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SOME METHODS FOR APPROXIMATING

FUNCTIONS OF SEVERAL VARIABLES.

RICHARD FRANKE

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Rear Admiral Mason B. Freeman   Jack R. Borsting
Superintendent   Provost

This report was prepared by:

w. m. woods, Chairman   J. M. Wozencraft
Department of Mathematics   Dean of Research

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

   Some methods of approximating discrete functions of several variables
were investigated. The principal goal was a suitable approximation for
aerodynamic and infrared signature data for use in real time hybrid computer
simulations. The main thrust is toward approximation by sums of functions
of fewer variables. Two computer programs are given, and a number of
comparisons between three types of approximations are given. It is decided
that no method for determining, a priori, the kind of approximation which
will yield suitable results is known, except in special cases.

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1.0 Introduction

The problem to be considered is that of approximating functions of several variables. We will assume that values of the functions are known on a cartesian grid of points, say at $\left(X_{i_1}^1, X_{i_2}^2, \ldots, X_{i_n}^n \right)$, $i_j = 1, \ldots, N_j$, $j = 1, \ldots, n$. (Note: We will often use superscripts, which should not be interpreted as exponents). We will denote the function values by $F_{i_1, \ldots, i_n}$.

The application in which we are particularly interested is the representation of aerodynamic and infrared signature data for use in real time hybrid computer simulations. Thus the approximations must be capable of being evaluated rapidly. There are usually large amounts of data available and it is desirable and sometimes necessary to reduce the amount of data which must be stored.

The data is obtained by measurement, hence may be subject to error, in some instances as much as 10% or more of the range of the function. This fact will have its impact on some of the measures of the goodness of fit which we seriously consider.

There has been theoretical work done on this problem, usually in a more general setting. Notably there is the work of Diliberto and Strauss [1] and Golomb [4], as well as some more general and some less general, such as [2], [5], and [7]. There are also a number of practical articles in the area which have had an influence, such as [3] and [6].

We will briefly discuss several common methods using the full data set. We will be more interested in approximation schemes which reduce the amount of data and will discuss some of these in more detail. Some Fortran IV programs for processing the data into the appropriate form are given in the appendix.

2-0 Interpolation on the Full Data Set

2-1 Linear Interpolation

The simplest and most obvious way to approximate the function using the full data set is to use iterated linear interpolation between points. This results in the approximating function being multilinear (i.e., linear in each variable). This is sometimes called characteristic strip interpolation. The approximation is continuous, but does not have continuous derivatives in general.

A simpler version of the above uses a hyperplane to fit the function and its first divided difference in each variable. This is equivalent to a linear Taylor series representation where the differences replace the derivatives. This approximation is easier to compute, but it is not continuous.

The two above approximations have been available in hardware from the MacNeal – Schwendler Corporation [8]. A digital processor is used to compute a function of up to four variables. The input variables are analog and are converted to digital. The output function is available in both digital and analog form.

It should be noted that the hyperplane fit can be arranged so as to give a continuous approximation. Instead of using the same hyperplane over the entire n-cube, one uses many. After the n-cube in which the point lies has been determined, one then must determine a subset of n + 1 vertices which define the n-simplex in which the point lies. (It will be unique, unless the point lies on a boundary of one of the simplexes). The n + 1 values of the functions at the vertices of the simplex then define the hyperplane. This procedure is also available in hardware from the MacNeal-Schwendler Corporation, although the author has no other information about it.

[2]

2.2 Smooth Interpolation

For some applications it may be necessary to provide approximations which are smooth. One could then consider some type of global spline approximation. Because of the necessity of rapid evaluation it would be necessary to preprocess the data. This would result in an increase in the amount of stored data and in many cases this would not be feasible. One could also use a local approximation, such as Hermite interpolation, or deficient quintic splines. For rapid evaluation these would also need to be preprocessed, with an increase in the amount of stored data.

Because of the increase in the amount of data it is probably not feasible to use the full data set when smooth approximations are desired. If the approximation is to be smooth in one or two variables, the increase in the amount of data may be manageable. The procedures in these cases are well documented and will not be discussed here.

3.0 Approximations

The type of approximations we will consider here are generally of the form of sums of functions of fewer variables. This can be a very effective means of fitting certain functions, and certainly is a desirable method from the standpoints of both evaluation time and storage requirements. However, for it to be an accurate method the function to be approximated must have some special properties. In particular, it is necessary for the function to have basically the same character for different cross sections. For example, consider the approximation of $F(x,y)$ by $f(x) + g(y)$. For fixed y_0 the approximation becomes $F(x,y_0) \simeq f(x) + g(y_0)$. If $F(x,y)$ has basically the same shape for various constant y, then the approximation will be a good one.

If $F(x,y_0)$ and $F(x,y_1)$ have basically different shapes, then the approximation will not be good. We will discuss several schemes for obtaining approximations by sums of functions of fewer variables.

There are many possible variations on this theme. For example, one could approximate a function of four variables by sums of products of functions of two variables, e.g. $f^1(w,x)\ g^1(y,z) + f^2(w,y)\ g^2(x,z) + f^3(w,z)\ g^3(x,y)$. This replaces a function of four variables by six functions of two variables. Unless one of these products can be eliminated, from the standpoint of evaluation time one is not likely to gain much, although the storage required will likely be much less. Nonetheless, the above method appears like it could be fruitful, and should be explored. The form of the approximation has the advantage that for functions of three variables it reduces to a sum of products of functions of two variables and ones of one variable.

When the approximations are evaluated, it is now much easier to use smooth approximations, since the number of variables has been decreased.

3.1 Minimax Approximation by Sums of Functions

We consider the approximation of a function $F(x^1, x^2, \ldots, x^n)$ by $\sum f^i(x^i)$ and seek to minimize $\displaystyle \sup_{(x^1, \ldots, x^n)} |F(x^1, x^2, \ldots, x^n) - \sum_i f^i(x^i)|$ over all possible functions $f^1, f^2, \ldots, f^n$. In our case we have a discrete function, so we wish to find vectors $\left(f^1_1, \ldots, f^1_{N_1}\right)^T, \ldots, \left(f^n_1, \ldots, f^n_{N_n}\right)^T$ which minimize $\displaystyle \max_{i_1, i_2, \ldots i_n} |F_{i_1, i_2, \ldots, i_n} - \sum_j f^j_{i_j}|$ over all possible $\left(f^j_1, \ldots, f^j_{n_j}\right)^T$.

An algorithm for the solution of this problem was given by Diliberto and Strauss [1] and it was analyzed, and convergence proven by Golomb [4]. A sequence of functions (vectors), $\left(f^{1,\ell}_1, \ldots, f^{1,\ell}_{n_1}\right)^T, \ldots, \left(f^{n,\ell}_1, \ldots, f^{n,\ell}_{N_n}\right)^T$,

[4]

$\ell = 0,1,\ldots,$ is constructed so that $\left(f_1^j,\ldots,f_{N_j}^j\right)^T = \lim_{\ell\to\infty}\left(f_1^{j,\ell},\ldots,f_{N_j}^{j,\ell}\right)$ is a solution to the problem. In general the solution is not unique. However, the above solution has the desirable property the maximum error for any fixed index is minimized. The algorithm can also be applied if one or more of the $X_{i_j}^j$ take on their values in multidimensional space. Hence, the algorithm could be used to calculate the best approximation to a function of six variables, $F_{i_1,i_2,i_3,i_4,i_5,i_6}$ by a sum of the form $f_{i_1}^i + f_{i_2,i_3}^{2,3} + f_{i_4,i_5,i_6}^{4,5,6}$, for example.

The algorithm is as follows. Initialize $f_{i_j}^{j,0} = 0$, $i_j = 1,\ldots,N_j$, $j = 1,\ldots,n$, and $F_{i_1,\ldots,i_n}^0 = F_{i_1,\ldots,i_n}$ for all $i_1,i_2,\ldots,i_n$. Then for $k = 0, 1,\ldots,$ set $j = (k \bmod n) + 1$ and $\ell = [k/n] + 1$, where $[\cdot]$ denotes the integer part. For $i_j = 1,2,\ldots,N_j$ let

$$\Delta f = \tfrac{1}{2}\left[\max_{\substack{1\le i_p \le N_p \\ 1\le p\le n \\ p\ne j}} F_{i_1,i_2,\ldots,i_n}^k - \min_{\substack{1\le i_p \le N_p \\ 1\le p\le n \\ p\ne j}} F_{i_1,\ldots,i_n}^k\right]$$

$F_{i_1,\ldots,i_n}^{k+1} = F_{i_1,\ldots,i_n}^k - \Delta f$ for $1 \le i_p \le N_p$, $1 \le p \le n$, $p \ne j$ and

$f_{i_j}^{j,\ell} = f_{i_j}^{j,\ell-1} + \Delta f.$

Although not analyzed by Golomb, a similar algorithm for minimax approximation by sums of functions of two variables, $f_{i_1,i_2}^{1,2} + f_{i_1,i_3}^{1,3} + \ldots + f_{i_1,i_n}^{1,n} + \ldots + f_{i_{n-1},i_n}^{n-1,n}$ has been programmed and successfully applied to many data sets. This algorithm is implemented in program MINMAX, whose use is described in the appendix.

3.2 <u>Least Squares Approximation by Sums of Function</u>

We now turn to least squares approximations. As in the previous instance we will consider fitting with sums of arbitrary functions of

fewer variables. The easiest form of least squares approximation is an analysis of variance technique outlined by Pike and Silverberg [6]. The algorithm is quite simple to apply. One sequentially fits functions of zero (a constant), one, two, etc., variables. We proceed as follows.

Let $K = \dfrac{1}{\prod\limits_{j=1}^{n} N_j} \sum\limits_{i_1=1}^{N_1} \cdots \sum\limits_{i_n=1}^{N_n} F_{i_1,\ldots,i_n}$, the mean value, and let the

residual $R^1_{i_1,\ldots,i_n} = F_{i_1,\ldots,i_n} - K$, $1 \le i_j \le N_j$, $1 \le j \le n$.

For each $j = 1,\ldots,n$, we define

$$V^j_{i_j} = \frac{1}{\prod\limits_{\substack{k=1\\k\neq j}}^{n} N_k} \sum\limits_{i_1=1}^{N_1} \cdots \sum\limits_{i_{j-1}=1}^{N_{j-1}} \sum\limits_{i_{j+1}=1}^{N_{j+1}} \cdots \sum\limits_{i_n=1}^{N_n} R^1_{i_1,\ldots,i_n} \quad \text{for } i_j = 1,\ldots,N_j.$$

That is, $V^j_{i_j}$ is the average value of $R^1_{i_1,\ldots,i_n}$ over all values with $j\underline{\text{th}}$ subscript fixed at i_j.

Then the new residual is $R^2_{i_1,\ldots,i_n} = R^1_{i_1,\ldots,i_n} - \left(V^1_{i_1} + V^2_{i_2} + \ldots + V^n_{i_n} \right)$. A sum of all possible functions of two variables is fit in exactly the same fashion, taking the value for a particular pair of subscripts to be the average of $R^2_{i_1,\ldots,i_n}$ over all values with that pair of subscripts fixed.

One desirable feature of this procedure is that the sum of the variances of the fitting functions and the residual is equal to the variance of the function itself. For example

$$\sum\limits_{i_1=1}^{N_1} \cdots \sum\limits_{i_n=1}^{N_n} \left[\left(F_{i_1 \cdots i_n} \right)^2 - \left(R^2_{i_1 \cdots i_n} \right)^2 \right] = K^2 + \sum\limits_{j=1}^{n} \left[\prod\limits_{\substack{k=1\\k\neq j}}^{n} N_k \sum\limits_{i_j=1}^{n_j} \left(V^j_{i_j} \right)^2 \right].$$

Thus one can easily see how much each component is contributing to the approximation. Those which do not make a significant contribution may be

Unfortunately there seems to be no general rule for observing data and then selecting an appropriate approximation scheme. While plots of the data may help, there is sometimes not a satisfactory answer.

Tables 1-6 give the data on which the programs were tested. Tables 7-12 give the pertinent information about the approximation: Type of approximation, maximum error, root mean square error (for least squares approximations), and the approximate evaluation time in terms of the time required for a one dimensional table look up. In determining the last number, it was assumed that an n-dimensional table look up takes $2^n - 1$ one dimensional table look ups. In cases where more than one table is used, some time will be saved since the argument processing needs to be done only once.

Data Set 1: This data represents the function
$f(w,x,y,z) = \exp\left[(w+1)^2 - x/(1+y)\right]$ on a uniform grid of 5x9x11x11 points on the unit 4-cube. This data was selected to test the programs on a set of smooth data which was not a sum of functions of fewer variables, and which behaved in a different but well behaved manner in each variable. Inspection of Table 7 shows that a quadratic fit in any of the first three variables results in a good approximation. None of the sum of functions of fewer variables is good. Use of a quadratic fit in the third variable results in the data being reduced by over 70%, with a possible increase in evaluation time, compared with four dimensional table look ups, depending on the argument processing time.

Data Set 2: This data set represents actual test data obtained from NMC. Cross-section plots for the various constant values of the second and third variables were available. Perusal of these revealed that the variation

in the first variable would probably be fit nicely by a quadratic.
However, the cross-section did not differ by only a constant, thus it
appeared a sum of functions of one variable would not give a satisfactory
approximation. This was indeed the case, as Table 8 shows. The smallest
rms error was achieved by a quadratic fit in the second variable. The
quadratic fit in the first variable was almost the same, and resulted in
the amount of data being reduced by over 85%. Evaluation might be slightly
longer than 3 dimensional table look up, depending on argument processing
time. For this data set only we also tried a linear approximation. This
revealed that the smallest rms error was for the fit in the second variable.
This would result in the amount of data being reduced by over 75% and a
slight reduction in evaluation time compared with three dimensional table
look up. It is interesting to note that in the third variable the maximum
error is smaller for a linear fit than it is for the quadratic fit.

If one wished to consider a sum of two variables approximation, it is
observed that the maximum error obtained by MINMAX was .164, while for
APPROX it was .219. Near the center of the table the errors are basically
of similar size, although MINMAX gives the minimum possible error over any
two fixed indices in this case.

Data Set 3: This data set is very similar to the previous and the same
comments apply. See Table 9 for the details.

Data Set 4: This data set also represents test data obtained from NMC.
Cross-section plots revealed it to be unlikely that any of the approximations
will be very good. The best is the quadratic approximation in the second
variable, which reduces the amount of data by two-thirds, but increases the
evaluation time slightly. None of the sum of functions approximation are
worth considering. See Table 10 for the details.

Data Set 5: The comments on this data set are basically the same as
on the previous set. See Table 11 for the details.

Data Set 6: This data also represents test data obtained from NMC. In-
spection of the data reveals that a sum of functions approximation will
probably not be very good. Table 12 verifies this. The best is a
quadratic approximation in the second variable, which reduces the amount
of data by two-thirds but increases the evaluation time slightly.

TABLE 1

$$f(w,x,y,z) \simeq \exp[(w+1)^z - x/(1+y)]$$

at the points (w_i, x_j, y_k, z_ℓ) ,

$$w_i = \frac{i}{4} \quad , \quad i = 0,\ldots,4$$

$$x_j = \frac{i}{8} \quad , \quad j = 0,\ldots,8$$

$$y_k = \frac{k}{10} \quad , \quad k = 0,\ldots,10$$

$$z_\ell = \frac{\ell}{10} \quad , \quad \ell = 0,\ldots,10$$

TABLE 2

THE 21 VALUES OF THE 1TH VARIABLE FOLLOW

```
0.0        2.00E 00   4.00E 00   6.00E 00   8.00E 00
1.00E 01   1.20E 01   1.40E 01   1.60E 01   1.80E 01
2.00E 01   2.20E 01   2.40E 01   2.60E 01   2.80E 01
3.00E 01   3.20E 01   3.40E 01   3.60E 01   3.80E 01
4.00E 01
```

THE 9 VALUES OF THE 2TH VARIABLE FOLLOW

```
 2.00E 01  1.60E 01   1.20E 01   8.00E 00   0.0
-8.00E 00 -1.20E 01  -1.60E 01  -2.00E 01
```

THE 8 VALUES OF THE 3TH VARIABLE FOLLOW

```
1.30E 00   1.60E 00   2.00E 00   2.30E 00   2.60E 00
3.00E 00   4.00E 00   4.60E 00
```

I2	I3	I4	I5	I1=1	I1=2	ETC.		
1	1	1	1	8.60E-01	9.90E-01	1.13E 00	1.29E 00	1.45E 00
				1.63E 00	1.81E 00	2.00E 00	2.18E 00	2.36E 00
				2.53E 00	2.71E 00	2.87E 00	3.06E 00	3.23E 00
				3.41E 00	3.57E 00	3.75E 00	3.93E 00	4.11E 00
				4.26E 00				
2	1	1	1	7.90E-01	9.30E-01	1.08E 00	1.23E 00	1.40E 00
				1.59E 00	1.76E 00	1.95E 00	2.13E 00	2.32E 00
				2.49E 00	2.67E 00	2.85E 00	3.02E 00	3.19E 00
				3.36E 00	3.55E 00	3.75E 00	3.93E 00	4.10E 00
				4.26E 00				
3	1	1	1	5.50E-01	7.30E-01	9.30E-01	1.14E 00	1.34E 00
				1.53E 00	1.71E 00	1.90E 00	2.09E 00	2.26E 00
				2.44E 00	2.61E 00	2.79E 00	2.96E 00	3.15E 00
				3.31E 00	3.50E 00	3.69E 00	3.87E 00	4.04E 00
				4.22E 00				
4	1	1	1	4.00E-01	6.20E-01	8.20E-01	1.05E 00	1.24E 00
				1.44E 00	1.64E 00	1.81E 00	2.00E 00	2.18E 00
				2.36E 00	2.55E 00	2.73E 00	2.89E 00	3.05E 00
				3.22E 00	3.39E 00	3.56E 00	3.78E 00	3.98E 00
				4.18E 00				
5	1	1	1	0.0	2.20E-01	4.40E-01	6.80E-01	9.10E-01
				1.13E 00	1.35E 00	1.57E 00	1.78E 00	1.98E 00
				2.18E 00	2.38E 00	2.58E 00	2.80E 00	2.99E 00
				3.20E 00	3.41E 00	3.62E 00	3.82E 00	4.00E 00
				4.17E 00				
6	1	1	1	-4.00E-01	-2.30E-01	-4.00E-02	1.60E-01	3.80E-01
				6.20E-01	8.40E-01	1.06E 00	1.28E 00	1.50E 00
				1.72E 00	1.96E 00	2.17E 00	2.40E 00	2.63E 00
				2.87E 00	3.08E 00	3.32E 00	3.55E 00	3.77E 00
				3.99E 00				
7	1	1	1	-5.60E-01	-4.10E-01	-2.30E-01	-3.00E-02	1.80E-01
				4.00E-01	6.30E-01	8.50E-01	1.07E 00	1.28E 00
				1.50E 00	1.73E 00	1.97E 00	2.20E 00	2.44E 00
				2.68E 00	2.91E 00	3.15E 00	3.39E 00	3.61E 00
				3.85E 00				
8	1	1	1	-7.80E-01	-6.20E-01	-4.60E-01	-2.80E-01	-9.00E-02
				1.20E-01	3.50E-01	5.90E-01	8.10E-01	1.03E 00
				1.25E 00	1.49E 00	1.72E 00	1.96E 00	2.20E 00
				2.47E 00	2.72E 00	2.97E 00	3.21E 00	3.44E 00
				3.68E 00				
9	1	1	1	-8.80E-01	-7.50E-01	-5.90E-01	-4.20E-01	-2.60E-01
				-5.00E-02	1.30E-01	3.40E-01	5.50E-01	7.70E-01
				9.80E-01	1.20E 00	1.44E 00	1.67E 00	1.91E 00
				2.15E 00	2.40E 00	2.67E 00	2.92E 00	3.17E 00
				3.44E 00				
1	2	1	1	8.50E-01	9.80E-01	1.13E 00	1.28E 00	1.44E 00
				1.60E 00	1.77E 00	1.95E 00	2.11E 00	2.29E 00
				2.48E 00	2.65E 00	2.81E 00	2.99E 00	3.17E 00
				3.35E 00	3.52E 00	3.70E 00	3.88E 00	4.06E 00
				4.25E 00				

