.	1.	1.	1.	-1.	-1.	0.4574
-1.	-1.	-1.	1.	-1.	1.	0.5390
-1.	-1.	1.	1.	1.	1.	0.4574
1.	1.	-1.	-1.	-1.	-1.	0.4149
1.	-1.	-1.	1.	1.	-1.	0.5390
-1.	1.	-1.	-1.	1.	-1.	0.4149
1.	-1.	1.	1.	-1.	-1.	0.4149

X'X INVERSE

0.0691	-0.0066	0.0066	0.0053	0.0053	-0.0066	0.0066
-0.0066	0.0691	-0.0066	-0.0053	-0.0053	0.0066	-0.0066
0.0066	-0.0066	0.0691	0.0053	0.0053	-0.0066	0.0066
0.0053	-0.0053	0.0053	0.0709	-0.0124	-0.0053	0.0053
0.0053	-0.0053	0.0053	-0.0124	0.0709	-0.0053	0.0053
-0.0066	0.0066	-0.0066	-0.0053	-0.0053	0.0691	-0.0066
0.0066	-0.0066	0.0066	0.0053	0.0053	-0.0066	0.0691

DET(X'X) = 0.1478492160D 09

D-EFFICIENCY= 98.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.0697

T-EFFICIENCY= 95.7

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.7021

DESIGN (6.15. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.1064	-0.1064	0.1064	0.0851	0.0851	-0.1064	0.1064
13	0.1383	-0.1383	0.1383	0.1773	-0.1560	-0.6383	0.1383
14	0.0319	-0.0319	0.0319	-0.2411	0.0922	-0.0319	-0.4681
15	-0.0957	0.0957	-0.0957	-0.6099	0.0567	0.0957	0.4043
16	0.0106	-0.0106	0.0106	0.1418	-0.5248	0.4894	0.0106
23	-0.0851	0.0851	-0.0851	-0.1348	0.1986	0.0851	-0.0851
24	-0.0851	0.0851	-0.0851	0.1986	-0.1348	0.0851	-0.0851
25	0.1064	-0.1064	0.1064	0.0851	0.0851	-0.1064	0.1064
26	-0.1064	0.1064	-0.1064	-0.0851	-0.0851	0.1064	-0.1064
34	0.2234	-0.2234	0.2234	-0.0213	-0.0213	-0.2234	-0.2766
35	0.1383	-0.6383	0.1383	0.1773	-0.1560	-0.1383	0.1383
36	-0.1277	0.1277	-0.1277	-0.0355	-0.3688	0.1277	-0.1277
45	0.0851	-0.0851	0.0851	-0.1986	0.1348	-0.0851	0.0851
46	-0.0745	-0.4255	-0.0745	-0.3262	0.0071	0.0745	-0.0745
56	0.0532	0.4468	0.0532	0.0426	0.0426	-0.0532	0.0532
SS	0.1788	0.9395	0.1788	0.7419	0.5717	0.8065	0.5778

CONFOUNDING INDEX= 0.6360

DESIGN (6.15. 2)

6 VARIABLES 7 PARAMETERS 15 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
1.	-1.	1.	-1.	1.	-1.	0.5532
-1.	-1.	-1.	-1.	-1.	-1.	0.5390
-1.	1.	-1.	1.	1.	-1.	0.4255
1.	-1.	1.	-1.	-1.	1.	0.4149
-1.	-1.	1.	1.	-1.	1.	0.4858
1.	1.	-1.	1.	-1.	-1.	0.4574
-1.	1.	1.	-1.	-1.	1.	0.4149
-1.	1.	1.	1.	-1.	-1.	0.4858
1.	1.	-1.	-1.	-1.	1.	0.5390
1.	-1.	-1.	1.	1.	1.	0.4149
-1.	1.	-1.	-1.	1.	1.	0.4858
-1.	-1.	-1.	1.	1.	1.	0.4255
1.	1.	1.	1.	1.	1.	0.4858
1.	1.	1.	-1.	1.	-1.	0.4574
1.	-1.	-1.	1.	-1.	-1.	0.4149

X'X INVERSE

0.0691	-0.0066	-0.0066	0.0053	-0.0053	0.0066	-0.0066
-0.0066	0.0691	0.0066	-0.0053	0.0053	-0.0066	0.0066
-0.0066	0.0066	0.0691	-0.0053	0.0053	-0.0066	0.0066
0.0053	-0.0053	-0.0053	0.0709	0.0124	0.0053	-0.0053
-0.0053	0.0053	0.0053	0.0124	0.0709	-0.0053	0.0053
0.0066	-0.0066	-0.0066	0.0053	-0.0053	0.0691	-0.0066
-0.0066	0.0066	0.0066	-0.0053	0.0053	-0.0066	0.0691

DET(X'X) = 0.1478492160D 09

D-EFFICIENCY= 98.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.0697

T-EFFICIENCY= 95.7

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.7021

DESIGN (6.15. 2)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	-0.1064	0.1064	0.1064	-0.0851	0.0851	-0.1064	0.1064
13	0.1809	-0.1809	-0.1809	0.0780	-0.4113	0.6809	-0.1809
14	-0.1277	0.1277	0.1277	-0.3688	0.0355	-0.1277	0.1277
15	0.1489	-0.1489	-0.1489	0.6525	0.0142	0.1489	-0.1489
16	-0.1064	0.1064	0.1064	-0.0851	0.0851	-0.1064	0.1064
23	0.0851	-0.0851	-0.0851	0.1348	0.1986	0.0851	-0.0851
24	-0.0319	0.0319	0.0319	0.2411	0.0922	-0.0319	-0.4681
25	0.1064	-0.1064	-0.1064	0.0851	-0.0851	0.1064	-0.1064
26	-0.0638	0.0638	0.0638	-0.1844	-0.4823	-0.0638	0.0638
34	-0.2234	-0.2766	0.2234	0.0213	-0.0213	-0.2234	0.2234
35	-0.0851	0.5851	0.0851	-0.1348	-0.1986	-0.0851	-0.4149
36	0.0319	-0.0319	-0.0319	0.0922	0.2411	-0.4681	-0.0319
45	0.0319	-0.0319	-0.0319	-0.2411	-0.0922	0.0319	0.4681
46	0.0213	-0.0213	-0.5213	0.2837	0.0496	0.5213	-0.0213
56	0.0213	-0.0213	-0.0213	-0.3830	0.3830	0.0213	-0.0213
SS	0.1776	0.5393	0.4488	1.0123	0.7286	1.0978	0.7786

CONFOUNDING INDEX= 0.7676

DESIGN (6.15. 3)

6 VARIABLES 7 PARAMETERS 15 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
-1.	-1.	1.	-1.	-1.	-1.	0.4858
1.	-1.	-1.	1.	-1.	1.	0.4858
-1.	1.	-1.	-1.	-1.	-1.	0.5390
1.	1.	1.	-1.	1.	1.	0.5532
1.	1.	1.	1.	-1.	-1.	0.4858
1.	-1.	1.	-1.	1.	-1.	0.5532
-1.	-1.	1.	1.	-1.	1.	0.4858
1.	-1.	-1.	1.	1.	-1.	0.4149
-1.	-1.	-1.	1.	1.	1.	0.4149
-1.	1.	1.	1.	1.	-1.	0.4255
1.	1.	-1.	-1.	-1.	1.	0.4858
-1.	1.	-1.	-1.	1.	1.	0.4149
-1.	1.	1.	1.	1.	1.	0.4149
1.	1.	-1.	1.	1.	-1.	0.4255
-1.	-1.	-1.	-1.	1.	-1.	0.4149

X'X INVERSE

0.0709	0.0053	-0.0053	0.0053	-0.0053	-0.0124	0.0053
0.0053	0.0691	-0.0066	0.0066	-0.0066	0.0053	0.0066
-0.0053	-0.0066	0.0691	-0.0066	0.0066	-0.0053	-0.0066
0.0053	0.0066	-0.0066	0.0691	-0.0066	0.0053	0.0066
-0.0053	-0.0066	0.0066	-0.0066	0.0691	-0.0053	-0.0066
-0.0124	0.0053	-0.0053	0.0053	-0.0053	0.0709	0.0053
0.0053	0.0066	-0.0066	0.0066	-0.0066	0.0053	0.0691

DET(X'X) = 0.1478492160D 09

D-EFFICIENCY= 98.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.0697

T-EFFICIENCY= 95.7

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.7021

DESIGN (6.15. 3)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.1348	0.0851	-0.0851	0.0851	-0.0851	-0.1986	0.0851
13	-0.0922	-0.0319	0.0319	-0.0319	-0.4681	0.2411	-0.0319
14	0.0496	-0.0213	0.0213	-0.5213	0.0213	-0.2837	-0.5213
15	-0.0213	0.2234	-0.2234	0.2234	-0.2234	-0.0213	-0.2766
16	0.0071	-0.0745	0.0745	-0.0745	-0.4255	-0.3262	-0.0745
23	-0.0071	0.0745	-0.0745	0.0745	0.4255	0.3262	0.0745
24	-0.1348	-0.0851	0.0851	0.4149	0.0851	0.1986	-0.5851
25	0.0638	-0.1702	0.1702	0.3298	0.1702	0.0638	0.3298
26	0.0780	0.1809	-0.1809	0.1809	-0.6809	0.4113	0.1809
34	0.0496	-0.5213	0.5213	-0.0213	0.0213	-0.2837	-0.0213
35	-0.0213	0.2234	0.2766	0.2234	-0.2234	-0.0213	0.2234
36	-0.1348	-0.0851	0.0851	-0.0851	0.0851	0.1986	-0.0851
45	-0.0213	-0.2766	0.2766	-0.2766	0.2766	-0.0213	-0.2766
46	0.1348	-0.4149	-0.5851	0.0851	-0.0851	-0.1986	0.0851
56	-0.0638	-0.3298	0.3298	0.1702	-0.1702	-0.0638	0.1702
SS	0.1018	0.8249	1.0217	0.8249	1.3090	0.7684	1.0217

CONFOUNDING INDEX= 0.9618

DESIGN (6.16. 1)

6 VARIABLES 7 PARAMETERS 16 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
1.	1.	-1.	1.	-1.	-1.	0.4375
1.	1.	1.	1.	-1.	-1.	0.4375
1.	1.	-1.	-1.	-1.	1.	0.4375
1.	-1.	-1.	1.	-1.	-1.	0.4375
-1.	-1.	-1.	-1.	1.	-1.	0.4375
1.	-1.	1.	-1.	-1.	-1.	0.4375
1.	-1.	1.	-1.	-1.	1.	0.4375
-1.	1.	1.	-1.	1.	-1.	0.4375
-1.	1.	1.	1.	1.	1.	0.4375
-1.	-1.	1.	1.	-1.	1.	0.4375
1.	1.	1.	-1.	1.	-1.	0.4375
-1.	-1.	-1.	-1.	1.	1.	0.4375
1.	1.	-1.	1.	1.	1.	0.4375
1.	-1.	-1.	1.	1.	-1.	0.4375
1.	-1.	1.	1.	1.	1.	0.4375
-1.	1.	-1.	-1.	-1.	1.	0.4375

X'X INVERSE

0.0625	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0625	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0625	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0625	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0625	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0625	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0625

DET(X'X) = 0.2684354560D 09

D-EFFICIENCY= 100.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.0625

T-EFFICIENCY= 100.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.4375

DESIGN (6.16. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.0	0.0	0.0	-0.5000	0.0	0.0	0.0
13	0.0	0.0	-0.5000	0.0	-0.5000	0.0	0.0
14	0.0	0.0	0.0	-0.5000	0.0	0.5000	0.0
15	0.0	0.0	0.0	0.0	0.5000	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.0	-0.5000	0.0	0.0	0.0	0.5000	-0.5000
24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.5000	0.0	0.0	0.0
26	0.0	0.0	0.0	-0.5000	0.0	0.0	0.0
34	0.0	-0.5000	0.0	0.0	0.0	0.0	0.5000
35	0.0	0.0	0.5000	0.0	0.0	0.0	0.0
36	0.0	0.0	-0.5000	0.0	0.5000	0.0	0.0
45	0.0	0.5000	0.0	0.0	0.0	0.0	0.5000
46	0.0	0.0	0.0	0.5000	0.0	0.5000	0.0
56	0.0	0.0	0.0	0.0	0.5000	0.0	0.0
SS	0.0	0.7500	0.7500	1.2500	1.0000	0.7500	0.7500

CONFOUNDING INDEX= 0.8750

DESIGN (6.17. 1)

6 VARIABLES 7 PARAMETERS 17 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
-1.	1.	-1.	1.	1.	1.	0.4348
-1.	-1.	1.	1.	-1.	-1.	0.3043
1.	1.	-1.	1.	-1.	-1.	0.4348
-1.	1.	1.	1.	-1.	1.	0.4130
1.	1.	1.	-1.	1.	1.	0.4130
-1.	-1.	-1.	-1.	-1.	1.	0.4348
1.	-1.	1.	1.	1.	-1.	0.4130
1.	-1.	-1.	1.	-1.	1.	0.4348
1.	-1.	1.	1.	1.	1.	0.4348
1.	1.	1.	-1.	-1.	-1.	0.4348
-1.	-1.	1.	-1.	1.	-1.	0.4130
-1.	-1.	1.	-1.	-1.	1.	0.4130
1.	-1.	-1.	-1.	-1.	-1.	0.4348
1.	1.	-1.	-1.	1.	1.	0.3696
-1.	1.	-1.	-1.	1.	-1.	0.4348
-1.	-1.	-1.	1.	1.	-1.	0.4130
-1.	1.	1.	1.	-1.	-1.	0.3696

X'X INVERSE

0.0598	0.0027	0.0027	-0.0027	-0.0027	0.0027	0.0027
0.0027	0.0598	-0.0027	0.0027	0.0027	-0.0027	-0.0027
0.0027	-0.0027	0.0598	0.0027	0.0027	-0.0027	-0.0027
-0.0027	0.0027	0.0027	0.0598	-0.0027	0.0027	0.0027
-0.0027	0.0027	0.0027	-0.0027	0.0598	0.0027	0.0027
0.0027	-0.0027	-0.0027	0.0027	0.0027	0.0598	-0.0027
0.0027	-0.0027	-0.0027	0.0027	0.0027	-0.0027	0.0598

DET(X'X) = 0.3858759680D 09

D-EFFICIENCY= 99.1

AVERAGE VARIANCE OF COEFFICIENTS= 0.0598

T-EFFICIENCY= 98.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.4348

DESIGN (6.17. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.0652	-0.0652	-0.0652	0.0652	-0.4348	-0.0652	-0.0652
13	-0.0217	0.0217	0.0217	-0.0217	-0.0217	0.5217	0.0217
14	-0.0652	0.0652	-0.4348	-0.0652	-0.0652	0.0652	0.0652
15	0.0435	-0.0435	-0.0435	0.5435	0.0435	-0.0435	0.4565
16	0.0652	-0.0652	-0.0652	0.0652	0.0652	0.4348	-0.0652
23	-0.0652	0.0652	0.0652	-0.0652	-0.0652	-0.4348	0.0652
24	-0.0870	-0.4130	0.0870	-0.0870	-0.0870	-0.4130	0.0870
25	0.1087	-0.1087	-0.1087	-0.3913	-0.3913	-0.1087	0.3913
26	0.0652	-0.0652	-0.0652	0.0652	0.0652	0.4348	-0.0652
34	0.0435	-0.0435	-0.0435	0.0435	0.0435	-0.0435	-0.0435
35	-0.0435	0.5435	-0.4565	-0.0435	-0.0435	0.0435	0.0435
36	-0.0435	0.0435	0.0435	-0.0435	-0.0435	0.0435	0.0435
45	-0.0652	0.0652	-0.4348	-0.0652	-0.0652	0.0652	0.0652
46	-0.0435	0.0435	0.0435	-0.0435	-0.0435	0.0435	0.0435
56	0.0870	0.4130	0.4130	0.0870	0.0870	-0.0870	-0.0870
SS	0.0624	0.6819	0.8015	0.4972	0.3885	1.0515	0.4102

CONFOUNDING INDEX= 0.6385

DESIGN (6.17. 2)

6 VARIABLES 7 PARAMETERS 17 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
1.	1.	1.	-1.	-1.	-1.	0.4348
-1.	1.	1.	-1.	1.	1.	0.4348
1.	1.	1.	1.	1.	-1.	0.4130
1.	-1.	1.	1.	-1.	-1.	0.4348
-1.	-1.	1.	1.	1.	1.	0.4348
-1.	-1.	-1.	-1.	-1.	-1.	0.4348
-1.	1.	-1.	1.	1.	-1.	0.3043
1.	-1.	-1.	-1.	1.	1.	0.4348
1.	-1.	1.	1.	-1.	1.	0.4130
-1.	1.	1.	-1.	-1.	1.	0.4348
1.	-1.	-1.	-1.	-1.	1.	0.4130
1.	1.	-1.	-1.	1.	-1.	0.4130
-1.	1.	-1.	1.	-1.	1.	0.4130
1.	1.	-1.	1.	1.	1.	0.4130
-1.	-1.	1.	-1.	1.	-1.	0.4348
-1.	-1.	-1.	1.	1.	-1.	0.3696
-1.	1.	-1.	1.	-1.	-1.	0.3696

X'X INVERSE

0.0598	0.0027	-0.0027	0.0027	-0.0027	-0.0027	0.0027
0.0027	0.0598	0.0027	-0.0027	0.0027	0.0027	-0.0027
-0.0027	0.0027	0.0598	0.0027	-0.0027	-0.0027	0.0027
0.0027	-0.0027	0.0027	0.0598	0.0027	0.0027	-0.0027
-0.0027	0.0027	-0.0027	0.0027	0.0598	-0.0027	0.0027
-0.0027	0.0027	-0.0027	0.0027	-0.0027	0.0598	0.0027
0.0027	-0.0027	0.0027	-0.0027	0.0027	0.0027	0.0598

DET(X'X) = 0.3858759680D 09

D-EFFICIENCY= 99.1

AVERAGE VARIANCE OF COEFFICIENTS= 0.0598

T-EFFICIENCY= 98.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.4348

DESIGN (6.17. 2)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	-0.0870	0.0870	-0.0870	0.0870	-0.0870	0.4130	-0.4130
13	0.0217	-0.0217	0.0217	-0.0217	0.5217	-0.4783	-0.5217
14	-0.0217	0.0217	-0.0217	0.5217	-0.0217	-0.0217	0.0217
15	-0.0870	0.0870	0.4130	-0.4130	-0.0870	-0.0870	0.0870
16	0.0435	-0.0435	-0.4565	-0.5435	0.0435	0.0435	-0.0435
23	-0.0217	0.0217	-0.0217	0.0217	-0.5217	-0.0217	0.0217
24	0.0217	-0.0217	0.0217	-0.5217	0.0217	0.0217	-0.0217
25	0.0652	0.4348	0.0652	-0.0652	0.0652	0.0652	-0.0652
26	-0.0652	-0.4348	-0.0652	0.0652	-0.0652	-0.0652	0.0652
34	-0.0000	0.5000	-0.5000	0.0000	-0.0000	-0.0000	0.0000
35	-0.0652	-0.4348	-0.0652	0.0652	-0.0652	-0.0652	0.0652
36	0.0217	-0.5217	0.0217	-0.0217	0.0217	0.0217	-0.0217
45	0.0435	-0.0435	0.0435	-0.0435	0.0435	0.0435	-0.0435
46	-0.0435	0.0435	-0.0435	0.0435	-0.0435	-0.0435	0.0435
56	-0.0435	0.0435	-0.0435	0.0435	-0.0435	-0.0435	0.0435
SS	0.0378	1.1139	0.6574	1.0378	0.5813	0.4291	0.4726

CONFOUNDING INDEX= 0.7153

DESIGN (6.17. 3)

6 VARIABLES 7 PARAMETERS 17 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
-1.	1.	1.	1.	1.	1.	0.3696
-1.	-1.	-1.	-1.	-1.	1.	0.4130
1.	-1.	1.	-1.	-1.	-1.	0.3696
1.	-1.	-1.	1.	-1.	1.	0.4130
-1.	-1.	1.	1.	1.	-1.	0.4348
-1.	1.	-1.	1.	-1.	-1.	0.4348
1.	1.	-1.	1.	1.	1.	0.4348
-1.	1.	-1.	-1.	-1.	-1.	0.4130
-1.	-1.	1.	1.	-1.	-1.	0.4348
-1.	-1.	-1.	-1.	1.	1.	0.4348
1.	-1.	-1.	-1.	1.	-1.	0.3696
1.	-1.	-1.	1.	1.	-1.	0.4130
-1.	1.	1.	-1.	1.	1.	0.4130
1.	-1.	1.	-1.	-1.	1.	0.4130
1.	1.	1.	1.	-1.	1.	0.4348
1.	1.	1.	-1.	1.	-1.	0.4348
1.	1.	-1.	-1.	-1.	-1.	0.3696

X'X INVERSE

0.0598	-0.0027	0.0027	0.0027	0.0027	0.0027	0.0027
-0.0027	0.0598	0.0027	0.0027	0.0027	0.0027	0.0027
0.0027	0.0027	0.0598	-0.0027	-0.0027	-0.0027	-0.0027
0.0027	0.0027	-0.0027	0.0598	-0.0027	-0.0027	-0.0027
0.0027	0.0027	-0.0027	-0.0027	0.0598	-0.0027	-0.0027
0.0027	0.0027	-0.0027	-0.0027	-0.0027	0.0598	-0.0027
0.0027	0.0027	-0.0027	-0.0027	-0.0027	-0.0027	0.0598

DET(X'X) = 0.3858759680D 09

D-EFFICIENCY= 99.1

AVERAGE VARIANCE OF COEFFICIENTS= 0.0598

T-EFFICIENCY= 98.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.4348

DESIGN (6.17. 3)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	-0.0435	-0.0435	0.0435	0.0435	0.0435	0.0435	0.0435
13	-0.0870	-0.0870	0.0870	0.0870	-0.4130	-0.4130	0.0870
14	-0.0435	-0.0435	0.0435	-0.4565	0.0435	0.0435	0.5435
15	-0.0870	-0.0870	0.0870	-0.4130	0.0870	0.0870	-0.4130
16	-0.0435	-0.0435	0.0435	0.0435	0.5435	-0.4565	0.0435
23	0.0870	0.0870	-0.0870	-0.0870	-0.0870	0.4130	0.4130
24	0.0652	0.0652	-0.0652	-0.0652	-0.0652	-0.0652	0.4348
25	0.0870	0.0870	-0.0870	0.4130	-0.0870	-0.0870	0.4130
26	0.1087	0.1087	-0.1087	0.3913	0.3913	0.3913	-0.1087
34	0.0652	-0.4348	-0.0652	-0.0652	-0.0652	-0.0652	-0.0652
35	0.0870	-0.4130	0.4130	-0.0870	-0.0870	-0.0870	-0.0870
36	0.0652	0.0652	0.4348	-0.0652	-0.0652	-0.0652	-0.0652
45	0.0435	0.0435	-0.0435	-0.0435	-0.0435	-0.0435	-0.0435
46	0.0435	0.5435	0.4565	-0.0435	-0.0435	-0.0435	-0.0435
56	0.0870	-0.4130	0.4130	-0.0870	-0.0870	-0.0870	-0.0870
SS	0.0794	0.8837	0.7968	0.7533	0.6772	0.7533	1.0468

CONFOUNDING INDEX= 0.8185

DESIGN (6.18. 1)