TABLE 2 CONTINUED

```
2  2  1  1   7.20E-01   8.70E-01   1.03E 00   1.21E 00   1.37E 00
             1.54E 00   1.71E 00   1.87E 00   2.04E 00   2.21E 00
             2.39E 00   2.55E 00   2.73E 00   2.91E 00   3.10E 00
             3.28E 00   3.47E 00   3.65E 00   3.84E 00   4.02E 00
             4.20E 00
3  2  1  1   5.60E-01   7.20E-01   9.00E-01   1.08E 00   1.26E 00
             1.45E 00   1.63E 00   1.81E 00   2.00E 00   2.18E 00
             2.36E 00   2.54E 00   2.73E 00   2.93E 00   3.09E 00
             3.28E 00   3.47E 00   3.66E 00   3.84E 00   4.01E 00
             4.19E 00
4  2  1  1   4.20E-01   5.80E-01   7.70E-01   9.50E-01   1.13E 00
             1.32E 00   1.50E 00   1.70E 00   1.89E 00   2.08E 00
             2.27E 00   2.47E 00   2.66E 00   2.85E 00   3.05E 00
             3.24E 00   3.43E 00   3.63E 00   3.82E 00   3.99E 00
             4.17E 00
5  2  1  1   0.0        1.80E-01   3.80E-01   5.90E-01   8.00E-01
             1.01E 00   1.22E 00   1.44E 00   1.65E 00   1.87E 00
             2.09E 00   2.29E 00   2.50E 00   2.72E 00   2.95E 00
             3.16E 00   3.37E 00   3.56E 00   3.75E 00   3.93E 00
             4.11E 00
6  2  1  1  -4.20E-01  -2.80E-01  -1.10E-01   8.00E-02   2.90E-01
             5.10E-01   7.40E-01   9.80E-01   1.20E 00   1.44E 00
             1.66E 00   1.88E 00   2.11E 00   2.34E 00   2.59E 00
             2.83E 00   3.07E 00   3.29E 00   3.52E 00   3.74E 00
             3.94E 00
7  2  1  1  -5.70E-01  -4.10E-01  -2.30E-01  -2.00E-02   1.70E-01
             3.80E-01   6.00E-01   8.20E-01   1.05E 00   1.29E 00
             1.49E 00   1.73E 00   1.96E 00   2.20E 00   2.44E 00
             2.68E 00   2.91E 00   3.14E 00   3.37E 00   3.58E 00
             3.79E 00
8  2  1  1  -7.50E-01  -5.70E-01  -4.00E-01  -2.30E-01  -4.00E-02
             1.50E-01   3.70E-01   5.70E-01   8.00E-01   1.03E 00
             1.27E 00   1.49E 00   1.74E 00   1.97E 00   2.20E 00
             2.45E 00   2.69E 00   2.92E 00   3.14E 00   3.36E 00
             3.55E 00
9  2  1  1  -8.60E-01  -7.10E-01  -5.70E-01  -4.10E-01  -2.10E-01
            -1.00E-02   1.90E-01   3.90E-01   6.10E-01   8.30E-01
             1.06E 00   1.28E 00   1.50E 00   1.73E 00   1.97E 00
             2.20E 00   2.45E 00   2.69E 00   2.92E 00   3.15E 00
             3.36E 00
1  3  1  1   8.10E-01   9.40E-01   1.09E 00   1.24E 00   1.39E 00
             1.55E 00   1.70E 00   1.87E 00   2.04E 00   2.19E 00
             2.37E 00   2.55E 00   2.73E 00   2.92E 00   3.12E 00
             3.35E 00   3.56E 00   3.78E 00   4.00E 00   4.22E 00
             4.41E 00
2  3  1  1   6.60E-01   7.90E-01   9.20E-01   1.08E 00   1.24E 00
             1.41E 00   1.59E 00   1.77E 00   1.95E 00   2.12E 00
             2.30E 00   2.49E 00   2.68E 00   2.89E 00   3.09E 00
             3.31E 00   3.52E 00   3.73E 00   3.94E 00   4.15E 00
             4.38E 00
3  3  1  1   5.30E-01   6.60E-01   8.10E-01   9.80E-01   1.14E 00
             1.31E 00   1.47E 00   1.62E 00   1.80E 00   1.99E 00
             2.18E 00   2.37E 00   2.57E 00   2.80E 00   3.02E 00
             3.24E 00   3.47E 00   3.68E 00   3.91E 00   4.14E 00
             4.37E 00
4  3  1  1   3.70E-01   5.00E-01   6.60E-01   8.20E-01   9.90E-01
             1.17E 00   1.35E 00   1.53E 00   1.70E 00   1.87E 00
             2.06E 00   2.27E 00   2.46E 00   2.69E 00   2.90E 00
             3.11E 00   3.35E 00   3.58E 00   3.81E 00   4.05E 00
             4.29E 00
5  3  1  1   0.0        1.60E-01   3.30E-01   4.90E-01   6.80E-01
             8.60E-01   1.04E 00   1.23E 00   1.42E 00   1.62E 00
             1.83E 00   2.04E 00   2.25E 00   2.48E 00   2.71E 00
             2.94E 00   3.17E 00   3.41E 00   3.65E 00   3.89E 00
             4.13E 00
6  3  1  1  -3.70E-01  -1.90E-01  -1.00E-02   1.50E-01   3.10E-01
             5.00E-01   6.70E-01   8.60E-01   1.05E 00   1.24E 00
             1.44E 00   1.66E 00   1.89E 00   2.11E 00   2.34E 00
             2.59E 00   2.83E 00   3.07E 00   3.33E 00   3.57E 00
             3.83E 00
```

TABLE 2 CONTINUED

7	3	1	1	-5.10E-01	-3.30E-01	-1.70E-01	-1.00E-02	1.60E-01
				3.40E-01	5.10E-01	7.00E-01	8.90E-01	1.08E 00
				1.28E 00	1.50E 00	1.73E 00	1.95E 00	2.19E 00
				2.44E 00	2.69E 00	2.93E 00	3.18E 00	3.43E 00
				3.70E 00				
8	3	1	1	-6.60E-01	-4.90E-01	-3.20E-01	-1.70E-01	0.0
				1.80E-01	3.60E-01	5.60E-01	7.50E-01	9.60E-01
				1.17E 00	1.40E 00	1.63E 00	1.85E 00	2.09E 00
				2.34E 00	2.59E 00	2.83E 00	3.08E 00	3.34E 00
				3.59E 00				
9	3	1	1	-8.00E-01	-6.40E-01	-4.90E-01	-3.30E-01	-1.70E-01
				1.00E-02	2.00E-01	4.00E-01	5.90E-01	8.00E-01
				1.01E 00	1.23E 00	1.46E 00	1.69E 00	1.94E 00
				2.18E 00	2.43E 00	2.69E 00	2.96E 00	3.21E 00
				3.47E 00				
1	4	1	1	7.40E-01	8.70E-01	9.90E-01	1.14E 00	1.29E 00
				1.45E 00	1.61E 00	1.77E 00	1.93E 00	2.11E 00
				2.27E 00	2.45E 00	2.63E 00	2.84E 00	3.03E 00
				3.25E 00	3.47E 00	3.69E 00	3.91E 00	4.13E 00
				4.35E 00				
2	4	1	1	6.10E-01	7.30E-01	8.50E-01	1.01E 00	1.14E 00
				1.30E 00	1.45E 00	1.61E 00	1.79E 00	1.96E 00
				2.14E 00	2.31E 00	2.53E 00	2.75E 00	2.98E 00
				3.20E 00	3.43E 00	3.65E 00	3.88E 00	4.10E 00
				4.32E 00				
3	4	1	1	4.60E-01	5.80E-01	7.20E-01	8.60E-01	1.01E 00
				1.17E 00	1.34E 00	1.51E 00	1.69E 00	1.85E 00
				2.03E 00	2.22E 00	2.43E 00	2.65E 00	2.89E 00
				3.13E 00	3.38E 00	3.60E 00	3.83E 00	4.04E 00
				4.26E 00				
4	4	1	1	3.10E-01	4.20E-01	5.70E-01	7.10E-01	8.60E-01
				1.03E 00	1.20E 00	1.37E 00	1.55E 00	1.73E 00
				1.92E 00	2.13E 00	2.34E 00	2.57E 00	2.80E 00
				3.05E 00	3.29E 00	3.53E 00	3.77E 00	3.99E 00
				4.22E 00				
5	4	1	1	0.0	1.20E-01	2.70E-01	4.20E-01	5.70E-01
				7.40E-01	9.20E-01	1.09E 00	1.26E 00	1.44E 00
				1.63E 00	1.84E 00	2.06E 00	2.31E 00	2.54E 00
				2.80E 00	3.07E 00	3.34E 00	3.59E 00	3.85E 00
				4.10E 00				
6	4	1	1	-3.10E-01	-1.80E-01	-4.00E-02	1.20E-01	2.80E-01
				4.50E-01	6.00E-01	7.70E-01	9.40E-01	1.13E 00
				1.32E 00	1.51E 00	1.73E 00	1.96E 00	2.19E 00
				2.45E 00	2.72E 00	2.99E 00	3.26E 00	3.53E 00
				3.79E 00				
7	4	1	1	-4.70E-01	-3.30E-01	-1.90E-01	-3.00E-02	1.20E-01
				2.80E-01	4.60E-01	6.30E-01	8.10E-01	9.90E-01
				1.17E 00	1.37E 00	1.59E 00	1.83E 00	2.06E 00
				2.32E 00	2.59E 00	2.84E 00	3.10E 00	3.37E 00
				3.62E 00				
8	4	1	1	-6.10E-01	-4.80E-01	-3.30E-01	-1.70E-01	0.0
				1.60E-01	3.20E-01	5.00E-01	6.80E-01	8.60E-01
				1.06E 00	1.29E 00	1.49E 00	1.71E 00	1.94E 00
				2.18E 00	2.44E 00	2.70E 00	2.96E 00	3.22E 00
				3.48E 00				
9	4	1	1	-7.60E-01	-6.30E-01	-4.80E-01	-3.10E-01	-1.50E-01
				0.0	1.80E-01	3.50E-01	5.30E-01	7.20E-01
				9.20E-01	1.12E 00	1.32E 00	1.56E 00	1.79E 00
				2.04E 00	2.28E 00	2.52E 00	2.78E 00	3.04E 00
				3.32E 00				
1	5	1	1	6.60E-01	7.90E-01	9.10E-01	1.05E 00	1.19E 00
				1.33E 00	1.48E 00	1.64E 00	1.81E 00	1.98E 00
				2.16E 00	2.35E 00	2.55E 00	2.75E 00	2.96E 00
				3.19E 00	3.40E 00	3.65E 00	3.89E 00	4.14E 00
				4.40E 00				
2	5	1	1	5.20E-01	6.40E-01	7.90E-01	9.20E-01	1.06E 00
				1.22E 00	1.38E 00	1.54E 00	1.71E 00	1.89E 00
				2.06E 00	2.25E 00	2.46E 00	2.65E 00	2.86E 00
				3.08E 00	3.30E 00	3.54E 00	3.77E 00	4.03E 00
				4.28E 00				

TABLE 2 CONTINUED

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3  5  1  1   3.80E-01    5.20E-01    6.50E-01    7.90E-01    9.30E-01
             1.07E 00    1.22E 00    1.38E 00    1.54E 00    1.72E 00
             1.90E 00    2.09E 00    2.29E 00    2.52E 00    2.77E 00
             3.00E 00    3.24E 00    3.47E 00    3.70E 00    3.92E 00
             4.15E 00
4  5  1  1   2.60E-01    3.90E-01    5.40E-01    6.50E-01    7.90E-01
             9.20E-01    1.09E 00    1.24E 00    1.41E 00    1.60E 00
             1.77E 00    1.96E 00    2.16E 00    2.38E 00    2.60E 00
             2.87E 00    3.11E 00    3.34E 00    3.57E 00    3.78E 00
             3.97E 00
5  5  1  1   0.0         1.20E-01    2.40E-01    3.60E-01    5.20E-01
             6.60E-01    8.20E-01    9.70E-01    1.14E 00    1.32E 00
             1.50E 00    1.69E 00    1.89E 00    2.10E 00    2.31E 00
             2.55E 00    2.78E 00    3.03E 00    3.29E 00    3.56E 00
             3.84E 00
6  5  1  1  -2.70E-01   -1.50E-01   -3.00E-02    1.20E-01    2.60E-01
             4.10E-01    5.70E-01    7.30E-01    8.90E-01    1.07E 00
             1.25E 00    1.44E 00    1.63E 00    1.83E 00    2.04E 00
             2.28E 00    2.52E 00    2.76E 00    3.01E 00    3.28E 00
             3.56E 00
7  5  1  1  -4.00E-01   -2.80E-01   -1.60E-01   -2.00E-02    1.30E-01
             2.70E-01    4.30E-01    5.80E-01    7.60E-01    9.40E-01
             1.11E 00    1.30E 00    1.49E 00    1.70E 00    1.91E 00
             2.14E 00    2.38E 00    2.62E 00    2.88E 00    3.14E 00
             3.40E 00
8  5  1  1  -5.10E-01   -4.00E-01   -2.70E-01   -1.40E-01    1.00E-02
             1.60E-01    3.10E-01    4.80E-01    6.40E-01    8.20E-01
             1.00E 00    1.19E 00    1.37E 00    1.58E 00    1.79E 00
             2.00E 00    2.23E 00    2.47E 00    2.71E 00    2.96E 00
             3.20E 00
9  5  1  1  -6.70E-01   -5.40E-01   -4.20E-01   -2.80E-01   -1.40E-01
             1.00E-02    1.70E-01    3.30E-01    5.30E-01    6.70E-01
             8.50E-01    1.04E 00    1.22E 00    1.42E 00    1.63E 00
             1.85E 00    2.07E 00    2.30E 00    2.55E 00    2.79E 00
             3.06E 00
1  6  1  1   6.20E-01    7.30E-01    8.40E-01    9.70E-01    1.08E 00
             1.21E 00    1.35E 00    1.49E 00    1.66E 00    1.84E 00
             2.03E 00    2.25E 00    2.46E 00    2.64E 00    2.83E 00
             3.01E 00    3.18E 00    3.35E 00    3.52E 00    3.70E 00
             3.89E 00
2  6  1  1   4.90E-01    5.90E-01    7.00E-01    8.30E-01    9.50E-01
             1.09E 00    1.24E 00    1.38E 00    1.53E 00    1.71E 00
             1.89E 00    2.08E 00    2.29E 00    2.51E 00    2.73E 00
             2.94E 00    3.14E 00    3.31E 00    3.49E 00    3.67E 00
             3.88E 00
3  6  1  1   3.50E-01    4.60E-01    5.70E-01    7.00E-01    8.30E-01
             9.50E-01    1.08E 00    1.23E 00    1.38E 00    1.57E 00
             1.74E 00    1.94E 00    2.14E 00    2.37E 00    2.60E 00
             2.84E 00    3.06E 00    3.28E 00    3.48E 00    3.69E 00
             3.89E 00
4  6  1  1   2.50E-01    3.50E-01    4.60E-01    5.80E-01    7.00E-01
             8.40E-01    9.80E-01    1.14E 00    1.29E 00    1.45E 00
             1.61E 00    1.80E 00    1.99E 00    2.19E 00    2.43E 00
             2.68E 00    2.91E 00    3.14E 00    3.36E 00    3.56E 00
             3.77E 00
5  6  1  1   0.0         1.00E-01    2.10E-01    3.30E-01    4.60E-01
             5.90E-01    7.10E-01    8.40E-01    1.00E 00    1.17E 00
             1.34E 00    1.53E 00    1.72E 00    1.92E 00    2.13E 00
             2.35E 00    2.58E 00    2.83E 00    3.08E 00    3.32E 00
             3.58E 00
6  6  1  1  -2.50E-01   -1.40E-01   -2.00E-02    1.10E-01    2.40E-01
             3.70E-01    5.20E-01    6.70E-01    8.30E-01    9.80E-01
             1.15E 00    1.33E 00    1.50E 00    1.70E 00    1.89E 00
             2.10E 00    2.31E 00    2.54E 00    2.79E 00    3.03E 00
             3.27E 00
7  6  1  1  -3.70E-01   -2.60E-01   -1.40E-01   -1.00E-02    1.20E-01
             2.60E-01    4.00E-01    5.50E-01    6.90E-01    8.60E-01
             1.01E 00    1.18E 00    1.37E 00    1.55E 00    1.76E 00
             1.95E 00    2.18E 00    2.39E 00    2.64E 00    2.91E 00
             3.18E 00
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TABLE 2 CONTINUED

8	6	1	1	-4.80E-01	-3.70E-01	-2.50E-01	-1.30E-01	0.0
				1.30E-01	2.80E-01	4.20E-01	5.80E-01	7.40E-01
				9.00E-01	1.07E 00	1.25E 00	1.44E 00	1.65E 00
				1.87E 00	2.09E 00	2.31E 00	2.53E 00	2.74E 00
				2.95E 00				
9	6	1	1	-6.20E-01	-5.00E-01	-3.80E-01	-2.50E-01	-1.10E-01
				2.00E-02	1.60E-01	3.10E-01	4.60E-01	6.00E-01
				7.60E-01	9.30E-01	1.11E 00	1.30E 00	1.50E 00
				1.71E 00	1.92E 00	2.15E 00	2.35E 00	2.58E 00
				2.79E 00				
1	7	1	1	5.70E-01	6.50E-01	7.60E-01	8.70E-01	9.90E-01
				1.13E 00	1.27E 00	1.45E 00	1.64E 00	1.84E 00
				2.06E 00	2.27E 00	2.47E 00	2.66E 00	2.85E 00
				3.03E 00	3.21E 00	3.37E 00	3.53E 00	3.68E 00
				3.84E 00				
2	7	1	1	4.70E-01	5.70E-01	6.90E-01	8.00E-01	9.20E-01
				1.04E 00	1.16E 00	1.30E 00	1.47E 00	1.65E 00
				1.86E 00	2.10E 00	2.30E 00	2.54E 00	2.73E 00
				2.92E 00	3.11E 00	3.30E 00	3.48E 00	3.66E 00
				3.84E 00				
3	7	1	1	3.50E-01	4.40E-01	5.50E-01	6.60E-01	7.60E-01
				8.90E-01	1.02E 00	1.15E 00	1.31E 00	1.47E 00
				1.65E 00	1.86E 00	2.06E 00	2.27E 00	2.48E 00
				2.71E 00	2.93E 00	3.14E 00	3.37E 00	3.61E 00
				3.84E 00				
4	7	1	1	2.10E-01	3.10E-01	4.10E-01	5.20E-01	6.30E-01
				7.50E-01	8.70E-01	1.01E 00	1.14E 00	1.31E 00
				1.47E 00	1.66E 00	1.91E 00	2.13E 00	2.35E 00
				2.57E 00	2.81E 00	3.05E 00	3.29E 00	3.56E 00
				3.84E 00				
5	7	1	1	0.0	8.00E-02	1.80E-01	2.80E-01	4.00E-01
				5.10E-01	6.30E-01	7.50E-01	8.90E-01	1.03E 00
				1.19E 00	1.35E 00	1.53E 00	1.73E 00	1.94E 00
				2.17E 00	2.40E 00	2.65E 00	2.93E 00	3.22E 00
				3.52E 00				
6	7	1	1	-1.90E-01	-9.00E-02	1.00E-02	1.20E-01	2.30E-01
				3.40E-01	4.60E-01	5.90E-01	7.30E-01	8.70E-01
				1.02E 00	1.17E 00	1.35E 00	1.53E 00	1.73E 00
				1.93E 00	2.15E 00	2.36E 00	2.58E 00	2.83E 00
				3.08E 00				
7	7	1	1	-3.00E-01	-2.00E-01	-1.00E-01	1.00E-02	1.20E-01
				2.40E-01	3.70E-01	5.00E-01	6.40E-01	7.90E-01
				9.30E-01	1.09E 00	1.25E 00	1.42E 00	1.62E 00
				1.81E 00	2.03E 00	2.24E 00	2.46E 00	2.70E 00
				2.93E 00				
8	7	1	1	-4.10E-01	-3.00E-01	-1.90E-01	-1.00E-01	2.00E-02
				1.40E-01	2.70E-01	3.90E-01	5.30E-01	6.70E-01
				8.20E-01	9.70E-01	1.14E 00	1.32E 00	1.51E 00
				1.70E 00	1.92E 00	2.13E 00	2.35E 00	2.58E 00
				2.81E 00				
9	7	1	1	-5.20E-01	-4.30E-01	-3.30E-01	-2.30E-01	-1.10E-01
				1.00E-02	1.20E-01	2.60E-01	4.00E-01	5.50E-01
				7.00E-01	8.60E-01	1.03E 00	1.20E 00	1.40E 00
				1.59E 00	1.78E 00	1.99E 00	2.20E 00	2.41E 00
				2.64E 00				
1	8	1	1	5.20E-01	6.20E-01	7.00E-01	8.10E-01	9.40E-01
				1.08E 00	1.22E 00	1.39E 00	1.57E 00	1.75E 00
				1.96E 00	2.18E 00	2.40E 00	2.59E 00	2.81E 00
				3.00E 00	3.19E 00	3.37E 00	3.56E 00	3.71E 00
				3.86E 00				
2	8	1	1	3.90E-01	5.00E-01	6.10E-01	7.30E-01	8.30E-01
				9.60E-01	1.10E 00	1.24E 00	1.40E 00	1.57E 00
				1.76E 00	1.97E 00	2.19E 00	2.42E 00	2.64E 00
				2.86E 00	3.06E 00	3.27E 00	3.47E 00	3.67E 00
				3.86E 00				
3	8	1	1	2.70E-01	3.60E-01	4.60E-01	5.60E-01	6.80E-01
				8.10E-01	9.40E-01	1.09E 00	1.24E 00	1.40E 00
				1.58E 00	1.78E 00	1.97E 00	2.19E 00	2.41E 00
				2.65E 00	2.89E 00	3.13E 00	3.36E 00	3.59E 00
				3.80E 00				

TABLE 2 CONTINUED

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4  8  1  1   1.90E-01   2.90E-01   3.80E-01   4.50E-01   6.10E-01
             7.20E-01   8.50E-01   9.80E-01   1.12E 00   1.28E 00
             1.45E 00   1.62E 00   1.82E 00   2.03E 00   2.25E 00
             2.48E 00   2.71E 00   2.95E 00   3.21E 00   3.49E 00
             3.80E 00
5  8  1  1   0.0        8.00E-02   1.70E-01   2.70E-01   3.90E-01
             5.00E-01   6.30E-01   7.70E-01   9.10E-01   1.05E 00
             1.20E 00   1.37E 00   1.54E 00   1.72E 00   1.92E 00
             2.16E 00   2.39E 00   2.65E 00   2.92E 00   3.21E 00
             3.53E 00
6  8  1  1  -1.80E-01  -9.00E-02   2.00E-02   1.20E-01   2.40E-01
             3.60E-01   4.90E-01   6.30E-01   7.70E-01   9.00E-01
             1.03E 00   1.18E 00   1.36E 00   1.56E 00   1.76E 00
             1.96E 00   2.18E 00   2.42E 00   2.66E 00   2.91E 00
             3.18E 00
7  8  1  1  -2.70E-01  -1.60E-01  -6.00E-02   5.00E-02   1.50E-01
             2.60E-01   4.00E-01   5.30E-01   6.60E-01   7.90E-01
             9.30E-01   1.08E 00   1.26E 00   1.45E 00   1.66E 00
             1.87E 00   2.08E 00   2.30E 00   2.53E 00   2.77E 00
             3.00E 00
8  8  1  1  -3.80E-01  -2.80E-01  -1.90E-01  -9.00E-02   3.00E-02
             1.40E-01   2.80E-01   4.30E-01   5.70E-01   7.10E-01
             8.40E-01   1.00E 00   1.17E 00   1.36E 00   1.55E 00
             1.76E 00   1.95E 00   2.18E 00   2.40E 00   2.65E 00
             2.89E 00
9  8  1  1  -5.00E-01  -4.20E-01  -3.10E-01  -2.10E-01  -9.00E-02
             4.00E-02   1.80E-01   3.10E-01   4.60E-01   6.00E-01
             7.30E-01   8.70E-01   1.03E 00   1.20E 00   1.38E 00
             1.59E 00   1.79E 00   2.01E 00   2.23E 00   2.47E 00
             2.70E 00
```

TABLE 3

THE 21 VALUES OF THE 1TH VARIABLE FOLLOW

0.0	2.00E 00	4.00E 00	6.00E 00	8.00E 00
1.00E 01	1.20E 01	1.40E 01	1.60E 01	1.80E 01
2.00E 01	2.20E 01	2.40E 01	2.60E 01	2.80E 01
3.00E 01	3.20E 01	3.40E 01	3.60E 01	3.80E 01
4.00E 01				

THE 9 VALUES OF THE 2TH VARIABLE FOLLOW

2.00E 01	1.60E 01	1.20E 01	8.00E 00	0.0
-8.00E 00	-1.20E 01	-1.60E 01	-2.00E 01	

THE 8 VALUES OF THE 3TH VARIABLE FOLLOW

1.30E 00	1.60E 00	2.00E 00	2.30E 00	2.60E 00
3.00E 00	4.00E 00	4.60E 00		

I2	I3	I4	I5	I1=1	I1=2	ETC.		
1	1	1	1	6.40E-01	7.90E-01	9.60E-01	1.10E 00	1.29E 00
				1.46E 00	1.64E 00	1.84E 00	2.03E 00	2.22E 00
				2.42E 00	2.63E 00	2.83E 00	3.05E 00	3.28E 00
				3.49E 00	3.72E 00	3.94E 00	4.18E 00	4.42E 00
				4.64E 00				
2	1	1	1	5.70E-01	7.40E-01	9.10E-01	1.10E 00	1.29E 00
				1.47E 00	1.63E 00	1.83E 00	2.01E 00	2.22E 00
				2.42E 00	2.63E 00	2.83E 00	3.05E 00	3.28E 00
				3.50E 00	3.73E 00	3.95E 00	4.18E 00	4.41E 00
				4.64E 00				
3	1	1	1	4.70E-01	6.60E-01	8.60E-01	1.05E 00	1.24E 00
				1.44E 00	1.63E 00	1.83E 00	2.02E 00	2.22E 00
				2.42E 00	2.63E 00	2.85E 00	3.05E 00	3.27E 00
				3.50E 00	3.72E 00	3.95E 00	4.19E 00	4.43E 00
				4.64E 00				
4	1	1	1	3.10E-01	5.20E-01	7.20E-01	9.40E-01	1.15E 00
				1.36E 00	1.56E 00	1.76E 00	1.95E 00	2.15E 00
				2.35E 00	2.55E 00	2.76E 00	2.96E 00	3.15E 00
				3.36E 00	3.58E 00	3.82E 00	4.05E 00	4.31E 00
				4.57E 00				
5	1	1	1	0.0	2.10E-01	4.50E-01	6.80E-01	9.00E-01
				1.12E 00	1.35E 00	1.58E 00	1.79E 00	2.01E 00
				2.23E 00	2.46E 00	2.69E 00	2.91E 00	3.13E 00
				3.36E 00	3.59E 00	3.81E 00	4.05E 00	4.27E 00
				4.48E 00				
6	1	1	1	-3.10E-01	-1.00E-01	1.10E-01	3.30E-01	5.60E-01
				7.80E-01	1.00E 00	1.23E 00	1.46E 00	1.69E 00
				1.92E 00	2.15E 00	2.39E 00	2.63E 00	2.88E 00
				3.13E 00	3.36E 00	3.61E 00	3.85E 00	4.09E 00
				4.34E 00				
7	1	1	1	-4.60E-01	-2.70E-01	-7.00E-02	1.30E-01	3.50E-01
				5.70E-01	7.90E-01	1.00E 00	1.25E 00	1.48E 00
				1.71E 00	1.96E 00	2.19E 00	2.43E 00	2.68E 00
				2.92E 00	3.16E 00	3.42E 00	3.66E 00	3.92E 00
				4.18E 00				
8	1	1	1	-5.50E-01	-3.80E-01	-1.80E-01	1.00E-02	2.00E-01
				4.10E-01	6.20E-01	8.50E-01	1.07E 00	1.32E 00
				1.55E 00	1.80E 00	2.05E 00	2.29E 00	2.54E 00
				2.79E 00	3.03E 00	3.26E 00	3.54E 00	3.78E 00
				4.05E 00				
9	1	1	1	-6.50E-01	-4.50E-01	-2.60E-01	-7.00E-02	1.20E-01
				3.40E-01	5.50E-01	7.70E-01	1.00E 00	1.22E 00
				1.46E 00	1.69E 00	1.93E 00	2.17E 00	2.41E 00
				2.66E 00	2.90E 00	3.16E 00	3.40E 00	3.65E 00
				3.91E 00				
1	2	1	1	5.40E-01	7.30E-01	9.30E-01	1.12E 00	1.28E 00
				1.45E 00	1.62E 00	1.78E 00	1.94E 00	2.12E 00
				2.30E 00	2.49E 00	2.69E 00	2.91E 00	3.14E 00
				3.37E 00	3.62E 00	3.86E 00	4.12E 00	4.37E 00
				4.65E 00				

TABLE 3 CONTINUED

2	2	1	1	5.10E-01	6.80E-01	8.50E-01	1.03E 00	1.21E 00
				1.38E 00	1.55E 00	1.73E 00	1.91E 00	2.08E 00
				2.28E 00	2.48E 00	2.68E 00	2.91E 00	3.13E 00
				3.37E 00	3.61E 00	3.87E 00	4.13E 00	4.38E 00
				4.65E 00				
3	2	1	1	3.90E-01	5.70E-01	7.50E-01	9.10E-01	1.09E 00
				1.28E 00	1.46E 00	1.67E 00	1.85E 00	2.04E 00
				2.25E 00	2.47E 00	2.69E 00	2.91E 00	3.14E 00
				3.37E 00	3.62E 00	3.87E 00	4.14E 00	4.38E 00
				4.65E 00				
4	2	1	1	2.60E-01	4.40E-01	6.60E-01	8.40E-01	1.04E 00
				1.22E 00	1.42E 00	1.60E 00	1.77E 00	1.95E 00
				2.16E 00	2.38E 00	2.60E 00	2.83E 00	3.06E 00
				3.30E 00	3.55E 00	3.81E 00	4.07E 00	4.34E 00
				4.60E 00				
5	2	1	1	-3.00E-02	1.80E-01	3.90E-01	5.90E-01	7.80E-01
				9.80E-01	1.18E 00	1.38E 00	1.59E 00	1.80E 00
				2.03E 00	2.24E 00	2.47E 00	2.72E 00	2.96E 00
				3.21E 00	3.46E 00	3.73E 00	3.99E 00	4.26E 00
				4.53E 00				
6	2	1	1	-3.10E-01	-1.30E-01	7.00E-02	2.70E-01	4.70E-01
				6.70E-01	9.00E-01	1.12E 00	1.34E 00	1.58E 00
				1.81E 00	2.04E 00	2.27E 00	2.52E 00	2.75E 00
				2.99E 00	3.25E 00	3.49E 00	3.74E 00	4.00E 00
				4.26E 00				
7	2	1	1	-4.20E-01	-2.50E-01	-8.00E-02	1.10E-01	3.00E-01
				5.20E-01	7.30E-01	9.40E-01	1.17E 00	1.40E 00
				1.62E 00	1.87E 00	2.10E 00	2.35E 00	2.59E 00
				2.84E 00	3.10E 00	3.33E 00	3.61E 00	3.86E 00
				4.12E 00				
8	2	1	1	-5.40E-01	-3.60E-01	-1.90E-01	0.0	1.70E-01
				3.80E-01	5.90E-01	8.00E-01	1.03E 00	1.26E 00
				1.49E 00	1.73E 00	1.97E 00	2.23E 00	2.45E 00
				2.72E 00	2.95E 00	3.23E 00	3.48E 00	3.74E 00
				4.01E 00				
9	2	1	1	-5.60E-01	-4.10E-01	-2.60E-01	-9.00E-02	7.00E-02
				2.60E-01	4.40E-01	6.60E-01	8.70E-01	1.10E 00
				1.31E 00	1.57E 00	1.82E 00	2.06E 00	2.31E 00
				2.56E 00	2.83E 00	3.08E 00	3.35E 00	3.63E 00
				3.90E 00				
1	3	1	1	5.40E-01	6.70E-01	8.10E-01	9.50E-01	1.12E 00
				1.28E 00	1.42E 00	1.61E 00	1.80E 00	1.97E 00
				2.18E 00	2.38E 00	2.58E 00	2.80E 00	3.02E 00
				3.27E 00	3.54E 00	3.79E 00	4.04E 00	4.30E 00
				4.55E 00				
2	3	1	1	4.50E-01	5.90E-01	7.40E-01	8.80E-01	1.04E 00
				1.20E 00	1.36E 00	1.55E 00	1.73E 00	1.92E 00
				2.11E 00	2.33E 00	2.54E 00	2.75E 00	2.98E 00
				3.22E 00	3.47E 00	3.74E 00	4.01E 00	4.25E 00
				4.52E 00				
3	3	1	1	3.40E-01	4.80E-01	6.20E-01	7.70E-01	9.40E-01
				1.11E 00	1.29E 00	1.47E 00	1.64E 00	1.84E 00
				2.04E 00	2.24E 00	2.46E 00	2.68E 00	2.92E 00
				3.15E 00	3.41E 00	3.67E 00	3.94E 00	4.20E 00
				4.44E 00				
4	3	1	1	2.40E-01	3.80E-01	5.50E-01	7.00E-01	8.60E-01
				1.04E 00	1.21E 00	1.39E 00	1.55E 00	1.74E 00
				1.95E 00	2.17E 00	2.39E 00	2.62E 00	2.87E 00
				3.13E 00	3.37E 00	3.62E 00	3.88E 00	4.13E 00
				4.40E 00				
5	3	1	1	0.0	1.50E-01	3.40E-01	5.10E-01	6.90E-01
				8.60E-01	1.01E 00	1.20E 00	1.39E 00	1.62E 00
				1.83E 00	2.05E 00	2.27E 00	2.51E 00	2.74E 00
				2.99E 00	3.24E 00	3.50E 00	3.76E 00	4.02E 00
				4.28E 00				
6	3	1	1	-2.70E-01	-1.20E-01	6.00E-02	2.30E-01	4.20E-01
				6.10E-01	7.90E-01	1.01E 00	1.20E 00	1.40E 00
				1.63E 00	1.85E 00	2.07E 00	2.30E 00	2.52E 00
				2.77E 00	3.02E 00	3.26E 00	3.51E 00	3.77E 00
				4.01E 00				

TABLE 3 CONTINUED

```
7 3 1 1 -3.90E-01 -2.30E-01 -7.00E-02  1.00E-01  2.70E-01
         4.50E-01  6.70E-01  8.50E-01  1.07E 00  1.28E 00
         1.50E 00  1.71E 00  1.92E 00  2.15E 00  2.39E 00
         2.63E 00  2.88E 00  3.13E 00  3.37E 00  3.64E 00
         3.88E 00
8 3 1 1 -4.90E-01 -3.30E-01 -1.80E-01 -2.00E-02  1.50E-01
         3.50E-01  5.40E-01  7.30E-01  9.20E-01  1.15E 00
         1.35E 00  1.58E 00  1.81E 00  2.04E 00  2.27E 00
         2.52E 00  2.76E 00  3.01E 00  3.24E 00  3.49E 00
         3.74E 00
9 3 1 1 -5.80E-01 -4.30E-01 -2.80E-01 -1.10E-01  5.00E-02
         2.30E-01  4.00E-01  5.90E-01  8.00E-01  1.01E 00
         1.22E 00  1.43E 00  1.66E 00  1.89E 00  2.10E 00
         2.34E 00  2.58E 00  2.81E 00  3.06E 00  3.30E 00
         3.56E 00
1 4 1 1  5.40E-01  6.40E-01  7.70E-01  9.10E-01  1.07E 00
         1.22E 00  1.40E 00  1.56E 00  1.75E 00  1.95E 00
         2.14E 00  2.37E 00  2.59E 00  2.81E 00  3.04E 00
         3.27E 00  3.52E 00  3.76E 00  4.01E 00  4.27E 00
         4.53E 00
2 4 1 1  4.70E-01  5.80E-01  7.10E-01  8.50E-01  1.00E 00
         1.16E 00  1.32E 00  1.51E 00  1.69E 00  1.88E 00
         2.09E 00  2.30E 00  2.51E 00  2.75E 00  2.99E 00
         3.23E 00  3.46E 00  3.70E 00  3.96E 00  4.21E 00
         4.46E 00
3 4 1 1  3.60E-01  4.90E-01  6.30E-01  7.60E-01  9.30E-01
         1.09E 00  1.25E 00  1.44E 00  1.64E 00  1.84E 00
         2.03E 00  2.25E 00  2.48E 00  2.71E 00  2.93E 00
         3.17E 00  3.42E 00  3.65E 00  3.90E 00  4.18E 00
         4.43E 00
4 4 1 1  2.50E-01  3.80E-01  5.10E-01  6.80E-01  8.40E-01
         1.01E 00  1.19E 00  1.37E 00  1.57E 00  1.76E 00
         1.96E 00  2.18E 00  2.40E 00  2.63E 00  2.86E 00
         3.11E 00  3.35E 00  3.58E 00  3.84E 00  4.10E 00
         4.35E 00
5 4 1 1  0.0       1.70E-01  3.20E-01  5.00E-01  6.80E-01
         8.40E-01  1.03E 00  1.21E 00  1.39E 00  1.59E 00
         1.80E 00  2.01E 00  2.20E 00  2.44E 00  2.67E 00
         2.91E 00  3.15E 00  3.39E 00  3.66E 00  3.91E 00
         4.19E 00
6 4 1 1 -2.10E-01 -7.00E-02  9.00E-02  2.40E-01  4.20E-01
         5.90E-01  7.70E-01  9.60E-01  1.14E 00  1.36E 00
         1.57E 00  1.78E 00  2.00E 00  2.22E 00  2.46E 00
         2.69E 00  2.93E 00  3.18E 00  3.42E 00  3.69E 00
         3.96E 00
7 4 1 1 -3.40E-01 -1.80E-01 -1.00E-02  1.40E-01  3.10E-01
         4.90E-01  6.60E-01  8.40E-01  1.04E 00  1.24E 00
         1.46E 00  1.67E 00  1.88E 00  2.11E 00  2.34E 00
         2.57E 00  2.82E 00  3.06E 00  3.31E 00  3.55E 00
         3.81E 00
8 4 1 1 -4.60E-01 -2.90E-01 -1.30E-01  3.00E-02  2.10E-01
         3.90E-01  5.70E-01  7.60E-01  9.20E-01  1.12E 00
         1.33E 00  1.53E 00  1.75E 00  1.97E 00  2.20E 00
         2.43E 00  2.67E 00  2.90E 00  3.12E 00  3.37E 00
         3.60E 00
9 4 1 1 -5.00E-01 -3.60E-01 -2.20E-01 -6.00E-02  1.00E-01
         2.60E-01  4.30E-01  6.00E-01  8.00E-01  9.80E-01
         1.18E 00  1.40E 00  1.61E 00  1.82E 00  2.05E 00
         2.26E 00  2.50E 00  2.73E 00  2.96E 00  3.20E 00
         3.45E 00
1 5 1 1  5.10E-01  5.90E-01  6.90E-01  8.20E-01  9.70E-01
         1.13E 00  1.29E 00  1.45E 00  1.64E 00  1.84E 00
         2.04E 00  2.24E 00  2.44E 00  2.65E 00  2.88E 00
         3.09E 00  3.33E 00  3.57E 00  3.78E 00  4.01E 00
         4.22E 00
2 5 1 1  4.20E-01  5.20E-01  6.20E-01  7.60E-01  9.00E-01
         1.05E 00  1.22E 00  1.39E 00  1.57E 00  1.75E 00
         1.95E 00  2.16E 00  2.37E 00  2.58E 00  2.82E 00
         3.04E 00  3.28E 00  3.52E 00  3.74E 00  3.97E 00
         4.19E 00
```

TABLE 3 CONTINUED

```
3  5  1  1   3.30E-01    4.30E-01    5.50E-01    6.80E-01    8.20E-01
             9.80E-01    1.15E 00    1.31E 00    1.48E 00    1.67E 00
             1.85E 00    2.06E 00    2.29E 00    2.51E 00    2.75E 00
             2.99E 00    3.24E 00    3.46E 00    3.70E 00    3.92E 00
             4.14E 00
4  5  1  1   2.10E-01    3.20E-01    4.40E-01    5.70E-01    7.10E-01
             8.80E-01    1.03E 00    1.20E 00    1.39E 00    1.59E 00
             1.78E 00    1.99E 00    2.20E 00    2.44E 00    2.68E 00
             2.92E 00    3.16E 00    3.40E 00    3.63E 00    3.87E 00
             4.09E 00
5  5  1  1   0.0         1.30E-01    2.60E-01    4.10E-01    5.60E-01
             7.20E-01    8.80E-01    1.04E 00    1.23E 00    1.42E 00
             1.62E 00    1.83E 00    2.05E 00    2.27E 00    2.50E 00
             2.75E 00    2.99E 00    3.22E 00    3.47E 00    3.70E 00
             3.92E 00
6  5  1  1  -1.90E-01   -8.00E-02    7.00E-02    2.10E-01    3.80E-01
             5.40E-01    7.20E-01    8.80E-01    1.07E 00    1.25E 00
             1.43E 00    1.66E 00    1.87E 00    2.07E 00    2.29E 00
             2.50E 00    2.73E 00    2.96E 00    3.19E 00    3.41E 00
             3.62E 00
7  5  1  1  -3.20E-01   -1.80E-01   -3.00E-02    1.20E-01    2.80E-01
             4.30E-01    6.00E-01    7.80E-01    9.40E-01    1.12E 00
             1.31E 00    1.50E 00    1.69E 00    1.90E 00    2.09E 00
             2.32E 00    2.55E 00    2.78E 00    2.99E 00    3.21E 00
             3.44E 00
8  5  1  1  -3.90E-01   -2.70E-01   -1.30E-01    2.00E-02    1.80E-01
             3.20E-01    5.00E-01    6.80E-01    8.50E-01    1.01E 00
             1.19E 00    1.38E 00    1.59E 00    1.79E 00    2.00E 00
             2.19E 00    2.40E 00    2.60E 00    2.83E 00    3.04E 00
             3.26E 00
9  5  1  1  -4.90E-01   -3.60E-01   -2.30E-01   -8.00E-02    7.00E-02
             2.20E-01    3.80E-01    5.60E-01    7.10E-01    8.90E-01
             1.06E 00    1.25E 00    1.43E 00    1.66E 00    1.85E 00
             2.08E 00    2.30E 00    2.51E 00    2.74E 00    2.96E 00
             3.18E 00
1  6  1  1   4.50E-01    5.60E-01    6.80E-01    8.30E-01    9.50E-01
             1.10E 00    1.27E 00    1.44E 00    1.62E 00    1.82E 00
             2.01E 00    2.22E 00    2.44E 00    2.66E 00    2.89E 00
             3.10E 00    3.32E 00    3.54E 00    3.75E 00    3.95E 00
             4.15E 00
2  6  1  1   3.40E-01    4.70E-01    6.00E-01    7.40E-01    8.80E-01
             1.04E 00    1.19E 00    1.36E 00    1.53E 00    1.74E 00
             1.94E 00    2.15E 00    2.39E 00    2.62E 00    2.85E 00
             3.07E 00    3.29E 00    3.52E 00    3.71E 00    3.92E 00
             4.10E 00
3  6  1  1   2.60E-01    3.80E-01    5.00E-01    6.40E-01    7.80E-01
             9.20E-01    1.10E 00    1.26E 00    1.44E 00    1.64E 00
             1.84E 00    2.06E 00    2.30E 00    2.55E 00    2.78E 00
             3.00E 00    3.23E 00    3.45E 00    3.66E 00    3.89E 00
             4.11E 00
4  6  1  1   1.50E-01    2.70E-01    4.10E-01    5.40E-01    7.00E-01
             8.40E-01    1.02E 00    1.18E 00    1.35E 00    1.54E 00
             1.74E 00    1.97E 00    2.20E 00    2.43E 00    2.66E 00
             2.89E 00    3.10E 00    3.34E 00    3.55E 00    3.76E 00
             3.97E 00
5  6  1  1   0.0         1.40E-01    2.60E-01    3.90E-01    5.40E-01
             6.70E-01    9.30E-01    1.00E 00    1.18E 00    1.38E 00
             1.58E 00    1.79E 00    2.02E 00    2.25E 00    2.47E 00
             2.71E 00    2.93E 00    3.17E 00    3.39E 00    3.61E 00
             3.81E 00
6  6  1  1  -1.40E-01   -4.00E-02    9.00E-02    2.30E-01    3.60E-01
             5.20E-01    6.80E-01    8.30E-01    9.90E-01    1.19E 00
             1.36E 00    1.56E 00    1.77E 00    1.96E 00    2.16E 00
             2.38E 00    2.60E 00    2.83E 00    3.05E 00    3.26E 00
             3.46E 00
7  6  1  1  -2.30E-01   -1.40E-01   -3.00E-02    1.00E-01    2.40E-01
             4.00E-01    5.30E-01    7.10E-01    8.60E-01    1.03E 00
             1.18E 00    1.36E 00    1.55E 00    1.75E 00    1.95E 00
             2.15E 00    2.37E 00    2.59E 00    2.80E 00    3.02E 00
             3.24E 00
```

TABLE 3 CONTINUED