6 VARIABLES 7 PARAMETERS 18 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
-1.	1.	1.	1.	-1.	1.	0.3864
1.	1.	1.	-1.	1.	1.	0.4110
1.	-1.	-1.	1.	1.	1.	0.4318
-1.	1.	-1.	-1.	-1.	1.	0.3030
-1.	-1.	1.	-1.	1.	-1.	0.4110
1.	-1.	1.	-1.	1.	1.	0.4318
-1.	1.	-1.	-1.	-1.	-1.	0.3655
-1.	-1.	-1.	1.	1.	-1.	0.4110
-1.	1.	-1.	1.	1.	1.	0.4110
-1.	-1.	-1.	-1.	-1.	1.	0.3655
-1.	1.	1.	-1.	1.	-1.	0.4318
1.	1.	1.	1.	-1.	-1.	0.4110
1.	-1.	-1.	-1.	-1.	-1.	0.4318
1.	1.	-1.	1.	1.	-1.	0.4318
1.	-1.	1.	1.	-1.	-1.	0.3485
-1.	-1.	1.	1.	-1.	1.	0.3655
1.	1.	-1.	-1.	-1.	1.	0.3485
-1.	-1.	1.	1.	-1.	-1.	0.3030

X'X INVERSE

0.0568	0.0057	0.0	0.0	0.0	0.0057	0.0
0.0057	0.0568	0.0	0.0	0.0	-0.0057	0.0
0.0	0.0	0.0573	0.0052	0.0052	0.0	-0.0052
0.0	0.0	0.0052	0.0573	-0.0052	0.0	0.0052
0.0	0.0	0.0052	-0.0052	0.0573	0.0	0.0052
0.0057	-0.0057	0.0	0.0	0.0	0.0568	0.0
0.0	0.0	-0.0052	0.0052	0.0052	0.0	0.0573

DET(X'X) = 0.5536481280D 09

D-EFFICIENCY= 98.6

AVERAGE VARIANCE OF COEFFICIENTS= 0.0571

T-EFFICIENCY= 97.3

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.4318

DESIGN (6.18. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.0	0.0	-0.0833	0.0833	0.0833	0.0	-0.0833
13	0.0	0.0	0.0833	-0.0833	-0.0833	0.0	0.0833
14	0.0	0.0	0.1250	-0.1250	-0.1250	0.0	-0.3750
15	0.0909	-0.0909	-0.0417	0.0417	0.0417	-0.0909	0.4583
16	0.0455	-0.0455	-0.1250	0.1250	-0.3750	0.4545	-0.1250
23	-0.0909	0.0909	0.0	0.0	0.0	0.0909	0.0
24	-0.0909	0.0909	0.0	0.0	0.0	0.0909	0.0
25	0.0	0.0	-0.0833	0.0833	0.0833	0.0	-0.0833
26	0.0909	-0.0909	0.0	0.0	0.0	-0.0909	0.0
34	-0.0000	0.0000	0.0	0.0	0.0	-1.0000	0.0
35	0.0	0.0	0.0000	-0.0000	-1.0000	0.0	0.0
36	-0.0909	0.0909	0.0	0.0	0.0	0.0909	0.0
45	0.0	0.0	0.0000	-1.0000	-0.0000	0.0	0.0000
46	-0.1364	-0.3636	0.0	0.0	0.0	0.1364	0.0
56	0.0455	0.4545	-0.0833	0.0833	0.0833	-0.0455	-0.0833
SS	0.0640	0.3822	0.0608	1.0608	1.1858	1.2686	0.3941

CONFOUNDING INDEX= 0.7254

DESIGN (6.18. 2)

6 VARIABLES 7 PARAMETERS 18 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
1.	1.	-1.	1.	-1.	-1.	0.3485
-1.	1.	-1.	-1.	1.	1.	0.4318
-1.	-1.	-1.	-1.	1.	-1.	0.3655
-1.	1.	1.	1.	1.	-1.	0.3864
1.	1.	-1.	1.	1.	1.	0.4110
-1.	1.	1.	-1.	-1.	-1.	0.3864
1.	-1.	-1.	-1.	-1.	-1.	0.4318
-1.	-1.	-1.	1.	-1.	1.	0.4110
1.	-1.	1.	-1.	-1.	1.	0.4110
1.	1.	-1.	1.	-1.	1.	0.3485
1.	1.	1.	-1.	1.	1.	0.4110
-1.	1.	1.	1.	-1.	-1.	0.3655
-1.	-1.	1.	1.	-1.	1.	0.4318
1.	-1.	1.	1.	1.	-1.	0.4110
1.	-1.	1.	-1.	1.	-1.	0.3485
-1.	-1.	-1.	1.	1.	-1.	0.3864
-1.	1.	-1.	-1.	-1.	-1.	0.3655
-1.	-1.	1.	-1.	1.	1.	0.3485

X'X INVERSE

0.0568	0.0057	0.0	0.0	0.0	0.0	0.0057
0.0057	0.0568	0.0	0.0	0.0	0.0	-0.0057
0.0	0.0	0.0573	0.0052	-0.0052	0.0052	0.0
0.0	0.0	0.0052	0.0573	0.0052	-0.0052	0.0
0.0	0.0	-0.0052	0.0052	0.0573	0.0052	0.0
0.0	0.0	0.0052	-0.0052	0.0052	0.0573	0.0
0.0057	-0.0057	0.0	0.0	0.0	0.0	0.0568

DET(X'X) = 0.5536481280D 09

D-EFFICIENCY= 98.6

AVERAGE VARIANCE OF COEFFICIENTS= 0.0571

T-EFFICIENCY= 97.3

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.4318

DESIGN (6.18. 2)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.0455	-0.0455	-0.1667	-0.3333	0.3333	0.1667	0.4545
13	0.0	0.0	-0.2917	-0.2083	-0.2917	0.2917	0.0
14	0.0	0.0	0.3333	-0.3333	-0.1667	0.1667	0.0
15	0.0	0.0	0.1250	0.3750	0.1250	-0.1250	0.0
16	0.0909	-0.0909	0.4583	0.0417	-0.0417	0.0417	-0.0909
23	-0.1818	-0.3182	0.0	0.0	0.0	0.0	-0.3182
24	0.1364	0.3636	0.0	0.0	0.0	0.0	-0.1364
25	-0.0455	0.0455	0.0	0.0	0.0	0.0	0.5455
26	0.0455	0.4545	-0.0833	-0.4167	-0.0833	0.5833	-0.0455
34	-0.1818	-0.3182	0.0	0.0	0.0	0.0	-0.3182
35	0.1364	0.3636	0.0	0.0	0.0	0.0	-0.1364
36	0.0	0.0	-0.3333	-0.1667	-0.3333	-0.1667	0.0
45	-0.1364	0.1364	0.0	0.0	0.0	0.0	-0.3636
46	0.0	0.0	-0.1667	-0.3333	-0.1667	-0.3333	0.0
56	0.0	0.0	0.5833	-0.0833	-0.4167	-0.0833	0.0
SS	0.1364	0.7045	0.9358	0.7274	0.5608	0.6441	0.8864

CONFOUNDING INDEX= 0.7432

DESIGN (6.18, 3)

6 VARIABLES 7 PARAMETERS 18 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
1.	1.	1.	1.	1.	-1.	0.4110
-1.	1.	-1.	1.	-1.	1.	0.4318
-1.	-1.	1.	-1.	-1.	-1.	0.3030
-1.	1.	1.	1.	1.	-1.	0.4318
1.	1.	1.	-1.	-1.	-1.	0.3864
1.	-1.	-1.	1.	-1.	1.	0.4318
1.	-1.	-1.	-1.	1.	-1.	0.3655
1.	-1.	1.	1.	1.	1.	0.4318
-1.	-1.	-1.	-1.	1.	-1.	0.3864
-1.	1.	1.	-1.	1.	1.	0.4318
1.	1.	-1.	-1.	1.	1.	0.3485
-1.	1.	-1.	-1.	-1.	-1.	0.3864
1.	1.	-1.	-1.	1.	1.	0.3485
1.	1.	-1.	1.	-1.	-1.	0.4110
1.	-1.	1.	-1.	-1.	-1.	0.3655
-1.	-1.	1.	1.	-1.	1.	0.3485
-1.	-1.	-1.	1.	1.	-1.	0.4318
-1.	-1.	1.	-1.	-1.	1.	0.3485

X'X INVERSE

0.0568	0.0	0.0	0.0	0.0057	0.0	0.0057
0.0	0.0573	-0.0052	0.0052	0.0	-0.0052	0.0
0.0	-0.0052	0.0573	0.0052	0.0	-0.0052	0.0
0.0	0.0052	0.0052	0.0573	0.0	0.0052	0.0
0.0057	0.0	0.0	0.0	0.0568	0.0	-0.0057
0.0	-0.0052	-0.0052	0.0052	0.0	0.0573	0.0
0.0057	0.0	0.0	0.0	-0.0057	0.0	0.0568

DET(X'X) = 0.5536481280D 09

D-EFFICIENCY= 98.6

AVERAGE VARIANCE OF COEFFICIENTS= 0.0571

T-EFFICIENCY= 97.3

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.4318

DESIGN (6.18. 3)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.0909	0.0	0.0	0.0	-0.0909	0.0	-0.0909
13	-0.1364	0.0	0.0	0.0	0.1364	0.0	-0.3636
14	0.0	-0.0833	-0.0833	0.0833	0.0	-0.0833	0.0
15	0.1364	0.0	0.0	0.0	-0.1364	0.0	0.3636
16	0.0	-0.1667	-0.1667	-0.3333	0.0	0.3333	0.0
23	-0.1364	-0.0417	-0.0417	0.0417	0.1364	0.4583	-0.3636
24	-0.0455	-0.0833	-0.0833	0.0833	0.0455	-0.0833	-0.4545
25	0.1364	0.0417	0.0417	0.4583	-0.1364	0.0417	0.3636
26	-0.0455	-0.1667	-0.1667	-0.3333	-0.4545	0.3333	0.0455
34	0.0	0.0417	0.0417	-0.0417	0.0	0.5417	0.0
35	-0.0455	-0.0417	0.4583	0.0417	0.5455	-0.0417	0.0455
36	0.0	-0.3333	-0.3333	-0.1667	0.0	0.1667	0.0
45	-0.0455	-0.0417	-0.0417	0.5417	0.0455	-0.0417	-0.4545
46	0.0909	0.0833	-0.4167	-0.0833	-0.0909	-0.4167	-0.0909
56	-0.0455	0.3333	0.3333	0.1667	-0.4545	-0.1667	0.0455
SS	0.1012	0.3073	0.6823	0.8073	0.8058	0.9740	0.9649

CONFOUNDING INDEX= 0.7569

DESIGN (6.19. 1)

6 VARIABLES 7 PARAMETERS 19 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
-1.	-1.	-1.	1.	1.	-1.	0.3350
1.	-1.	-1.	1.	-1.	-1.	0.4087
-1.	-1.	-1.	-1.	-1.	-1.	0.4087
-1.	-1.	1.	-1.	1.	-1.	0.3350
1.	-1.	-1.	-1.	1.	1.	0.4687
1.	-1.	1.	1.	1.	1.	0.3787
-1.	1.	-1.	1.	-1.	1.	0.3350
1.	1.	-1.	1.	1.	-1.	0.3350
-1.	1.	-1.	-1.	1.	1.	0.3787
-1.	-1.	1.	-1.	1.	-1.	0.3350
1.	1.	-1.	1.	1.	-1.	0.3350
1.	1.	1.	-1.	-1.	-1.	0.3787
-1.	1.	1.	1.	-1.	-1.	0.4087
1.	1.	1.	-1.	1.	-1.	0.3350
1.	-1.	1.	1.	-1.	1.	0.3600
-1.	1.	-1.	-1.	-1.	1.	0.3600
-1.	1.	1.	1.	1.	1.	0.4087
1.	1.	1.	-1.	-1.	1.	0.3600
-1.	-1.	1.	1.	-1.	1.	0.3350

X'X INVERSE

0.0537	0.0038	-0.0038	-0.0038	-0.0038	-0.0031	0.0031
0.0038	0.0538	-0.0038	-0.0038	-0.0038	-0.0031	0.0031
-0.0038	-0.0038	0.0538	0.0038	0.0038	0.0031	-0.0031
-0.0038	-0.0038	0.0038	0.0538	0.0038	0.0031	-0.0031
-0.0038	-0.0038	0.0038	0.0038	0.0538	0.0031	-0.0031
-0.0031	-0.0031	0.0031	0.0031	0.0031	0.0547	0.0078
0.0031	0.0031	-0.0031	-0.0031	-0.0031	0.0078	0.0547

DET(X'X) = 0.8192000000D 09

D-EFFICIENCY= 98.8

AVERAGE VARIANCE OF COEFFICIENTS= 0.0540

T-EFFICIENCY= 97.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.5000

DESIGN (6.19. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.0250	0.0250	-0.0250	0.1750	-0.2250	0.0625	-0.5625
13	0.1000	0.1000	0.1000	-0.1000	-0.3000	-0.2500	0.2500
14	0.0800	0.0800	-0.2800	-0.2800	-0.0800	0.1000	-0.1000
15	0.0600	0.0600	0.1400	-0.2600	0.1400	-0.0500	0.0500
16	-0.0300	-0.0300	-0.5700	0.2300	-0.1700	0.0250	-0.0250
23	-0.0450	0.1550	0.0450	0.0450	-0.1550	-0.2125	-0.2875
24	-0.1000	-0.3000	0.1000	-0.1000	0.1000	0.2500	-0.2500
25	-0.0600	0.1400	0.0600	-0.1400	0.2600	0.0500	-0.0500
26	0.0600	-0.5400	-0.0600	-0.2600	-0.2600	-0.0500	0.0500
34	-0.0250	-0.2250	-0.1750	0.0250	0.0250	-0.0625	0.5625
35	-0.0600	-0.2600	-0.1400	0.0600	-0.1400	0.0500	-0.0500
36	0.0600	0.2600	-0.2600	-0.0600	0.5400	-0.0500	0.0500
45	-0.0600	0.1400	0.2600	-0.1400	0.0600	0.0500	-0.0500
46	0.0300	-0.1700	-0.2300	0.5700	-0.0300	-0.0250	0.0250
56	-0.1400	0.0600	-0.0600	-0.0600	-0.0600	-0.0500	0.0500
SS	0.0727	0.6847	0.6947	0.6947	0.6847	0.2067	0.8692

CONFOUNDING INDEX= 0.6391

DESIGN (6.19. 2)

6 VARIABLES 7 PARAMETERS 19 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
-1.	1.	-1.	1.	-1.	1.	0.3600
1.	1.	-1.	-1.	1.	-1.	0.4087
-1.	1.	1.	1.	-1.	1.	0.3350
1.	-1.	1.	-1.	-1.	1.	0.3400
-1.	-1.	1.	1.	1.	-1.	0.3787
1.	1.	1.	-1.	-1.	1.	0.3350
-1.	1.	-1.	-1.	-1.	1.	0.3350
1.	1.	1.	1.	1.	1.	0.3787
1.	-1.	-1.	-1.	-1.	-1.	0.3600
1.	-1.	-1.	1.	1.	1.	0.3787
-1.	-1.	1.	1.	-1.	-1.	0.3350
-1.	-1.	-1.	-1.	1.	1.	0.4087
1.	-1.	1.	-1.	-1.	-1.	0.3350
1.	1.	1.	1.	1.	-1.	0.4087
-1.	-1.	-1.	1.	-1.	-1.	0.3600
-1.	1.	1.	-1.	-1.	-1.	0.3350
1.	-1.	-1.	1.	-1.	1.	0.3600
-1.	-1.	1.	-1.	1.	1.	0.4687
-1.	1.	-1.	-1.	1.	-1.	0.3787

X'X INVERSE

0.0547	0.0031	0.0031	-0.0031	0.0031	0.0078	-0.0031
0.0031	0.0538	0.0038	-0.0038	0.0038	-0.0031	-0.0038
0.0031	0.0038	0.0538	-0.0038	0.0038	-0.0031	-0.0038
-0.0031	-0.0038	-0.0038	0.0538	-0.0038	0.0031	0.0038
0.0031	0.0038	0.0038	-0.0038	0.0538	-0.0031	-0.0038
0.0078	-0.0031	-0.0031	0.0031	-0.0031	0.0547	0.0031
-0.0031	-0.0038	-0.0038	0.0038	-0.0038	0.0031	0.0538

DET(X'X) = 0.8192000000D 09

D-EFFICIENCY= 98.8

AVERAGE VARIANCE OF COEFFICIENTS= 0.0540

T-EFFICIENCY= 97.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.5000

DESIGN (6.19. 2)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.0125	-0.0850	-0.0850	0.2850	0.1150	0.4875	-0.1150
13	0.0500	0.0600	0.2600	-0.0600	-0.1400	-0.0500	0.1400
14	0.0125	-0.0850	0.1150	-0.1150	-0.0850	0.4875	0.2850
15	0.1000	-0.0800	0.5200	-0.1200	0.5200	-0.1000	-0.1200
16	0.0500	0.0600	-0.1400	0.1400	0.2600	-0.0500	-0.0600
23	0.0750	0.2900	0.0900	-0.0900	0.2900	-0.0750	0.1100
24	-0.0750	0.1100	-0.0900	0.2900	-0.0900	0.0750	0.2900
25	0.1000	0.5200	-0.0800	-0.1200	0.1200	-0.1000	-0.5200
26	-0.0125	-0.1150	0.0850	0.1150	0.2850	-0.4875	-0.0850
34	0.1375	-0.1350	0.2650	-0.0650	0.0650	0.3625	-0.2650
35	-0.0250	-0.0300	-0.0300	-0.1700	0.3700	0.0250	0.0300
36	-0.0500	0.1400	0.1400	0.0600	-0.2600	0.0500	0.0600
45	0.0500	0.4600	0.0600	0.3400	-0.1400	-0.0500	-0.0600
46	0.1000	0.3200	0.3200	-0.3200	0.1200	-0.1000	-0.1200
56	-0.0750	-0.0900	-0.4900	0.0900	-0.0900	0.0750	-0.1100
SS	0.0769	0.7687	0.8447	0.5147	0.8167	0.9019	0.6107

CONFOUNDING INDEX= 0.7429

DESIGN (6.20. 1)

6 VARIABLES 7 PARAMETERS 20 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	VARIANCE OF FITTED RESPONSE
-1.	1.	-1.	1.	1.	-1.	0.3500
1.	1.	1.	1.	1.	-1.	0.3500
-1.	1.	1.	-1.	1.	-1.	0.3500
-1.	-1.	1.	-1.	-1.	1.	0.3500
-1.	1.	1.	1.	-1.	1.	0.3500
-1.	-1.	-1.	1.	-1.	-1.	0.3500
1.	-1.	-1.	-1.	-1.	-1.	0.3500
1.	1.	-1.	-1.	1.	1.	0.3500
-1.	1.	1.	-1.	-1.	1.	0.3500
1.	-1.	1.	1.	-1.	-1.	0.3500
-1.	-1.	-1.	1.	1.	1.	0.3500
1.	1.	-1.	-1.	-1.	1.	0.3500
-1.	-1.	1.	-1.	1.	-1.	0.3500
1.	-1.	1.	1.	-1.	1.	0.3500
1.	-1.	-1.	-1.	1.	1.	0.3500
1.	1.	-1.	1.	-1.	-1.	0.3500
1.	1.	1.	1.	1.	1.	0.3500
-1.	1.	-1.	-1.	-1.	-1.	0.3500
1.	-1.	1.	-1.	1.	-1.	0.3500
-1.	-1.	-1.	1.	1.	1.	0.3500

X'X INVERSE

0.0500	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0500	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0500	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0500	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0500	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0500	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0500

DET(X'X) = 0.1280000000D 10

D-EFFICIENCY= 100.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.0500

T-EFFICIENCY= 100.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.3500

DESIGN (6.20. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6
12	0.0	0.0	0.0	-0.2000	0.2000	0.2000	0.2000
13	0.0	0.0	-0.2000	0.0	0.6000	0.2000	-0.2000
14	0.0	0.0	0.2000	0.6000	0.0	-0.2000	-0.2000
15	0.0	0.0	0.2000	0.2000	-0.2000	0.0	0.2000
16	0.0	0.0	0.2000	-0.2000	-0.2000	0.2000	0.0
23	0.0	-0.2000	0.0	0.0	0.2000	0.2000	0.2000
24	0.0	0.2000	0.0	0.2000	0.0	0.2000	-0.2000
25	0.0	0.2000	0.0	0.2000	0.2000	0.0	-0.2000
26	0.0	0.2000	0.0	0.2000	-0.2000	-0.2000	0.0
34	0.0	0.6000	0.2000	0.0	0.0	-0.2000	0.2000
35	0.0	0.2000	0.2000	0.0	-0.2000	0.0	-0.6000
36	0.0	-0.2000	0.2000	0.0	0.2000	-0.6000	0.0
45	0.0	-0.2000	0.2000	-0.2000	0.0	0.0	0.2000
46	0.0	-0.2000	-0.2000	0.2000	0.0	0.2000	0.0
56	0.0	0.2000	-0.2000	-0.6000	0.2000	0.0	0.0
SS	0.0	0.7200	0.4000	1.0400	0.7200	0.7200	0.7200

CONFOUNDING INDEX= 0.7200

DESIGN (7. 8. 1)

7 VARIABLES 8 PARAMETERS 8 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONSE
-1.	1.	-1.	1.	1.	1.	-1.	1.0000
1.	-1.	1.	1.	1.	-1.	-1.	1.0000
1.	1.	-1.	-1.	1.	-1.	1.	1.0000
1.	-1.	-1.	1.	-1.	1.	1.	1.0000
-1.	1.	1.	1.	-1.	-1.	1.	1.0000
-1.	-1.	-1.	-1.	-1.	-1.	-1.	1.0000
1.	1.	1.	-1.	-1.	1.	-1.	1.0000
-1.	-1.	1.	-1.	1.	1.	1.	1.0000

X'X INVERSE

0.1250	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.1250	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.1250	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.1250	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.1250	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.1250	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.1250	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1250

DET(X'X) = 0.1677721600D 08

D-EFFICIENCY= 100.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.1250

T-EFFICIENCY= 100.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.0000

DESIGN (7. 8. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	0.0	0.0	0.0	0.0	-1.0000	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.0000
14	0.0	0.0	-1.0000	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0	0.0	-1.0000	0.0
16	0.0	0.0	0.0	0.0	0.0	-1.0000	0.0	0.0
17	0.0	0.0	0.0	-1.0000	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	0.0	0.0	-1.0000	0.0	0.0
24	0.0	-1.0000	0.0	0.0	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	-1.0000	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.0000
27	0.0	0.0	0.0	0.0	0.0	0.0	-1.0000	0.0
34	0.0	0.0	0.0	0.0	0.0	0.0	-1.0000	0.0
35	0.0	0.0	-1.0000	0.0	0.0	0.0	0.0	0.0
36	0.0	0.0	0.0	0.0	-1.0000	0.0	0.0	0.0
37	0.0	-1.0000	0.0	0.0	0.0	0.0	0.0	0.0
45	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.0000
46	0.0	0.0	0.0	-1.0000	0.0	0.0	0.0	0.0
47	0.0	0.0	0.0	0.0	0.0	-1.0000	0.0	0.0
56	0.0	-1.0000	0.0	0.0	0.0	0.0	0.0	0.0
57	0.0	0.0	0.0	0.0	-1.0000	0.0	0.0	0.0
67	0.0	0.0	-1.0000	0.0	0.0	0.0	0.0	0.0
SS	0.0	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000

CONFOUNDING INDEX= 3.0000

DESIGN (7. 9. 1)