```
8 6 1 1 -3.20E-01 -2.20E-01 -1.00E-01  5.00E-02  1.90E-01
         3.20E-01  4.80E-01  6.30E-01  7.90E-01  9.40E-01
         1.11E 00  1.29E 00  1.46E 00  1.64E 00  1.82E 00
         1.99E 00  2.21E 00  2.42E 00  2.62E 00  2.84E 00
         3.06E 00
9 6 1 1 -4.50E-01 -3.30E-01 -2.10E-01 -7.00E-02  8.00E-02
         2.20E-01  3.70E-01  5.20E-01  6.70E-01  8.40E-01
         1.01E 00  1.19E 00  1.38E 00  1.53E 00  1.70E 00
         1.89E 00  2.07E 00  2.26E 00  2.46E 00  2.66E 00
         2.86E 00
1 7 1 1  3.60E-01  4.60E-01  5.80E-01  7.10E-01  8.60E-01
         1.01E 00  1.17E 00  1.35E 00  1.54E 00  1.73E 00
         1.94E 00  2.17E 00  2.40E 00  2.62E 00  2.86E 00
         3.07E 00  3.28E 00  3.49E 00  3.69E 00  3.89E 00
         4.08E 00
2 7 1 1  2.60E-01  3.60E-01  4.70E-01  6.00E-01  7.40E-01
         8.90E-01  1.06E 00  1.24E 00  1.43E 00  1.62E 00
         1.83E 00  2.06E 00  2.30E 00  2.53E 00  2.78E 00
         3.00E 00  3.23E 00  3.45E 00  3.64E 00  3.83E 00
         4.01E 00
3 7 1 1  1.90E-01  2.80E-01  3.90E-01  5.10E-01  6.50E-01
         8.10E-01  9.80E-01  1.16E 00  1.33E 00  1.54E 00
         1.75E 00  1.98E 00  2.22E 00  2.46E 00  2.70E 00
         2.93E 00  3.15E 00  3.37E 00  3.56E 00  3.76E 00
         3.94E 00
4 7 1 1  1.00E-01  1.90E-01  2.90E-01  4.10E-01  5.40E-01
         6.90E-01  8.60E-01  1.03E 00  1.21E 00  1.40E 00
         1.61E 00  1.84E 00  2.09E 00  2.34E 00  2.59E 00
         2.82E 00  3.06E 00  3.27E 00  3.48E 00  3.67E 00
         3.85E 00
5 7 1 1  1.00E-02  6.00E-02  1.50E-01  2.70E-01  3.90E-01
         5.40E-01  6.80E-01  8.40E-01  1.01E 00  1.19E 00
         1.38E 00  1.60E 00  1.81E 00  2.04E 00  2.28E 00
         2.51E 00  2.73E 00  2.94E 00  3.14E 00  3.33E 00
         3.51E 00
6 7 1 1 -1.10E-01 -3.00E-02  6.00E-02  1.60E-01  2.80E-01
         4.20E-01  5.60E-01  7.00E-01  8.60E-01  1.01E 00
         1.18E 00  1.34E 00  1.53E 00  1.70E 00  1.89E 00
         2.09E 00  2.30E 00  2.49E 00  2.69E 00  2.91E 00
         3.12E 00
7 7 1 1 -2.00E-01 -1.10E-01  0.0       1.00E-01  2.20E-01
         3.50E-01  4.80E-01  6.30E-01  7.80E-01  9.30E-01
         1.07E 00  1.22E 00  1.39E 00  1.57E 00  1.75E 00
         1.94E 00  2.14E 00  2.34E 00  2.56E 00  2.76E 00
         2.98E 00
8 7 1 1 -2.80E-01 -2.00E-01 -1.00E-01  1.00E-02  1.30E-01
         2.60E-01  4.00E-01  5.40E-01  6.90E-01  8.30E-01
         9.80E-01  1.14E 00  1.31E 00  1.48E 00  1.66E 00
         1.84E 00  2.02E 00  2.20E 00  2.39E 00  2.59E 00
         2.78E 00
9 7 1 1 -3.70E-01 -2.90E-01 -2.00E-01 -9.00E-02  3.00E-02
         1.50E-01  2.90E-01  4.40E-01  5.90E-01  7.40E-01
         8.90E-01  1.06E 00  1.22E 00  1.38E 00  1.54E 00
         1.71E 00  1.89E 00  2.07E 00  2.28E 00  2.48E 00
         2.68E 00
1 8 1 1  3.60E-01  4.50E-01  5.70E-01  7.00E-01  8.30E-01
         9.80E-01  1.14E 00  1.31E 00  1.50E 00  1.70E 00
         1.90E 00  2.10E 00  2.34E 00  2.57E 00  2.79E 00
         3.00E 00  3.21E 00  3.42E 00  3.61E 00  3.78E 00
         3.96E 00
2 8 1 1  2.50E-01  3.40E-01  4.60E-01  5.50E-01  7.20E-01
         8.80E-01  1.05E 00  1.21E 00  1.40E 00  1.60E 00
         1.80E 00  2.01E 00  2.23E 00  2.48E 00  2.70E 00
         2.93E 00  3.14E 00  3.36E 00  3.57E 00  3.75E 00
         3.93E 00
3 8 1 1  1.80E-01  2.60E-01  3.70E-01  4.90E-01  6.10E-01
         7.50E-01  9.10E-01  1.08E 00  1.27E 00  1.49E 00
         1.71E 00  1.93E 00  2.17E 00  2.40E 00  2.63E 00
         2.86E 00  3.08E 00  3.29E 00  3.49E 00  3.68E 00
         3.84E 00
```

TABLE 3 CONTINUED

```
4   8   1   1    1.00E-01     1.80E-01     2.80E-01     3.90E-01     5.20E-01
                 6.60E-01     8.10E-01     9.70E-01     1.15E 00     1.34E 00
                 1.56E 00     1.78E 00     2.01E 00     2.27E 00     2.51E 00
                 2.73E 00     2.96E 00     3.17E 00     3.36E 00     3.53E 00
                 3.69E 00
5   8   1   1    0.0          7.00E-02     1.70E-01     2.60E-01     3.70E-01
                 4.90E-01     6.20E-01     7.80E-01     9.30E-01     1.10E 00
                 1.28E 00     1.48E 00     1.69E 00     1.90E 00     2.15E 00
                 2.38E 00     2.60E 00     2.81E 00     2.99E 00     3.17E 00
                 3.32E 00
6   8   1   1   -1.00E-01    -5.00E-02     5.00E-02     1.50E-01     2.60E-01
                 3.90E-01     5.20E-01     6.60E-01     8.10E-01     9.50E-01
                 1.10E 00     1.26E 00     1.42E 00     1.60E 00     1.78E 00
                 1.97E 00     2.18E 00     2.38E 00     2.58E 00     2.79E 00
                 2.99E 00
7   8   1   1   -1.80E-01    -1.20E-01    -3.00E-02     8.00E-02     1.90E-01
                 3.00E-01     4.30E-01     5.60E-01     7.00E-01     8.30E-01
                 9.70E-01     1.14E 00     1.31E 00     1.46E 00     1.64E 00
                 1.82E 00     2.01E 00     2.21E 00     2.41E 00     2.61E 00
                 2.83E 00
8   8   1   1   -2.30E-01    -1.80E-01    -8.00E-02     3.00E-02     1.40E-01
                 2.50E-01     3.80E-01     5.00E-01     6.30E-01     7.60E-01
                 9.00E-01     1.04E 00     1.19E 00     1.35E 00     1.52E 00
                 1.70E 00     1.88E 00     2.09E 00     2.27E 00     2.47E 00
                 2.67E 00
9   8   1   1   -3.50E-01    -2.80E-01    -1.70E-01    -5.00E-02     7.00E-02
                 1.90E-01     3.10E-01     4.40E-01     5.60E-01     6.90E-01
                 8.20E-01     9.50E-01     1.10E 00     1.25E 00     1.40E 00
                 1.56E 00     1.74E 00     1.91E 00     2.11E 00     2.31E 00
                 2.51E 00
```

TABLE 4

THE 21 VALUES OF THE 1TH VARIABLE FOLLOW

```
0.0        2.00E 00   4.00E 00   6.00E 00   8.00E 00
1.00E 01   1.20E 01   1.40E 01   1.60E 01   1.80E 01
2.00E 01   2.20E 01   2.40E 01   2.60E 01   2.80E 01
3.00E 01   3.20E 01   3.40E 01   3.60E 01   3.80E 01
4.00E 01
```

THE 9 VALUES OF THE 2TH VARIABLE FOLLOW

```
2.00E 01   1.60E 01    1.20E 01   8.00E 00   0.0
-8.00E 00  -1.20E 01  -1.60E 01  -2.00E 01
```

THE 8 VALUES OF THE 3TH VARIABLE FOLLOW

```
1.30E 00   1.60E 00   2.00E 00   2.30E 00   2.60E 00
3.00E 00   4.00E 00   4.60E 00
```

```
I2 I3 I4 I5    I1=1         I1=2        ETC.
1  1  1  1  2.40E 00   2.41E 00   1.71E 00   1.15E 00   6.30E-01
           1.40E-01  -2.90E-01  -6.40E-01  -9.00E-01  -1.11E 00
          -1.30E 00  -1.43E 00  -1.56E 00  -1.69E 00  -1.81E 00
          -1.94E 00  -2.07E 00  -2.20E 00  -2.35E 00  -2.49E 00
          -2.64E 00
2  1  1  1  1.78E 00   1.88E 00   1.30E 00   8.60E-01   4.50E-01
          -1.00E-02  -4.10E-01  -7.40E-01  -1.02E 00  -1.24E 00
          -1.44E 00  -1.59E 00  -1.71E 00  -1.84E 00  -1.95E 00
          -2.06E 00  -2.19E 00  -2.31E 00  -2.45E 00  -2.59E 00
          -2.75E 00
3  1  1  1  1.17E 00   1.17E 00   8.40E-01   5.10E-01   1.90E-01
          -1.60E-01  -5.50E-01  -9.00E-01  -1.21E 00  -1.46E 00
          -1.68E 00  -1.85E 00  -1.99E 00  -2.13E 00  -2.24E 00
          -2.35E 00  -2.45E 00  -2.56E 00  -2.67E 00  -2.81E 00
          -2.94E 00
4  1  1  1  7.70E-01   6.50E-01   4.50E-01   1.70E-01  -1.60E-01
          -5.40E-01  -8.80E-01  -1.19E 00  -1.44E 00  -1.64E 00
          -1.80E 00  -1.96E 00  -2.08E 00  -2.18E 00  -2.30E 00
          -2.43E 00  -2.55E 00  -2.66E 00  -2.78E 00  -2.91E 00
          -3.06E 00
5  1  1  1 -2.00E-02  -1.60E-01  -3.30E-01  -5.40E-01  -7.80E-01
          -1.05E 00  -1.34E 00  -1.59E 00  -1.81E 00  -2.00E 00
          -2.16E 00  -2.29E 00  -2.40E 00  -2.54E 00  -2.65E 00
          -2.76E 00  -2.88E 00  -3.00E 00  -3.12E 00  -3.25E 00
          -3.37E 00
6  1  1  1 -8.00E-01  -8.50E-01  -9.50E-01  -1.10E 00  -1.29E 00
          -1.52E 00  -1.74E 00  -1.93E 00  -2.09E 00  -2.24E 00
          -2.36E 00  -2.47E 00  -2.57E 00  -2.67E 00  -2.78E 00
          -2.90E 00  -3.00E 00  -3.12E 00  -3.24E 00  -3.37E 00
          -3.52E 00
7  1  1  1 -1.18E 00  -1.22E 00  -1.30E 00  -1.40E 00  -1.56E 00
          -1.75E 00  -1.97E 00  -2.17E 00  -2.33E 00  -2.48E 00
          -2.61E 00  -2.72E 00  -2.82E 00  -2.94E 00  -3.05E 00
          -3.16E 00  -3.27E 00  -3.39E 00  -3.50E 00  -3.63E 00
          -3.77E 00
8  1  1  1 -1.76E 00  -1.63E 00  -1.57E 00  -1.62E 00  -1.60E 00
          -2.01E 00  -2.19E 00  -2.36E 00  -2.47E 00  -2.58E 00
          -2.68E 00  -2.79E 00  -2.90E 00  -3.00E 00  -3.11E 00
          -3.23E 00  -3.34E 00  -3.47E 00  -3.59E 00  -3.71E 00
          -3.85E 00
9  1  1  1 -2.42E 00  -2.33E 00  -2.27E 00  -2.25E 00  -2.27E 00
          -2.33E 00  -2.41E 00  -2.51E 00  -2.62E 00  -2.73E 00
          -2.84E 00  -2.93E 00  -3.03E 00  -3.14E 00  -3.26E 00
          -3.36E 00  -3.47E 00  -3.60E 00  -3.73E 00  -3.86E 00
          -3.99E 00
1  2  1  1  1.28E 00   1.15E 00   9.50E-01   6.60E-01   2.80E-01
          -1.80E-01  -4.80E-01  -6.70E-01  -8.20E-01  -9.30E-01
          -1.05E 00  -1.12E 00  -1.22E 00  -1.34E 00  -1.47E 00
          -1.63E 00  -1.78E 00  -1.93E 00  -2.09E 00  -2.26E 00
          -2.44E 00
```

TABLE 4 CONTINUED

```
2  2  1  1   1.07E 00   9.30E-01   7.20E-01   4.40E-01   1.00E-01
             -2.40E-01  -5.20E-01  -7.30E-01  -9.20E-01  -1.06E 00
             -1.14E 00  -1.25E 00  -1.37E 00  -1.49E 00  -1.62E 00
             -1.77E 00  -1.93E 00  -2.09E 00  -2.24E 00  -2.41E 00
             -2.57E 00
3  2  1  1   7.90E-01   6.80E-01   5.20E-01   2.90E-01  -1.00E-02
             -3.50E-01  -6.30E-01  -8.60E-01  -1.04E 00  -1.18E 00
             -1.24E 00  -1.33E 00  -1.43E 00  -1.56E 00  -1.71E 00
             -1.85E 00  -2.00E 00  -2.17E 00  -2.34E 00  -2.50E 00
             -2.66E 00
4  2  1  1   4.90E-01   3.60E-01   1.70E-01  -4.00E-02  -3.20E-01
             -6.20E-01  -8.40E-01  -1.04E 00  -1.17E 00  -1.26E 00
             -1.33E 00  -1.41E 00  -1.51E 00  -1.63E 00  -1.76E 00
             -1.93E 00  -2.09E 00  -2.25E 00  -2.42E 00  -2.57E 00
             -2.74E 00
5  2  1  1   0.0        -1.40E-01  -3.10E-01  -4.70E-01  -6.70E-01
             -8.80E-01  -1.07E 00  -1.25E 00  -1.42E 00  -1.58E 00
             -1.70E 00  -1.81E 00  -1.92E 00  -2.03E 00  -2.15E 00
             -2.29E 00  -2.43E 00  -2.59E 00  -2.75E 00  -2.89E 00
             -3.05E 00
6  2  1  1  -4.90E-01  -5.80E-01  -7.10E-01  -8.50E-01  -1.00E 00
             -1.16E 00  -1.31E 00  -1.44E 00  -1.56E 00  -1.68E 00
             -1.77E 00  -1.86E 00  -1.96E 00  -2.07E 00  -2.20E 00
             -2.34E 00  -2.50E 00  -2.66E 00  -2.82E 00  -2.99E 00
             -3.15E 00
7  2  1  1  -7.80E-01  -8.50E-01  -9.40E-01  -1.04E 00  -1.16E 00
             -1.31E 00  -1.44E 00  -1.56E 00  -1.67E 00  -1.77E 00
             -1.88E 00  -1.96E 00  -2.05E 00  -2.15E 00  -2.27E 00
             -2.41E 00  -2.58E 00  -2.74E 00  -2.91E 00  -3.08E 00
             -3.24E 00
8  2  1  1  -1.02E 00  -1.13E 00  -1.23E 00  -1.35E 00  -1.49E 00
             -1.63E 00  -1.74E 00  -1.85E 00  -1.93E 00  -1.99E 00
             -2.06E 00  -2.13E 00  -2.21E 00  -2.32E 00  -2.44E 00
             -2.58E 00  -2.75E 00  -2.91E 00  -3.08E 00  -3.25E 00
             -3.42E 00
9  2  1  1  -1.25E 00  -1.35E 00  -1.44E 00  -1.52E 00  -1.61E 00
             -1.71E 00  -1.83E 00  -1.92E 00  -1.99E 00  -2.05E 00
             -2.12E 00  -2.20E 00  -2.28E 00  -2.41E 00  -2.54E 00
             -2.71E 00  -2.91E 00  -3.10E 00  -3.26E 00  -3.43E 00
             -3.56E 00
1  3  1  1   8.90E-01   7.60E-01   5.90E-01   3.30E-01   7.00E-02
             -2.20E-01  -4.20E-01  -5.90E-01  -7.40E-01  -8.70E-01
             -1.00E 00  -1.13E 00  -1.26E 00  -1.41E 00  -1.55E 00
             -1.71E 00  -1.88E 00  -2.05E 00  -2.21E 00  -2.38E 00
             -2.55E 00
2  3  1  1   8.50E-01   7.10E-01   5.00E-01   2.90E-01   0.0
             -2.90E-01  -5.00E-01  -6.80E-01  -8.40E-01  -9.70E-01
             -1.10E 00  -1.22E 00  -1.37E 00  -1.51E 00  -1.67E 00
             -1.85E 00  -2.01E 00  -2.18E 00  -2.34E 00  -2.50E 00
             -2.66E 00
3  3  1  1   5.10E-01   4.10E-01   2.40E-01   6.00E-02  -1.40E-01
             -3.80E-01  -5.80E-01  -7.30E-01  -8.70E-01  -1.01E 00
             -1.14E 00  -1.28E 00  -1.40E 00  -1.56E 00  -1.73E 00
             -1.90E 00  -2.05E 00  -2.22E 00  -2.39E 00  -2.55E 00
             -2.73E 00
4  3  1  1   2.80E-01   1.70E-01   6.00E-02  -1.00E-01  -2.60E-01
             -4.40E-01  -6.10E-01  -7.80E-01  -9.20E-01  -1.04E 00
             -1.17E 00  -1.30E 00  -1.46E 00  -1.60E 00  -1.77E 00
             -1.93E 00  -2.09E 00  -2.25E 00  -2.43E 00  -2.59E 00
             -2.77E 00
5  3  1  1   0.0        -1.30E-01  -2.80E-01  -4.20E-01  -5.80E-01
             -7.40E-01  -8.70E-01  -1.00E 00  -1.14E 00  -1.27E 00
             -1.40E 00  -1.55E 00  -1.70E 00  -1.86E 00  -2.04E 00
             -2.22E 00  -2.38E 00  -2.53E 00  -2.70E 00  -2.86E 00
             -3.02E 00
6  3  1  1  -3.00E-01  -3.80E-01  -4.70E-01  -5.80E-01  -7.10E-01
             -8.50E-01  -9.70E-01  -1.10E 00  -1.22E 00  -1.34E 00
             -1.49E 00  -1.62E 00  -1.79E 00  -1.94E 00  -2.10E 00
             -2.26E 00  -2.44E 00  -2.60E 00  -2.78E 00  -2.96E 00
             -3.13E 00
```

TABLE 4 CONTINUED

```
7   3   1   1  -5.10E-01  -5.70E-01  -6.30E-01  -7.10E-01  -8.00E-01
               -9.10E-01  -1.01E 00  -1.13E 00  -1.25E 00  -1.39E 00
               -1.52E 00  -1.67E 00  -1.81E 00  -1.98E 00  -2.13E 00
               -2.31E 00  -2.47E 00  -2.65E 00  -2.84E 00  -3.03E 00
               -3.17E 00
8   3   1   1  -8.60E-01  -9.10E-01  -9.80E-01  -1.06E 00  -1.15E 00
               -1.26E 00  -1.36E 00  -1.45E 00  -1.55E 00  -1.65E 00
               -1.76E 00  -1.86E 00  -1.95E 00  -2.06E 00  -2.19E 00
               -2.35E 00  -2.51E 00  -2.70E 00  -2.88E 00  -3.07E 00
               -3.27E 00
9   3   1   1  -9.10E-01  -9.60E-01  -1.02E 00  -1.10E 00  -1.19E 00
               -1.29E 00  -1.39E 00  -1.49E 00  -1.58E 00  -1.68E 00
               -1.78E 00  -1.90E 00  -1.99E 00  -2.11E 00  -2.24E 00
               -2.40E 00  -2.56E 00  -2.73E 00  -2.92E 00  -3.11E 00
               -3.33E 00
1   4   1   1   3.90E-01   3.30E-01   2.40E-01   1.10E-01  -3.00E-02
               -1.90E-01  -3.70E-01  -5.00E-01  -6.30E-01  -7.50E-01
               -8.90E-01  -1.02E 00  -1.20E 00  -1.34E 00  -1.52E 00
               -1.69E 00  -1.85E 00  -2.00E 00  -2.17E 00  -2.33E 00
               -2.48E 00
2   4   1   1   3.40E-01   2.30E-01   1.10E-01  -1.00E-02  -1.50E-01
               -3.10E-01  -4.50E-01  -5.80E-01  -7.30E-01  -8.50E-01
               -9.80E-01  -1.14E 00  -1.28E 00  -1.43E 00  -1.60E 00
               -1.76E 00  -1.92E 00  -2.09E 00  -2.23E 00  -2.40E 00
               -2.56E 00
3   4   1   1   2.50E-01   1.60E-01   5.00E-02  -7.00E-02  -2.00E-01
               -3.80E-01  -5.30E-01  -6.70E-01  -8.00E-01  -9.30E-01
               -1.07E 00  -1.20E 00  -1.36E 00  -1.51E 00  -1.68E 00
               -1.84E 00  -1.99E 00  -2.14E 00  -2.31E 00  -2.47E 00
               -2.63E 00
4   4   1   1   1.20E-01   5.00E-02  -4.00E-02  -1.60E-01  -2.90E-01
               -4.50E-01  -6.00E-01  -7.40E-01  -8.80E-01  -1.00E 00
               -1.14E 00  -1.28E 00  -1.43E 00  -1.59E 00  -1.75E 00
               -1.92E 00  -2.07E 00  -2.24E 00  -2.39E 00  -2.56E 00
               -2.72E 00
5   4   1   1   0.0       -1.40E-01  -2.50E-01  -3.80E-01  -4.90E-01
               -6.00E-01  -7.10E-01  -8.30E-01  -9.40E-01  -1.06E 00
               -1.18E 00  -1.35E 00  -1.55E 00  -1.76E 00  -1.95E 00
               -2.16E 00  -2.34E 00  -2.54E 00  -2.68E 00  -2.85E 00
               -2.98E 00
6   4   1   1  -1.30E-01  -2.50E-01  -3.60E-01  -4.60E-01  -5.60E-01
               -6.70E-01  -7.60E-01  -8.50E-01  -9.60E-01  -1.08E 00
               -1.20E 00  -1.39E 00  -1.57E 00  -1.80E 00  -2.02E 00
               -2.22E 00  -2.40E 00  -2.59E 00  -2.76E 00  -2.91E 00
               -3.04E 00
7   4   1   1  -2.60E-01  -3.60E-01  -4.30E-01  -5.30E-01  -6.10E-01
               -7.10E-01  -7.90E-01  -8.80E-01  -9.90E-01  -1.11E 00
               -1.25E 00  -1.42E 00  -1.61E 00  -1.84E 00  -2.06E 00
               -2.25E 00  -2.45E 00  -2.63E 00  -2.80E 00  -2.96E 00
               -3.08E 00
8   4   1   1  -3.40E-01  -4.00E-01  -4.80E-01  -5.60E-01  -6.30E-01
               -7.30E-01  -8.10E-01  -9.10E-01  -1.02E 00  -1.14E 00
               -1.28E 00  -1.45E 00  -1.64E 00  -1.86E 00  -2.06E 00
               -2.28E 00  -2.49E 00  -2.66E 00  -2.84E 00  -3.01E 00
               -3.17E 00
9   4   1   1  -4.00E-01  -4.50E-01  -5.10E-01  -5.80E-01  -6.70E-01
               -7.40E-01  -8.30E-01  -9.30E-01  -1.04E 00  -1.16E 00
               -1.29E 00  -1.48E 00  -1.68E 00  -1.91E 00  -2.12E 00
               -2.33E 00  -2.54E 00  -2.72E 00  -2.91E 00  -3.07E 00
               -3.23E 00
1   5   1   1   3.40E-01   2.50E-01   1.60E-01   5.00E-02  -6.00E-02
               -1.90E-01  -3.10E-01  -4.50E-01  -6.00E-01  -7.40E-01
               -8.80E-01  -1.01E 00  -1.17E 00  -1.31E 00  -1.44E 00
               -1.59E 00  -1.74E 00  -1.87E 00  -2.00E 00  -2.13E 00
               -2.26E 00
2   5   1   1   2.80E-01   1.90E-01   9.00E-02   0.0       -1.30E-01
               -2.40E-01  -3.80E-01  -5.00E-01  -6.40E-01  -8.10E-01
               -9.50E-01  -1.10E 00  -1.23E 00  -1.40E 00  -1.55E 00
               -1.69E 00  -1.83E 00  -1.98E 00  -2.12E 00  -2.26E 00
               -2.38E 00
```

TABLE 4 CONTINUED

```
3  5  1  1   2.00E-01    1.20E-01    3.00E-02   -9.00E-02   -2.10E-01
            -3.30E-01   -4.70E-01   -6.10E-01   -7.70E-01   -9.20E-01
            -1.05E 00   -1.21E 00   -1.37E 00   -1.50E 00   -1.66E 00
            -1.81E 00   -1.95E 00   -2.11E 00   -2.25E 00   -2.38E 00
            -2.49E 00
4  5  1  1   1.10E-01    4.00E-02   -3.00E-02   -1.40E-01   -2.50E-01
            -3.90E-01   -5.10E-01   -6.70E-01   -8.20E-01   -9.90E-01
            -1.14E 00   -1.31E 00   -1.48E 00   -1.65E 00   -1.81E 00
            -1.98E 00   -2.15E 00   -2.30E 00   -2.48E 00   -2.63E 00
            -2.80E 00
5  5  1  1   0.0        -1.10E-01   -2.30E-01   -3.50E-01   -4.60E-01
            -5.60E-01   -6.70E-01   -7.90E-01   -9.00E-01   -1.05E 00
            -1.21E 00   -1.38E 00   -1.59E 00   -1.80E 00   -2.00E 00
            -2.18E 00   -2.34E 00   -2.50E 00   -2.64E 00   -2.74E 00
            -2.86E 00
6  5  1  1  -1.00E-01   -1.80E-01   -2.70E-01   -3.80E-01   -5.00E-01
            -5.90E-01   -7.00E-01   -8.20E-01   -9.70E-01   -1.11E 00
            -1.29E 00   -1.45E 00   -1.65E 00   -1.83E 00   -2.03E 00
            -2.22E 00   -2.38E 00   -2.53E 00   -2.65E 00   -2.77E 00
            -2.88E 00
7  5  1  1  -1.90E-01   -2.50E-01   -3.20E-01   -4.00E-01   -5.10E-01
            -6.10E-01   -7.30E-01   -8.70E-01   -1.01E 00   -1.16E 00
            -1.32E 00   -1.50E 00   -1.67E 00   -1.87E 00   -2.06E 00
            -2.25E 00   -2.39E 00   -2.54E 00   -2.67E 00   -2.79E 00
            -2.89E 00
8  5  1  1  -2.40E-01   -3.00E-01   -3.80E-01   -4.70E-01   -5.60E-01
            -6.80E-01   -7.80E-01   -9.20E-01   -1.06E 00   -1.22E 00
            -1.38E 00   -1.54E 00   -1.73E 00   -1.91E 00   -2.10E 00
            -2.27E 00   -2.42E 00   -2.58E 00   -2.70E 00   -2.81E 00
            -2.91E 00
9  5  1  1  -3.40E-01   -3.90E-01   -4.40E-01   -5.20E-01   -6.20E-01
            -7.20E-01   -8.50E-01   -9.60E-01   -1.11E 00   -1.28E 00
            -1.43E 00   -1.61E 00   -1.78E 00   -1.59E 00   -2.17E 00
            -2.32E 00   -2.47E 00   -2.61E 00   -2.74E 00   -2.84E 00
            -2.92E 00
1  6  1  1   1.90E-01    1.30E-01    6.00E-02   -1.00E-02   -1.20E-01
            -2.40E-01   -3.40E-01   -4.60E-01   -5.80E-01   -6.90E-01
            -8.20E-01   -9.30E-01   -1.05E 00   -1.17E 00   -1.32E 00
            -1.42E 00   -1.54E 00   -1.65E 00   -1.78E 00   -1.89E 00
            -2.01E 00
2  6  1  1   1.60E-01    8.00E-02   -1.00E-02   -9.00E-02   -1.80E-01
            -2.80E-01   -3.90E-01   -5.10E-01   -6.20E-01   -7.50E-01
            -9.10E-01   -1.06E 00   -1.20E 00   -1.32E 00   -1.45E 00
            -1.57E 00   -1.70E 00   -1.82E 00   -1.94E 00   -2.07E 00
            -2.18E 00
3  6  1  1   1.20E-01    4.00E-02   -6.00E-02   -1.30E-01   -2.10E-01
            -3.10E-01   -4.00E-01   -5.20E-01   -6.30E-01   -7.90E-01
            -9.80E-01   -1.14E 00   -1.30E 00   -1.46E 00   -1.58E 00
            -1.71E 00   -1.84E 00   -1.96E 00   -2.04E 00   -2.13E 00
            -2.17E 00
4  6  1  1   1.10E-01    0.0        -8.00E-02   -1.60E-01   -2.60E-01
            -3.50E-01   -4.60E-01   -6.00E-01   -7.30E-01   -9.00E-01
            -1.06E 00   -1.26E 00   -1.42E 00   -1.56E 00   -1.72E 00
            -1.84E 00   -1.96E 00   -2.08E 00   -2.18E 00   -2.24E 00
            -2.28E 00
5  6  1  1   0.0        -8.00E-02   -1.60E-01   -2.50E-01   -3.50E-01
            -4.50E-01   -5.60E-01   -6.80E-01   -7.90E-01   -9.40E-01
            -1.14E 00   -1.32E 00   -1.54E 00   -1.71E 00   -1.91E 00
            -2.12E 00   -2.31E 00   -2.44E 00   -2.54E 00   -2.55E 00
            -2.51E 00
6  6  1  1  -7.00E-02   -1.30E-01   -1.90E-01   -2.70E-01   -3.70E-01
            -4.60E-01   -5.70E-01   -6.80E-01   -8.00E-01   -9.10E-01
            -1.08E 00   -1.30E 00   -1.47E 00   -1.66E 00   -1.90E 00
            -2.12E 00   -2.30E 00   -2.45E 00   -2.53E 00   -2.54E 00
            -2.50E 00
7  6  1  1  -1.30E-01   -1.80E-01   -2.40E-01   -3.20E-01   -3.90E-01
            -4.80E-01   -5.80E-01   -7.00E-01   -8.30E-01   -9.40E-01
            -1.11E 00   -1.28E 00   -1.43E 00   -1.62E 00   -1.78E 00
            -2.01E 00   -2.25E 00   -2.38E 00   -2.48E 00   -2.52E 00
            -2.51E 00
```

TABLE 4 CONTINUED

```
8  6  1  1 -1.70E-01 -2.10E-01 -2.60E-01 -3.10E-01 -4.00E-01
           -4.80E-01 -5.70E-01 -6.90E-01 -8.00E-01 -9.20E-01
           -1.12E 00 -1.28E 00 -1.43E 00 -1.62E 00 -1.82E 00
           -2.02E 00 -2.16E 00 -2.31E 00 -2.38E 00 -2.42E 00
           -2.40E 00
9  6  1  1 -1.90E-01 -2.30E-01 -2.70E-01 -3.40E-01 -4.40E-01
           -5.20E-01 -6.30E-01 -7.20E-01 -8.30E-01 -9.60E-01
           -1.12E 00 -1.29E 00 -1.43E 00 -1.58E 00 -1.73E 00
           -1.85E 00 -1.98E 00 -2.08E 00 -2.17E 00 -2.24E 00
           -2.29E 00
1  7  1  1  9.00E-02  6.00E-02  1.00E-02 -4.00E-02 -1.20E-01
           -2.00E-01 -3.10E-01 -4.40E-01 -5.70E-01 -6.90E-01
           -8.50E-01 -9.80E-01 -1.13E 00 -1.24E 00 -1.36E 00
           -1.45E 00 -1.53E 00 -1.60E 00 -1.63E 00 -1.66E 00
           -1.66E 00
2  7  1  1  7.00E-02  4.00E-02 -1.00E-02 -7.00E-02 -1.30E-01
           -2.20E-01 -3.20E-01 -4.50E-01 -5.80E-01 -7.00E-01
           -8.50E-01 -9.90E-01 -1.11E 00 -1.22E 00 -1.32E 00
           -1.40E 00 -1.48E 00 -1.52E 00 -1.54E 00 -1.52E 00
           -1.47E 00
3  7  1  1  4.00E-02  2.00E-02 -1.00E-02 -8.00E-02 -1.50E-01
           -2.30E-01 -3.40E-01 -4.70E-01 -6.00E-01 -7.40E-01
           -9.10E-01 -1.10E 00 -1.30E 00 -1.45E 00 -1.55E 00
           -1.61E 00 -1.66E 00 -1.68E 00 -1.68E 00 -1.68E 00
           -1.64E 00
4  7  1  1  2.00E-02  0.0      -4.00E-02 -9.00E-02 -1.70E-01
           -2.60E-01 -3.70E-01 -4.80E-01 -6.00E-01 -7.40E-01
           -9.10E-01 -1.10E 00 -1.32E 00 -1.45E 00 -1.56E 00
           -1.64E 00 -1.68E 00 -1.67E 00 -1.67E 00 -1.67E 00
           -1.66E 00
5  7  1  1  0.0      -1.00E-02 -7.00E-02 -1.40E-01 -2.10E-01
           -3.20E-01 -4.40E-01 -5.70E-01 -7.00E-01 -8.50E-01
           -1.00E 00 -1.20E 00 -1.41E 00 -1.62E 00 -1.86E 00
           -1.96E 00 -1.99E 00 -1.95E 00 -1.87E 00 -1.74E 00
           -1.54E 00
6  7  1  1 -4.00E-02 -6.00E-02 -9.00E-02 -1.40E-01 -2.10E-01
           -3.00E-01 -4.20E-01 -5.30E-01 -6.70E-01 -8.40E-01
           -1.00E 00 -1.20E 00 -1.38E 00 -1.52E 00 -1.61E 00
           -1.67E 00 -1.69E 00 -1.71E 00 -1.71E 00 -1.70E 00
           -1.68E 00
7  7  1  1 -4.00E-02 -7.00E-02 -1.00E-01 -1.40E-01 -2.10E-01
           -3.20E-01 -4.30E-01 -5.60E-01 -7.00E-01 -8.50E-01
           -1.01E 00 -1.19E 00 -1.37E 00 -1.51E 00 -1.59E 00
           -1.64E 00 -1.68E 00 -1.68E 00 -1.68E 00 -1.68E 00
           -1.67E 00
8  7  1  1 -6.00E-02 -8.00E-02 -1.20E-01 -2.10E-01 -2.90E-01
           -3.70E-01 -4.80E-01 -6.00E-01 -7.20E-01 -8.50E-01
           -1.01E 00 -1.18E 00 -1.34E 00 -1.47E 00 -1.56E 00
           -1.63E 00 -1.67E 00 -1.68E 00 -1.67E 00 -1.67E 00
           -1.66E 00
9  7  1  1 -8.00E-02 -1.00E-01 -1.30E-01 -1.90E-01 -2.70E-01
           -3.70E-01 -4.50E-01 -5.90E-01 -7.20E-01 -8.60E-01
           -1.01E 00 -1.13E 00 -1.30E 00 -1.43E 00 -1.50E 00
           -1.56E 00 -1.60E 00 -1.63E 00 -1.64E 00 -1.63E 00
           -1.63E 00
1  8  1  1  9.00E-02  5.00E-02  3.00E-02 -3.00E-02 -1.20E-01
           -2.20E-01 -3.10E-01 -4.50E-01 -5.80E-01 -7.10E-01
           -8.00E-01 -8.90E-01 -9.50E-01 -1.00E 00 -1.04E 00
           -1.05E 00 -1.06E 00 -1.06E 00 -1.06E 00 -1.05E 00
           -1.03E 00
2  8  1  1  8.00E-02  5.00E-02  1.00E-02 -5.00E-02 -1.30E-01
           -2.20E-01 -3.50E-01 -4.80E-01 -6.20E-01 -7.40E-01
           -8.50E-01 -9.60E-01 -1.07E 00 -1.14E 00 -1.24E 00
           -1.30E 00 -1.36E 00 -1.40E 00 -1.42E 00 -1.44E 00
           -1.44E 00
3  8  1  1  5.00E-02  4.00E-02  0.0      -7.00E-02 -1.40E-01
           -2.40E-01 -3.40E-01 -4.70E-01 -6.30E-01 -8.00E-01
           -9.50E-01 -1.13E 00 -1.30E 00 -1.48E 00 -1.62E 00
           -1.71E 00 -1.74E 00 -1.72E 00 -1.65E 00 -1.55E 00
           -1.44E 00
```

TABLE 4 CONTINUED

```
4  8  1  1   3.00E-02   0.0        -1.00E-02 -7.00E-02 -1.30E-01
            -2.10E-01 -3.20E-01 -4.40E-01 -5.70E-01 -7.20E-01
            -9.90E-01 -1.18E 00 -1.38E 00 -1.58E 00 -1.83E 00
            -1.99E 00 -2.05E 00 -2.03E 00 -1.94E 00 -1.81E 00
            -1.58E 00
5  8  1  1   0.0        -4.00E-02 -1.00E-01 -1.00E-01 -1 70E-01
            -2.60E-01 -3.80E-01 -5.50E-01 -6.60E-01 -7 90E-01
            -9.60E-01 -1.13E 00 -1.30E 00 -1.48E 00 -1.65E 00
            -1.78E 00 -1.83E 00 -1.84E 00 -1.81E 00 -1.71E 00
            -1.56E 00
6  8  1  1  -5.00E-02 -7.00E-02 -1.10E-01 -1.70E-01 -2.50E-01
            -3.40E-01 -4.30E-01 -5.40E-01 -6.70E-01 -8.00E-01
            -9.60E-01 -1.13E 00 -1.30E 00 -1.48E 00 -1.63E 00
            -1.70E 00 -1.73E 00 -1.71E 00 -1.64E 00 -1.55E 00
            -1.43E 00
7  8  1  1  -8.00E-02 -1.00E-01 -1.40E-01 -2.00E-01 -2.70E-01
            -3.40E-01 -4.60E-01 -5.70E-01 -7.20E-01 -8.80E-01
            -1.06E 00 -1.23E 00 -1.34E 00 -1.43E 00 -1.46E 00
            -1.50E 00 -1.55E 00 -1.61E 00 -1.68E 00 -1.76E 00
            -1.90E 00
8  8  1  1  -1.00E-01 -1.10E-01 -1.40E-01 -2.00E-01 -2.70E-01
            -3.50E-01 -4.50E-01 -5.80E-01 -7.20E-01 -8.90E-01
            -1.06E 00 -1.21E 00 -1.30E 00 -1.37E 00 -1.43E 00
            -1.48E 00 -1.53E 00 -1.58E 00 -1.67E 00 -1.74E 00
            -1.83E 00
9  8  1  1  -1.00E-01 -1.00E-01 -1.40E-01 -2.00E-01 -2.70E-01
            -3.30E-01 -4.60E-01 -5.70E-01 -7.10E-01 -8.70E-01
            -1.04E 00 -1.22E 00 -1.32E 00 -1.40E 00 -1.45E 00
            -1.47E 00 -1.54E 00 -1.60E 00 -1.66E 00 -1.73E 00
            -1.86E 00
```

TABLE 5

THE 21 VALUES OF THE 1TH VARIABLE FOLLOW

```
0.0         2.00E 00   4.C0E 00   6.C0E 00   8.00E 00
1.00E 01   1.20E 01   1.40E 01   1.60E 01   1.80E 01
2.00E 01   2.20E 01   2.40E 01   2.60E 01   2.80E 01
3.00E 01   3.20E 01   3.40E 01   3.60E 01   3.80E 01
4.00E 01
```

THE 9 VALUES OF THE 2TH VARIABLE FOLLOW

```
2.00E 01   1.60E 01   1.20E 01   8.00E 00   0.0
-8.00E 00 -1.20E 01 -1.60E 01 -2.00E 01
```

THE 8 VALUES OF THE 3TH VARIABLE FOLLOW

```
1.30E 00   1.60E 00   2.00E 00   2.30E 00   2.60E 00
3.00E 00   4.00E 00   4.60E 00
```

I2	I3	I4	I5	I1=1	I1=2	ETC.		
1	1	1	1	3.06E 00	3.13E 00	3.09E 00	2.98E 00	2.76E 00
				2.26E 00	1.69E 00	1.23E 00	8.50E-01	5.00E-01
				1.40E-01	-2.30E-01	-5.90E-01	-9.50E-01	-1.27E 00
				-1.50E 00	-1.72E 00	-1.93E 00	-2.11E 00	-2.24E 00
				-2.35E 00				
2	1	1	1	2.61E 00	2.64E 00	2.57E 00	2.38E 00	2.06E 00
				1.57E 00	1.10E 00	7.30E-01	4.20E-01	1.00E-01
				-2.40E-01	-5.70E-01	-8.80E-01	-1.22E 00	-1.49E 00
				-1.72E 00	-1.93E 00	-2.10E 00	-2.27E 00	-2.41E 00
				-2.51E 00				
3	1	1	1	1.98E 00	1.94E 00	1.82E 00	1.60E 00	1.31E 00
				9.50E-01	5.70E-01	2.90E-01	2.00E-02	-2.80E-01
				-5.60E-01	-8.40E-01	-1.12E 00	-1.39E 00	-1.62E 00
				-1.84E 00	-2.04E 00	-2.21E 00	-2.35E 00	-2.49E 00
				-2.59E 00				
4	1	1	1	1.29E 00	1.24E 00	1.10E 00	9.00E-01	6.30E-01
				3.60E-01	1.10E-01	-1.40E-01	-3.90E-01	-6.30E-01
				-8.90E-01	-1.14E 00	-1.39E 00	-1.63E 00	-1.84E 00
				-2.03E 00	-2.22E 00	-2.38E 00	-2.51E 00	-2.63E 00
				-2.73E 00				
5	1	1	1	0.0	-1.50E-01	-2.80E-01	-4.10E-01	-5.60E-01
				-7.20E-01	-8.70E-01	-1.03E 00	-1.22E 00	-1.39E 00
				-1.55E 00	-1.73E 00	-1.90E 00	-2.05E 00	-2.20E 00
				-2.33E 00	-2.45E 00	-2.56E 00	-2.64E 00	-2.73E 00
				-2.84E 00				
6	1	1	1	-1.32E 00	-1.33E 00	-1.36E 00	-1.42E 00	-1.52E 00
				-1.68E 00	-1.80E 00	-1.91E 00	-2.01E 00	-2.11E 00
				-2.18E 00	-2.27E 00	-2.34E 00	-2.41E 00	-2.47E 00
				-2.54E 00	-2.58E 00	-2.65E 00	-2.71E 00	-2.78E 00
				-2.85E 00				
7	1	1	1	-1.99E 00	-1.93E 00	-1.92E 00	-1.95E 00	-2.03E 00
				-2.15E 00	-2.27E 00	-2.36E 00	-2.43E 00	-2.49E 00
				-2.53E 00	-2.56E 00	-2.58E 00	-2.62E 00	-2.65E 00
				-2.68E 00	-2.73E 00	-2.77E 00	-2.81E 00	-2.87E 00
				-2.92E 00				
8	1	1	1	-2.63E 00	-2.49E 00	-2.42E 00	-2.42E 00	-2.47E 00
				-2.57E 00	-2.66E 00	-2.74E 00	-2.79E 00	-2.84E 00
				-2.87E 00	-2.87E 00	-2.86E 00	-2.85E 00	-2.85E 00
				-2.85E 00	-2.87E 00	-2.89E 00	-2.91E 00	-2.94E 00
				-2.97E 00				
9	1	1	1	-3.08E 00	-2.92E 00	-2.83E 00	-2.81E 00	-2.83E 00
				-2.92E 00	-2.99E 00	-3.09E 00	-3.18E 00	-3.24E 00
				-3.28E 00	-3.29E 00	-3.26E 00	-3.22E 00	-3.20E 00
				-3.16E 00	-3.15E 00	-3.14E 00	-3.14E 00	-3.15E 00
				-3.15E 00				
1	2	1	1	2.08E 00	2.04E 00	1.95E 00	1.79E 00	1.57E 00
				1.23E 00	8.70E-01	5.40E-01	2.50E-01	4.00E-02
				-2.00E-01	-4.30E-01	-6.50E-01	-8.80E-01	-1.11E 00
				-1.31E 00	-1.48E 00	-1.67E 00	-1.81E 00	-1.96E 00
				-2.08E 00				

TABLE 5 CONTINUED