7 VARIABLES 8 PARAMETERS 9 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONSE
-1.	1.	1.	-1.	-1.	1.	1.	0.9687
1.	-1.	-1.	-1.	-1.	1.	-1.	0.9687
1.	1.	-1.	-1.	1.	-1.	1.	0.9687
-1.	1.	-1.	1.	-1.	-1.	-1.	0.9687
-1.	1.	-1.	-1.	1.	1.	-1.	0.5000
-1.	-1.	-1.	1.	1.	1.	1.	0.9687
1.	1.	1.	1.	1.	1.	-1.	0.9687
-1.	-1.	1.	-1.	1.	-1.	-1.	0.9687
1.	-1.	1.	1.	-1.	-1.	1.	0.7187

X'X INVERSE

0.1172	0.0078	-0.0078	0.0078	0.0078	-0.0078	-0.0078	0.0078
0.0078	0.1172	0.0078	-0.0078	-0.0078	0.0078	0.0078	-0.0078
-0.0078	0.0078	0.1172	0.0078	0.0078	-0.0078	-0.0078	0.0078
0.0078	-0.0078	0.0078	0.1172	-0.0078	0.0078	0.0078	-0.0078
0.0078	-0.0078	0.0078	-0.0078	0.1172	0.0078	0.0078	-0.0078
-0.0078	0.0078	-0.0078	0.0078	0.0078	0.1172	-0.0078	0.0078
-0.0078	0.0078	-0.0078	0.0078	0.0078	-0.0078	0.1172	0.0078
0.0078	-0.0078	0.0078	-0.0078	-0.0078	0.0078	0.0078	0.1172

DET(X'X) = 0.3355443200D 08

D-EFFICIENCY= 96.9

AVERAGE VARIANCE OF COEFFICIENTS= 0.1172

T-EFFICIENCY= 94.8

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.0000

DESIGN (7. 9. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	-0.1250	0.1250	-0.1250	0.1250	0.1250	0.8750	-0.1250	0.1250
13	0.1250	-0.1250	0.1250	-0.1250	0.8750	0.1250	0.1250	-0.1250
14	0.1250	-0.1250	0.1250	0.8750	-0.1250	0.1250	0.1250	-0.1250
15	-0.1250	0.1250	0.8750	0.1250	0.1250	-0.1250	-0.1250	0.1250
16	-0.1250	0.1250	-0.1250	0.1250	0.1250	-0.1250	-0.1250	-0.8750
17	0.1250	-0.1250	0.1250	-0.1250	-0.1250	0.1250	-0.8750	-0.1250
23	-0.1250	0.1250	-0.1250	0.1250	0.1250	-0.1250	0.8750	0.1250
24	-0.1250	0.1250	-0.1250	0.1250	0.1250	-0.1250	-0.1250	-0.8750
25	0.1250	0.8750	0.1250	-0.1250	-0.1250	0.1250	0.1250	-0.1250
26	0.1250	-0.1250	0.1250	0.8750	-0.1250	0.1250	0.1250	-0.1250
27	-0.1250	0.1250	-0.1250	0.1250	-0.8750	-0.1250	-0.1250	0.1250
34	0.1250	0.8750	0.1250	-0.1250	-0.1250	0.1250	0.1250	-0.1250
35	-0.1250	0.1250	-0.1250	0.1250	0.1250	-0.1250	-0.1250	-0.8750
36	-0.1250	0.1250	0.8750	0.1250	0.1250	-0.1250	-0.1250	0.1250
37	0.1250	-0.1250	0.1250	-0.1250	-0.1250	-0.8750	0.1250	-0.1250
45	-0.1250	0.1250	-0.1250	0.1250	0.1250	-0.1250	0.8750	0.1250
46	-0.1250	0.1250	-0.1250	0.1250	0.1250	0.8750	-0.1250	0.1250
47	0.1250	-0.1250	-0.8750	-0.1250	-0.1250	0.1250	0.1250	-0.1250
56	0.1250	-0.1250	0.1250	-0.1250	0.8750	0.1250	0.1250	-0.1250
57	-0.1250	0.1250	-0.1250	-0.8750	0.1250	-0.1250	-0.1250	0.1250
67	-0.1250	-0.8750	-0.1250	0.1250	0.1250	-0.1250	-0.1250	0.1250
SS	0.3281	2.5781	2.5781	2.5781	2.5781	2.5781	2.5781	2.5781

CONFOUNDING INDEX= 2.5781

DESIGN (7. 9. 2)

7 VARIABLES 8 PARAMETERS 9 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONSE
-1.	-1.	-1.	1.	1.	-1.	1.	0.5000
1.	1.	1.	1.	1.	1.	-1.	0.9687
-1.	1.	-1.	1.	-1.	-1.	-1.	0.9687
1.	-1.	-1.	-1.	-1.	1.	-1.	0.9687
-1.	-1.	1.	-1.	1.	-1.	-1.	0.9687
1.	1.	1.	-1.	-1.	-1.	1.	0.9687
-1.	1.	-1.	-1.	1.	1.	1.	0.9687
-1.	-1.	1.	1.	-1.	1.	1.	0.9687
1.	-1.	-1.	1.	1.	-1.	1.	0.7187

X'X INVERSE

0.1172	0.0078	0.0078	0.0078	-0.0078	-0.0078	0.0078	-0.0078
0.0078	0.1172	-0.0078	-0.0078	0.0078	0.0078	-0.0078	0.0078
0.0078	-0.0078	0.1172	-0.0078	0.0078	0.0078	-0.0078	0.0078
0.0078	-0.0078	-0.0078	0.1172	0.0078	0.0078	-0.0078	0.0078
-0.0078	0.0078	0.0078	0.0078	0.1172	-0.0078	0.0078	-0.0078
-0.0078	0.0078	0.0078	0.0078	-0.0078	0.1172	0.0078	-0.0078
0.0078	-0.0078	-0.0078	-0.0078	0.0078	0.0078	0.1172	0.0078
-0.0078	0.0078	0.0078	0.0078	-0.0078	-0.0078	0.0078	0.1172

DET(X'X) = 0.3355443200D 08

D-EFFICIENCY= 96.9

AVERAGE VARIANCE OF COEFFICIENTS= 0.1172

T-EFFICIENCY= 94.8

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.0000

DESIGN (7. 9. 2)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	0.1250	-0.1250	-0.1250	0.8750	0.1250	0.1250	-0.1250	0.1250
13	0.1250	-0.1250	0.8750	-0.1250	0.1250	0.1250	-0.1250	0.1250
14	-0.1250	0.1250	0.1250	0.1250	-0.1250	0.8750	0.1250	-0.1250
15	-0.1250	0.1250	0.1250	0.1250	0.8750	-0.1250	0.1250	-0.1250
16	0.1250	-0.1250	-0.1250	-0.1250	0.1250	0.1250	-0.1250	-0.8750
17	-0.1250	0.1250	0.1250	0.1250	-0.1250	-0.1250	-0.8750	-0.1250
23	0.1250	0.8750	-0.1250	-0.1250	0.1250	0.1250	-0.1250	0.1250
24	0.0000	0.0	0.0000	0.0	0.0	-0.0000	0.0000	-1.0000
25	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	1.0000	-0.0000
26	0.0000	-0.0000	-0.0000	-0.0000	0.0000	1.0000	-0.0000	0.0000
27	-0.0000	0.0000	0.0000	0.0000	-1.0000	-0.0000	0.0000	-0.0000
34	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000	1.0000	-0.0000
35	0.0000	0.0	0.0000	0.0	0.0	-0.0000	0.0000	-1.0000
36	0.0000	-0.0000	-0.0000	-0.0000	1.0000	0.0000	-0.0000	0.0000
37	-0.0000	0.0000	0.0000	0.0000	-0.0000	-1.0000	0.0000	-0.0000
45	0.1250	0.8750	-0.1250	-0.1250	0.1250	0.1250	-0.1250	0.1250
46	-0.0000	0.0000	0.0000	1.0000	-0.0000	-0.0000	0.0000	-0.0000
47	0.0000	-0.0000	-1.0000	-0.0000	0.0000	0.0000	-0.0000	0.0000
56	-0.0000	0.0000	1.0000	0.0000	-0.0000	-0.0000	0.0000	-0.0000
57	0.0000	-0.0000	-0.0000	-1.0000	0.0000	0.0000	-0.0000	0.0000
67	-0.1250	-0.8750	0.1250	0.1250	-0.1250	-0.1250	0.1250	-0.1250
SS	0.1406	2.3906	2.8906	2.8906	2.8906	2.8906	2.8906	2.8906

CONFOUNDING INDEX= 2.8192

DESIGN (7.10. 1)

7 VARIABLES 8 PARAMETERS 10 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONSE
1.	-1.	-1.	1.	1.	-1.	-1.	0.7500
-1.	-1.	1.	-1.	1.	1.	-1.	0.7500
-1.	1.	-1.	1.	-1.	1.	1.	0.9375
1.	-1.	-1.	-1.	-1.	1.	-1.	0.6875
1.	1.	1.	-1.	-1.	-1.	1.	0.9375
-1.	-1.	1.	1.	-1.	-1.	-1.	0.6875
1.	-1.	1.	1.	1.	1.	1.	0.9375
-1.	-1.	-1.	-1.	1.	-1.	1.	0.9375
-1.	1.	1.	1.	1.	-1.	-1.	0.6875
1.	1.	-1.	-1.	1.	1.	-1.	0.6875

X'X INVERSE

0.1094	0.0	0.0156	0.0	0.0	-0.0156	0.0	0.0156
0.0	0.1094	0.0	0.0156	0.0156	0.0	-0.0156	0.0
0.0156	0.0	0.1094	0.0	0.0	0.0156	0.0	-0.0156
0.0	0.0156	0.0	0.1094	-0.0156	0.0	0.0156	0.0
0.0	0.0156	0.0	-0.0156	0.1094	0.0	0.0156	0.0
-0.0156	0.0	0.0156	0.0	0.0	0.1094	0.0	0.0156
0.0	-0.0156	0.0	0.0156	0.0156	0.0	0.1094	0.0
0.0156	0.0	-0.0156	0.0	0.0	0.0156	0.0	0.1094

DET(X'X) = 0.6710886400D 08

D-EFFICIENCY= 95.1

AVERAGE VARIANCE OF COEFFICIENTS= 0.1094

T-EFFICIENCY= 91.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.0000

DESIGN (7.10. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	0.0	-0.2500	0.0	0.2500	-0.7500	0.0	-0.2500	0.0
13	0.0000	0.0	0.0000	0.0	0.0	-0.0000	0.0	1.0000
14	-0.3750	0.0	-0.6250	0.0	0.0	0.6250	0.0	0.3750
15	0.0	0.2500	0.0	-0.2500	0.7500	0.0	0.2500	0.0
16	0.1250	0.0	-0.1250	0.0	0.0	0.1250	0.0	-0.1250
17	0.0	-0.0000	0.0	1.0000	0.0000	0.0	-0.0000	0.0
23	0.0	0.2500	0.0	-0.2500	-0.2500	0.0	-0.7500	0.0
24	0.0	-0.7500	0.0	-0.2500	-0.2500	0.0	0.2500	0.0
25	-0.2500	0.0	0.2500	0.0	0.0	-0.2500	0.0	-0.7500
26	0.0	-0.2500	0.0	-0.7500	0.2500	0.0	-0.2500	0.0
27	0.2500	0.0	-0.2500	0.0	0.0	-0.7500	0.0	-0.2500
34	0.1250	0.0	-0.1250	0.0	0.0	0.1250	0.0	-0.1250
35	0.0	-0.2500	0.0	0.2500	0.2500	0.0	0.7500	0.0
36	-0.3750	0.0	-0.6250	0.0	0.0	0.6250	0.0	0.3750
37	0.0	1.0000	0.0	-0.0000	-0.0000	0.0	0.0000	0.0
45	0.0	0.7500	0.0	0.2500	0.2500	0.0	-0.2500	0.0
46	0.0000	0.0	0.0000	0.0	0.0	-0.0000	0.0	1.0000
47	0.0	-0.0000	0.0	-0.0000	-0.0000	0.0	1.0000	0.0
56	0.0	0.2500	0.0	0.7500	-0.2500	0.0	0.2500	0.0
57	-0.2500	0.0	-0.7500	0.0	0.0	-0.2500	0.0	0.2500
67	0.0	-0.0000	0.0	0.0000	1.0000	0.0	-0.0000	0.0
SS	0.5000	2.5000	1.5000	2.5000	2.5000	1.5000	2.5000	3.0000

CONFOUNDING INDEX= 2.2857

DESIGN (7.10. 2)

7 VARIABLES 8 PARAMETERS 10 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONSE
1.	1.	1.	-1.	-1.	-1.	-1.	0.9375
1.	-1.	-1.	-1.	1.	-1.	-1.	0.5000
-1.	-1.	1.	1.	-1.	1.	-1.	0.9375
1.	1.	-1.	1.	-1.	1.	1.	0.9375
-1.	1.	1.	-1.	1.	1.	1.	0.9375
1.	-1.	1.	-1.	-1.	1.	1.	0.5000
-1.	-1.	-1.	-1.	-1.	-1.	1.	0.9375
1.	-1.	1.	1.	1.	-1.	1.	0.9375
-1.	1.	-1.	1.	1.	-1.	-1.	0.6875
1.	-1.	-1.	-1.	1.	1.	-1.	0.6875

X'X INVERSE

0.1094	-0.0156	0.0156	0.0	0.0156	0.0	0.0	0.0
-0.0156	0.1094	0.0156	0.0	0.0156	0.0	0.0	0.0
0.0156	0.0156	0.1094	0.0	-0.0156	0.0	0.0	0.0
0.0	0.0	0.0	0.1094	0.0	0.0156	-0.0156	-0.0156
0.0156	0.0156	-0.0156	0.0	0.1094	0.0	0.0	0.0
0.0	0.0	0.0	0.0156	0.0	0.1094	0.0156	0.0156
0.0	0.0	0.0	-0.0156	0.0	0.0156	0.1094	-0.0156
0.0	0.0	0.0	-0.0156	0.0	0.0156	-0.0156	0.1094

DET(X'X)= 0.6710886400D 08

D-EFFICIENCY= 95.1

AVERAGE VARIANCE OF COEFFICIENTS= 0.1094

T-EFFICIENCY= 91.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.0000

DESIGN (7.10. 2)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	-0.1250	-0.1250	0.1250	-0.1250	0.1250	-0.8750	-0.1250	-0.1250
13	0.0	0.0	0.0	0.2500	0.0	-0.2500	-0.7500	0.2500
14	-0.1250	-0.1250	0.1250	-0.1250	0.1250	0.1250	-0.1250	0.8750
15	-0.1250	-0.1250	-0.8750	-0.1250	0.1250	0.1250	-0.1250	-0.1250
16	0.0	0.0	0.0	-0.7500	0.0	-0.2500	0.2500	0.2500
17	0.1250	0.1250	-0.1250	0.1250	0.8750	-0.1250	0.1250	0.1250
23	-0.1250	-0.1250	0.1250	-0.1250	-0.8750	0.1250	-0.1250	-0.1250
24	0.1250	0.1250	-0.1250	-0.8750	-0.1250	-0.1250	0.1250	0.1250
25	0.1250	-0.8750	-0.1250	0.1250	-0.1250	-0.1250	0.1250	0.1250
26	0.0	0.0	0.0	-0.2500	0.0	0.2500	-0.2500	0.7500
27	0.0	0.0	0.0	-0.2500	0.0	0.2500	0.7500	-0.2500
34	-0.1250	-0.1250	-0.8750	-0.1250	0.1250	0.1250	-0.1250	-0.1250
35	-0.1250	-0.1250	0.1250	-0.1250	0.1250	0.1250	-0.1250	0.8750
36	0.2500	-0.7500	-0.2500	0.0	-0.2500	0.0	0.0	0.0
37	0.1250	0.1250	-0.1250	0.1250	-0.1250	0.8750	0.1250	0.1250
45	0.0	0.0	0.0	0.2500	0.0	-0.2500	-0.7500	0.2500
46	0.0	0.0	0.0	-0.2500	0.0	-0.7500	-0.2500	-0.2500
47	-0.1250	0.8750	0.1250	-0.1250	0.1250	0.1250	-0.1250	-0.1250
56	-0.2500	-0.2500	0.2500	0.0	-0.7500	0.0	0.0	0.0
57	-0.1250	-0.1250	0.1250	0.8750	0.1250	0.1250	-0.1250	-0.1250
67	0.2500	0.2500	0.7500	0.0	-0.2500	0.0	0.0	0.0
SS	0.3750	2.3750	2.3750	2.5625	2.3750	2.5625	2.0625	2.5625

CONFOUNDING INDEX= 2.4107

DESIGN (7.10. 3)

7 VARIABLES 8 PARAMETERS 10 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONSE
-1.	1.	1.	-1.	1.	-1.	1.	0.8750
1.	-1.	-1.	-1.	1.	1.	1.	0.8750
1.	-1.	1.	1.	1.	1.	-1.	0.6875
1.	1.	1.	-1.	-1.	-1.	-1.	0.6875
-1.	1.	-1.	1.	1.	1.	-1.	0.8750
-1.	-1.	-1.	-1.	-1.	-1.	-1.	0.8750
-1.	-1.	1.	1.	-1.	1.	1.	0.8750
1.	1.	-1.	1.	-1.	-1.	1.	0.8750
-1.	-1.	1.	1.	1.	-1.	-1.	0.6875
-1.	1.	1.	-1.	-1.	1.	-1.	0.6875

X'X INVERSE

0.1094	0.0156	0.0	-0.0156	0.0	0.0	0.0	0.0156
0.0156	0.1094	0.0	0.0156	0.0	0.0	0.0	-0.0156
0.0	0.0	0.1094	0.0	0.0156	0.0156	0.0156	0.0
-0.0156	0.0156	0.0	0.1094	0.0	0.0	0.0	0.0156
0.0	0.0	0.0156	0.0	0.1094	-0.0156	-0.0156	0.0
0.0	0.0	0.0156	0.0	-0.0156	0.1094	-0.0156	0.0
0.0	0.0	0.0156	0.0	-0.0156	-0.0156	0.1094	0.0
0.0156	-0.0156	0.0	0.0156	0.0	0.0	0.0	0.1094

DET(X'X) = 0.6710886400D 08

D-EFFICIENCY= 95.1

AVERAGE VARIANCE OF COEFFICIENTS= 0.1094

T-EFFICIENCY= 91.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.0000

DESIGN (7.10. 3)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	0.0	0.0	-0.3750	0.0	0.3750	-0.6250	-0.6250	0.0
13	-0.2500	0.2500	0.0	-0.2500	0.0	0.0	0.0	-0.7500
14	0.0	0.0	0.1250	0.0	-0.1250	-0.1250	-0.1250	0.0
15	0.0	0.0	-0.6250	0.0	-0.3750	-0.3750	0.6250	0.0
16	0.0	0.0	-0.6250	0.0	-0.3750	0.6250	-0.3750	0.0
17	0.2500	-0.2500	0.0	-0.7500	0.0	0.0	0.0	-0.2500
23	0.0	0.0	0.0000	0.0	-1.0000	-0.0000	-0.0000	0.0
24	-0.0000	0.0000	0.0	-1.0000	0.0	0.0	0.0	0.0000
25	-0.2500	-0.7500	0.0	-0.2500	0.0	0.0	0.0	0.2500
26	-0.3750	-0.6250	0.0	-0.3750	0.0	0.0	0.0	-0.6250
27	0.0	0.0	-0.2500	0.0	0.2500	0.2500	-0.7500	0.0
34	0.0	0.0	-1.0000	0.0	0.0000	0.0000	0.0000	0.0
35	0.0	0.0	-0.2500	0.0	0.2500	0.2500	-0.7500	0.0
36	0.0	0.0	-0.2500	0.0	0.2500	-0.7500	0.2500	0.0
37	-0.2500	-0.7500	0.0	-0.2500	0.0	0.0	0.0	0.2500
45	-0.0000	-0.0000	0.0	0.0000	0.0	0.0	0.0	-1.0000
46	0.1250	-0.1250	0.0	0.1250	0.0	0.0	0.0	-0.1250
47	0.0	0.0	0.0000	0.0	-0.0000	-1.0000	-0.0000	0.0
56	0.3750	0.6250	0.0	-0.6250	0.0	0.0	0.0	-0.3750
57	0.0	0.0	0.0000	0.0	-1.0000	-0.0000	-0.0000	0.0
67	0.0	0.0	-0.7500	0.0	-0.2500	-0.2500	-0.2500	0.0
SS	0.5469	2.0469	2.6875	2.2969	2.6875	2.6875	2.1875	2.2969

CONFOUNDING INDEX= 2.4129

DESIGN (7.11. 1)

7 VARIABLES 8 PARAMETERS 11 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONSE
-1.	-1.	1.	-1.	-1.	-1.	-1.	0.6667
-1.	1.	-1.	-1.	-1.	1.	1.	0.6667
-1.	-1.	1.	1.	-1.	1.	-1.	0.6667
1.	1.	1.	1.	1.	1.	-1.	0.7500
1.	-1.	1.	-1.	1.	1.	1.	1.0000
-1.	-1.	-1.	1.	1.	-1.	1.	0.6667
1.	-1.	-1.	1.	-1.	1.	1.	0.7500
1.	-1.	-1.	-1.	1.	-1.	-1.	0.7500
-1.	1.	-1.	-1.	1.	1.	-1.	0.6667
1.	1.	1.	-1.	-1.	-1.	1.	0.7500
-1.	1.	1.	1.	1.	-1.	1.	0.6667

X'X INVERSE

0.1042	0.0208	0.0208	-0.0208	0.0208	-0.0208	-0.0208	-0.0208
0.0208	0.1042	0.0208	-0.0208	0.0208	-0.0208	-0.0208	-0.0208
0.0208	0.0208	0.1042	-0.0208	0.0208	-0.0208	-0.0208	-0.0208
-0.0208	-0.0208	-0.0208	0.1042	-0.0208	0.0208	0.0208	0.0208
0.0208	0.0208	0.0208	-0.0208	0.1042	-0.0208	-0.0208	-0.0208
-0.0208	-0.0208	-0.0208	0.0208	-0.0208	0.1042	0.0208	0.0208
-0.0208	-0.0208	-0.0208	0.0208	-0.0208	0.0208	0.1042	0.0208
-0.0208	-0.0208	-0.0208	0.0208	-0.0208	0.0208	0.0208	0.1042