```
2  2  1  1   1.59E 00   1.52E 00   1.42E 00   1.25E 00   1.05E 00
             8.00E-01   5.30E-01   3.00E-01   6.00E-02  -1.70E-01
            -3.80E-01  -5.60E-01  -7.70E-01  -9.60E-01  -1.17E 00
            -1.37E 00  -1.55E 00  -1.72E 00  -1.87E 00  -2.02E 00
            -2.13E 00
3  2  1  1   1.13E 00   1.04E 00   9.20E-01   7.70E-01   5.70E-01
             3.60E-01   1.40E-01  -4.00E-02  -2.30E-01  -4.30E-01
            -6.10E-01  -8.00E-01  -9.80E-01  -1.16E 00  -1.32E 00
            -1.50E 00  -1.66E 00  -1.80E 00  -1.95E 00  -2.06E 00
            -2.19E 00
4  2  1  1   7.70E-01   6.50E-01   5.20E-01   3.80E-01   2.30E-01
             7.00E-02  -1.00E-01  -2.70E-01  -4.60E-01  -6.40E-01
            -8.20E-01  -9.90E-01  -1.17E 00  -1.34E 00  -1.50E 00
            -1.66E 00  -1.81E 00  -1.96E 00  -2.08E 00  -2.18E 00
            -2.29E 00
5  2  1  1   0.0       -1.40E-01  -2.70E-01  -4.00E-01  -5.20E-01
            -6.50E-01  -7.60E-01  -8.50E-01  -9.80E-01  -1.10E 00
            -1.21E 00  -1.32E 00  -1.45E 00  -1.58E 00  -1.72E 00
            -1.86E 00  -1.99E 00  -2.13E 00  -2.26E 00  -2.35E 00
            -2.44E 00
6  2  1  1  -7.80E-01  -8.40E-01  -9.20E-01  -9.90E-01  -1.09E 00
            -1.19E 00  -1.28E 00  -1.39E 00  -1.48E 00  -1.60E 00
            -1.70E 00  -1.79E 00  -1.91E 00  -2.01E 00  -2.12E 00
            -2.21E 00  -2.31E 00  -2.37E 00  -2.46E 00  -2.55E 00
            -2.61E 00
7  2  1  1  -1.13E 00  -1.22E 00  -1.29E 00  -1.36E 00  -1.42E 00
            -1.51E 00  -1.59E 00  -1.73E 00  -1.84E 00  -1.94E 00
            -2.03E 00  -2.12E 00  -2.18E 00  -2.27E 00  -2.33E 00
            -2.42E 00  -2.48E 00  -2.56E 00  -2.64E 00  -2.71E 00
            -2.79E 00
8  2  1  1  -1.60E 00  -1.62E 00  -1.62E 00  -1.66E 00  -1.71E 00
            -1.77E 00  -1.85E 00  -1.97E 00  -2.09E 00  -2.17E 00
            -2.27E 00  -2.35E 00  -2.41E 00  -2.49E 00  -2.55E 00
            -2.62E 00  -2.69E 00  -2.75E 00  -2.81E 00  -2.86E 00
            -2.91E 00
9  2  1  1  -2.08E 00  -2.06E 00  -2.04E 00  -1.98E 00  -1.98E 00
            -2.02E 00  -2.10E 00  -2.21E 00  -2.35E 00  -2.46E 00
            -2.54E 00  -2.61E 00  -2.68E 00  -2.73E 00  -2.78E 00
            -2.83E 00  -2.88E 00  -2.94E 00  -2.98E 00  -3.04E 00
            -3.09E 00
1  3  1  1   1.16E 00   1.13E 00   1.06E 00   9.50E-01   8.00E-01
             6.30E-01   4.10E-01   2.50E-01   1.00E-01  -4.00E-02
            -1.70E-01  -3.50E-01  -5.10E-01  -7.10E-01  -8.80E-01
            -1.09E 00  -1.33E 00  -1.53E 00  -1.78E 00  -2.03E 00
            -2.29E 00
2  3  1  1   9.30E-01   8.70E-01   7.90E-01   6.70E-01   5.40E-01
             3.80E-01   2.10E-01   9.00E-02  -4.00E-02  -1.60E-01
            -2.80E-01  -4.40E-01  -6.10E-01  -8.10E-01  -9.80E-01
            -1.21E 00  -1.42E 00  -1.63E 00  -1.89E 00  -2.14E 00
            -2.36E 00
3  3  1  1   6.80E-01   6.10E-01   5.10E-01   3.90E-01   2.70E-01
             1.50E-01   2.00E-02  -8.00E-02  -1.50E-01  -2.40E-01
            -3.70E-01  -5.10E-01  -6.90E-01  -8.90E-01  -1.09E 00
            -1.31E 00  -1.52E 00  -1.76E 00  -2.00E 00  -2.25E 00
            -2.50E 00
4  3  1  1   4.90E-01   3.80E-01   2.40E-01   1.10E-01  -2.00E-02
            -1.10E-01  -1.50E-01  -2.30E-01  -3.10E-01  -4.20E-01
            -5.50E-01  -7.00E-01  -8.60E-01  -1.06E 00  -1.26E 00
            -1.48E 00  -1.69E 00  -1.93E 00  -2.15E 00  -2.40E 00
            -2.63E 00
5  3  1  1   0.0       -1.20E-01  -2.50E-01  -3.50E-01  -4.40E-01
            -5.40E-01  -6.10E-01  -6.70E-01  -7.50E-01  -8.40E-01
            -9.30E-01  -1.05E 00  -1.17E 00  -1.35E 00  -1.55E 00
            -1.77E 00  -1.98E 00  -2.21E 00  -2.45E 00  -2.68E 00
            -2.86E 00
6  3  1  1  -4.70E-01  -5.50E-01  -6.30E-01  -7.10E-01  -8.00E-01
            -8.90E-01  -9.80E-01  -1.06E 00  -1.13E 00  -1.21E 00
            -1.31E 00  -1.43E 00  -1.58E 00  -1.77E 00  -1.98E 00
            -2.21E 00  -2.40E 00  -2.61E 00  -2.82E 00  -3.00E 00
            -3.16E 00
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TABLE 5 CONTINUED

```
7  3  1  1 -7.00E-01 -7.60E-01 -8.10E-01 -9.00E-01 -9.90E-01
           -1.08E 00 -1.17E 00 -1.24E 00 -1.31E 00 -1.40E 00
           -1.51E 00 -1.63E 00 -1.77E 00 -1.98E 00 -2.18E 00
           -2.41E 00 -2.61E 00 -2.79E 00 -2.98E 00 -3.16E 00
           -3.33E 00
8  3  1  1 -9.00E-01 -9.40E-01 -1.00E 00 -1.07E 00 -1.14E 00
           -1.23E 00 -1.28E 00 -1.39E 00 -1.46E 00 -1.59E 00
           -1.71E 00 -1.85E 00 -2.01E 00 -2.19E 00 -2.39E 00
           -2.58E 00 -2.80E 00 -3.01E 00 -3.21E 00 -3.38E 00
           -3.55E 00
9  3  1  1 -1.13E 00 -1.14E 00 -1.17E 00 -1.24E 00 -1.30E 00
           -1.38E 00 -1.46E 00 -1.55E 00 -1.65E 00 -1.76E 00
           -1.89E 00 -2.03E 00 -2.20E 00 -2.39E 00 -2.59E 00
           -2.82E 00 -3.03E 00 -3.22E 00 -3.41E 00 -3.61E 00
           -3.76E 00
1  4  1  1  6.70E-01  6.20E-01  5.60E-01  4.70E-01  3.80E-01
            2.70E-01  1.70E-01  6.00E-02 -3.00E-02 -1.10E-01
           -2.10E-01 -3.10E-01 -4.40E-01 -6.00E-01 -7.90E-01
           -9.90E-01 -1.21E 00 -1.44E 00 -1.69E 00 -1.97E 00
           -2.25E 00
2  4  1  1  5.50E-01  5.00E-01  4.40E-01  3.60E-01  2.80E-01
            1.80E-01  7.00E-02 -2.00E-02 -1.10E-01 -2.00E-01
           -2.90E-01 -3.90E-01 -5.20E-01 -6.70E-01 -8.50E-01
           -1.05E 00 -1.26E 00 -1.50E 00 -1.76E 00 -2.04E 00
           -2.35E 00
3  4  1  1  3.90E-01  3.10E-01  2.30E-01  1.50E-01  7.00E-02
           -1.00E-02 -8.00E-02 -1.40E-01 -2.00E-01 -2.50E-01
           -3.40E-01 -4.50E-01 -5.80E-01 -7.50E-01 -9.30E-01
           -1.14E 00 -1.36E 00 -1.60E 00 -1.88E 00 -2.16E 00
           -2.47E 00
4  4  1  1  2.70E-01  1.90E-01  1.20E-01  4.00E-02 -4.00E-02
           -1.10E-01 -1.90E-01 -2.50E-01 -3.30E-01 -4.00E-01
           -4.90E-01 -5.90E-01 -7.10E-01 -8.60E-01 -1.02E 00
           -1.24E 00 -1.46E 00 -1.70E 00 -1.96E 00 -2.22E 00
           -2.55E 00
5  4  1  1 -3.00E-02 -1.00E-01 -1.80E-01 -2.60E-01 -3.30E-01
           -4.10E-01 -4.90E-01 -5.60E-01 -6.40E-01 -7.00E-01
           -8.00E-01 -9.00E-01 -1.01E 00 -1.15E 00 -1.32E 00
           -1.51E 00 -1.73E 00 -1.96E 00 -2.20E 00 -2.46E 00
           -2.74E 00
6  4  1  1 -2.80E-01 -3.50E-01 -4.10E-01 -4.90E-01 -5.80E-01
           -6.80E-01 -7.90E-01 -9.00E-01 -1.03E 00 -1.18E 00
           -1.33E 00 -1.49E 00 -1.64E 00 -1.82E 00 -2.01E 00
           -2.21E 00 -2.42E 00 -2.63E 00 -2.86E 00 -3.08E 00
           -3.32E 00
7  4  1  1 -3.90E-01 -4.80E-01 -5.70E-01 -6.70E-01 -7.80E-01
           -8.80E-01 -1.02E 00 -1.17E 00 -1.30E 00 -1.44E 00
           -1.60E 00 -1.76E 00 -1.91E 00 -2.07E 00 -2.23E 00
           -2.41E 00 -2.60E 00 -2.80E 00 -3.01E 00 -3.24E 00
           -3.51E 00
8  4  1  1 -6.00E-01 -6.40E-01 -7.10E-01 -7.90E-01 -8.80E-01
           -1.02E 00 -1.16E 00 -1.30E 00 -1.45E 00 -1.61E 00
           -1.76E 00 -1.90E 00 -2.06E 00 -2.23E 00 -2.38E 00
           -2.54E 00 -2.72E 00 -2.90E 00 -3.11E 00 -3.33E 00
           -3.61E 00
9  4  1  1 -6.90E-01 -7.60E-01 -8.30E-01 -9.20E-01 -1.04E 00
           -1.14E 00 -1.29E 00 -1.42E 00 -1.58E 00 -1.72E 00
           -1.87E 00 -2.04E 00 -2.21E 00 -2.37E 00 -2.53E 00
           -2.71E 00 -2.89E 00 -3.05E 00 -3.24E 00 -3.47E 00
           -3.70E 00
1  5  1  1  4.70E-01  4.30E-01  3.90E-01  3.50E-01  2.90E-01
            2.30E-01  1.50E-01  9.00E-02  0.0      -8.00E-02
           -1.70E-01 -2.60E-01 -3.60E-01 -4.60E-01 -5.90E-01
           -7.50E-01 -9.40E-01 -1.14E 00 -1.38E 00 -1.65E 00
           -1.94E 00
2  5  1  1  3.90E-01  3.60E-01  3.20E-01  2.80E-01  2.20E-01
            1.60E-01  1.00E-01  3.00E-02 -5.00E-02 -1.30E-01
           -2.20E-01 -3.00E-01 -4.00E-01 -5.00E-01 -6.30E-01
           -7.90E-01 -9.60E-01 -1.18E 00 -1.41E 00 -1.69E 00
           -1.99E 00
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TABLE 5 CONTINUED

```
3  5  1  1   2.80E-01   2.10E-01   1.60E-01   1.10E-01   6.00E-02
             2.00E-02  -4.00E-02  -9.00E-02  -1.40E-01  -2.00E-01
            -2.80E-01  -3.70E-01  -4.50E-01  -5.60E-01  -7.00E-01
            -8.60E-01  -1.04E 00  -1.27E 00  -1.52E 00  -1.81E 00
            -2.14E 00
4  5  1  1   1.80E-01   1.20E-01   7.00E-02   1.00E-02  -5.00E-02
            -1.10E-01  -1.70E-01  -2.50E-01  -3.20E-01  -3.    -01
            -4.80E-01  -5.60E-01  -6.80E-01  -7.70E-01  -8.    -01
            -1.02E 00  -1.19E 00  -1.39E 00  -1.62E 00  -1.    E 00
            -2.18E 00
5  5  1  1  -1.00E-02  -6.00E-02  -1.30E-01  -1.90E-01  -2.50E-01
            -3.20E-01  -3.90E-01  -4.70E-01  -5.50E-01  -6.40E-01
            -7.30E-01  -8.20E-01  -9.20E-01  -1.03E 00  -1.17E 00
            -1.32E 00  -1.53E 00  -1.76E 00  -2.02E 00  -2.31E 00
            -2.62E 00
6  5  1  1  -1.90E-01  -2.30E-01  -2.90E-01  -3.80E-01  -4.50E-01
            -5.60E-01  -6.70E-01  -8.00E-01  -9.20E-01  -1.06E 00
            -1.20E 00  -1.36E 00  -1.52E 00  -1.67E 00  -1.83E 00
            -2.01E 00  -2.20E 00  -2.38E 00  -2.56E 00  -2.76E 00
            -2.93E 00
7  5  1  1  -2.60E-01  -3.10E-01  -3.80E-01  -4.60E-01  -5.50E-01
            -6.70E-01  -7.90E-01  -9.10E-01  -1.05E 00  -1.20E 00
            -1.34E 00  -1.50E 00  -1.68E 00  -1.86E 00  -2.03E 00
            -2.22E 00  -2.40E 00  -2.59E 00  -2.78E 00  -2.98E 00
            -3.17E 00
8  5  1  1  -3.60E-01  -4.10E-01  -4.70E-01  -5.50E-01  -6.60E-01
            -7.60E-01  -8.80E-01  -1.00E 00  -1.14E 00  -1.29E 00
            -1.44E 00  -1.59E 00  -1.77E 00  -1.94E 00  -2.12E 00
            -2.31E 00  -2.50E 00  -2.68E 00  -2.87E 00  -3.07E 00
            -3.26E 00
9  5  1  1  -4.40E-01  -4.90E-01  -5.60E-01  -6.40E-01  -7.30E-01
            -8.30E-01  -9.50E-01  -1.06E 00  -1.21E 00  -1.37E 00
            -1.54E 00  -1.73E 00  -1.93E 00  -2.18E 00  -2.41E 00
            -2.63E 00  -2.84E 00  -3.03E 00  -3.18E 00  -3.32E 00
            -3.42E 00
1  6  1  1   3.10E-01   2.80E-01   2.60E-01   2.40E-01   2.10E-01
             1.90E-01   1.50E-01   1.10E-01   7.00E-02   2.00E-02
            -3.00E-02  -9.00E-02  -1.50E-01  -2.30E-01  -3.10E-01
            -4.30E-01  -5.80E-01  -7.90E-01  -1.01E 00  -1.28E 00
            -1.61E 00
2  6  1  1   2.60E-01   2.40E-01   2.20E-01   1.90E-01   1.70E-01
             1.40E-01   1.10E-01   7.00E-02   3.00E-02  -2.00E-02
            -8.00E-02  -1.30E-01  -2.10E-01  -2.80E-01  -3.70E-01
            -4.90E-01  -6.40E-01  -8.20E-01  -1.08E 00  -1.36E 00
            -1.72E 00
3  6  1  1   1.90E-01   1.70E-01   1.60E-01   1.30E-01   1.10E-01
             7.00E-02   4.00E-02   1.00E-02  -3.00E-02  -8.00E-02
            -1.30E-01  -1.80E-01  -2.60E-01  -3.40E-01  -4.30E-01
            -5.70E-01  -7.40E-01  -9.50E-01  -1.19E 00  -1.50E 00
            -1.84E 00
4  6  1  1   1.20E-01   1.10E-01   8.00E-02   4.00E-02   0.0
            -5.00E-02  -1.00E-01  -1.50E-01  -2.10E-01  -2.70E-01
            -3.40E-01  -3.90E-01  -4.60E-01  -5.40E-01  -6.30E-01
            -7.70E-01  -9.40E-01  -1.15E 00  -1.39E 00  -1.67E 00
            -1.97E 00
5  6  1  1   3.00E-02   0.0       -5.00E-02  -9.00E-02  -1.30E-01
            -1.70E-01  -2.20E-01  -2.80E-01  -3.50E-01  -4.20E-01
            -4.90E-01  -5.80E-01  -6.80E-01  -7.90E-01  -9.30E-01
            -1.09E 00  -1.28E 00  -1.52E 00  -1.79E 00  -2.09E 00
            -2.43E 00
6  6  1  1  -7.00E-02  -1.10E-01  -1.60E-01  -2.10E-01  -2.90E-01
            -3.60E-01  -4.30E-01  -5.20E-01  -6.10E-01  -7.20E-01
            -8.40E-01  -9.80E-01  -1.12E 00  -1.29E 00  -1.47E 00
            -1.67E 00  -1.88E 00  -2.09E 00  -2.34E 00  -2.57E 00
            -2.82E 00
7  6  1  1  -1.40E-01  -1.80E-01  -2.30E-01  -3.10E-01  -3.90E-01
            -4.60E-01  -5.40E-01  -6.20E-01  -7.20E-01  -8.40E-01
            -9.40E-01  -1.09E 00  -1.23E 00  -1.42E 00  -1.63E 00
            -1.83E 00  -2.05E 00  -2.28E 00  -2.53E 00  -2.81E 00
            -3.07E 00
```

TABLE 5 CONTINUED

```
8  6  1  1  -2.00E-01  -2.60E-01  -3.00E-01  -3.70E-01  -4.40E-01
             -5.00E-01  -5.80E-01  -6.80E-01  -7.90E-01  -9.10E-01
             -1.07E 00  -1.25E 00  -1.46E 00  -1.69E 00  -1.92E 00
             -2.16E 00  -2.39E 00  -2.66E 00  -2.90E 00  -3.15E 00
             -3.36E 00
9  6  1  1  -2.80E-01  -3.10E-01  -3.50E-01  -4.10E-01  -4.90E-01
             -5.50E-01  -6.40E-01  -7.40E-01  -8.60E-01  -9.80E-01
             -1.13E 00  -1.31E 00  -1.57E 00  -1.82E 00  -2.06E 00
             -2.32E 00  -2.56E 00  -2.82E 00  -3.06E 00  -3.26E 00
             -3.43E 00
1  7  1  1   1.00E-01   1.00E-01   1.10E-01   1.50E-01   1.80E-01
              2.10E-01   2.20E-01   2.20E-01   2.30E-01   2.30E-01
              2.30E-01   2.20E-01   2.00E-01   1.70E-01   1.20E-01
              3.00E-02  -7.00E-02  -2.30E-01  -4.30E-01  -7.10E-01
             -1.04E 00
2  7  1  1   6.00E-02   7.00E-02   8.00E-02   9.00E-02   1.00E-01
              1.20E-01   1.20E-01   1.30E-01   1.40E-01   1.40E-01
              1.30E-01   1.20E-01   1.10E-01   8.00E-02   4.00E-02
             -3.00E-02  -1.30E-01  -2.90E-01  -4.90E-01  -7.80E-01
             -1.13E 00
3  7  1  1   3.00E-02   3.00E-02   5.00E-02   6.00E-02   8.00E-02
              9.00E-02   1.00E-01   1.00E-01   1.00E-01   9.00E-02
              7.00E-02   5.00E-02   1.00E-02  -2.00E-02  -6.00E-02
             -1.10E-01  -2.20E-01  -3.90E-01  -6.70E-01  -1.01E 00
             -1.51E 00
4  7  1  1   0.0        1.00E-02   1.00E-02   2.00E-02   2.00E-02
              2.00E-02   2.00E-02   2.00E-02   2.00E-02   2.00E-02
              0.0       -3.00E-02  -7.00E-02  -1.20E-01  -1.80E-01
             -2.70E-01  -4.10E-01  -6.20E-01  -8.80E-01  -1.19E 00
             -1.62E 00
5  7  1  1   0.0       -1.00E-02  -3.00E-02  -5.00E-02  -9.00E-02
             -1.30E-01  -2.00E-01  -2.40E-01  -3.10E-01  -3.80E-01
             -4.40E-01  -5.20E-01  -5.80E-01  -6.50E-01  -7.60E-01
             -9.10E-01  -1.09E 00  -1.30E 00  -1.54E 00  -1.81E 00
             -2.10E 00
6  7  1  1  -1.00E-02  -3.00E-02  -6.00E-02  -1.10E-01  -1.60E-01
             -2.30E-01  -3.10E-01  -4.00E-01  -5.00E-01  -6.00E-01
             -7.10E-01  -8.60E-01  -1.03E 00  -1.22E 00  -1.43E 00
             -1.65E 00  -1.91E 00  -2.17E 00  -2.42E 00  -2.71E 00
             -2.99E 00
7  7  1  1  -3.00E-02  -6.00E-02  -1.10E-01  -1.60E-01  -2.10E-01
             -2.90E-01  -3.80E-01  -4.90E-01  -6.00E-01  -7.30E-01
             -8.70E-01  -1.02E 00  -1.21E 00  -1.41E 00  -1.65E 00
             -1.89E 00  -2.14E 00  -2.39E 00  -2.62E 00  -2.87E 00
             -3.11E 00
8  7  1  1  -7.00E-02  -9.00E-02  -1.30E-01  -1.80E-01  -2.40E-01
             -3.20E-01  -4.20E-01  -5.50E-01  -6.80E-01  -8.20E-01
             -9.70E-01  -1.15E 00  -1.34E 00  -1.58E 00  -1.82E 00
             -2.10E 00  -2.35E 00  -2.60E 00  -2.84E 00  -3.06E 00
             -3.27E 00
9  7  1  1  -9.00E-02  -1.10E-01  -1.60E-01  -2.20E-01  -2.90E-01
             -3.80E-01  -4.80E-01  -6.20E-01  -7.70E-01  -9.20E-01
             -1.08E 00  -1.26E 00  -1.49E 00  -1.76E 00  -2.05E 00
             -2.37E 00  -2.66E 00  -2.92E 00  -3.16E 00  -3.35E 00
             -3.50E 00
1  8  1  1   8.00E-02   1.10E-01   1.40E-01   1.70E-01   2.00E-01
              2.30E-01   2.60E-01   2.80E-01   2.90E-01   3.00E-01
              2.90E-01   2.70E-01   2.70E-01   2.50E-01   2.10E-01
              1.70E-01   7.00E-02  -7.00E-02  -2.80E-01  -5.40E-01
             -8.60E-01
2  8  1  1   6.00E-02   7.00E-02   9.00E-02   1.10E-01   1.30E-01
              1.60E-01   1.80E-01   2.00E-01   2.10E-01   2.10E-01
              2.10E-01   2.00E-01   1.80E-01   1.60E-01   1.30E-01
              8.00E-02   0.0       -1.60E-01  -3.90E-01  -7.00E-01
             -1.08E 00
3  8  1  1   3.00E-02   3.00E-02   5.00E-02   5.00E-02   6.00E-02
              7.00E-02   9.00E-02   1.10E-01   1.10E-01   1.10E-01
              1.00E-01   9.00E-02   9.00E-02   8.00E-02   6.00E-02
              2.00E-02  -7.00E-02  -2.50E-01  -5.10E-01  -8.50E-01
             -1.28E 00
```

TABLE 5 CONTINUED

```
4  8  1  1   2.00E-02   2.00E-02   2.00E-02   2.00E-02   2.00E-02
             1.00E-02   1.00E-02   1.00E-02   1.00E-02   0.0
            -2.00E-02  -2.00E-02  -2.00E-02  -4.00E-02  -1.10E-01
            -2.40E-01  -3.80E-01  -5.90E-01  -8.30E-01  -1.12E 00
            -1.46E 00
5  8  1  1   2.00E-02   2.00E-02   2.00E-02   1.00E-02  -1.00E-02
            -5.00E-02  -1.00E-01  -1.60E-01  -2.20E-01  -2.90E-01
            -3.80E-01  -4.60E-01  -5.50E-01  -6.40E-01  -7.40E-01
            -8.70E-01  -1.01E 00  -1.20E 00  -1.45E 00  -1.75E 00
            -2.14E 00
6  8  1  1   0.0        0.0       -1.00E-02  -3.00E-02  -9.00E-02
            -1.50E-01  -2.30E-01  -3.30E-01  -4.50E-01  -5.90E-01
            -7.30E-01  -8.80E-01  -1.05E 00  -1.23E 00  -1.43E 00
            -1.65E 00  -1.88E 00  -2.10E 00  -2.33E 00  -2.57E 00
            -2.78E 00
7  8  1  1  -2.00E-02  -2.00E-02  -4.00E-02  -7.00E-02  -1.20E-01
            -1.80E-01  -2.60E-01  -3.70E-01  -5.00E-01  -6.50E-01
            -8.10E-01  -1.00E 00  -1.21E 00  -1.44E 00  -1.68E 00
            -1.93E 00  -2.15E 00  -2.41E 00  -2.68E 00  -2.96E 00
            -3.26E 00
8  8  1  1  -1.00E-02  -3.00E-02  -5.00E-02  -8.00E-02  -1.50E-01
            -2.20E-01  -3.20E-01  -4.10E-01  -5.90E-01  -7.70E-01
            -9.60E-01  -1.19E 00  -1.42E 00  -1.68E 00  -1.93E 00
            -2.20E 00  -2.44E 00  -2.68E 00  -2.94E 00  -3.19E 00
            -3.40E 00
9  8  1  1  -4.00E-02  -4.00E-02  -7.00E-02  -1.10E-01  -1.80E-01
            -2.60E-01  -3.50E-01  -4.70E-01  -6.40E-01  -8.20E-01
            -1.02E 00  -1.25E 00  -1.52E 00  -1.79E 00  -2.08E 00
            -2.37E 00  -2.65E 00  -2.90E 00  -3.12E 00  -3.33E 00
            -3.50E 00
```

TABLE 6

THE 13 VALUES OF THE 1TH VARIABLE FOLLOW

```
     0.0         2.00E 00   4.00E 00   6.COE 00   8.00E 00
     1.00E 01    1.20E 01   1.40E 01   1.60E 01   1.80E 01
     2.00E 01    2.20E 01   2.40E 01
```

THE 9 VALUES OF THE 2TH VARIABLE FOLLOW

```
    -2.00E 01  -1.60E 01  -1.20E 01  -8.00E 00   0.0
     8.00E 00   1.20E 01   1.60E 01   2.00E 01
```

THE 10 VALUES OF THE 3TH VARIABLE FOLLOW

```
     8.00E-01    1.00E 00   1.30E 00   1.60E 00   2.00E 00
     2.30E 00    2.60E 00   3.00E 00   4.00E 00   4.60E 00
```

I2	I3	I4	I5	I1=1	I1=2	ETC.		
1	1	1	1	-2.37E 00	-2.26E 00	-2.27E 00	-2.32E 00	-2.44E 00
				-2.58E 00	-2.70E 00	-2.81E 00	-2.89E 00	-2.94E 00
				-2.97E 00	-2.98E 00	-2.94E 00		
2	1	1	1	-2.12E 00	-2.08E 00	-2.04E 00	-2.08E 00	-2.16E 00
				-2.31E 00	-2.47E 00	-2.60E 00	-2.70E 00	-2.77E 00
				-2.80E 00	-2.81E 00	-2.81E 00		
3	1	1	1	-2.00E 00	-1.95E 00	-1.94E 00	-1.97E 00	-2.07E 00
				-2.22E 00	-2.38E 00	-2.50E 00	-2.60E 00	-2.67E 00
				-2.70E 00	-2.73E 00	-2.74E 00		
4	1	1	1	-1.30E 00	-1.20E 00	-1.19E 00	-1.25E 00	-1.41E 00
				-1.63E 00	-1.89E 00	-2.09E 00	-2.24E 00	-2.39E 00
				-2.48E 00	-2.53E 00	-2.57E 00		
5	1	1	1	0.0	-2.00E-02	-1.10E-01	-2.50E-01	-4.20E-01
				-7.00E-01	-1.08E 00	-1.47E 00	-1.80E 00	-2.07E 00
				-2.29E 00	-2.41E 00	-2.45E 00		
6	1	1	1	1.30E 00	1.32E 00	1.09E 00	5.COE-01	4.00E-02
				-3.10E-01	-7.00E-01	-1.09E 00	-1.41E 00	-1.72E 00
				-2.05E 00	-2.25E 00	-2.34E 00		
7	1	1	1	1.99E 00	1.99E 00	1.73E 00	1.20E 00	6.30E-01
				1.20E-01	-3.00E-01	-7.60E-01	-1.18E 00	-1.51E 00
				-1.86E 00	-2.12E 00	-2.30E 00		
8	1	1	1	2.19E 00	2.20E 00	1.81E 00	1.30E 00	7.90E-01
				2.90E-01	-2.00E-01	-6.40E-01	-1.C7E 00	-1.42E 00
				-1.74E 00	-2.02E 00	-2.24E 00		
9	1	1	1	2.40E 00	2.38E 00	1.97E 00	1.44E 00	9.50E-01
				4.50E-01	0.0	-4.30E-01	-8.60E-01	-1.29E 00
				-1.64E 00	-1.94E 00	-2.20E 00		
1	2	1	1	-2.98E 00	-2.86E 00	-2.80E 00	-2.80E 00	-2.85E 00
				-2.96E 00	-3.12E 00	-3.30E 00	-3.47E 00	-3.62E 00
				-3.77E 00	-3.89E 00	-4.00E 00		
2	2	1	1	-2.44E 00	-2.39E 00	-2.40E 00	-2.46E 00	-2.65E 00
				-2.72E 00	-2.92E 00	-3.10E 00	-3.27E 00	-3.41E 00
				-3.56E 00	-3.69E 00	-3.81E 00		
3	2	1	1	-2.06E 00	-1.90E 00	-1.84E 00	-1.88E 00	-2.00E 00
				-2.16E 00	-2.32E 00	-2.50E 00	-2.67E 00	-2.83E 00
				-3.01E 00	-3.19E 00	-3.35E 00		
4	2	1	1	-1.30E 00	-1.23E 00	-1.28E 00	-1.48E 00	-1.70E 00
				-1.91E 00	-2.11E 00	-2.30E 00	-2.50E 00	-2.70E 00
				-2.89E 00	-3.08E 00	-3.24E 00		
5	2	1	1	0.0	-7.00E-02	-1.90E-01	-3.30E-01	-5.30E-01
				-8.00E-01	-1.12E 00	-1.41E 00	-1.71E 00	-2.00E 00
				-2.27E 00	-2.50E 00	-2.71E 00		
6	2	1	1	1.34E 00	1.37E 00	1.17E 00	8.80E-01	4.30E-01
				-5.00E-02	-5.00E-01	-9.40E-01	-1.30E 00	-1.66E 00
				-1.96E 00	-2.22E 00	-2.50E 00		
7	2	1	1	2.06E 00	2.04E 00	1.80E 00	1.43E 00	8.80E-01
				3.00E-01	-2.00E-01	-6.50E-01	-1.C5E 00	-1.41E 00
				-1.75E 00	-2.05E 00	-2.31E 00		
8	2	1	1	2.41E 00	2.39E 00	2.10E 00	1.61E 00	1.01E 00
				4.70E-01	-2.00E-02	-5.00E-01	-9.40E-01	-1.30E 00
				-1.64E 00	-1.96E 00	-2.22E 00		
9	2	1	1	3.00E 00	2.98E 00	2.69E 00	2.21E 00	1.55E 00
				8.50E-01	2.50E-01	-2.50E-01	-7.00E-01	-1.09E 00
				-1.43E 00	-1.74E 00	-2.00E 00		

TABLE 6 CONTINUED

```
1   3   1   1   -2.51E 00   -2.36E 00   -2.25E 00   -2.20E 00   -2.20E 00
                -2.25E 00   -2.30E 00   -2.37E 00   -2.44E 00   -2.52E 00
                -2.60E 00   -2.66E 00   -2.72E 00
2   3   1   1   -1.84E 00   -1.62E 00   -1.54E 00   -1.58E 00   -1.72E 00
                -1.89E 00   -2.03E 00   -2.15E 00   -2.26E 00   -2.34E 00
                -2.41E 00   -2.48E 00   -2.54E 00
3   3   1   1   -1.23E 00   -1.24E 00   -1.28E 00   -1.36E 00   -1.49E 00
                -1.64E 00   -1.81E 00   -1.96E 00   -2.09E 00   -2.21E 00
                -2.31E 00   -2.40E 00   -2.47E 00
4   3   1   1   -7.90E-01   -8.20E-01   -8.90E-01   -1.02E 00   -1.19E 00
                -1.38E 00   -1.53E 00   -1.69E 00   -1.82E 00   -1.96E 00
                -2.07E 00   -2.15E 00   -2.20E 00
5   3   1   1    0.0        -1.10E-01   -2.40E-01   -4.10E-01   -6.10E-01
                -8.30E-01   -1.08E 00   -1.30E 00   -1.50E 00   -1.67E 00
                -1.79E 00   -1.89E 00   -1.99E 00
6   3   1   1    8.20E-01    7.70E-01    5.80E-01    3.60E-01    2.00E-02
                -2.90E-01   -5.90E-01   -8.50E-01   -1.10E 00   -1.29E 00
                -1.44E 00   -1.54E 00   -1.63E 00
7   3   1   1    1.24E 00    1.11E 00    9.00E-01    6.50E-01    3.60E-01
                 1.00E-02   -2.80E-01   -5.60E-01   -8.50E-01   -1.11E 00
                -1.32E 00   -1.47E 00   -1.56E 00
8   3   1   1    1.87E 00    1.65E 00    1.35E 00    1.01E 00    6.30E-01
                 2.50E-01   -1.10E-01   -4.00E-01   -6.80E-01   -8.90E-01
                -1.05E 00   -1.19E 00   -1.28E 00
9   3   1   1    2.50E 00    2.30E 00    1.85E 00    1.40E 00    8.90E-01
                 4.40E-01    5.00E-02   -2.90E-01   -5.80E-01   -7.70E-01
                -9.10E-01   -1.03E 00   -1.12E 00
1   4   1   1   -1.40E 00   -1.43E 00   -1.50E 00   -1.55E 00   -1.65E 00
                -1.70E 00   -1.78E 00   -1.82E 00   -1.90E 00   -1.92E 00
                -1.98E 00   -2.01E 00   -2.05E 00
2   4   1   1   -1.01E 00   -1.15E 00   -1.25E 00   -1.35E 00   -1.45E 00
                -1.55E 00   -1.65E 00   -1.75E 00   -1.80E 00   -1.85E 00
                -1.86E 00   -1.90E 00   -1.95E 00
3   4   1   1   -8.50E-01   -9.00E-01   -9.50E-01   -1.00E 00   -1.10E 00
                -1.25E 00   -1.35E 00   -1.45E 00   -1.55E 00   -1.60E 00
                -1.65E 00   -1.75E 00   -1.80E 00
4   4   1   1   -5.50E-01   -6.00E-01   -7.00E-01   -8.50E-01   -9.50E-01
                -1.10E 00   -1.20E 00   -1.30E 00   -1.40E 00   -1.45E 00
                -1.55E 00   -1.65E 00   -1.70E 00
5   4   1   1    0.0        -1.20E-01   -2.70E-01   -4.30E-01   -5.80E-01
                -7.80E-01   -9.50E-01   -1.10E 00   -1.22E 00   -1.36E 00
                -1.46E 00   -1.54E 00   -1.61E 00
6   4   1   1    5.10E-01    4.20E-01    2.80E-01    8.00E-02   -1.80E-01
                -4.50E-01   -6.20E-01   -7.80E-01   -8.90E-01   -9.70E-01
                -1.05E 00   -1.13E 00   -1.20E 00
7   4   1   1    8.50E-01    7.50E-01    6.00E-01    4.20E-01    1.40E-01
                -2.30E-01   -5.00E-01   -6.80E-01   -8.00E-01   -8.90E-01
                -9.50E-01   -1.05E 00   -1.12E 00
8   4   1   1    1.10E 00    9.90E-01    8.00E-01    5.50E-01    2.50E-01
                -1.00E-01   -3.60E-01   -5.40E-01   -6.90E-01   -8.00E-01
                -8.90E-01   -9.70E-01   -1.05E 00
9   4   1   1    1.35E 00    1.20E 00    1.00E 00    7.60E-01    4.50E-01
                 2.00E-01   -2.50E-01   -4.00E-01   -5.50E-01   -6.40E-01
                -7.40E-01   -8.10E-01   -9.00E-01
1   5   1   1   -1.00E 00   -1.02E 00   -1.08E 00   -1.14E 00   -1.20E 00
                -1.27E 00   -1.32E 00   -1.40E 00   -1.47E 00   -1.53E 00
                -1.61E 00   -1.69E 00   -1.75E 00
2   5   1   1   -9.20E-01   -9.70E-01   -1.02E 00   -1.08E 00   -1.15E 00
                -1.22E 00   -1.29E 00   -1.36E 00   -1.43E 00   -1.51E 00
                -1.60E 00   -1.66E 00   -1.72E 00
3   5   1   1   -5.70E-01   -6.00E-01   -6.50E-01   -7.10E-01   -7.80E-01
                -8.30E-01   -9.10E-01   -1.00E 00   -1.09E 00   -1.18E 00
                -1.30E 00   -1.41E 00   -1.53E 00
4   5   1   1   -3.30E-01   -3.80E-01   -4.50E-01   -5.40E-01   -6.70E-01
                -7.80E-01   -8.60E-01   -9.50E-01   -1.04E 00   -1.14E 00
                -1.25E 00   -1.36E 00   -1.48E 00
5   5   1   1    0.0        -1.30E-01   -2.50E-01   -3.80E-01   -5.00E-01
                -6.20E-01   -7.40E-01   -8.40E-01   -9.30E-01   -1.02E 00
                -1.13E 00   -1.27E 00   -1.40E 00
6   5   1   1    2.90E-01    2.30E-01    1.30E-01    2.00E-02   -1.60E-01
                -3.20E-01   -4.50E-01   -5.70E-01   -6.80E-01   -7.80E-01
                -8.80E-01   -1.00E 00   -1.12E 00
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TABLE 6 CONTINUED

7	5	1	1	5.40E-01	4.60E-01	3.30E-01	1.50E-01	1.00E-02
				-1.90E-01	-3.50E-01	-5.00E-01	-6.20E-01	-7.40E-01
				-8.50E-01	-9.70E-01	-1.08E 00		
8	5	1	1	9.00E-01	7.80E-01	6.20E-01	3.90E-01	9.00E-02
				-1.30E-01	-3.10E-01	-4.50E-01	-5.60E-01	-6.70E-01
				-7.90E-01	-9.10E-01	-1.03E 00		
9	5	1	1	9.50E-01	8.50E-01	7.00E-01	4.80E-01	1.90E-01
				-5.00E-02	-2.20E-01	-3.70E-01	-5.00E-01	-6.00E-01
				-6.90E-01	-8.10E-01	-9.10E-01		
1	6	1	1	-4.60E-01	-5.00E-01	-5.20E-01	-5.80E-01	-6.20E-01
				-6.70E-01	-7.40E-01	-8.00E-01	-8.90E-01	-9.70E-01
				-1.10E 00	-1.27E 00	-1.44E 00		
2	6	1	1	-4.10E-01	-4.50E-01	-5.00E-01	-5.30E-01	-5.80E-01
				-6.50E-01	-7.00E-01	-7.80E-01	-8.60E-01	-9.50E-01
				-1.09E 00	-1.25E 00	-1.44E 00		
3	6	1	1	-3.00E-01	-3.50E-01	-4.00E-01	-4.50E-01	-5.10E-01
				-5.80E-01	-6.50E-01	-7.30E-01	-8.30E-01	-9.30E-01
				-1.05E 00	-1.21E 00	-1.36E 00		
4	6	1	1	-1.50E-01	-2.40E-01	-3.30E-01	-4.00E-01	-4.80E-01
				-5.40E-01	-6.10E-01	-7.00E-01	-8.00E-01	-9.00E-01
				-1.03E 00	-1.20E 00	-1.36E 00		
5	6	1	1	0.0	-1.00E-01	-2.10E-01	-3.30E-01	-4.20E-01
				-5.00E-01	-5.90E-01	-6.70E-01	-7.80E-01	-8.90E-01
				-1.10E 00	-1.18E 00	-1.34E 00		
6	6	1	1	1.40E-01	9.00E-02	0.0	-8.00E-02	-2.00E-01
				-3.10E-01	-4.40E-01	-5.50E-01	-6.60E-01	-7.90E-01
				-8.90E-01	-1.01E 00	-1.15E 00		
7	6	1	1	2.80E-01	2.10E-01	1.40E-01	3.00E-02	-1.00E-01
				-2.20E-01	-3.50E-01	-4.80E-01	-5.90E-01	-7.00E-01
				-8.10E-01	-9.40E-01	-1.05E 00		
8	6	1	1	3.30E-01	2.90E-01	2.00E-01	1.00E-01	-2.00E-02
				-1.50E-01	-2.90E-01	-4.10E-01	-5.20E-01	-6.40E-01
				-7.30E-01	-8.50E-01	-9.80E-01		
9	6	1	1	4.70E-01	4.20E-01	3.50E-01	2.50E-01	1.00E-01
				-3.00E-02	-1.50E-01	-2.80E-01	-4.00E-01	-5.00E-01
				-6.00E-01	-7.40E-01	-8.50E-01		
1	7	1	1	-4.10E-01	-4.30E-01	-4.50E-01	-5.30E-01	-6.20E-01
				-7.00E-01	-8.00E-01	-9.10E-01	-1.02E 00	-1.17E 00
				-1.30E 00	-1.46E 00	-1.61E 00		
2	7	1	1	-3.10E-01	-3.50E-01	-3.90E-01	-4.60E-01	-5.20E-01
				-6.10E-01	-7.10E-01	-8.10E-01	-9.20E-01	-1.03E 00
				-1.18E 00	-1.31E 00	-1.48E 00		
3	7	1	1	-2.20E-01	-2.80E-01	-3.30E-01	-4.00E-01	-4.60E-01
				-5.20E-01	-6.00E-01	-7.00E-01	-8.00E-01	-9.50E-01
				-1.10E 00	-1.25E 00	-1.40E 00		
4	7	1	1	-1.30E-01	-2.00E-01	-2.60E-01	-3.30E-01	-4.20E-01
				-4.80E-01	-5.70E-01	-6.60E-01	-7.60E-01	-8.90E-01
				-1.03E 00	-1.17E 00	-1.35E 00		
5	7	1	1	0.0	-1.20E-01	-2.00E-01	-2.80E-01	-3.50E-01
				-4.40E-01	-5.40E-01	-6.40E-01	-7.40E-01	-8.80E-01
				-1.01E 00	-1.15E 00	-1.32E 00		
6	7	1	1	1.30E-01	9.00E-02	3.00E-02	-5.00E-02	-1.60E-01
				-2.60E-01	-3.90E-01	-5.10E-01	-6.20E-01	-7.40E-01
				-8.70E-01	-1.00E 00	-1.13E 00		
7	7	1	1	2.60E-01	1.80E-01	1.00E-01	1.00E-02	-1.00E-01
				-2.00E-01	-3.10E-01	-4.30E-01	-5.60E-01	-6.80E-01
				-8.20E-01	-9.30E-01	-1.05E 00		
8	7	1	1	3.20E-01	2.70E-01	1.80E-01	9.00E-02	0.0
				-1.00E-01	-2.20E-01	-3.20E-01	-4.50E-01	-5.70E-01
				-7.00E-01	-8.00E-01	-9.10E-01		
9	7	1	1	4.10E-01	3.40E-01	2.60E-01	1.70E-01	7.00E-02
				-3.00E-02	-1.40E-01	-2.50E-01	-3.70E-01	-5.00E-01
				-6.10E-01	-7.10E-01	-8.10E-01		
1	8	1	1	-2.50E-01	-2.60E-01	-2.90E-01	-3.40E-01	-4.00E-01
				-4.70E-01	-5.40E-01	-6.50E-01	-7.40E-01	-8.50E-01
				-9.80E-01	-1.11E 00	-1.25E 00		
2	8	1	1	-2.20E-01	-2.30E-01	-2.70E-01	-3.10E-01	-3.70E-01
				-4.40E-01	-5.40E-01	-6.20E-01	-7.40E-01	-8.50E-01
				-9.80E-01	-1.10E 00	-1.27E 00		
3	8	1	1	-1.50E-01	-1.90E-01	-2.40E-01	-3.00E-01	-3.70E-01
				-4.40E-01	-5.20E-01	-6.10E-01	-7.00E-01	-8.10E-01
				-9.50E-01	-1.10E 00	-1.26E 00		