DET(X'X)= 0.1433272320D 09

D-EFFICIENCY= 95.1

AVERAGE VARIANCE OF COEFFICIENTS= 0.1042

I-EFFICIENCY= 87.3

MAXIMUM VARIANCE OF FITTED RESPONSE= 2.0000

DESIGN (7.11. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	-0.0000	-0.0000	-0.0000	0.3333	0.3333	-0.3333	-0.3333	-0.3333
13	0.0000	0.0000	0.3333	-0.0000	-0.3333	0.3333	0.3333	0.3333
14	-0.0000	-0.0000	0.3333	-0.3333	-0.0000	-0.3333	0.3333	-0.3333
15	0.0000	0.0000	-0.3333	0.3333	-0.3333	-0.0000	0.3333	-0.3333
16	0.0000	0.0000	-0.3333	0.3333	0.3333	0.3333	-0.0000	0.3333
17	0.0000	0.0000	-0.3333	0.3333	-0.3333	-0.3333	0.3333	-0.0000
23	0.3333	0.6667	0.3333	-0.3333	0.6667	0.0000	-0.6667	0.0000
24	-0.1667	0.1667	-0.1667	0.5000	-0.1667	0.5000	-0.1667	-0.1667
25	0.1667	-0.1667	0.1667	0.1667	0.5000	-0.1667	0.1667	-0.5000
26	0.1667	-0.1667	0.1667	-0.5000	-0.1667	0.1667	-0.1667	-0.5000
27	0.1667	-0.1667	0.1667	0.1667	-0.1667	-0.5000	-0.5000	-0.1667
34	0.1667	-0.1667	0.5000	-0.1667	0.1667	0.1667	0.1667	-0.5000
35	-0.1667	0.1667	0.1667	0.1667	0.1667	0.1667	0.5000	0.5000
36	-0.1667	0.1667	-0.5000	0.1667	0.1667	0.5000	0.1667	-0.1667
37	-0.1667	0.1667	0.1667	0.1667	-0.5000	0.5000	-0.1667	0.1667
45	0.1667	-0.1667	0.5000	0.1667	0.1667	-0.1667	-0.5000	0.1667
46	0.3333	0.6667	-0.0000	0.0000	0.3333	-0.6667	-0.3333	-0.6667
47	0.1667	-0.1667	-0.1667	-0.5000	0.1667	0.1667	-0.5000	-0.1667
56	-0.1667	0.1667	0.1667	0.5000	-0.5000	0.1667	0.1667	-0.1667
57	-0.3333	-0.6667	-0.6667	0.6667	0.0000	0.3333	-0.0000	0.3333
67	-0.1667	0.1667	-0.5000	-0.1667	-0.5000	-0.1667	0.1667	0.1667
SS	0.6667	1.6667	2.3333	2.3333	2.3333	2.3333	2.3333	2.3333

CONFOUNDING INDEX= 2.2381

DESIGN (7.12. 1)

7 VARIABLES 8 PARAMETERS 12 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONSE
1.	1.	-1.	1.	-1.	1.	-1.	0.6667
1.	-1.	1.	1.	-1.	1.	1.	0.6667
-1.	1.	1.	1.	-1.	-1.	-1.	0.6667
1.	-1.	1.	-1.	1.	1.	-1.	0.6667
-1.	1.	-1.	-1.	1.	1.	1.	0.6667
-1.	-1.	1.	1.	1.	-1.	1.	0.6667
-1.	-1.	-1.	-1.	-1.	-1.	-1.	0.6667
1.	1.	1.	-1.	1.	-1.	-1.	0.6667
1.	-1.	-1.	-1.	-1.	-1.	1.	0.6667
-1.	-1.	-1.	1.	1.	1.	-1.	0.6667
1.	1.	-1.	1.	1.	-1.	1.	0.6667
-1.	1.	1.	-1.	-1.	1.	1.	0.6667

X'X INVERSE

0.0833	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0833	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0833	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0833	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0833	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0833	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0833	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0833

DET(X'X) = 0.4299816960D 09

D-EFFICIENCY= 100.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.0833

T-EFFICIENCY= 100.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.6667

DESIGN (7.12. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	0.0	0.0	0.0	-0.3333	0.3333	0.3333	-0.3333	-0.3333
13	0.0	0.0	-0.3333	0.0	-0.3333	0.3333	0.3333	-0.3333
14	0.0	0.0	0.3333	-0.3333	0.0	-0.3333	0.3333	0.3333
15	0.0	0.0	0.3333	0.3333	-0.3333	0.0	-0.3333	-0.3333
16	0.0	0.0	-0.3333	0.3333	0.3333	-0.3333	0.0	-0.3333
17	0.0	0.0	-0.3333	-0.3333	0.3333	-0.3333	-0.3333	0.0
23	0.0	-0.3333	0.0	0.0	-0.3333	-0.3333	-0.3333	-0.3333
24	0.0	0.3333	0.0	-0.3333	0.0	-0.3333	-0.3333	-0.3333
25	0.0	0.3333	0.0	-0.3333	-0.3333	0.0	-0.3333	0.3333
26	0.0	-0.3333	0.0	-0.3333	-0.3333	-0.3333	0.0	0.3333
27	0.0	-0.3333	0.0	-0.3333	-0.3333	0.3333	0.3333	0.0
34	0.0	-0.3333	-0.3333	0.0	0.0	-0.3333	-0.3333	0.3333
35	0.0	0.3333	-0.3333	0.0	-0.3333	0.0	-0.3333	-0.3333
36	0.0	0.3333	-0.3333	0.0	-0.3333	-0.3333	0.0	0.3333
37	0.0	-0.3333	-0.3333	0.0	0.3333	-0.3333	0.3333	0.0
45	0.0	-0.3333	-0.3333	-0.3333	0.0	0.0	-0.3333	0.3333
46	0.0	0.3333	-0.3333	-0.3333	0.0	-0.3333	0.0	-0.3333
47	0.0	0.3333	-0.3333	0.3333	0.0	0.3333	-0.3333	0.0
56	0.0	-0.3333	-0.3333	-0.3333	-0.3333	0.0	0.0	-0.3333
57	0.0	-0.3333	0.3333	-0.3333	0.3333	0.0	-0.3333	0.0
67	0.0	-0.3333	0.3333	0.3333	-0.3333	-0.3333	0.0	0.0
SS	0.0	1.6667	1.6667	1.6667	1.6667	1.6667	1.6667	1.6667

CONFOUNDING INDEX= 1.6667

DESIGN (7.13. 1)

7 VARIABLES 8 PARAMETERS 13 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONSE
-1.	-1.	-1.	-1.	1.	-1.	1.	0.6500
1.	1.	-1.	-1.	-1.	1.	-1.	0.6000
1.	1.	1.	-1.	1.	-1.	1.	0.6667
-1.	1.	1.	1.	-1.	-1.	-1.	0.6000
-1.	1.	1.	1.	1.	1.	-1.	0.6000
1.	-1.	-1.	1.	1.	-1.	-1.	0.6000
-1.	-1.	1.	-1.	-1.	-1.	-1.	0.6000
-1.	1.	-1.	-1.	1.	1.	-1.	0.6000
1.	-1.	1.	1.	1.	1.	1.	0.6500
1.	1.	-1.	1.	-1.	-1.	1.	0.6500
-1.	-1.	-1.	1.	-1.	1.	1.	0.6667
1.	-1.	1.	-1.	-1.	1.	-1.	0.6000
-1.	1.	1.	-1.	-1.	1.	1.	0.5167

X'X INVERSE

0.0792	0.0042	-0.0042	-0.0042	0.0042	0.0042	-0.0042	0.0042
0.0042	0.0792	0.0042	0.0042	-0.0042	-0.0042	0.0042	-0.0042
-0.0042	0.0042	0.0792	-0.0042	0.0042	0.0042	-0.0042	0.0042
-0.0042	0.0042	-0.0042	0.0792	0.0042	0.0042	-0.0042	0.0042
0.0042	-0.0042	0.0042	0.0042	0.0792	-0.0042	0.0042	-0.0042
0.0042	-0.0042	0.0042	0.0042	-0.0042	0.0792	0.0042	-0.0042
-0.0042	0.0042	-0.0042	-0.0042	0.0042	0.0042	0.0792	0.0042
0.0042	-0.0042	0.0042	0.0042	-0.0042	-0.0042	0.0042	0.0792

DET(X'X) = 0.7166361600D 09

D-EFFICIENCY= 98.4

AVERAGE VARIANCE OF COEFFICIENTS= 0.0792

T-EFFICIENCY= 97.2

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.6667

DESIGN (7.13. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	-0.0333	0.0333	-0.0333	-0.3667	-0.3000	-0.3000	-0.3667	0.3667
13	-0.0333	0.0333	-0.3667	-0.0333	-0.3000	0.3667	0.3000	0.3667
14	0.1333	-0.1333	-0.2000	-0.2000	-0.1333	0.2000	-0.2000	0.2000
15	0.1000	-0.1000	-0.2333	0.4333	0.2333	-0.1000	-0.2333	0.2333
16	-0.1000	0.1000	-0.4333	0.2333	-0.2333	-0.2333	-0.1000	-0.2333
17	0.0667	-0.0667	0.4000	0.4000	0.2667	0.2667	-0.2667	-0.0667
23	0.1000	-0.4333	0.1000	0.1000	0.2333	0.2333	-0.2333	0.2333
24	-0.1000	-0.2333	-0.1000	0.2333	0.1000	-0.2333	-0.4333	-0.2333
25	-0.1333	-0.2000	-0.1333	0.2000	-0.2000	0.1333	0.2000	-0.2000
26	0.0333	-0.3667	0.0333	-0.3000	-0.3667	0.3000	0.0333	-0.3667
27	-0.0667	0.4000	-0.0667	0.2667	-0.2667	-0.2667	-0.4000	0.0667
34	-0.1000	-0.2333	0.2333	-0.1000	0.1000	0.4333	0.2333	-0.2333
35	-0.0333	0.3667	0.3000	-0.0333	0.3667	0.0333	0.3000	0.3667
36	0.1333	0.2000	-0.2000	0.1333	0.2000	0.2000	0.1333	0.2000
37	-0.0667	0.4000	0.2667	-0.0667	-0.2667	0.4000	0.2667	0.0667
45	0.0333	0.3000	-0.3000	0.3667	-0.0333	-0.0333	0.3667	-0.3667
46	-0.0333	-0.3000	-0.3667	0.3000	0.0333	0.3667	-0.0333	0.3667
47	0.0667	0.2667	-0.2667	-0.2667	-0.0667	-0.4000	0.4000	-0.0667
56	-0.1000	-0.2333	0.2333	0.2333	0.4333	0.1000	-0.1000	-0.2333
57	0.0667	0.2667	-0.2667	0.4000	-0.4000	-0.0667	-0.2667	-0.0667
67	-0.0667	-0.2667	-0.4000	0.2667	0.4000	-0.2667	-0.0667	0.0667
SS	0.1467	1.4578	1.4578	1.4578	1.4578	1.4578	1.4578	1.2800

CONFOUNDING INDEX= 1.4324

DESIGN (7.13. 2)

7 VARIABLES 8 PARAMETERS 13 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONSE
-1.	-1.	1.	1.	1.	-1.	-1.	0.6500
1.	-1.	-1.	-1.	-1.	-1.	-1.	0.6500
-1.	1.	1.	-1.	-1.	1.	1.	0.6000
1.	-1.	1.	-1.	1.	1.	-1.	0.6000
1.	-1.	-1.	1.	1.	1.	1.	0.6500
-1.	-1.	-1.	-1.	-1.	1.	1.	0.6000
-1.	1.	-1.	-1.	1.	-1.	-1.	0.6667
1.	1.	-1.	1.	-1.	-1.	1.	0.6000
-1.	-1.	1.	1.	-1.	-1.	1.	0.6500
-1.	1.	-1.	1.	-1.	1.	-1.	0.5167
1.	1.	1.	-1.	1.	-1.	1.	0.6500
1.	1.	1.	1.	-1.	1.	-1.	0.6500
-1.	1.	-1.	1.	1.	1.	1.	0.5167

X'X INVERSE

0.0792	0.0042	-0.0042	0.0042	-0.0042	0.0042	-0.0042	-0.0042
0.0042	0.0792	0.0042	-0.0042	0.0042	-0.0042	0.0042	0.0042
-0.0042	0.0042	0.0792	0.0042	-0.0042	0.0042	-0.0042	-0.0042
0.0042	-0.0042	0.0042	0.0792	0.0042	-0.0042	0.0042	0.0042
-0.0042	0.0042	-0.0042	0.0042	0.0792	0.0042	-0.0042	-0.0042
0.0042	-0.0042	0.0042	-0.0042	0.0042	0.0792	0.0042	0.0042
-0.0042	0.0042	-0.0042	0.0042	-0.0042	0.0042	0.0792	-0.0042
-0.0042	0.0042	-0.0042	0.0042	-0.0042	0.0042	-0.0042	0.0792

DET(X'X) = 0.7166361600D 09

D-EFFICIENCY= 98.4

AVERAGE VARIANCE OF COEFFICIENTS= 0.0792

T-EFFICIENCY= 97.2

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.6667

DESIGN (7.13. 2)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	-0.0667	0.0667	-0.0667	0.4000	0.2667	-0.2667	-0.4000	0.2667
13	0.0667	-0.0667	0.4000	-0.0667	-0.2667	0.2667	0.4000	-0.2667
14	-0.1333	0.1333	0.2000	-0.2000	-0.1333	-0.2000	0.2000	0.2000
15	0.0667	-0.0667	-0.2667	0.2667	-0.2667	-0.0667	0.4000	0.4000
16	-0.0000	0.0000	-0.3333	0.3333	0.3333	0.3333	-0.0000	-0.3333
17	-0.0667	0.0667	0.2667	-0.2667	0.2667	0.4000	-0.4000	-0.0667
23	-0.0667	0.4000	-0.0667	0.0667	-0.4000	-0.2667	0.2667	0.2667
24	0.0333	0.3000	0.0333	-0.3667	0.0333	-0.3667	0.3667	-0.3000
25	-0.0667	-0.2667	-0.0667	-0.2667	-0.4000	0.0667	-0.4000	0.2667
26	0.0333	-0.3667	0.0333	0.3000	0.3667	-0.3667	0.0333	-0.3000
27	0.1333	0.2000	0.1333	0.2000	-0.2000	0.2000	-0.2000	0.1333
34	-0.0333	-0.3000	-0.3667	0.0333	-0.0333	-0.3000	-0.3667	-0.3667
35	0.1333	0.2000	-0.2000	-0.1333	-0.2000	-0.1333	-0.2000	-0.2000
36	-0.0333	0.3667	0.3000	0.0333	-0.3667	-0.3000	-0.0333	-0.3667
37	-0.0667	-0.2667	0.2667	0.0667	-0.4000	-0.2667	-0.4000	-0.0667
45	-0.1000	-0.2333	-0.4333	-0.2333	-0.1000	0.1000	0.2333	0.2333
46	0.0667	0.2667	0.4000	-0.4000	0.0667	0.2667	0.0667	-0.2667
47	0.1000	0.2333	-0.2333	-0.4333	0.1000	0.2333	-0.2333	0.1000
56	-0.0667	0.4000	-0.4000	-0.2667	0.2667	0.0667	-0.0667	0.2667
57	-0.1000	0.4333	0.2333	-0.2333	0.2333	0.1000	0.2333	-0.1000
67	0.0667	-0.4000	-0.2667	-0.4000	-0.2667	0.2667	0.0667	0.0667
SS	0.1322	1.5544	1.5100	1.5100	1.4656	1.3322	1.5989	1.3322

CONFOUNDING INDEX= 1.4719

DESIGN (7.13. 3)

7 VARIABLES 8 PARAMETERS 13 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONSE
1.	-1.	1.	-1.	-1.	-1.	1.	0.6667
1.	1.	1.	1.	-1.	1.	1.	0.6500
1.	-1.	-1.	1.	1.	-1.	1.	0.6500
-1.	1.	-1.	-1.	-1.	-1.	-1.	0.6000
-1.	-1.	-1.	-1.	1.	1.	1.	0.6667
-1.	1.	-1.	1.	-1.	-1.	1.	0.6667
-1.	-1.	1.	1.	-1.	1.	-1.	0.6000
-1.	-1.	1.	1.	1.	-1.	-1.	0.6667
1.	1.	-1.	-1.	1.	-1.	-1.	0.4000
-1.	1.	1.	-1.	1.	1.	1.	0.6667
1.	-1.	-1.	-1.	-1.	1.	-1.	0.6500
1.	1.	-1.	1.	1.	1.	-1.	0.6000
1.	1.	1.	-1.	1.	-1.	-1.	0.5167

X'X INVERSE

0.0792	-0.0042	-0.0042	0.0042	0.0042	-0.0042	0.0042	0.0042
-0.0042	0.0792	-0.0042	0.0042	0.0042	-0.0042	0.0042	0.0042
-0.0042	-0.0042	0.0792	0.0042	0.0042	-0.0042	0.0042	0.0042
0.0042	0.0042	0.0042	0.0792	-0.0042	0.0042	-0.0042	-0.0042
0.0042	0.0042	0.0042	-0.0042	0.0792	0.0042	-0.0042	-0.0042
-0.0042	-0.0042	-0.0042	0.0042	0.0042	0.0792	0.0042	0.0042
0.0042	0.0042	0.0042	-0.0042	-0.0042	0.0042	0.0792	-0.0042
0.0042	0.0042	0.0042	-0.0042	-0.0042	0.0042	-0.0042	0.0792

DET(X'X) = 0.7166361600D 09

D-EFFICIENCY= 98.4

AVERAGE VARIANCE OF COEFFICIENTS= 0.0792

T-EFFICIENCY= 97.2

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.6667

DESIGN (7.13. 3)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	0.0667	0.0667	0.0667	0.2667	0.2667	0.4000	0.2667	-0.4000
13	-0.0667	-0.0667	0.2667	0.0667	-0.2667	-0.4000	-0.2667	0.4000
14	-0.0667	-0.0667	0.2667	-0.2667	0.0667	0.2667	0.4000	0.4000
15	0.0000	0.0000	0.3333	-0.3333	0.3333	0.0000	-0.3333	-0.3333
16	-0.0667	-0.0667	0.2667	-0.2667	0.4000	-0.4000	0.0667	-0.2667
17	-0.0000	-0.0000	-0.3333	0.3333	0.3333	-0.3333	-0.3333	0.0000
23	-0.0667	0.2667	-0.0667	0.0667	-0.2667	0.2667	0.4000	0.4000
24	-0.0333	0.3000	-0.0333	-0.3000	0.0333	-0.3667	0.3667	0.3667
25	0.0333	0.3667	0.0333	0.3000	-0.3667	0.0333	0.3000	-0.3667
26	-0.0333	0.3000	-0.0333	0.3667	0.3667	0.3000	0.0333	0.3667
27	0.0333	-0.3000	0.0333	0.3000	0.3000	-0.3000	0.3000	-0.0333
34	0.1000	-0.2333	-0.2333	-0.1000	-0.1000	-0.2333	0.2333	-0.4333
35	-0.1000	-0.4333	0.2333	0.1000	-0.2333	-0.1000	-0.2333	-0.2333
36	0.1000	-0.2333	0.4333	-0.1000	0.2333	-0.2333	-0.1000	0.2333
37	0.0333	0.3667	0.3667	-0.0333	-0.3667	-0.3000	0.3000	-0.0333
45	-0.1000	0.2333	-0.4333	-0.2333	0.1000	-0.1000	-0.2333	-0.2333
46	0.0333	0.3667	0.3667	0.3000	-0.0333	-0.3000	-0.0333	-0.3667
47	0.0000	0.3333	0.3333	-0.3333	-0.0000	-0.3333	-0.3333	-0.0000
56	-0.0667	-0.4000	0.2667	-0.2667	-0.2667	-0.0667	0.0667	0.4000
57	-0.0333	-0.3667	-0.3667	-0.3000	-0.3000	-0.0333	0.3667	0.0333
67	0.0333	-0.3000	0.3667	0.3000	-0.3667	0.3667	-0.0333	-0.0333
SS	0.0756	1.6089	1.6533	1.3867	1.5200	1.6089	1.5200	1.8756

CONFOUNDING INDEX= 1.5962

DESIGN (7.14. 1)

7 VARIABLES 8 PARAMETERS 14 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONSE
1.	-1.	1.	-1.	-1.	-1.	-1.	0.6000
1.	1.	1.	1.	-1.	1.	1.	0.5333
-1.	-1.	-1.	-1.	1.	-1.	1.	0.6000
-1.	1.	-1.	-1.	-1.	-1.	-1.	0.6333
1.	1.	1.	-1.	1.	1.	-1.	0.5000
-1.	-1.	1.	-1.	-1.	1.	1.	0.5000
1.	1.	1.	1.	1.	-1.	-1.	0.5000
1.	1.	-1.	-1.	-1.	1.	1.	0.6000
-1.	1.	-1.	1.	1.	1.	-1.	0.5333
-1.	1.	1.	1.	1.	-1.	1.	0.6333
-1.	-1.	1.	1.	-1.	1.	-1.	0.6333
1.	-1.	-1.	1.	1.	1.	-1.	0.6000
1.	-1.	-1.	1.	-1.	-1.	1.	0.6333
1.	-1.	1.	-1.	1.	1.	1.	0.5000

X'X INVERSE

0.0750	-0.0083	0.0	-0.0083	0.0	0.0	-0.0083	0.0
-0.0083	0.0750	0.0	-0.0083	0.0	0.0	-0.0083	0.0
0.0	0.0	0.0750	0.0	-0.0083	-0.0083	0.0	0.0083
-0.0083	-0.0083	0.0	0.0750	0.0	0.0	-0.0083	0.0
0.0	0.0	-0.0083	0.0	0.0750	-0.0083	0.0	0.0083
0.0	0.0	-0.0083	0.0	-0.0083	0.0750	0.0	0.0083
-0.0083	-0.0083	0.0	-0.0083	0.0	0.0	0.0750	0.0
0.0	0.0	0.0083	0.0	0.0083	0.0083	0.0	0.0750

DET(X'X) = 0.1194393600D 10

D-EFFICIENCY= 97.4

AVERAGE VARIANCE OF COEFFICIENTS= 0.0750

T-EFFICIENCY= 95.2

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.6667

DESIGN (7.14. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	-0.0667	-0.0667	0.2000	0.2667	-0.1333	-0.1333	0.2667	0.1333
13	0.1333	0.1333	0.2667	0.1333	-0.4000	0.2667	-0.2000	-0.2667
14	0.0667	0.0667	-0.1333	-0.2667	0.2000	-0.1333	-0.2667	0.1333
15	-0.0667	-0.0667	-0.2000	0.2667	-0.2000	0.1333	0.2667	-0.4667
16	0.1333	0.1333	0.3333	-0.2000	-0.3333	0.3333	0.1333	0.3333
17	-0.0000	-0.0000	0.2000	-0.3333	0.2000	-0.4667	0.3333	0.1333
23	0.0000	0.3333	0.0667	-0.0000	0.4000	0.4000	-0.3333	0.2667
24	0.1333	-0.2000	0.0000	0.4667	0.0000	0.3333	-0.2000	0.3333
25	0.1333	-0.2000	-0.0667	0.4667	0.2667	-0.0667	-0.2000	-0.2667
26	0.0	0.3333	0.2000	-0.3333	-0.1333	-0.1333	0.0	0.1333
27	-0.2000	0.1333	0.0	0.1333	0.3333	-0.3333	0.1333	0.0
34	0.0667	-0.2667	0.4667	0.0667	0.1333	-0.2000	-0.2667	0.2000
35	0.0000	0.3333	0.4667	-0.0000	-0.2000	0.1333	-0.3333	0.2000
36	0.1333	-0.2000	-0.2000	0.1333	-0.2000	-0.2000	0.1333	0.2000
37	-0.0000	-0.3333	0.1333	0.0000	0.1333	0.1333	0.3333	0.2000
45	0.2000	-0.1333	0.2667	-0.1333	-0.0667	-0.0667	-0.1333	-0.2667
46	0.0667	-0.2667	-0.2000	-0.2667	0.1333	-0.2000	0.0667	-0.4667
47	-0.1333	0.2000	0.3333	0.2000	-0.0000	-0.3333	-0.4667	0.0000
56	0.0	0.3333	-0.2000	-0.3333	-0.2000	0.1333	0.0	-0.4667
57	-0.0667	-0.4000	-0.2667	0.2667	-0.2667	0.0667	-0.4000	-0.0667
67	-0.0667	0.2667	0.2667	0.2667	-0.4000	-0.4000	-0.0667	0.0667
SS	0.2178	1.1733	1.2667	1.3511	1.1778	1.3111	1.3067	1.4000

CONFOUNDING INDEX= 1.2838

DESIGN (7.14. 2)

7 VARIABLES 8 PARAMETERS 14 RUNS

DESIGN MATRIX*

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONS
1.	-1.	1.	1.	1.	1.	-1.	0.5333
1.	-1.	-1.	-1.	-1.	-1.	1.	0.6333
1.	1.	-1.	1.	1.	-1.	1.	0.5333
-1.	1.	1.	-1.	-1.	1.	1.	0.6333
1.	1.	1.	1.	-1.	-1.	-1.	0.6333
1.	-1.	-1.	-1.	1.	1.	-1.	0.6000
-1.	1.	-1.	-1.	1.	-1.	-1.	0.5000
-1.	-1.	1.	-1.	-1.	-1.	-1.	0.6000
1.	1.	-1.	1.	-1.	1.	-1.	0.5000
-1.	-1.	-1.	1.	-1.	1.	1.	0.6667
1.	1.	1.	-1.	1.	1.	1.	0.6333
-1.	-1.	1.	1.	1.	-1.	1.	0.6333
-1.	1.	-1.	1.	1.	1.	-1.	0.5000
-1.	1.	-1.	-1.	1.	-1.	1.	0.4000

X'X INVERSE

0.0750	0.0	-0.0083	0.0083	0.0	-0.0083	0.0	0.0
0.0	0.0750	0.0	0.0	-0.0083	0.0	-0.0083	0.0083
-0.0083	0.0	0.0750	0.0083	0.0	-0.0083	0.0	0.0
0.0083	0.0	0.0083	0.0750	0.0	0.0083	0.0	0.0
0.0	-0.0083	0.0	0.0	0.0750	0.0	-0.0083	0.0083
-0.0083	0.0	-0.0083	0.0083	0.0	0.0750	0.0	0.0
0.0	-0.0083	0.0	0.0	-0.0083	0.0	0.0750	0.0083
0.0	0.0083	0.0	0.0	0.0083	0.0	0.0083	0.0750

DET(X'X)= 0.1194393600D 10

D-EFFICIENCY= 97.4

AVERAGE VARIANCE OF COEFFICIENTS= 0.0750

T-EFFICIENCY= 95.2

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.6667

DESIGN (7.14. 2)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	0.0667	0.1333	0.0667	0.2667	0.4667	-0.2667	-0.2000	0.2000
13	-0.0667	-0.2000	0.2667	0.0667	0.1333	0.2667	0.1333	-0.1333
14	0.1333	-0.0000	0.4667	0.2000	-0.0000	-0.2000	-0.3333	-0.3333
15	0.0667	0.1333	-0.2667	0.2667	-0.2000	0.0667	0.4667	0.2000
16	0.1333	-0.0000	-0.2000	0.2000	-0.3333	0.4667	0.0000	-0.3333
17	-0.2000	0.0667	0.1333	-0.1333	-0.2667	0.1333	-0.2667	-0.0667
23	-0.0667	0.3333	-0.0667	0.0667	-0.3333	-0.4000	0.3333	0.3333
24	0.0000	0.4000	0.0000	-0.3333	0.0667	-0.3333	-0.2667	-0.4000
25	0.0667	-0.2000	0.0667	-0.4000	-0.2000	0.0667	-0.2000	0.2000
26	0.0667	-0.1333	0.0667	0.2667	-0.1333	-0.2667	0.2000	0.1333
27	-0.0000	0.2000	-0.0000	0.3333	-0.4667	0.3333	0.2000	0.1333
34	-0.0000	0.2000	-0.3333	-0.0000	-0.1333	0.3333	-0.4667	-0.2000
35	-0.0667	0.2667	-0.4000	0.0667	0.2667	-0.0667	0.2667	0.4000
36	-0.0667	0.2667	0.2667	0.0667	-0.4000	0.2667	-0.0667	0.4000
37	-0.0667	-0.2000	0.2667	0.0667	-0.2000	0.2667	0.4667	-0.1333
45	0.0667	-0.1333	-0.2667	0.2667	0.2000	0.0667	-0.1333	0.1333
46	0.1333	-0.3333	-0.2000	-0.4667	0.0000	-0.2000	0.0000	-0.3333
47	-0.1333	-0.2667	-0.4667	-0.2000	0.0667	0.2000	-0.2667	-0.0667
56	0.0667	0.4000	-0.2667	0.2667	-0.2667	0.0667	0.0667	-0.4000
57	0.0	0.2000	0.3333	0.3333	0.2000	0.0	-0.4667	0.1333
67	-0.0667	-0.2667	0.2667	0.4000	-0.2667	-0.4000	0.0667	-0.0667
SS	0.1644	1.1422	1.4311	1.3867	1.3644	1.3867	1.5867	1.3644

CONFOUNDING INDEX= 1.3803

DESIGN (7.14. 3)

7 VARIABLES 8 PARAMETERS 14 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONSE
-1.	1.	1.	1.	-1.	1.	-1.	0.5333
-1.	-1.	-1.	1.	-1.	-1.	-1.	0.6333
-1.	1.	-1.	-1.	-1.	-1.	1.	0.6000
1.	1.	1.	-1.	1.	-1.	-1.	0.5333
-1.	-1.	-1.	-1.	1.	1.	1.	0.5000
-1.	-1.	1.	-1.	1.	1.	-1.	0.6333
1.	-1.	1.	-1.	-1.	-1.	1.	0.6333
1.	1.	-1.	-1.	-1.	1.	-1.	0.6333
1.	1.	-1.	1.	1.	-1.	-1.	0.5333
-1.	1.	1.	1.	1.	-1.	1,	0.6333
1.	1.	1.	1.	-1.	1.	1.	0.6000
1.	-1.	-1.	1.	1.	1.	1.	0.6333
1.	-1.	1.	1.	-1.	-1.	-1.	0.5000
1.	1.	-1.	-1.	1.	-1.	1.	0.4000

X'X INVERSE

0.0750	-0.0083	-0.0083	0.0	0.0	0.0	0.0083	0.0
-0.0083	0.0750	-0.0083	0.0	0.0	0.0	0.0083	0.0
-0.0083	-0.0083	0.0750	0.0	0.0	0.0	0.0083	0.0
0.0	0.0	0.0	0.0750	-0.0083	0.0083	0.0	0.0083
0.0	0.0	0.0	0.0083	0.0750	0.0083	0.0	0.0083
0.0	0.0	0.0	0.0083	0.0083	0.0750	0.0	-0.0083
0.0083	0.0083	0.0083	0.0	0.0	0.0	0.0750	0.0
0.0	0.0	0.0	0.0083	0.0083	-0.0083	0.0	0.0750

DET(X'X) = 0.1194393600D 10

D-EFFICIENCY= 97.4

AVERAGE VARIANCE OF COEFFICIENTS= 0.0750

T-EFFICIENCY= 95.2

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.6667

DESIGN (7.14. 3)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	0.1333	0.1333	0.1333	-0.2667	-0.2667	0.2667	0.2000	-0.4000
13	-0.0000	-0.0000	-0.3333	0.1333	-0.2000	-0.4667	-0.3333	0.2000
14	0.0667	0.0667	-0.2667	-0.1333	0.2000	0.1333	0.2667	0.1333
15	-0.0667	-0.0667	0.2667	-0.4667	0.2000	0.1333	-0.2667	-0.2000
16	-0.1333	-0.1333	0.2000	-0.3333	0.3333	-0.3333	0.1333	0.3333
17	0.0667	0.0667	-0.2667	0.1333	0.1333	-0.1333	0.2667	0.2000
23	0.0667	-0.2667	0.0667	0.1333	0.4667	0.2000	0.2667	0.2000
24	0.0667	-0.2667	0.0667	0.4667	0.1333	0.2000	0.2667	0.2000
25	-0.1333	0.2000	-0.1333	0.1333	0.1333	0.2000	-0.8667	-0.1333
26	-0.1333	0.2000	-0.1333	0.1333	0.1333	-0.8000	0.1333	-0.1333
27	-0.0000	-0.3333	0.0000	0.1333	0.1333	-0.1333	-0.3333	0.2000
34	0.1333	-0.2000	0.4667	0.0000	0.0000	-0.3333	0.2000	0.3333
35	-0.1333	-0.4667	0.2000	-0.0000	-0.3333	-0.0000	-0.2000	-0.3333
36	0.0	-0.3333	0.3333	-0.2000	0.1333	-0.1333	0.0	-0.1333
37	-0.2000	0.1333	0.1333	-0.0667	0.2667	-0.2667	-0.1333	0.0667
45	-0.2000	0.1333	0.1333	-0.2667	0.0667	-0.0667	-0.1333	0.2667
46	-0.0667	0.2667	0.2667	0.2000	-0.1333	-0.2000	0.0667	0.4667
47	-0.1333	0.2000	0.2000	0.3333	-0.0000	0.3333	0.4667	0.0000
56	0.1333	-0.2000	-0.8667	-0.1333	-0.1333	-0.2000	-0.1333	0.1333
57	0.2000	-0.1333	-0.1333	-0.3333	0.3333	-0.0000	0.1333	-0.0000
67	0.0	0.3333	-0.3333	-0.2000	0.4667	0.2000	0.0	-0.1333
SS	0.2889	1.0667	1.8222	1.1778	1.1778	1.6667	1.7778	1.1333

CONFOUNDING INDEX= 1.4032

DESIGN (7.15. 1)

7 VARIABLES 8 PARAMETERS 15 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONSE
-1.	1.	-1.	-1.	1.	-1.	1.	0.5417
-1.	-1.	-1.	-1.	-1.	1.	1.	0.4940
-1.	1.	1.	1.	1.	-1.	-1.	0.4940
-1.	-1.	1.	1.	-1.	1.	-1.	0.5417
1.	1.	1.	-1.	1.	1.	1.	0.4940
-1.	-1.	-1.	1.	1.	1.	1.	0.5179
1.	1.	-1.	1.	-1.	1.	1.	0.5417
1.	-1.	-1.	1.	1.	1.	-1.	0.4940
-1.	-1.	-1.	-1.	1.	-1.	-1.	0.5714
-1.	1.	1.	-1.	-1.	1.	-1.	0.4762
1.	-1.	1.	1.	1.	-1.	1.	0.5417
1.	-1.	1.	-1.	-1.	-1.	1.	0.6607
1.	1.	-1.	1.	-1.	-1.	-1.	0.6607
-1.	1.	1.	1.	-1.	-1.	1.	0.4940
1.	1.	1.	-1.	1.	1.	-1.	0.4762

X'X INVERSE

0.0699	0.0074	-0.0060	-0.0060	-0.0074	-0.0074	-0.0074	-0.0074
0.0074	0.0699	-0.0060	-0.0060	-0.0074	-0.0074	-0.0074	-0.0074
-0.0060	-0.0060	0.0714	-0.0119	0.0060	0.0060	0.0060	0.0060
-0.0060	-0.0060	-0.0119	0.0714	0.0060	0.0060	0.0060	0.0060
-0.0074	-0.0074	0.0060	0.0060	0.0699	0.0074	0.0074	0.0074
-0.0074	-0.0074	0.0060	0.0060	0.0074	0.0699	0.0074	0.0074
-0.0074	-0.0074	0.0060	0.0060	0.0074	0.0074	0.0699	0.0074
-0.0074	-0.0074	0.0060	0.0060	0.0074	0.0074	0.0074	0.0699

DET(X'X) = 0.2113929216D 10

D-EFFICIENCY= 97.6

AVERAGE VARIANCE OF COEFFICIENTS= 0.0703

T-EFFICIENCY= 94.8

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.9048

DESIGN (7.15. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	0.0833	0.0833	-0.0000	-0.3333	-0.0833	-0.0833	0.4167	-0.0833
13	0.0833	0.0833	-0.3333	-0.0000	-0.5833	0.4167	-0.0833	0.4167
14	0.1667	0.1667	-0.0000	-0.6667	-0.1667	-0.1667	-0.1667	-0.1667
15	0.0119	0.0119	-0.1429	0.5238	-0.0119	-0.0119	0.4881	-0.0119
16	0.0119	0.0119	0.5238	-0.1429	-0.0119	0.4881	-0.0119	-0.0119
17	0.0714	0.0714	-0.1905	0.4762	-0.0714	-0.0714	-0.0714	-0.0714
23	0.1310	-0.3690	0.0952	0.0952	-0.1310	0.3690	0.3690	-0.1310
24	0.0238	0.0238	0.0476	-0.2857	-0.0238	-0.5238	-0.5238	-0.0238
25	-0.0833	-0.0833	0.0000	0.3333	-0.4167	0.0833	0.0833	0.0833
26	-0.0238	0.4762	-0.0476	0.2857	-0.4762	0.0238	0.0238	0.0238
27	-0.0952	-0.0952	0.1429	-0.1905	0.0952	0.0952	0.0952	0.0952
34	-0.0952	-0.5952	-0.1905	0.1429	0.0952	0.0952	-0.4048	0.0952
35	-0.0833	0.4167	0.3333	0.0000	0.0833	0.0833	0.0833	0.0833
36	-0.0238	-0.0238	0.2857	-0.0476	-0.4762	0.0238	0.0238	-0.4762
37	0.0238	0.5238	-0.2857	0.0476	-0.0238	-0.0238	-0.5238	-0.0238
45	-0.0714	-0.0714	-0.4762	0.1905	0.0714	0.0714	0.0714	0.0714
46	-0.0238	-0.0238	-0.3810	-0.3810	0.0238	0.0238	0.0238	0.0238
47	-0.1190	-0.1190	0.0952	0.0952	0.1190	0.1190	0.1190	0.1190
56	-0.0595	0.4405	0.0476	0.0476	0.0595	0.0595	0.0595	0.0595
57	-0.1190	-0.1190	0.0952	0.0952	0.1190	0.1190	0.1190	0.1190
67	-0.0714	-0.0714	0.1905	-0.4762	0.0714	0.0714	0.0714	0.0714
SS	0.1412	1.4626	1.2154	1.8503	1.0935	0.9388	1.3673	0.5340

CONFOUNDING INDEX= 1.2089

DESIGN (7.15. 2)

7 VARIABLES 8 PARAMETERS 15 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONSE
-1.	1.	1.	-1.	-1.	1.	-1.	0.5714
1.	-1.	-1.	1.	-1.	-1.	1.	0.5417
1.	1.	-1.	-1.	-1.	1.	1.	0.4940
-1.	1.	-1.	-1.	1.	-1.	-1.	0.4940
1.	-1.	1.	-1.	1.	1.	1.	0.4762
1.	1.	-1.	1.	-1.	1.	-1.	0.5714
1.	1.	1.	1.	1.	-1.	1.	0.5714
1.	-1.	1.	-1.	1.	-1.	-1.	0.5714
-1.	-1.	-1.	1.	1.	1.	-1.	0.6607
-1.	1.	-1.	-1.	1.	-1.	1.	0.4762
-1.	1.	1.	1.	1.	1.	1.	0.5714
-1.	-1.	-1.	-1.	-1.	-1.	1.	0.4762
-1.	-1.	1.	1.	-1.	-1.	-1.	0.5714
-1.	-1.	1.	-1.	-1.	1.	1.	0.4762
1.	-1.	-1.	-1.	1.	1.	-1.	0.4762

X'X INVERSE

0.0714	0.0060	0.0060	0.0060	0.0119	-0.0060	-0.0060	-0.0060
0.0060	0.0699	0.0074	0.0074	-0.0060	-0.0074	-0.0074	-0.0074
0.0060	0.0074	0.0699	0.0074	-0.0060	-0.0074	-0.0074	-0.0074
0.0060	0.0074	0.0074	0.0699	-0.0060	-0.0074	-0.0074	-0.0074
0.0119	-0.0060	-0.0060	-0.0060	0.0714	0.0060	0.0060	0.0060
-0.0060	-0.0074	-0.0074	-0.0074	0.0060	0.0699	0.0074	0.0074
-0.0060	-0.0074	-0.0074	-0.0074	0.0060	0.0074	0.0699	0.0074
-0.0060	-0.0074	-0.0074	-0.0074	0.0060	0.0074	0.0074	0.0699

DET(X'X) = 0.2113929216D 10

D-EFFICIENCY= 97.6

AVERAGE VARIANCE OF COEFFICIENTS= 0.0703

T-EFFICIENCY= 94.8

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.9048

DESIGN (7.15. 2)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	-0.0000	-0.0833	-0.0833	-0.0833	0.3333	-0.4167	0.0833	0.0833
13	-0.1429	-0.0952	-0.0952	-0.0952	-0.1905	0.5952	-0.4048	0.0952
14	0.0952	-0.1310	0.3690	-0.1310	-0.0952	-0.3690	-0.3690	0.1310
15	0.0476	0.1429	-0.3571	0.6429	-0.3810	-0.1429	-0.1429	-0.1429
16	0.0000	0.0833	0.0833	-0.4167	-0.3333	-0.0833	-0.0833	-0.0833
17	0.1429	0.0952	0.0952	0.0952	0.1905	-0.0952	-0.0952	-0.0952
23	-0.0476	-0.1429	-0.1429	-0.1429	0.3810	0.1429	0.1429	0.1429
24	0.0476	0.3095	-0.1905	0.3095	-0.0476	0.1905	0.1905	0.1905
25	0.0952	-0.4643	0.0357	0.0357	0.2381	-0.0357	-0.5357	0.4643
26	0.1905	0.1548	0.1548	0.1548	0.1429	-0.6548	-0.1548	-0.1548
27	0.0952	0.0357	0.0357	0.0357	0.2381	0.4643	-0.0357	-0.0357
34	0.0476	-0.1905	0.3095	-0.1905	-0.0476	0.1905	-0.3095	0.1905
35	0.1429	0.5952	0.0952	0.0952	0.1905	-0.0952	-0.0952	0.4048
36	-0.0476	-0.4762	0.0238	0.0238	-0.2857	-0.0238	-0.0238	0.4762
37	0.0476	-0.0238	-0.0238	-0.0238	0.2857	0.5238	0.5238	0.0238
45	-0.0952	-0.3690	0.1310	0.1310	0.0952	-0.1310	0.3690	0.3690
46	-0.0952	-0.3690	0.1310	-0.3690	0.0952	0.3690	-0.1310	-0.1310
47	-0.0000	0.2500	0.2500	0.2500	0.0000	0.2500	-0.2500	-0.2500
56	-0.0952	-0.2024	-0.7024	-0.2024	0.4286	0.2024	0.2024	0.2024
57	0.0476	-0.0238	0.4762	0.4762	0.2857	0.0238	0.0238	0.0238
67	-0.0952	-0.0357	-0.0357	0.4643	-0.2381	0.0357	0.0357	0.0357
SS	0.1769	1.4222	1.3031	1.5174	1.2721	1.9817	1.3508	1.0531

CONFOUNDING INDEX= 1.4144

DESIGN (7.15. 3)

7 VARIABLES 8 PARAMETERS 15 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONSE
-1.	1.	-1.	-1.	-1.	-1.	1.	0.5714
-1.	-1.	-1.	1.	-1.	-1.	1.	0.5417
1.	1.	1.	1.	-1.	-1.	-1.	0.4762
1.	-1.	-1.	-1.	-1.	1.	-1.	0.4762
-1.	-1.	1.	1.	-1.	1.	-1.	0.4940
-1.	-1.	1.	1.	1.	1.	1.	0.4940
1.	1.	1.	1.	-1.	1.	1.	0.5714
-1.	1.	1.	-1.	1.	1.	1.	0.5714
1.	-1.	1.	-1.	1.	-1.	1.	0.5417
1.	-1.	-1.	1.	1.	-1.	1.	0.5417
1.	1.	1.	1.	1.	-1.	-1.	0.5179
-1.	-1.	1.	-1.	-1.	-1.	-1.	0.5714
1.	-1.	-1.	-1.	1.	1.	-1.	0.4940
-1.	1.	-1.	1.	1.	1.	-1.	0.6607
1.	1.	-1.	-1.	-1.	1.	1.	0.4762

X'X INVERSE

0.0699	-0.0074	0.0074	-0.0060	-0.0060	0.0074	-0.0074	-0.0074
-0.0074	0.0699	-0.0074	0.0060	0.0060	-0.0074	0.0074	0.0074
0.0074	-0.0074	0.0699	-0.0060	-0.0060	0.0074	-0.0074	-0.0074
-0.006	0.0060	-0.0060	0.0714	-0.0119	-0.0060	0.0060	0.0060
-0.0060	0.0060	-0.0060	-0.0119	0.0714	-0.0060	0.0060	0.0060
0.0074	-0.0074	0.0074	-0.0060	-0.0060	0.0699	-0.0074	-0.0074
-0.0074	0.0074	-0.0074	0.0060	0.0060	-0.0074	0.0699	0.0074
-0.0074	0.0074	-0.0074	0.0060	0.0060	-0.0074	0.0074	0.0699

DET(X'X)= 0.2113929216D 10

D-EFFICIENCY= 97.6

AVERAGE VARIANCE OF COEFFICIENTS= 0.0703

T-EFFICIENCY= 94.8

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.9048

DESIGN (7.15. 3)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	-0.0357	0.0357	-0.0357	0.4286	0.4286	-0.5357	0.0357	0.0357
13	-0.0238	0.0238	0.4762	-0.0476	0.2857	-0.0238	-0.4762	0.0238
14	-0.0238	0.0238	0.4762	0.2857	-0.0476	-0.0238	-0.4762	0.0238
15	0.1190	-0.1190	-0.3810	-0.0952	-0.0952	0.1190	-0.6190	-0.1190
16	-0.0833	0.0833	-0.0833	-0.3333	-0.3333	-0.5833	0.0833	0.0833
17	-0.1190	0.1190	-0.1190	0.0952	0.0952	-0.1190	0.1190	0.1190
23	0.0357	0.4643	0.0357	-0.0952	0.2381	0.0357	-0.0357	-0.0357
24	0.0952	0.4048	0.0952	0.1905	-0.1429	0.0952	-0.0952	-0.5952
25	-0.0000	-0.5000	-0.0000	0.0000	0.0000	-0.0000	0.0000	-0.5000
26	0.0595	-0.0595	0.0595	-0.0476	-0.0476	0.0595	-0.0595	0.4405
27	0.0476	-0.0476	0.0476	0.0952	-0.5714	-0.4524	0.4524	-0.0476
34	0.1310	0.3690	0.1310	0.0952	0.0952	-0.3690	0.3690	-0.1310
35	0.0833	-0.0833	0.0833	-0.0000	-0.3333	0.0833	-0.0833	0.4167
36	-0.1429	-0.3571	-0.1429	0.0476	0.3810	-0.1429	0.1429	0.6429
37	-0.0952	0.0952	-0.0952	0.1429	-0.1905	0.4048	0.5952	0.0952
45	0.1429	-0.1429	0.1429	-0.3810	-0.0476	0.1429	-0.1429	-0.1429
46	-0.0833	-0.4167	-0.0833	0.3333	0.0000	-0.0833	0.0833	0.0833
47	-0.1548	0.1548	-0.6548	-0.1429	0.1905	-0.1548	0.1548	0.1548
56	0.1786	-0.6786	0.1786	-0.1429	-0.1429	0.1786	-0.1786	-0.1786
57	0.0119	-0.0119	-0.4881	0.5238	-0.1429	0.0119	-0.0119	-0.0119
67	-0.1071	0.1071	0.3929	0.6190	-0.0476	-0.1071	0.1071	0.1071
SS	0.2022	1.6427	1.5713	1.4399	1.1859	1.2975	1.6903	1.5475

CONFOUNDING INDEX= 1.4822

DESIGN (7.16. 1)

7 VARIABLES 8 PARAMETERS 16 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	VARIANCE OF FITTED RESPONSE
1.	1.	1.	-1.	-1.	-1.	-1.	0.5000
-1.	-1.	1.	-1.	-1.	1.	1.	0.5000
1.	-1.	-1.	-1.	-1.	1.	-1.	0.5000
-1.	1.	1.	-1.	1.	1.	-1.	0.5000
1.	-1.	1.	1.	1.	-1.	-1.	0.5000
1.	1.	-1.	1.	-1.	1.	-1.	0.5000
-1.	1.	1.	1.	-1.	1.	1.	0.5000
-1.	-1.	-1.	1.	-1.	-1.	-1.	0.5000
-1.	-1.	1.	1.	1.	1.	-1.	0.5000
1.	1.	1.	1.	-1.	-1.	1.	0.5000
1.	1.	-1.	-1.	1.	1.	1.	0.5000
-1.	1.	-1.	1.	1.	-1.	1.	0.5000
-1.	1.	-1.	-1.	1.	-1.	-1.	0.5000
1.	-1.	-1.	1.	1.	1.	1.	0.5000
1.	-1.	1.	-1.	1.	-1.	1.	0.5000
-1.	-1.	-1.	-1.	-1.	-1.	1.	0.5000

X'X INVERSE

0.0625	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0625	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0625	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0625	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0625	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0625	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0625	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0625

DET(X'X) = 0.4294967296D 10

D-EFFICIENCY= 100.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.0625

T-EFFICIENCY= 100.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.5000

DESIGN (7.16. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6	7
12	0.0	0.0	0.0	0.0	0.0	-0.5000	0.0	0.0
13	0.0	0.0	0.0	0.0	0.0	0.0	-1.0000	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	-0.5000	0.0	0.0	0.0	0.0	0.5000
16	0.0	0.0	0.0	-1.0000	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0	0.0	0.5000	0.0	0.0
23	0.0	0.0	0.0	0.0	0.0	-0.5000	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0	-0.5000	0.0	0.5000
25	0.0	-0.5000	0.0	-0.5000	-0.5000	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	0.5000	0.0	0.0	0.0
34	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35	0.0	0.0	-0.5000	0.0	0.0	0.0	0.0	-0.5000
36	0.0	-1.0000	0.0	0.0	0.0	0.0	0.0	0.0
37	0.0	0.0	0.0	0.0	0.0	-0.5000	0.0	0.0
45	0.0	0.0	-0.5000	0.0	0.0	0.0	0.0	0.0
46	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47	0.0	0.0	0.5000	0.0	0.0	0.0	0.0	0.0
56	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57	0.0	0.5000	0.0	-0.5000	0.0	0.0	0.0	0.0
67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SS	0.0	1.5000	1.0000	1.5000	0.5000	1.2500	1.0000	0.7500

CONFOUNDING INDEX= 1.0714

DESIGN (8. 9. 1)

8 VARIABLES 9 PARAMETERS 9 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	X(8)	VARIANCE OF FITTED RESPONSE
1.	-1.	1.	1.	1.	1.	1.	-1.	1.0000
1.	1.	-1.	1.	1.	-1.	-1.	-1.	1.0000
-1.	1.	-1.	1.	-1.	1.	1.	-1.	1.0000
1.	-1.	-1.	-1.	-1.	-1.	1.	1.	1.0000
-1.	1.	1.	-1.	1.	-1.	1.	-1.	1.0000
-1.	-1.	1.	1.	-1.	-1.	-1.	1.	1.0000
-1.	-1.	-1.	-1.	1.	1.	-1.	-1.	1.0000
1.	1.	1.	-1.	-1.	1.	-1.	1.	1.0000
-1.	1.	-1.	1.	1.	1.	1.	1.	1.0000

X'X INVERSE

0.1173	0.0077	-0.0077	0.0077	-0.0077	-0.0051	-0.0077	-0.0077	0.0051
0.0077	0.1173	0.0077	-0.0077	0.0077	0.0051	0.0077	0.0077	-0.0051
-0.0077	0.0077	0.1173	0.0077	-0.0077	-0.0051	-0.0077	-0.0077	0.0051
0.0077	-0.0077	0.0077	0.1173	0.0077	0.0051	0.0077	0.0077	-0.0051
-0.0077	0.0077	-0.0077	0.0077	0.1173	-0.0051	-0.0077	-0.0077	0.0051
-0.0051	0.0051	-0.0051	0.0051	-0.0051	0.1633	-0.0051	-0.0051	0.0867
-0.0077	0.0077	-0.0077	0.0077	-0.0077	-0.0051	0.1173	-0.0077	0.0051
-0.0077	0.0077	-0.0077	0.0077	-0.0077	-0.0051	-0.0077	0.1173	0.0051
0.0051	-0.0051	0.0051	-0.0051	0.0051	0.0867	0.0051	0.0051	0.1633

DET(X'X) = 0.2055208960D 09

D-EFFICIENCY= 93.2

AVERAGE VARIANCE OF COEFFICIENTS= 0.1276

T-EFFICIENCY= 87.1

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.3673

DESIGN (8. 9. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6	7	8
12	0.0000	-0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-1.0000	0.0000
13	-0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	-0.0000
14	-0.1429	0.1429	-0.1429	0.1429	-0.1429	0.5714	-0.1429	-0.1429	-0.5714
15	-0.1429	0.1429	-0.1429	0.1429	0.8571	-0.4286	-0.1429	-0.1429	-0.5714
16	0.0000	-0.0000	-0.0000	1.0000	-0.0000	-0.0000	-0.0000	-0.0000	0.0000
17	-0.0000	0.0000	-1.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	0.0000
18	0.1429	-0.1429	0.1429	-0.1429	-0.8571	-0.5714	0.1429	0.1429	-0.4286
23	0.0000	-0.0000	-0.0000	0.0000	-1.0000	-0.0000	-0.0000	-0.0000	0.0000
24	-0.0000	0.0000	0.0000	-1.0000	0.0000	0.0000	0.0000	0.0000	-0.0000
25	0.1429	-0.1429	0.1429	-0.1429	0.1429	0.4286	-0.8571	0.1429	0.5714
26	0.1429	-0.1429	0.1429	-0.1429	0.1429	-0.5714	0.1429	0.1429	0.5714
27	0.0000	-1.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000
28	-0.1429	0.1429	-0.1429	0.1429	-0.1429	0.5714	0.8571	-0.1429	0.4286
34	-0.0000	0.0000	-1.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	0.0000
35	-0.1429	0.1429	-0.1429	0.1429	-0.1429	-0.4286	-0.1429	0.8571	-0.5714
36	-0.0000	1.0000	-0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	0.0000
37	-0.1429	0.1429	-0.1429	0.1429	-0.1429	0.5714	-0.1429	-0.1429	-0.5714
38	0.1429	-0.1429	0.1429	-0.1429	0.1429	-0.5714	0.1429	-0.8571	-0.4286
45	0.1429	0.8571	0.1429	-0.1429	0.1429	0.4286	0.1429	0.1429	0.5714
46	-0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	-0.0000
47	-0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000	1.0000	0.0000	-0.0000
48	-0.1429	-0.8571	-0.1429	0.1429	-0.1429	0.5714	-0.1429	-0.1429	0.4286
56	0.1429	-0.1429	-0.8571	-0.1429	0.1429	0.4286	0.1429	0.1429	0.5714
57	0.1429	-0.1429	0.1429	0.8571	0.1429	0.4286	0.1429	0.1429	0.5714
58	-0.7143	-0.2857	0.2857	-0.2857	0.2857	-0.1429	0.2857	0.2857	0.1429
67	-0.0000	0.0000	0.0000	-0.0000	1.0000	0.0000	0.0000	0.0000	-0.0000
68	-0.1429	0.1429	0.8571	0.1429	-0.1429	0.5714	-0.1429	-0.1429	0.4286
78	-0.1429	0.1429	-0.1429	-0.8571	-0.1429	0.5714	-0.1429	-0.1429	0.4286
SS	0.8163	3.8163	3.8163	3.8163	3.8163	4.0612	3.8163	3.8163	4.0612

CONFOUNDING INDEX= 3.8776

DESIGN (8.10. 1)

8 VARIABLES 9 PARAMETERS 10 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	X(8)	VARIANCE OF FITTED RESPONSE
-1.	1.	-1.	-1.	1.	-1.	-1.	-1.	0.9375
-1.	-1.	-1.	1.	-1.	-1.	1.	1.	0.9375
1.	-1.	1.	-1.	-1.	-1.	-1.	-1.	0.9375
1.	-1.	-1.	1.	1.	1.	-1.	1.	0.7500
1.	1.	1.	1.	1.	-1.	1.	-1.	0.9375
1.	1.	-1.	1.	-1.	1.	-1.	-1.	0.9375
-1.	-1.	1.	1.	1.	1.	-1.	-1.	0.9375
1.	-1.	-1.	-1.	1.	1.	1.	-1.	0.9375
-1.	1.	1.	-1.	-1.	1.	1.	1.	0.9375
1.	1.	1.	-1.	1.	-1.	-1.	1.	0.7500

X'X INVERSE

0.1111	-0.0139	0.0	0.0	0.0	-0.0139	0.0	0.0139	0.0139
-0.0139	0.1111	0.0	0.0	0.0	-0.0139	0.0	0.0139	0.0139
0.0	0.0	0.1094	-0.0156	0.0156	0.0	0.0156	0.0	0.0
0.0	0.0	-0.0156	0.1094	0.0156	0.0	0.0156	0.0	0.0
0.0	0.0	0.0156	0.0156	0.1094	0.0	-0.0156	0.0	0.0
-0.0139	-0.0139	0.0	0.0	0.0	0.1111	0.0	0.0139	0.0139
0.0	0.0	0.0156	0.0156	-0.0156	0.0	0.1094	0.0	0.0
0.0139	0.0139	0.0	0.0	0.0	0.0139	0.0	0.1111	-0.0139
0.0139	0.0139	0.0	0.0	0.0	0.0139	0.0	-0.0139	0.1111

DET(X'X) = 0.6039797760D 09

D-EFFICIENCY= 94.6

AVERAGE VARIANCE OF COEFFICIENTS= 0.1103

T-EFFICIENCY= 90.6

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.1111

DESIGN (8.10. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6	7	8
12	0.0	0.0	0.2500	0.2500	0.7500	0.0	-0.2500	0.0	0.0
13	0.0	0.0	-0.0000	0.0000	-0.0000	0.0	-1.0000	0.0	0.0
14	0.0	0.0	0.7500	-0.2500	0.2500	0.0	0.2500	0.0	0.0
15	0.3333	0.3333	0.0	0.0	0.0	0.3333	0.0	0.6667	0.6667
16	0.0	0.0	-0.0000	-1.0000	0.0000	0.0	0.0000	0.0	0.0
17	-0.3333	-0.3333	0.0	0.0	0.0	0.6667	0.0	0.3333	-0.6667
18	-0.3333	-0.3333	0.0	0.0	0.0	0.6667	0.0	-0.6667	0.3333
23	0.3333	0.3333	0.0	0.0	0.0	0.3333	0.0	0.6667	0.6667
24	-0.3333	0.6667	0.0	0.0	0.0	-0.3333	0.0	0.3333	-0.6667
25	0.0	0.0	-0.0000	0.0000	-0.0000	0.0	-1.0000	0.0	0.0
26	0.0000	-0.0000	0.0	0.0	0.0	-1.0000	0.0	0.0000	0.0000
27	0.0	0.0	-0.2500	0.7500	0.2500	0.0	0.2500	0.0	0.0
28	0.0	0.0	-0.3750	0.6250	-0.6250	0.0	0.3750	0.0	0.0
34	-0.3333	-0.3333	0.0	0.0	0.0	0.6667	0.0	0.3333	-0.6667
35	0.0	0.0	0.2500	0.2500	0.7500	0.0	-0.2500	0.0	0.0
36	0.0	-1.0000	0.0	0.0	0.0	0.0000	0.0	0.0000	0.0000
37	0.0	0.0	0.7500	-0.2500	0.2500	0.0	0.2500	0.0	0.0
38	0.0	0.0	0.6250	-0.3750	-0.6250	0.0	0.3750	0.0	0.0
45	0.0	0.0	-0.2500	0.7500	0.2500	0.0	0.2500	0.0	0.0
46	-0.0000	-0.0000	0.0	0.0	0.0	0.0000	0.0	-1.0000	-0.0000
47	0.0	0.0	-0.0000	0.0000	-0.0000	0.0	-1.0000	0.0	0.0
48	0.0	0.0	-0.6250	-0.6250	-0.3750	0.0	-0.3750	0.0	0.0
56	0.0	0.0	-1.0000	-0.0000	0.0000	0.0	0.0000	0.0	0.0
57	-0.3333	0.6667	0.0	0.0	0.0	-0.3333	0.0	0.3333	-0.6667
58	-0.3333	0.6667	0.0	0.0	0.0	-0.3333	0.0	-0.6667	0.3333
67	0.0	0.0	0.0000	0.0000	-1.0000	0.0	-0.0000	0.0	0.0
68	0.0	0.0	0.1250	0.1250	-0.1250	0.0	-0.1250	0.0	0.0
78	0.3333	-0.6667	0.0	0.0	0.0	-0.6667	0.0	-0.3333	-0.3333
SS	1.0000	3.3333	3.3125	3.3125	3.3125	3.3333	3.8125	3.3333	3.0000

CONFOUNDING INDEX= 3.3437

DESIGN (8.10. 2)

8 VARIABLES 9 PARAMETERS 10 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	X(8)	VARIANCE OF FITTED RESPONSE
-1.	1.	1.	1.	-1.	1.	-1.	1.	0.9375
-1.	-1.	-1.	1.	1.	-1.	-1.	-1.	0.9375
1.	1.	1.	1.	-1.	-1.	1.	-1.	0.9375
-1.	-1.	1.	-1.	1.	-1.	1.	1.	0.9375
1.	-1.	-1.	1.	1.	1.	1.	1.	0.9375
1.	1.	-1.	-1.	1.	-1.	-1.	1.	0.9375
-1.	1.	-1.	-1.	-1.	1.	1.	-1.	0.9375
-1.	1.	1.	-1.	1.	1.	-1.	-1.	0.7500
1.	-1.	1.	-1.	-1.	1.	-1.	-1.	0.9375
-1.	-1.	-1.	-1.	-1.	-1.	-1.	1.	0.7500

X'X INVERSE

0.1094	0.0156	0.0	0.0	0.0156	0.0	0.0	0.0156	0.0
0.0156	0.1094	0.0	0.0	-0.0156	0.0	0.0	-0.0156	0.0
0.0	0.0	0.1111	-0.0139	0.0	0.0139	-0.0139	0.0	0.0139
0.0	0.0	-0.0139	0.1111	0.0	0.0139	-0.0139	0.0	0.0139
0.0156	-0.0156	0.0	0.0	0.1094	0.0	0.0	-0.0156	0.0
0.0	0.0	0.0139	0.0139	0.0	0.1111	0.0139	0.0	-0.0139
0.0	0.0	-0.0139	-0.0139	0.0	0.0139	0.1111	0.0	0.0139
0.0156	-0.0156	0.0	0.0	-0.0156	0.0	0.0	0.1094	0.0
0.0	0.0	0.0139	0.0139	0.0	-0.0139	0.0139	0.0	0.1111

DET(X'X) = 0.6033797760D 09

D-EFFICIENCY= 94.6

AVERAGE VARIANCE OF COEFFICIENTS= 0.1103

T-EFFICIENCY= 90.6

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.1111

DESIGN (8.10. 2)

ALIAS MATRIX

	0	1	2	3	4	5	6	7	8
12	0.0	0.0	0.0000	0.0000	0.0	0.0000	-1.0000	0.0	0.0000
13	0.0	0.0	-0.3333	-0.3333	0.0	-0.6667	-0.3333	0.0	-0.6667
14	0.2500	-0.2500	0.0	0.0	-0.2500	0.0	0.0	0.7500	0.0
15	0.0	0.0	0.3333	-0.6667	0.0	-0.3333	0.3333	0.0	0.6667
16	0.0	0.0	-1.0000	0.0000	0.0	-0.0000	-0.0000	0.0	0.0000
17	0.2500	-0.2500	0.0	0.0	0.7500	0.0	0.0	-0.2500	0.0
18	0.0	0.0	0.3333	-0.6667	0.0	0.6667	0.3333	0.0	-0.3333
23	0.2500	-0.2500	0.0	0.0	0.7500	0.0	0.0	-0.2500	0.0
24	0.0	0.0	-0.3333	0.6667	0.0	-0.6667	-0.3333	0.0	0.3333
25	-0.3750	0.3750	0.0	0.0	-0.6250	0.0	0.0	-0.6250	0.0
26	0.0000	-1.0000	0.0	0.0	-0.0000	0.0	0.0	-0.0000	0.0
27	0.0	0.0	-0.3333	-0.3333	0.0	-0.6667	-0.3333	0.0	-0.6667
28	-0.2500	0.2500	0.0	0.0	0.2500	0.0	0.0	-0.7500	0.0
34	0.0	0.0	0.6667	-0.3333	0.0	-0.6667	-0.3333	0.0	0.3333
35	-0.3750	-0.6250	0.0	0.0	-0.6250	0.0	0.0	0.3750	0.0
36	-0.0000	-0.0000	0.0	0.0	-0.0000	0.0	0.0	-1.0000	0.0
37	0.0	0.0	0.0000	0.0000	0.0	0.0000	-1.0000	0.0	0.0000
38	-0.2500	-0.7500	0.0	0.0	0.2500	0.0	0.0	0.2500	0.0
45	0.0	0.0	-0.6667	-0.6667	0.0	-0.3333	0.3333	0.0	-0.3333
46	0.0	0.0	0.0000	0.0000	0.0	0.0000	-0.0000	0.0	1.0000
47	0.2500	0.7500	0.0	0.0	-0.2500	0.0	0.0	-0.2500	0.0
48	0.0	0.0	-0.0000	-0.0000	0.0	-0.0000	1.0000	0.0	-0.0000
56	-0.1250	0.1250	0.0	0.0	0.1250	0.0	0.0	0.1250	0.0
57	0.0	0.0	-0.6667	0.3333	0.0	-0.3333	0.3333	0.0	0.6667
58	0.3750	0.6250	0.0	0.0	-0.3750	0.0	0.0	0.6250	0.0
67	0.0	0.0	0.0	-1.0000	0.0	-0.0000	-0.0000	0.0	0.0000
68	-0.0000	0.0000	0.0	0.0	1.0000	0.0	0.0	0.0000	0.0
78	0.0	0.0	-0.6667	0.3333	0.0	0.6667	0.3333	0.0	-0.3333
SS	0.8125	3.3125	3.3333	3.3333	3.3125	3.0000	4.0000	3.3125	3.3333

CONFOUNDING INDEX= 3.3672

DESIGN (8.10. 3)

8 VARIABLES 9 PARAMETERS 10 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	X(8)	VARIANCE OF FITTED RESPONSE
1.	1.	-1.	-1.	-1.	1.	1.	-1.	0.7500
-1.	1.	-1.	1.	-1.	-1.	-1.	-1.	1.0000
1.	-1.	1.	1.	-1.	1.	1.	-1.	0.7500
-1.	1.	1.	-1.	1.	-1.	1.	-1.	1.0000
1.	-1.	1.	-1.	-1.	-1.	-1.	1.	1.0000
-1.	-1.	-1.	-1.	1.	1.	-1.	-1.	1.0000
1.	1.	1.	1.	1.	1.	-1.	1.	1.0000
1.	-1.	-1.	1.	1.	-1.	1.	1.	1.0000
-1.	-1.	1.	1.	-1.	1.	1.	1.	0.7500
-1.	1.	-1.	-1.	-1.	1.	1.	1.	0.7500

X'X INVERSE

0.1094	0.0	0.0	0.0	0.0	0.0156	-0.0156	-0.0156	0.0
0.0	0.1111	0.0139	-0.0139	-0.0139	0.0	0.0	0.0	-0.0139
0.0	0.0139	0.1111	0.0139	0.0139	0.0	0.0	0.0	0.0139
0.0	-0.0139	0.0139	0.1111	-0.0139	0.0	0.0	0.0	-0.0139
0.0	-0.0139	0.0139	-0.0139	0.1111	0.0	0.0	0.0	-0.0139
0.0156	0.0	0.0	0.0	0.0	0.1094	0.0156	0.0156	0.0
-0.0156	0.0	0.0	0.0	0.0	0.0156	0.1094	-0.0156	0.0
-0.0156	0.0	0.0	0.0	0.0	0.0156	-0.0156	0.1094	0.0
0.0	-0.0139	0.0139	-0.0139	-0.0139	0.0	0.0	0.0	0.1111

DET(X'X) = 0.6039797760D 09

D-EFFICIENCY= 94.6

AVERAGE VARIANCE OF COEFFICIENTS= 0.1103

T-EFFICIENCY= 90.6

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.1111

DESIGN (8.10. 3)

ALIAS MATRIX

	0	1	2	3	4	5	6	7	8
12	-0.2500	0.0	0.0	0.0	0.0	0.2500	0.7500	-0.2500	0.0
13	0.2500	0.0	0.0	0.0	0.0	-0.2500	0.2500	-0.7500	0.0
14	0.2500	0.0	0.0	0.0	0.0	0.7500	0.2500	0.2500	0.0
15	0.0	-0.3333	0.3333	-0.3333	0.6667	0.0	0.0	0.0	0.6667
16	0.0	0.3333	0.6667	0.3333	0.3333	0.0	0.0	0.0	-0.6667
17	0.0	0.3333	-0.3333	-0.6667	0.3333	0.0	0.0	0.0	-0.6667
18	0.5000	0.0	0.0	0.0	0.0	0.5000	-0.5000	-0.5000	0.0
23	-0.0000	0.0	0.0	0.0	0.0	1.0000	-0.0000	-0.0000	0.0
24	0.0000	0.0	0.0	0.0	0.0	0.0000	-0.0000	-1.0000	0.0
25	0.0	-0.0000	-0.0000	1.0000	0.0000	0.0	0.0	0.0	0.0000
26	0.0	0.6667	0.3333	-0.3333	-0.3333	0.0	0.0	0.0	0.6667
27	0.0	0.0000	-0.0000	-0.0000	-1.0000	0.0	0.0	0.0	-0.0000
28	-0.2500	0.0	0.0	0.0	0.0	0.2500	0.7500	-0.2500	0.0
34	0.0000	0.0	0.0	0.0	0.0	-0.0000	1.0000	0.0000	0.0
35	0.0	0.0	1.0000	0.0000	-0.0000	0.0	0.0	0.0	-0.0000
36	0.0	-0.0000	0.0000	0.0000	1.0000	0.0	0.0	0.0	0.0000
37	0.0	-0.6667	-0.3333	0.3333	0.3333	0.0	0.0	0.0	-0.6667
38	0.2500	0.0	0.0	0.0	0.0	-0.2500	0.2500	-0.7500	0.0
45	0.0	0.6667	0.3333	-0.3333	-0.3333	0.0	0.0	0.0	0.6667
46	0.0	-0.0000	-0.0000	1.0000	0.0000	0.0	0.0	0.0	0.0000
47	0.0	0.0	-1.0000	-0.0000	0.0000	0.0	0.0	0.0	0.0000
48	0.2500	0.0	0.0	0.0	0.0	0.7500	0.2500	0.2500	0.0
56	0.0000	0.0	0.0	0.0	0.0	0.0000	-0.0000	-1.0000	0.0
57	-0.0000	0.0	0.0	0.0	0.0	0.0000	-1.0000	-0.0000	0.0
58	0.0	0.6667	0.3333	-0.3333	0.6667	0.0	0.0	0.0	-0.3333
67	0.0000	0.0	0.0	0.0	0.0	-1.0000	0.0000	0.0000	0.0
68	0.0	-0.6667	0.6667	0.3333	0.3333	0.0	0.0	0.0	0.3333
78	0.0	-0.6667	-0.3333	-0.6667	0.3333	0.0	0.0	0.0	0.3333
SS	0.6250	3.0000	3.6667	3.6667	3.6667	3.6250	3.6250	3.6250	3.0000

CONFOUNDING INDEX= 3.4844

DESIGN (8.11. 1)

8 VARIABLES 9 PARAMETERS 11 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	X(8)	VARIANCE OF FITTED RESPONSE
-1.	-1.	-1.	-1.	-1.	1.	1.	1.	0.7125
1.	1.	-1.	-1.	-1.	-1.	1.	-1.	0.8125
1.	-1.	1.	-1.	1.	-1.	1.	1.	0.9625
-1.	-1.	-1.	1.	1.	-1.	-1.	-1.	0.9625
1.	1.	1.	1.	1.	1.	1.	-1.	0.8500
1.	-1.	1.	-1.	-1.	1.	-1.	-1.	0.8125
-1.	1.	-1.	-1.	1.	1.	-1.	1.	0.8500
-1.	1.	1.	1.	-1.	-1.	-1.	1.	0.9125
1.	-1.	-1.	1.	-1.	1.	-1.	1.	0.8125
-1.	-1.	1.	1.	-1.	1.	1.	-1.	0.7125
1.	1.	-1.	1.	-1.	-1.	1.	1.	0.6000

X'X INVERSE

0.1031	-0.0094	0.0094	0.0094	-0.0125	0.0219	-0.0094	-0.0094	-0.0094
-0.0094	0.1031	-0.0094	-0.0094	0.0125	0.0094	0.0094	-0.0219	0.0094
0.0094	-0.0094	0.1031	0.0094	-0.0125	-0.0094	0.0219	-0.0094	-0.0094
0.0094	-0.0094	0.0094	0.1031	-0.0125	-0.0094	-0.0094	-0.0094	0.0219
-0.0125	0.0125	-0.0125	-0.0125	0.1000	0.0125	0.0125	0.0125	0.0125
0.0219	0.0094	-0.0094	-0.0094	0.0125	0.1031	0.0094	0.0094	0.0094
-0.0094	0.0094	0.0219	-0.0094	0.0125	0.0094	0.1031	0.0094	0.0094
-0.0094	-0.0219	-0.0094	-0.0094	0.0125	0.0094	0.0094	0.1031	0.0094
-0.0094	0.0094	-0.0094	0.0219	0.0125	0.0094	0.0094	0.0094	0.1031

DET(X'X)= 0.1342177280D 10

D-EFFICIENCY= 93.9

AVERAGE VARIANCE OF COEFFICIENTS= 0.1028

T-EFFICIENCY= 88.5

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.4000

DESIGN (8.11. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6	7	8
12	0.0250	-0.2750	0.0250	-0.4750	0.3000	-0.0250	-0.0250	0.7250	-0.5250
13	0.3000	-0.0500	-0.2000	0.0500	-0.4000	0.7000	0.2000	-0.0500	-0.0500
14	-0.2250	0.2250	0.2750	-0.4750	0.3000	0.2250	0.7250	0.2250	0.4750
15	-0.0750	-0.4250	-0.0750	0.6750	0.1000	0.0750	0.0750	0.5750	0.3250
16	-0.0500	0.3000	-0.0500	0.2000	0.4000	0.0500	0.0500	-0.7000	-0.2000
17	0.5000	0.0000	0.5000	-0.0000	0.0000	0.5000	-0.5000	0.0000	0.0000
18	-0.2000	0.2000	-0.7000	-0.2000	0.6000	0.2000	-0.3000	0.2000	0.2000
23	-0.1250	-0.1250	-0.1250	-0.1250	0.5000	0.1250	0.1250	-0.1250	0.1250
24	0.0750	0.1750	0.0750	0.5750	-0.1000	-0.0750	-0.0750	0.1750	0.4250
25	-0.0000	-0.0000	0.0000	0.0000	-0.0000	-0.0000	1.0000	-0.0000	-0.0000
26	-0.0000	-0.0000	0.0000	0.0000	-0.0000	1.0000	-0.0000	-0.0000	-0.0000
27	0.0250	0.7250	0.0250	-0.4750	0.3000	-0.0250	-0.0250	-0.2750	-0.5250
28	0.1750	-0.4250	0.1750	0.1750	0.1000	-0.1750	-0.1750	-0.4250	-0.1750
34	0.1500	-0.6500	0.6500	0.1500	-0.2000	-0.1500	0.3500	0.3500	-0.1500
35	-0.0750	0.5750	-0.0750	-0.3250	0.1000	0.0750	0.0750	0.5750	0.3250
36	0.1000	0.1500	0.1000	-0.1500	0.2000	-0.1000	-0.1000	0.1500	-0.8500
37	0.2000	0.0500	-0.3000	-0.0500	0.4000	0.8000	0.3000	0.0500	0.0500
38	-0.1000	-0.1500	-0.1000	0.1500	-0.2000	0.1000	-0.9000	-0.1500	-0.1500
45	-0.0250	0.0250	-0.0250	-0.2750	-0.3000	0.0250	0.0250	0.0250	-0.7250
46	-0.1500	0.4000	-0.1500	0.1000	0.2000	0.1500	0.1500	0.4000	-0.1000
47	-0.0750	0.0750	0.4250	0.1750	0.1000	0.0750	0.5750	0.0750	-0.1750
48	-0.2500	0.5000	0.2500	-0.0000	0.0000	-0.7500	-0.2500	-0.5000	0.0000
56	-0.0000	0.0000	1.0000	-0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000
57	-0.0750	0.5750	-0.0750	0.6750	0.1000	0.0750	0.0750	-0.4250	0.3250
58	0.0250	-0.0250	0.0250	0.2750	-0.7000	-0.0250	-0.0250	-0.0250	-0.2750
67	-0.0500	-0.7000	-0.0500	0.2000	0.4000	0.0500	0.0500	0.3000	-0.2000
68	-0.1000	-0.1500	-0.1000	-0.8500	-0.2000	0.1000	0.1000	-0.1500	-0.1500
78	-0.1000	0.1000	-0.6000	-0.1000	-0.2000	0.1000	-0.4000	0.1000	0.1000
SS	0.7000	3.2625	3.1000	3.1875	2.4000	3.2000	3.6000	2.9625	2.8875

CONFOUNDING INDEX= 3.0750

DESIGN (8.11. 2)

8 VARIABLES 9 PARAMETERS 11 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	X(8)	VARIANCE OF FITTED RESPONSE
1.	-1.	-1.	-1.	-1.	-1.	1.	-1.	0.9625
1.	-1.	1.	-1.	-1.	1.	-1.	1.	0.9625
-1.	-1.	1.	-1.	1.	-1.	1.	1.	0.8125
-1.	1.	-1.	-1.	-1.	1.	-1.	-1.	0.7125
1.	1.	-1.	-1.	1.	1.	1.	1.	0.9625
1.	1.	1.	-1.	1.	-1.	-1.	-1.	0.9625
1.	1.	1.	1.	-1.	1.	1.	-1.	0.8125
1.	-1.	-1.	1.	1.	-1.	-1.	1.	0.7125
-1.	-1.	-1.	1.	1.	1.	-1.	-1.	0.6500
-1.	1.	-1.	1.	-1.	-1.	-1.	1.	0.8500
-1.	-1.	1.	1.	1.	1.	1.	-1.	0.6000

X'X INVERSE

0.1000	-0.0125	0.0125	0.0125	0.0125	-0.0125	-0.0125	0.0125	0.0125
-0.0125	0.1031	-0.0094	-0.0094	0.0219	0.0094	0.0094	-0.0094	-0.0094
0.0125	-0.0094	0.1031	0.0094	0.0094	0.0219	-0.0094	0.0094	0.0094
0.0125	-0.0094	0.0094	0.1031	0.0094	-0.0094	-0.0094	-0.0219	0.0094
0.0125	0.0219	0.0094	0.0094	0.1031	-0.0094	-0.0094	0.0094	0.0094
-0.0125	0.0094	0.0219	-0.0094	-0.0094	0.1031	0.0094	-0.0094	-0.0094
-0.0125	0.0094	-0.0094	-0.0094	-0.0094	0.0094	0.1031	-0.0094	0.0219
0.0125	-0.0094	0.0094	-0.0219	0.0094	-0.0094	-0.0094	0.1031	0.0094
0.0125	-0.0094	0.0094	0.0094	0.0094	-0.0094	0.0219	0.0094	0.1031

DET(X'X) = 0.1342177280D 10

D-EFFICIENCY= 93.9

AVERAGE VARIANCE OF COEFFICIENTS= 0.1028

T-EFFICIENCY= 88.5

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.4000

DESIGN (8.11. 2)

ALIAS MATRIX

	0	1	2	3	4	5	6	7	8
12	0.1000	-0.0750	0.3250	0.3250	0.0750	0.6750	0.1750	0.3250	-0.1750
13	0.1000	-0.0750	0.3250	0.3250	0.0750	-0.3250	0.1750	-0.6750	-0.1750
14	-0.2000	-0.1000	0.1000	0.1000	0.1000	-0.1000	-0.1000	0.1000	0.1000
15	-0.1000	0.0750	0.6750	-0.3250	-0.0750	0.3250	-0.1750	-0.3250	0.1750
16	0.1000	-0.0750	0.3250	0.3250	0.0750	-0.3250	0.1750	0.3250	0.8250
17	0.1000	-0.0750	0.3250	-0.6750	0.0750	-0.3250	0.1750	0.3250	-0.1750
18	-0.1000	0.0750	-0.3250	-0.3250	-0.0750	0.3250	0.8250	-0.3250	0.1750
23	-0.2000	0.6500	-0.1500	-0.1500	0.3500	0.1500	-0.3500	-0.1500	-0.6500
24	0.1000	-0.0750	-0.1750	0.3250	0.0750	-0.8250	-0.3250	0.3250	0.3250
25	-0.4000	0.5500	-0.0500	-0.0500	-0.5500	0.0500	0.0500	-0.0500	-0.0500
26	0.1000	0.1750	0.0750	-0.4250	-0.1750	-0.0750	-0.0750	0.5750	0.0750
27	-0.2000	0.6500	-0.1500	-0.1500	0.3500	0.1500	0.6500	-0.1500	0.3500
28	-0.1000	-0.1750	-0.0750	-0.5750	0.1750	0.0750	0.0750	0.4250	-0.0750
34	-0.1000	0.0750	0.1750	-0.3250	-0.0750	-0.1750	0.3250	0.6750	-0.3250
35	0.2000	-0.6500	0.1500	0.1500	-0.3500	-0.1500	-0.6500	0.1500	-0.3500
36	0.2000	0.3500	-0.3500	0.1500	0.6500	-0.6500	-0.1500	0.1500	0.1500
37	0.4000	-0.5500	0.0500	0.0500	0.5500	-0.0500	-0.0500	0.0500	0.0500
38	-0.2000	-0.3500	-0.6500	-0.1500	-0.6500	-0.3500	0.1500	-0.1500	-0.1500
45	-0.1000	0.0750	-0.8250	-0.3250	-0.0750	-0.1750	0.3250	-0.3250	-0.3250
46	0.1000	-0.0750	-0.1750	0.3250	0.0750	0.1750	-0.3250	0.3250	-0.6750
47	-0.1000	0.0750	0.1750	0.6750	-0.0750	-0.1750	0.3250	-0.3250	-0.3250
48	-0.1000	0.0750	0.1750	-0.3250	-0.0750	-0.1750	-0.6750	-0.3250	-0.3250
56	-0.1000	-0.1750	-0.0750	-0.5750	0.1750	0.0750	0.0750	0.4250	-0.0750
57	0.2000	-0.6500	0.1500	0.1500	-0.3500	-0.1500	0.3500	0.1500	0.6500
58	0.1000	0.1750	0.0750	-0.4250	-0.1750	-0.0750	-0.0750	0.5750	0.0750
67	0.2000	0.3500	0.6500	0.1500	0.6500	0.3500	-0.1500	0.1500	0.1500
68	-0.4000	0.5500	-0.0500	-0.0500	-0.5500	0.0500	0.0500	-0.0500	-0.0500
78	-0.2000	-0.3500	0.3500	-0.1500	-0.6500	0.6500	0.1500	-0.1500	-0.1500
SS	1.0000	3.2875	3.0375	3.1875	3.2875	3.0375	3.0375	3.1875	3.0375

CONFOUNDING INDEX= 3.1375

DESIGN (8. 12. 1)

8 VARIABLES 9 PARAMETERS 12 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	X(8)	VARIANCE OF FITTED RESPONSE
-1.	-1.	1.	1.	-1.	1.	-1.	1.	0.7500
1.	-1.	1.	-1.	-1.	1.	1.	1.	0.7500
1.	1.	1.	1.	-1.	-1.	-1.	-1.	0.7500
1.	-1.	1.	-1.	1.	-1.	-1.	-1.	0.7500
-1.	1.	1.	-1.	1.	1.	1.	-1.	0.7500
1.	1.	-1.	1.	-1.	1.	1.	-1.	0.7500
1.	-1.	-1.	1.	1.	-1.	1.	1.	0.7500
-1.	1.	1.	1.	1.	-1.	1.	1.	0.7500
-1.	-1.	-1.	-1.	-1.	-1.	1.	-1.	0.7500
-1.	1.	-1.	-1.	-1.	-1.	-1.	1.	0.7500
1.	1.	-1.	-1.	1.	1.	-1.	1.	0.7500
-1.	-1.	-1.	1.	1.	1.	-1.	-1.	0.7500

X'X INVERSE

0.0833	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0833	0.0	0.0	0.0	0.0	0.0	0.0	0 0
0.0	0.0	0.0833	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0833	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0833	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0833	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0833	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0833	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0833

DET(X'X) = 0.5159760352D 10

D-EFFICIENCY= 100.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.0833

T-EFFICIENCY= 100.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.7500

DESIGN (8.12. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6	7	8
12	0.0	0.0	0.0	-0.3333	0.3333	-0.3333	0.3333	-0.3333	-0.3333
13	0.0	0.0	-0.3333	0.0	-0.3333	-0.3333	-0.3333	-0.3333	-0.3333
14	0.0	0.0	0.3333	-0.3333	0.0	-0.3333	-0.3333	0.3333	-0.3333
15	0.0	0.0	-0.3333	-0.3333	-0.3333	0.0	-0.3333	-0.3333	0.3333
16	0.0	0.0	0.3333	-0.3333	-0.3333	-0.3333	0.0	0.3333	0.3333
17	0.0	0.0	-0.3333	-0.3333	0.3333	-0.3333	0.3333	0.0	0.3333
18	0.0	0.0	-0.3333	-0.3333	-0.3333	0.3333	0.3333	0.3333	0.0
23	0.0	-0.3333	0.0	0.0	0.3333	0.3333	-0.3333	0.3333	-0.3333
24	0.0	0.3333	0.0	0.3333	0.0	-0.3333	-0.3333	0.3333	-0.3333
25	0.0	-0.3333	0.0	0.3333	-0.3333	0.0	0.3333	0.3333	0.3333
26	0.0	0.3333	0.0	-0.3333	-0.3333	0.3333	0.0	0.3333	-0.3333
27	0.0	-0.3333	0.0	0.3333	0.3333	0.3333	0.3333	0.0	-0.3333
28	0.0	-0.3333	0.0	-0.3333	-0.3333	0.3333	-0.3333	-0.3333	0.0
34	0.0	-0.3333	0.3333	0.0	0.0	-0.3333	-0.3333	-0.3333	0.3333
35	0.0	-0.3333	0.3333	0.0	-0.3333	0.0	-0.3333	0.3333	-0.3333
36	0.0	-0.3333	-0.3333	0.0	-0.3333	-0.3333	0.0	0.3333	0.3333
37	0.0	-0.3333	0.3333	0.0	-0.3333	0.3333	0.3333	0.0	0.3333
38	0.0	-0.3333	-0.3333	0.0	0.3333	-0.3333	0.3333	0.3333	0.0
45	0.0	-0.3333	-0.3333	-0.3333	0.0	0.0	-0.3333	0.3333	0.3333
46	0.0	-0.3333	-0.3333	-0.3333	0.0	-0.3333	0.0	-0.3333	-0.3333
47	0.0	0.3333	0.3333	-0.3333	0.0	0.3333	-0.3333	0.0	0.3333
48	0.0	-0.3333	-0.3333	0.3333	0.0	0.3333	-0.3333	0.3333	0.0
56	0.0	-0.3333	0.3333	-0.3333	-0.3333	0.0	0.0	-0.3333	-0.3333
57	0.0	-0.3333	0.3333	0.3333	0.3333	0.0	-0.3333	0.0	0.3333
58	0.0	0.3333	0.3333	-0.3333	0.3333	0.0	-0.3333	0.3333	0.0
67	0.0	0.3333	0.3333	0.3333	-0.3333	-0.3333	0.0	0.0	-0.3333
68	0.0	0.3333	-0.3333	0.3333	-0.3333	-0.3333	0.0	-0.3333	0.0
78	0.0	0.3333	-0.3333	0.3333	0.3333	0.3333	-0.3333	0.0	0.0
SS	0.0	2.3333	2.3333	2.3333	2.3333	2.3333	2.3333	2.3333	2.3333

CONFOUNDING INDEX= 2.3333

DESIGN (9.10. 1)

9 VARIABLES 10 PARAMETERS 10 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	X(8)	X(9)	VARIANCE OF FITTED RESPONSE
1.	-1.	1.	1.	1.	1.	1.	-1.	-1.	1.0000
1.	1.	1.	1.	1.	-1.	-1.	-1.	1.	1.0000
1.	-1.	-1.	1.	-1.	-1.	-1.	1.	-1.	1.0000
-1.	1.	-1.	1.	1.	-1.	1.	-1.	-1.	1.0000
-1.	-1.	-1.	-1.	-1.	1.	-1.	-1.	1.	1.0000
-1.	-1.	1.	1.	-1.	-1.	1.	1.	1.	1.0000
-1.	1.	1.	-1.	1.	1.	-1.	1.	-1.	1.0000
1.	-1.	-1.	-1.	1.	-1.	1.	1.	1.	1.0000
1.	1.	1.	-1.	-1.	-1.	1.	-1.	-1.	1.0000
1.	1.	-1.	1.	-1.	1.	1.	1.	1.	1.0000

X'X INVERSE

0.1111	-0.0139	0.0	0.0	-0.0139	0.0	0.0139	-0.0139	0.0	0.0
-0.0139	0.1111	0.0	0.0	-0.0139	0.0	0.0139	-0.0139	0.0	0.0
0.0	0.0	0.1111	-0.0139	0.0	-0.0139	0.0	0.0	0.0139	0.0139
0.0	0.0	-0.0139	0.1111	0.0	-0.0139	0.0	0.0	0.0139	0.0139
-0.0139	-0.0139	0.0	0.0	0.1111	0.0	0.0139	-0.0139	0.0	0.0
0.0	0.0	-0.0139	-0.0139	0.0	0.1111	0.0	0.0	0.0139	0.0139
0.0139	0.0139	0.0	0.0	0.0139	0.0	0.1111	0.0139	0.0	0.0
-0.0139	-0.0139	0.0	0.0	-0.0139	0.0	0.0139	0.1111	0.0	0.0
0.0	0.0	0.0139	0.0139	0.0	0.0139	0.0	0.0	0.1111	-0.0139
0.0	0.0	0.0139	0.0139	0.0	0.0139	0.0	0.0	-0.0139	0.1111

DET(X'X) = 0.5435817984D 10

D-EFFICIENCY= 94.1

AVERAGE VARIANCE OF COEFFICIENTS= 0.1111

T-EFFICIENCY= 90.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.2222

DESIGN (9.10. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6	7	8	9
12	0.0	0.0	0.3333	0.3333	0.0	-0.6667	0.0	0.0	-0.3333	0.6667
13	0.0	0.0	-0.0000	-0.0000	0.0	0.0000	0.0	0.0	-1.0000	-0.0000
14	0.3333	0.3333	0.0	0.0	0.3333	0.0	0.6667	-0.6667	0.0	0.0
15	0.0	0.0	-0.6667	0.3333	0.0	0.3333	0.0	0.0	-0.3333	0.6667
16	-0.3333	-0.3333	0.0	0.0	0.6667	0.0	0.3333	0.6667	0.0	0.0
17	0.3333	0.3333	0.0	0.0	-0.6667	0.0	0.6667	0.3333	0.0	0.0
18	0.0	0.0	0.0	-1.0000	0.0	0.0000	0.0	0.0	0.0000	0.0000
19	0.0	0.0	0.6667	-0.3333	0.0	0.6667	0.0	0.0	0.3333	0.3333
23	0.3333	0.3333	0.0	0.0	-0.6667	0.0	-0.3333	-0.6667	0.0	0.0
24	0.0	0.0	0.3333	-0.6667	0.0	0.3333	0.0	0.0	-0.3333	0.6667
25	0.3333	-0.6667	0.0	0.0	0.3333	0.0	-0.3333	-0.6667	0.0	0.0
26	0.0	0.0	0.0000	0.0000	0.0	-0.0000	0.0	0.0	1.0000	0.0000
27	0.0	0.0	0.3333	-0.6667	0.0	-0.6667	0.0	0.0	-0.3333	-0.3333
28	0.0000	0.0000	0.0	0.0	-0.0000	0.0	1.0000	-0.0000	0.0	0.0
29	-0.3333	0.6667	0.0	0.0	0.6667	0.0	0.3333	-0.3333	0.0	0.0
34	0.0	0.0	-0.6667	0.3333	0.0	0.3333	0.0	0.0	-0.3333	0.6667
35	0.3333	0.3333	0.0	0.0	0.3333	0.0	0.6667	-0.6667	0.0	0.0
36	0.0	0.0	-0.3333	-0.3333	0.0	0.6667	0.0	0.0	0.3333	-0.6667
37	0.0	0.0	-0.6667	0.3333	0.0	-0.6667	0.0	0.0	-0.3333	-0.3333
38	0.0	-1.0000	0.0	0.0	0.0000	0.0	0.0000	-0.0000	0.0	0.0
39	-0.3333	-0.3333	0.0	0.0	0.6667	0.0	-0.6667	-0.3333	0.0	0.0
45	0.0	0.0	-0.0000	-0.0000	0.0	0.0000	0.0	0.0	-1.0000	-0.0000
46	-0.3333	0.6667	0.0	0.0	-0.3333	0.0	0.3333	0.6667	0.0	0.0
47	0.3333	-0.6667	0.0	0.0	0.3333	0.0	0.6667	0.3333	0.0	0.0
48	0.0	0.0	0.0000	-0.0000	0.0	-1.0000	0.0	0.0	0.0000	0.0000
49	0.0	0.0	0.6667	0.6667	0.0	-0.3333	0.0	0.0	0.3333	0.3333
56	0.0	0.0	-0.3333	0.6667	0.0	-0.3333	0.0	0.0	0.3333	-0.6667
57	0.0	0.0	-0.6667	-0.6667	0.0	0.3333	0.0	0.0	-0.3333	-0.3333
58	0.0000	-0.0000	0.0	0.0	-1.0000	0.0	0.0000	-0.0000	0.0	0.0
59	-0.3333	0.6667	0.0	0.0	-0.3333	0.0	-0.6667	-0.3333	0.0	0.0
67	-0.3333	0.6667	0.0	0.0	0.6667	0.0	0.3333	-0.3333	0.0	0.0
68	0.0	0.0	1.0000	-0.0000	0.0	-0.0000	0.0	0.0	-0.0000	-0.0000
69	0.0	0.0	0.3333	-0.6667	0.0	-0.6667	0.0	0.0	-0.3333	-0.3333
78	0.0	0.0	0.0000	0.0000	0.0	-0.0000	0.0	0.0	0.0000	1.0000
79	0.0	0.0	0.0000	0.0000	0.0	-0.0000	0.0	0.0	1.0000	0.0000
89	-0.0000	-0.0000	0.0	0.0	0.0000	0.0	-0.0000	1.0000	0.0	0.0
SS	1.3333	4.3333	4.3333	4.3333	4.3333	4.3333	4.3333	4.3333	5.3333	4.3333

CONFOUNDING INDEX= 4.4444

DESIGN (9.11. 1)

9 VARIABLES 10 PARAMETERS 11 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	X(8)	X(9)	VARIANCE OF FITTED RESPONSE
-1.	1.	-1.	-1.	1.	-1.	1.	-1.	-1.	1.0000
-1.	-1.	1.	-1.	-1.	-1.	-1.	1.	-1.	0.9167
-1.	-1.	1.	-1.	1.	1.	1.	-1.	1.	1.0000
1.	1.	1.	1.	-1.	-1.	1.	-1.	1.	0.9167
-1.	1.	-1.	1.	-1.	1.	-1.	-1.	1.	0.9167
1.	-1.	1.	1.	1.	-1.	-1.	-1.	-1.	1.0000
-1.	1.	1.	1.	1.	1.	1.	1.	-1.	1.0000
-1.	-1.	-1.	1.	1.	-1.	1.	1.	1.	1.0000
1.	1.	-1.	-1.	1.	1.	-1.	1.	1.	0.6667
1.	-1.	-1.	-1.	-1.	1.	1.	1.	-1.	0.9167
1.	1.	1.	-1.	1.	-1.	-1.	1.	1.	0.6667

X'X INVERSE

0.1042	0.0104	-0.0104	-0.0104	0.0104	-0.0208	0.0104	-0.0104	-0.0104	-0.0104
0.0104	0.1042	-0.0104	-0.0104	0.0104	0.0104	0.0104	0.0208	-0.0104	-0.0104
-0.0104	-0.0104	0.1042	0.0104	-0.0104	-0.0104	-0.0104	0.0104	0.0104	-0.0208
-0.0104	-0.0104	0.0104	0.1042	-0.0104	-0.0104	0.0208	0.0104	0.0104	0.0104
0.0104	0.0104	-0.0104	-0.0104	0.1042	0.0104	0.0104	-0.0104	0.0208	-0.0104
-0.0208	0.0104	-0.0104	-0.0104	0.0104	0.1042	0.0104	-0.0104	-0.0104	-0.0104
0.0104	0.0104	-0.0104	0.0208	0.0104	0.0104	0.1042	-0.0104	-0.0104	-0.0104
-0.0104	0.0208	0.0104	0.0104	-0.0104	-0.0104	-0.0104	0.1042	0.0104	0.0104
-0.0104	-0.0104	0.0104	0.0104	0.0208	-0.0104	-0.0104	0.0104	0.1042	0.0104
-0.0104	-0.0104	-0.0208	0.0104	-0.0104	-0.0104	-0.0104	0.0104	0.0104	0.1042

DET(X'X) = 0.1288490189D 11

D-EFFICIENCY= 93.2

AVERAGE VARIANCE OF COEFFICIENTS= 0.1042

T-EFFICIENCY= 87.3

MAXIMUM VARIANCE OF FITTED RESPONSE= 1.6667

DESIGN (9.11. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6	7	8	9
12	-0.0833	-0.0833	-0.1667	0.3333	-0.3333	-0.0833	-0.3333	0.0833	0.3333	0.8333
13	0.0833	0.0833	0.1667	-0.3333	0.3333	0.0833	-0.6667	-0.0833	-0.3333	0.1667
14	-0.0833	-0.0833	-0.1667	0.3333	-0.3333	-0.0833	-0.3333	0.0833	-0.6667	-0.1667
15	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-1.0000	0.0000	0.0000
16	-0.0833	-0.0833	-0.1667	-0.6667	-0.3333	-0.0833	-0.3333	0.0833	0.3333	-0.1667
17	0.0000	0.0000	-0.0000	-0.0000	0.0000	-1.0000	0.0000	-0.0000	-0.0000	-0.0000
18	0.0833	0.0833	0.1667	-0.3333	-0.6667	0.0833	0.3333	-0.0833	-0.3333	0.1667
19	-0.0833	-0.0833	0.8333	0.3333	-0.3333	-0.0833	-0.3333	0.0833	0.3333	-0.1667
23	-0.1667	0.3333	0.1667	0.1667	0.3333	-0.1667	-0.1667	0.6667	0.6667	0.1667
24	0.2500	-0.2500	-0.0000	0.5000	0.0000	-0.7500	0.5000	0.2500	-0.0000	-0.0000
25	0.0000	0.0000	0.5000	-0.0000	-0.5000	0.0000	0.0000	-0.0000	0.5000	-0.5000
26	0.1667	-0.3333	-0.1667	-0.1667	0.6667	0.1667	0.1667	-0.6667	0.3333	-0.1667
27	-0.0833	-0.0833	0.3333	0.3333	0.1667	-0.0833	-0.3333	0.0833	-0.1667	-0.6667
28	-0.2500	0.2500	0.0000	0.5000	-0.0000	0.7500	0.5000	-0.2500	0.0000	0.0000
29	0.5000	0.5000	-0.0000	0.0000	-0.0000	-0.5000	-0.0000	-0.5000	0.0000	0.0000
34	0.1667	0.6667	0.3333	-0.1667	0.1667	0.1667	0.1667	0.3333	-0.1667	-0.6667
35	0.1667	0.1667	-0.1667	0.3333	0.1667	0.1667	0.6667	-0.1667	-0.1667	-0.1667
36	-0.5000	-0.5000	0.0000	-0.0000	0.0000	0.5000	0.0000	0.5000	-0.0000	-0.0000
37	-0.0833	-0.0833	0.3333	0.3333	0.1667	-0.0833	0.6667	0.0833	-0.1667	0.3333
38	-0.1667	-0.6667	0.6667	0.1667	-0.1667	-0.1667	-0.1667	-0.3333	0.1667	-0.3333
39	-0.1667	0.3333	0.1667	0.1667	-0.6667	-0.1667	-0.1667	0.6667	-0.3333	0.1667
45	-0.0000	-0.0000	-0.5000	0.0000	0.5000	-0.0000	-0.0000	0.0000	0.5000	-0.5000
46	-0.1667	-0.6667	0.6667	0.1667	-0.1667	-0.1667	-0.1667	-0.3333	0.1667	-0.3333
47	-0.0833	-0.0833	0.3333	0.3333	0.1667	-0.0833	-0.3333	0.0833	0.8333	0.3333
48	-0.5000	-0.5000	0.0000	-0.0000	0.0000	0.5000	0.0000	0.5000	-0.0000	-0.0000
49	0.2500	-0.2500	-0.0000	-0.5000	0.0000	-0.7500	-0.5000	0.2500	-0.0000	-0.0000
56	-0.1667	-0.1667	0.1667	0.6667	-0.1667	-0.1667	0.3333	0.1667	0.1667	0.1667
57	0.0000	-1.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	0.0000	-0.0000	-0.0000
58	-0.0000	0.0	0.5000	0.0000	0.5000	0.0000	0.0000	-0.0000	0.5000	0.5000
59	-0.0000	0.0000	-0.5000	-0.0000	-0.5000	-0.0000	0.0000	-0.0000	0.5000	0.5000
67	0.0833	0.0833	-0.3333	0.6667	-0.1667	0.0833	0.3333	-0.0833	0.1667	-0.3333
68	0.1667	0.6667	0.3333	-0.1667	0.1667	0.1667	0.1667	0.3333	-0.1667	-0.6667
69	0.1667	-0.3333	-0.1667	-0.1667	-0.3333	0.1667	0.1667	-0.6667	-0.6667	-0.1667
78	0.0833	0.0833	-0.3333	-0.3333	0.8333	0.0833	0.3333	-0.0833	0.1667	-0.3333
79	-0.0833	-0.0833	-0.6667	0.3333	0.1667	-0.0833	-0.3333	0.0833	-0.1667	0.3333
89	-0.2500	0.2500	0.0000	-0.5000	-0.0000	0.7500	-0.5000	-0.2500	0.0000	0.0000
SS	1.3611	4.3611	4.1111	3.7778	4.1111	4.3611	3.7778	4.3611	4.1111	4.1111

CONFOUNDING INDEX= 4.1204

DESIGN (9.11. 2)

9 VARIABLES 10 PARAMETERS 11 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	X(8)	X(9)	VARIANCE OF FITTED RESPONSE
-1.	-1.	-1.	1.	-1.	-1.	-1.	1.	1.	0.9167
1.	1.	-1.	1.	1.	-1.	1.	1.	1.	0.9167
-1.	-1.	-1.	-1.	1.	-1.	1.	-1.	-1.	1.0000
1.	-1.	-1.	-1.	-1.	1.	1.	-1.	1.	1.0000
1.	-1.	1.	1.	-1.	-1.	-1.	-1.	-1.	0.6667
-1.	1.	-1.	1.	1.	1.	-1.	-1.	-1.	1.0000
1.	-1.	1.	-1.	1.	1.	-1.	1.	-1.	0.9167
-1.	-1.	1.	1.	1.	1.	1.	-1.	1.	1.0000
-1.	1.	1.	-1.	1.	-1.	-1.	-1.	1.	1.0000
-1.	1.	1.	-1.	-1.	1.	1.	1.	-1.	0.9167
1.	1.	1.	1.	-1.	-1.	1.	-1.	-1.	0.6667

X'X INVERSE

0.1055	0.0117	0.0156	-0.0117	-0.0117	-0.0117	0.0117	-0.0156	0.0195	0.0117
0.0117	0.1055	0.0156	-0.0117	-0.0117	0.0195	0.0117	-0.0156	-0.0117	0.0117
0.0156	0.0156	0.1042	-0.0156	-0.0156	-0.0156	0.0156	-0.0208	-0.0156	0.0156
-0.0117	-0.0117	-0.0156	0.1055	0.0117	0.0117	-0.0117	0.0156	0.0117	0.0195
-0.0117	-0.0117	-0.0156	0.0117	0.1055	0.0117	0.0195	0.0156	0.0117	-0.0117
-0.0117	0.0195	-0.0156	0.0117	0.0117	0.1055	-0.0117	0.0156	0.0117	-0.0117
0.0117	0.0117	0.0156	-0.0117	0.0195	-0.0117	0.1055	-0.0156	-0.0117	0.0117
-0.0156	-0.0156	-0.0208	0.0156	0.0156	0.0156	-0.0156	0.1042	0.0156	-0.0156
0.0195	-0.0117	-0.0156	0.0117	0.0117	0.0117	-0.0117	0.0156	0.1055	-0.0117
0.0117	0.0117	0.0156	0.0195	-0.0117	-0.0117	0.0117	-0.0156	-0.0117	0.1055

DET(X'X) = 0.1288490189D 11

D-EFFICIENCY= 93.2

AVERAGE VARIANCE OF COEFFICIENTS= 0.1052

T-EFFICIENCY= 86.4

MAXIMUM VARIANCE OF FITTED RESPONSE= 2.0000

DESIGN (9.11. 2)

ALIAS MATRIX

	0	1	2	3	4	5	6	7	8	9
12	-0.2500	-0.2500	-0.3333	-0.0000	0.5000	0.2500	-0.5000	0.6667	0.2500	0.0000
13	0.0	0.0000	-0.3333	-0.2500	0.2500	0.0	-0.2500	-0.3333	-0.0000	-0.7500
14	-0.0000	0.0000	0.3333	0.2500	-0.2500	-0.0000	-0.7500	0.3333	-0.0000	-0.2500
15	0.0000	0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	-0.0000	1.0000	0.0000
16	-0.0000	-0.0000	-0.3333	-0.2500	-0.7500	0.0000	-0.2500	-0.3333	0.0000	0.2500
17	0.2500	0.2500	0.6667	-0.5000	0.0000	-0.2500	-0.0000	-0.3333	-0.2500	0.5000
18	0.0000	-0.0000	0.0000	-0.0000	-0.0000	1.0000	0.0000	-0.0000	-0.0000	0.0000
19	-0.0000	-0.0000	0.3333	-0.7500	-0.2500	0.0000	0.2500	0.3333	0.0000	-0.2500
23	0.1250	-0.3750	0.1667	-0.1250	-0.6250	-0.6250	-0.3750	0.1667	-0.1250	0.1250
24	0.1250	0.6250	0.1667	-0.6250	-0.1250	0.3750	0.1250	0.1667	-0.1250	-0.3750
25	0.2500	0.2500	0.3333	-0.5000	0.0000	-0.2500	-0.0000	-0.6667	-0.2500	0.5000
26	-0.1250	-0.6250	-0.1667	-0.3750	0.1250	-0.3750	-0.1250	-0.1667	0.1250	-0.6250
27	0.2500	0.2500	0.0000	0.2500	0.2500	-0.2500	-0.2500	0.0000	0.7500	-0.2500
28	0.0000	0.0000	-0.3333	-0.0000	-0.0000	-0.0000	0.0000	0.6667	-0.0000	0.0000
29	-0.1250	0.3750	-0.1667	0.1250	-0.3750	0.6250	-0.6250	-0.1667	0.1250	-0.1250
34	-0.3750	0.1250	-0.5000	0.1250	0.1250	-0.1250	-0.1250	0.5000	-0.6250	-0.1250
35	0.0000	0.0	-0.3333	0.2500	-0.2500	-0.0000	0.2500	-0.3333	0.0	0.7500
36	0.1250	-0.3750	-0.5000	0.1250	0.1250	0.3750	-0.1250	0.5000	0.8750	-0.1250
37	-0.1250	-0.6250	0.1667	0.1250	0.6250	-0.3750	0.3750	0.1667	0.1250	-0.1250
38	-0.0000	-0.0000	-0.0000	-0.5000	-0.5000	0.0000	0.5000	0.0000	0.0000	-0.5000
39	-0.5000	-0.5000	0.0000	-0.0000	-0.0000	0.5000	0.0000	-0.0000	-0.5000	0.0000
45	-0.0000	-0.0000	0.3333	-0.2500	0.2500	0.0000	0.7500	0.3333	0.0000	0.2500
46	-0.5000	-0.5000	0.0000	-0.0000	-0.0000	0.5000	0.0000	-0.0000	-0.5000	0.0000
47	-0.1250	0.3750	0.1667	0.6250	0.1250	0.6250	-0.1250	0.1667	0.1250	0.3750
48	-0.0000	-0.0000	-0.0000	-0.5000	-0.5000	0.0000	-0.5000	0.0000	0.0000	0.5000
49	0.1250	-0.3750	-0.5000	0.1250	0.1250	0.3750	-0.1250	0.5000	0.8750	-0.1250
56	0.0000	0.0000	-0.3333	0.2500	0.7500	-0.0000	0.2500	-0.3333	-0.0000	-0.2500
57	-0.2500	-0.2500	-0.6667	-0.0000	0.5000	0.2500	-0.5000	0.3333	0.2500	0.0000
58	-0.0000	1.0000	-0.0000	0.0000	0.0000	-0.0000	-0.0000	0.0000	0.0000	-0.0000
59	0.0000	0.0000	0.3333	0.7500	0.2500	-0.0000	-0.2500	0.3333	-0.0000	0.2500
67	0.1250	-0.3750	-0.1667	0.3750	-0.1250	-0.6250	0.1250	-0.1667	-0.1250	0.6250
68	-0.0000	0.0000	0.0000	0.5000	-0.5000	-0.0000	-0.5000	-0.0000	-0.0000	-0.5000
69	-0.3750	0.1250	-0.5000	0.1250	0.1250	-0.1250	-0.1250	0.5000	-0.6250	-0.1250
78	-0.0000	-0.0000	0.6667	0.0000	0.0000	0.0000	-0.0000	-0.3333	0.0000	-0.0000
79	0.1250	0.6250	-0.1667	-0.1250	0.3750	0.3750	0.6250	-0.1667	-0.1250	0.1250
89	0.0000	0.0000	0.0000	-0.5000	0.5000	-0.0000	-0.5000	-0.0000	-0.0000	-0.5000
SS	1.2500	4.2500	3.7778	4.2500	4.2500	4.2500	4.2500	3.7778	4.7500	4.2500

CONFOUNDING INDEX= 4.2006

DESIGN (9.12. 1)

9 VARIABLES 10 PARAMETERS 12 RUNS

DESIGN MATRIX

X(1)	X(2)	X(3)	X(4)	X(5)	X(6)	X(7)	X(8)	X(9)	VARIANCE OF FITTED RESPONSE
-1.	-1.	1.	1.	1.	1.	1.	1.	-1.	0.8333
1.	-1.	-1.	1.	1.	-1.	-1.	1.	-1.	0.8333
1.	1.	-1.	-1.	1.	1.	-1.	1.	1.	0.8333
-1.	1.	-1.	1.	-1.	-1.	1.	1.	1.	0.8333
-1.	1.	-1.	-1.	1.	-1.	1.	-1.	-1.	0.8333
1.	1.	1.	1.	-1.	-1.	-1.	-1.	-1.	0.8333
1.	-1.	-1.	-1.	-1.	1.	1.	-1.	-1.	0.8333
-1.	-1.	-1.	1.	-1.	1.	-1.	-1.	1.	0.8333
-1.	-1.	1.	-1.	1.	-1.	-1.	-1.	1.	0.8333
-1.	1.	1.	-1.	-1.	1.	-1.	1.	-1.	0.8333
1.	-1.	1.	-1.	-1.	-1.	1.	1.	1.	0.8333
1.	1.	1.	1.	1.	1.	1.	-1.	1.	0.8333

X'X INVERSE

0.0833	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0833	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0833	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0833	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0833	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0833	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0833	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0833	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0833	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0833

DET(X'X) = 0.6191736422D 11

D-EFFICIENCY= 100.0

AVERAGE VARIANCE OF COEFFICIENTS= 0.0833

T-EFFICIENCY= 100.0

MAXIMUM VARIANCE OF FITTED RESPONSE= 0.8333

DESIGN (9.12. 1)

ALIAS MATRIX

	0	1	2	3	4	5	6	7	8	9
12	0.0	0.0	0.0	0.3333	0.3333	0.3333	0.3333	-0.3333	-0.3333	0.3333
13	0.0	0.0	0.3333	0.0	0.3333	-0.3333	-0.3333	0.3333	-0.3333	0.3333
14	0.0	0.0	0.3333	0.3333	0.0	0.3333	-0.3333	-0.3333	-0.3333	-0.3333
15	0.0	0.0	0.3333	-0.3333	0.3333	0.0	0.3333	-0.3333	0.3333	0.3333
16	0.0	0.0	0.3333	-0.3333	-0.3333	0.3333	0.0	0.3333	-0.3333	0.3333
17	0.0	0.0	-0.3333	0.3333	-0.3333	-0.3333	0.3333	0.0	-0.3333	0.3333
18	0.0	0.0	-0.3333	-0.3333	-0.3333	0.3333	-0.3333	-0.3333	0.0	0.3333
19	0.0	0.0	0.3333	0.3333	-0.3333	0.3333	0.3333	0.3333	0.3333	0.0
23	0.0	0.3333	0.0	0.0	0.3333	-0.3333	0.3333	-0.3333	-0.3333	-0.3333
24	0.0	0.3333	0.0	0.3333	0.0	-0.3333	-0.3333	0.3333	-0.3333	0.3333
25	0.0	0.3333	0.0	-0.3333	-0.3333	0.0	0.3333	0.3333	-0.3333	0.3333
26	0.0	0.3333	0.0	0.3333	-0.3333	0.3333	0.0	-0.3333	0.3333	0.3333
27	0.0	-0.3333	0.0	-0.3333	0.3333	0.3333	-0.3333	0.0	-0.3333	0.3333
28	0.0	-0.3333	0.0	-0.3333	-0.3333	-0.3333	0.3333	-0.3333	0.0	0.3333
29	0.0	0.3333	0.0	-0.3333	0.3333	0.3333	0.3333	0.3333	0.3333	0.0
34	0.0	0.3333	0.3333	0.0	0.0	0.3333	0.3333	0.3333	-0.3333	-0.3333
35	0.0	-0.3333	-0.3333	0.0	0.3333	0.0	0.3333	0.3333	-0.3333	0.3333
36	0.0	-0.3333	0.3333	0.0	0.3333	0.3333	0.0	0.3333	0.3333	-0.3333
37	0.0	0.3333	-0.3333	0.0	0.3333	0.3333	0.3333	0.0	0.3333	0.3333
38	0.0	-0.3333	-0.3333	0.0	-0.3333	-0.3333	0.3333	0.3333	0.0	-0.3333
39	0.0	0.3333	-0.3333	0.0	-0.3333	0.3333	-0.3333	0.3333	-0.3333	0.0
45	0.0	0.3333	-0.3333	0.3333	0.0	0.0	0.3333	0.3333	0.3333	-0.3333
46	0.0	-0.3333	-0.3333	0.3333	0.0	0.3333	0.0	0.3333	-0.3333	0.3333
47	0.0	-0.3333	0.3333	0.3333	0.0	0.3333	0.3333	0.0	0.3333	0.3333
48	0.0	-0.3333	-0.3333	-0.3333	0.0	0.3333	-0.3333	0.3333	0.0	-0.3333
49	0.0	-0.3333	0.3333	-0.3333	0.0	-0.3333	0.3333	0.3333	-0.3333	0.0
56	0.0	0.3333	0.3333	0.3333	0.3333	0.0	0.0	0.3333	0.3333	0.3333
57	0.0	-0.3333	0.3333	0.3333	0.3333	0.0	0.3333	0.0	-0.3333	-0.3333
58	0.0	0.3333	-0.3333	-0.3333	0.3333	0.0	0.3333	-0.3333	0.0	-0.3333
59	0.0	0.3333	0.3333	0.3333	-0.3333	0.0	0.3333	-0.3333	-0.3333	0.0
67	0.0	0.3333	-0.3333	0.3333	0.3333	0.3333	0.0	0.0	-0.3333	-0.3333
68	0.0	-0.3333	0.3333	0.3333	-0.3333	0.3333	0.0	-0.3333	0.0	-0.3333
69	0.0	0.3333	0.3333	-0.3333	0.3333	0.3333	0.0	-0.3333	-0.3333	0.0
78	0.0	-0.3333	-0.3333	0.3333	0.3333	-0.3333	-0.3333	0.0	0.0	0.3333
79	0.0	0.3333	0.3333	0.3333	0.3333	-0.3333	-0.3333	0.0	0.3333	0.0
89	0.0	0.3333	0.3333	-0.3333	-0.3333	-0.3333	-0.3333	0.3333	0.0	0.0
SS	0.0	3.1111	3.1111	3.1111	3.1111	3.1111	3.1111	3.1111	3.1111	3.1111

CONFOUNDING INDEX= 3.1111

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