TABLE 6 CONTINUED

```
4  8  1  1  -1.10E-01  -1.30E-01  -1.80E-01  -2.40E-01  -3.10E-01
              -4.00E-01  -4.80E-01  -5.90E-01  -6.90E-01  -8.00E-01
              -9.30E-01  -1.09E 00  -1.26E 00
5  8  1  1   1.00E-02  -4.00E-02  -1.20E-01  -1.90E-01  -2.80E-01
              -3.70E-01  -4.70E-01  -5.70E-01  -6.70E-01  -7.80E-01
              -9.10E-01  -1.07E 00  -1.25E 00
6  8  1  1   1.00E-01   6.00E-02   0.0       -7.00E-02  -1.60E-01
              -2.40E-01  -3.40E-01  -4.50E-01  -5.60E-01  -6.90E-01
              -8.10E-01  -9.60E-01  -1.10E 00
7  8  1  1   1.60E-01   1.20E-01   6.00E-02  -1.00E-02  -9.00E-02
              -1.90E-01  -3.00E-01  -4.10E-01  -5.30E-01  -6.30E-01
              -7.40E-01  -8.80E-01  -1.00E 00
8  8  1  1   2.40E-01   1.90E-01   1.30E-01   0.0       -9.00E-02
              -1.70E-01  -2.60E-01  -3.40E-01  -4.70E-01  -5.70E-01
              -6.80E-01  -7.80E-01  -8.90E-01
9  8  1  1   2.70E-01   2.30E-01   1.70E-01   1.00E-01   1.00E-02
              -7.00E-02  -1.70E-01  -2.80E-01  -3.80E-01  -4.80E-01
              -5.80E-01  -6.70E-01  -7.70E-01
1  9  1  1  -1.10E-01  -1.30E-01  -2.00E-01  -2.40E-01  -2.70E-01
              -3.40E-01  -4.20E-01  -5.00E-01  -6.20E-01  -7.90E-01
              -8.10E-01  -9.90E-01  -1.15E 00
2  9  1  1  -9.00E-02  -1.00E-01  -1.30E-01  -1.80E-01  -2.40E-01
              -3.20E-01  -4.10E-01  -5.00E-01  -6.10E-01  -7.20E-01
              -8.40E-01  -9.90E-01  -1.15E 00
3  9  1  1  -8.00E-02  -1.00E-01  -1.20E-01  -1.80E-01  -2.40E-01
              -3.20E-01  -4.10E-01  -5.10E-01  -6.20E-01  -7.20E-01
              -8.50E-01  -1.00E 00  -1.15E 00
4  9  1  1  -5.00E-02  -6.00E-02  -9.00E-02  -1.50E-01  -2.00E-01
              -2.70E-01  -3.70E-01  -4.60E-01  -6.00E-01  -7.30E-01
              -8.70E-01  -1.00E 00  -1.12E 00
5  9  1  1   0.0       -1.00E-02  -6.00E-02  -1.10E-01  -1.70E-01
              -2.70E-01  -3.60E-01  -4.60E-01  -6.00E-01  -7.10E-01
              -8.20E-01  -9.80E-01  -1.23E 00
6  9  1  1   5.00E-02   2.00E-02  -1.00E-02  -6.00E-02  -1.20E-01
              -2.00E-01  -3.00E-01  -4.00E-01  -5.30E-01  -6.40E-01
              -7.80E-01  -9.90E-01  -1.20E 00
7  9  1  1   8.00E-02   4.00E-02   1.00E-02  -2.00E-02  -1.00E-01
              -1.80E-01  -2.60E-01  -3.40E-01  -4.60E-01  -5.70E-01
              -7.10E-01  -8.30E-01  -9.80E-01
8  9  1  1   8.00E-02   7.00E-02   3.00E-02  -2.00E-02  -7.00E-02
              -1.40E-01  -2.30E-01  -3.50E-01  -4.40E-01  -5.60E-01
              -6.50E-01  -7.30E-01  -8.30E-01
9  9  1  1   9.00E-02   8.00E-02   6.00E-02  -1.00E-02  -4.00E-02
              -1.20E-01  -2.00E-01  -2.90E-01  -3.90E-01  -4.80E-01
              -5.50E-01  -5.80E-01  -5.90E-01
1 10  1  1  -1.00E-01  -1.10E-01  -1.20E-01  -1.80E-01  -2.50E-01
              -3.20E-01  -4.10E-01  -5.10E-01  -5.90E-01  -7.20E-01
              -8.60E-01  -1.00E 00  -1.15E 00
2 10  1  1  -1.00E-01  -1.10E-01  -1.20E-01  -1.80E-01  -2.50E-01
              -3.20E-01  -4.10E-01  -5.10E-01  -5.90E-01  -7.20E-01
              -8.60E-01  -1.00E 00  -1.15E 00
3 10  1  1  -3.00E-02  -5.00E-02  -1.00E-01  -1.60E-01  -2.20E-01
              -2.90E-01  -3.90E-01  -5.10E-01  -5.90E-01  -7.20E-01
              -9.50E-01  -1.08E 00  -1.15E 00
4 10  1  1  -3.00E-02  -5.00E-02  -9.00E-02  -1.70E-01  -2.20E-01
              -2.50E-01  -2.80E-01  -3.80E-01  -5.00E-01  -6.30E-01
              -7.70E-01  -9.20E-01  -1.09E 00
5 10  1  1   0.0       -1.00E-02  -5.00E-02  -1.30E-01  -2.10E-01
              -2.80E-01  -2.90E-01  -5.00E-01  -6.20E-01  -7.60E-01
              -9.20E-01  -1.08E 00  -1.27E 00
6 10  1  1   6.00E-02   4.00E-02   1.00E-02  -2.00E-02  -1.10E-01
              -1.80E-01  -2.80E-01  -2.90E-01  -5.40E-01  -6.50E-01
              -7.50E-01  -8.80E-01  -1.08E 00
7 10  1  1   8.00E-02   5.00E-02   4.00E-02  -1.00E-02  -5.00E-02
              -1.60E-01  -2.40E-01  -3.50E-01  -4.50E-01  -5.80E-01
              -7.00E-01  -8.20E-01  -9.50E-01
8 10  1  1   1.30E-01   1.20E-01   8.00E-02   2.00E-02  -3.00E-02
              -1.20E-01  -2.20E-01  -2.20E-01  -4.30E-01  -5.20E-01
              -6.00E-01  -6.70E-01  -7.10E-01
9 10  1  1   1.30E-01   1.20E-01   1.00E-01   5.00E-02   0.0
              -9.00E-02  -1.80E-01  -2.90E-01  -4.10E-01  -5.00E-01
              -5.70E-01  -6.00E-01  -5.80E-01
```

TABLE 7: Data Set 1; 5445 points; Evaluation time = 15

Program	Type of Approximation		rms error	Maximum error	Points	Evaluation time
LSTSQ	Quad, 1st var.		.005	.029	3267	21
LSTSQ	Quad, 2nd var.		.004	.026	1815	21
LSTSQ	Quad, 3rd var.		.004	.016	1485	21
LSTSQ	Quad, 4th var.		.023	.107	1485	21
MINMAX	Sum 1 var. ftns		–	1.379	36	4
MINMAX	Sum 2 var. ftns		–	.402	474	18
APPROX	Sum 1 var. ftns		.429	2.582	36	4
APPROX	Sum 2 var. ftns		.113	.669	474	18
APPROX	Sum 3 var. ftns		.058	.148	2684	28

TABLE 8: Data set 2; 1512 points; evaluation time = 7

Program	Type of Approximation		rms error	Maximum error	Points	Evaluation time
LSTSQ	Linear, 1st var.		.110	.416	144	6
LSTSQ	Linear, 2nd var.		.065	.249	249	6
LSTSQ	Linear, 3rd var.		.079	.230	378	6
LSTSQ	Quad, 1st var.		.023	.126	216	9
LSTSQ	Quad, 2nd var.		.028	.128	504	9
LSTSQ	Quad, 3rd var.		.052	.262	567	9
MINMAX	Sum 1 var. ftns.			.370	38	3
MINMAX	Sum 2 var. ftns.			.156	429	9
APPROX.	Sum 1 var. ftns.		.137	.509	38	3
APPROX.	Sum 2 var. ftns.		.073	.252	429	9

TABLE 9: Data Set 3; 1512 points; evaluation time = 7

Program	Type of Approximation		rms error	Maximum error	Points	Evaluation time
LSTSQ	Quad, 1st var.		.028	.160	216	9
LSTSQ	Quad, 2nd var.		.027	.094	504	9
LSTSQ	Quad, 3rd var.		.035	.140	567	9
MINMAX	Sum 1 Var. ftns			.448	38	3
MINMAX	Sum 1 Var. ftns			.164	429	9
APPROX	Sum 1 Var. ftns		.137	.523	38	3
APPROX	Sum 2 Var. ftns		.075	.219	429	9

TABLE 10: Data Set 4; 1512 points; evaluation time = 7

Program	Type of Approximation		rms error	Maximum error	Points	Evaluation time
LSTSQ	Quad, 1st Var.		.093	.519	216	9
LSTSQ	Quad, 2nd Var.		.049	.285	504	9
LSTSQ	Quad, 3rd Var.		.101	.375	567	9
MINMAX	Sum 1 Var. ftns			1.363	38	3
MINMAX	Sum 2 Var. ftns			.514	429	9
APPROX	Sum 1 Var. ftns		.318	2.581	38	3
APPROX	Sum 2 Var. ftns		.133	1.083	429	9

TABLE 11:   Data Set 5; 1512 points; evaluation time = 7

Program	Type of Approximation	rms error	Maximum error	Points	Evaluation time
LSTSQ	Quad, 1st Var.	.079	.671	216	9
LSTSQ	Quad, 2nd Var.	.054	.237	504	9
LSTSQ	Quad, 3rd Var.	.112	.346	567	9
MINMAX	Sum 1 Var. ftns.		1.515	38	3
MINMAX	Sum 2 Var. ftns.		.988	429	9
APPROX	Sum 1 Var. ftns.	.442	2.687	38	3
APPROX	Sum 2 Var. ftns.	.341	1.248	429	9

TABLE 12:   Data set 6;   1170 points; evaluation time = 7

Program	Type of Approximation	rms error	Maximum error	Points	Evaluation time
LSTSQ	Quad, 1st Var.	.069	.448	270	9
LSTSQ	Quad, 2nd Var.	.066	.398	390	9
LSTSQ	Quad, 3rd Var.	.166	.850	351	9
MINMAX	Sum 1 Var. ftns		1.623	32	3
MINMAX	Sum 2 Var. ftns		.549	337	9
APPROX	Sum 1 Var. ftns	.567	2.179	32	3
APPROX	Sum 2 Var. ftns	.210	.802	337	9

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A.0 Program Descriptions

In this appendix the usage of programs MINMAX and LSTSQ are described, including input and output description, and a sample run for each.

A.1 Description of Program MINMAX

Program MINMAX is a Fortran IV version of the algorithm outlined in Section 3.1. The program package consists of the main program and two subroutines. Subroutine RDN(N) is supplied by the user and is used to read or generate the input function (table). The input argument N is the array of the number of entries in each variable. The version of RDN given in the program listings is the one used to read the test data supplied by NMC. Subroutine FAP is used to find the maximum and minimum values of an array, over specified limits of the subscripts. The average of these values are subtracted from each member of the array searched.

The common statement

COMMON F(1,2,3,4,5)

must be supplied by the user and appears in the main program and both subroutines. The actual dimensions used must be at least as large as the array to be input.

The input to the main program consists of one card punched in format (7I5). The description of the input values follows. A blank card ends the computer run.

Columns (right adjusted)	Program Symbol	Variable	Comments
1-5	N(1)	N_1	Number of entries for 1st Variable
6-10	N(2)	N_2	Number of entries for 2nd Variable
11-15	N(3)	N_3	Number of entries for 3rd Variable
16-20	N(4)	N_4	Number of entries for 4th Variable
21-25	N(5)	N_5	Number of entries for 5th Variable
26-30	NPR		NPR $\neq$ 0 will cause printout of the details of each iteration. Normally NPR = 0
31-35	NVF		Number of variables for the fitting functions; 1 or 2

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```
      MAINPROGRAM MINMAX                                                        MIN00010
      DIMENSION F1(5,25),N(5),M(5),MX(5),F2(10,25,25)                           MIN00020
      EQUIVALENCE (N(1),N1),(N(2),N2),(N(3),N3),(N(4),N4),(N(5),N5)             MIN00030
      COMMON F(26,10,10,1,1)                                                    MIN00040
                                                                               MIN00050
       PROGRAM MINMAX OBTAINS A SUM OF FUNCTIONS APPROXIMATION TO A             MIN00060
      FUNCTION OF UP TO FIVE VARIABLES WHICH MINIMIZES THE MAXIMUM ERROR        MIN00070
                                                                               MIN00080
      SUBROUTINE RDN(N) IS USER SUPPLIED AND IS USED TO GENERATE                MIN00090
      OR READ THE DATA IN THE ARRAY F                                          MIN00100
                                                                               MIN00110
      THE USER MUST ALSO SUPPLY APPROPRIATE STATEMENT OF THE FORM              MIN00120
      COMMON F(1,2,3,4,5)                                                       MIN00130
      WHERE THE ACTUAL DIMENSIONS USED ARE ADEQUATE FOR THE INPUT F            MIN00140
      THIS COMMON STATEMENT MUST APPEAR IN PROGRAM MINMAX AS WELL AS IN         MIN00150
      SUBROUTINES RDN AND FAP                                                   MIN00160
                                                                               MIN00170
      INPUT VARIABLE DESCRIPTION, ONE (1) CARD, FORMAT(7I5)                     MIN00180
      (N(I),I=1,5) = N1,N2,N3,N4,N5 ARE THE NUMBER OF ENTRIES IN THE            MIN00190
      FIRST, SECOND, ETC VARIABLES FOR THE INPUT FUNCTION F.                    MIN00200
                                                                               MIN00210
      NPR = 0 IS NORMAL                                                         MIN00220
      NPR = 1 WILL GIVE A PRINTOUT OF THE FITTING FUNCTIONS AND THE             MIN00230
      ERROR AT EACH ITERATION                                                   MIN00240
                                                                               MIN00250
      NVF = 1 GIVES AN APPROXIMATION BY A SUM OF ONE VARIABLE FUNCTIONS         MIN00260
      NVF = 2 GIVES AN APPROXIMATION BY A SUM OF TWO VARIABLE FUNCTIONS         MIN00270
                                                                               MIN00280
  100 READ(5,1)N,NPR,NVF                                                        MIN00290
      IF(N1.LE.0)STOP                                                           MIN00300
      CALL RDN(N)                                                               MIN00310
      WRITE(6,5)                                                                MIN00320
      DO 150 I5=1,N5                                                            MIN00330
      DO 150 I4=1,N4                                                            MIN00340
      DO 150 I3=1,N3                                                            MIN00350
      DO 150 I2=1,N2                                                            MIN00360
  150 WRITE(6,3)I2,I3,I4,I5,(F(I1,I2,I3,I4,I5),I1=1,N1)                         MIN00370
      DO 160 I=1,5                                                              MIN00380
      IF(N(I).EQ.1)GO TO 170                                                    MIN00390
  160 NV = I                                                                    MIN00400
  170 NVM = NV - 1                                                             MIN00410
      ITMAX = 20                                                                MIN00420
      IT = 1                                                                    MIN00430
      EPS = .5E-4                                                               MIN00440
      DO 200 I=1,5                                                              MIN00450
      DO 190 J=1,25                                                             MIN00460
  190 F1(I,J) = 0.0                                                             MIN00470
      M(I) = 1                                                                  MIN00480
  200 MX(I) = N(I)                                                              MIN00490
      DO 210 I=1,10                                                             MIN00500
      DO 210 J=1,25                                                             MIN00510
      DO 210 K=1,25                                                             MIN00520
  210 F2(I,J,K) = 0.                                                            MIN00530
  225 DX = 0.0                                                                  MIN00540
      IF(NVF.GT.1)GO TO 310                                                     MIN00550
                                                                               MIN00560
      THE CALCULATION OF ONE VARIABLE APPROXIMATIONS                           MIN00570
                                                                               MIN00580
      DO 300 I=1,NV                                                             MIN00590
      NP = N(I)                                                                 MIN00600
      DO 250 J=1,NP                                                             MIN00610
      M(I) = J                                                                  MIN00620
      MX(I) = J                                                                 MIN00630
      CALL FAP(FV,M,MX)                                                         MIN00640
      DX = AMAX1(ABS(FV),DX)                                                    MIN00650
  250 F1(I,J) = FV + F1(I,J)                                                    MIN00660
      M(I) = 1                                                                  MIN00670
      MX(I) = NP                                                                MIN00680
  300 CONTINUE                                                                  MIN00690
      GO TO 390                                                                 MIN00700
```

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```
C                                                                          MIN00710
C          THE CALCULATION OF TWO VARIABLE APPROXIMATICNS                  MIN00720
C                                          .                               MIN00730
  310 MF = 0                                                               MIN00740
      DO 370 I=1,NVM                                                       MIN00750
      IX = I + 1                                                           MIN00760
      NPI = N(I)                                                           MIN00770
      DO 360 K=IX,NV                                                       MIN00780
      MF = MF + 1                                                          MIN00790
      NPK = N(K)                                                           MIN00800
      DO 350 JI= 1,NPI                                                     MIN00810
      M(I) = JI                                                            MIN00820
      MX(I) = JI                                                           MIN00830
      DO 340 JK=1,NPK                                                      MIN00840
      M(K) = JK                                                            MIN00850
      MX(K) = JK                                                           MIN00860
      CALL FAP(FV,M,MX)                                                    MIN00870
      DX = AMAX1(ABS(FV),DX)                                               MIN00880
  340 F2(MF,JI,JK) = F2(MF,JI,JK) + FV                                     MIN00890
  350 CONTINUE                                                             MING0900
      M(K) = 1                                                             MINC0910
      MX(K) = NPK                                                          MIN00920
  360 CONTINUE                                                             MINC0930
      M(I) = 1                                                             MIN00940
      MX(I) = NPI                                                          MINC0950
  370 CONTINUE                                                             MIN00960
  390 CONTINUE                                                             MIN00970
      IF(DX.LT.EPS)GO TO 400                                               MIN00980
      IT = IT + 1                                                          MINC0990
      IF(IT.GT.ITMAX)GO TO 500                                             MIN01000
      IF(NPR.EC.0)GO TO 225                                                MIN01010
  400 WRITE(6,7)DX,IT                                                      MIN01020
      IF(NVF.GT.1)GO TO 412                                                MIN01030
      WRITE(6,6)                                                           MIN01040
      DO 410 I=1,NV                                                        MIN01050
      NP = N(I)                                                            MIN01060
  410 WRITE(6,8)I,(F1(I,J),J=1,NP)                                         MIN01070
      GO TO 418                                                            MIN01080
  412 MF = 0                                                               MIN01090
      WRITE(6,6)                                                           MIN01100
      DC 415 I=1,NVM                                                       MIN01110
      NPI = N(I)                                                           MIN01120
      IX = I + 1                                                           MIN01130
      DC 415 K=IX,NV                                                       MIN01140
      WRITE(6,12)K                                                         MIN01150
      MF = MF + 1                                                          MIN01160
      NPK = N(K)                                                           MIN01170
      DO 415 JK=1,NPK                                                      MIN01180
  415 WRITE(6,9)I,K,JK,(F2(MF,IK,JK ),IK=1,NPI)                            MIN01190
  418 CONTINUE                                                             MIN01200
      AM = 0.                                                              MIN01210
      DO 419 I5=1,N5                                                       MIN01220
      DO 419 I4=1,N4                                                       MIN01230
      DO 419 I3=1,N3                                                       MIN01240
      DO 419 I2=1,N2                                                       MIN01250
      DO 419 I1=1,N1                                                       MIN01260
  419 AM = AMAX1(ABS(F(I1,I2,I3,I4,I5)),AM)                                MIN01270
      WRITE(6,11)AM                                                        MIN01280
      DO 420 I5=1,N5                                                       MIN01290
      DO 420 I4=1,N4                                                       MIN01300
      DO 420 I3=1,N3                                                       MIN01310
      DO 420 I2=1,N2                                                       MIN01320
  420 WRITE(6,3)I2,I3,I4,I5,(F(I1,I2,I3,I4,I5),I1=1,N1)                    MIN01330
      IF(DX.LT.EPS.OR.IT.GT.ITMAX)GO TO 100                               MIN01340
      GC TO 225                                                           MIN01350
  500 WRITE(6,4)IT                                                         MIN01360
      GO TO 400                                                            MIN01370
    1 FCRMAT(16I5)                                                         MIN01380
    3 FORMAT(4I4,1P10E11.3/(16X,10E11.3))                                  MIN01390
    4 FORMAT(45H0CONVERGENCE FAILURE, NUMBER OF ITERATIONS IS ,I5)         MIN01400
    5 FORMAT(64H1THE INPUT FUNCTION, FIRST INDEPENDENT VARIATION ACROSS    MIN01410
     1THE PAGE/16H0 I2   I3   I4   I5)                                     MIN01420
    6 FCRMAT(9H0FUNCTION)                                                  MINC1430
    7 FORMAT(75H0THE APPROXIMATING FUNCTIONS FOLLOW.  LAST CF AND NUMBER   MIN01440
     1 OF ITERATIONS WERE,1PE12.5,I10//)                                   MIN01450
```

```
    8 FCRMAT(2HOF,I1,7X,1P10E11.3/(10X,10E11.3))                                    MINO1460
    9 FCRMAT(2H F,2I1,I6,1P10E11.3/(10X,10E11.3))                                  MINC1470
   11 FCRMAT(43H1THE ERROR ARRAY FCLLOWS.   MAXIMUM ERROR IS,1PE12.4/              MINO1480
    1 16HO I2  I3  I4  I5)                                                          MINO1490
   12 FCRMAT(/8X,1HI,I1)                                                           MINO1500
      END                                                                          MINO1510
```

               S U B R O U T I N E   R D N

```
      SUBROUTINE RDN(N)                                                            RDN00010
      DIMENSION N(1)                                                               RDN00020
      CCMMON F(26,10,10,1,1)                                                       RDN00030
      N1 = N(1)                                                                    RDN00040
      N2 = N(2)                                                                    RDN00050
      N3 = N(3)                                                                    RDN00060
      N4 = N(4)                                                                    RDN00070
      N5 = N(5)                                                                    RDN00080
      DO 110 I5=1,N5                                                               RDN00090
      DO 110 I4=1,N4                                                               RDN00100
      DO 110 I3=1,N3                                                               RDNC0110
      DC 110 I2=1,N2                                                               RDN00120
  110 READ(5,2)(F(I1,I2,I3,I4,I5),I1=1,N1)                                         RDNG0130
      RETURN                                                                       RDNG0140
    2 FCRMAT(9(1X,F5.2,2X))                                                        RDN00150
      END                                                                          RDNG0160
```

               S U B R O U T I N E   F A P

```
      SUBRCUTINE FAP(FV,M,MX)                                                      FAP00010
      DIMENSICN M(1),MX(1)                                                         FAP00020
      COMMON F(26,10,10,1,1)                                                       FAP00030
C                                                                                  FAP00040
C     FAP FINDS THE MAX AND MIN VALUES OF F WITH INDEX I1 VARYING                  FAP00050
C     FROM M(1) TO MX(1), I2 VARYING BETWEEN M(2) AND MX(2), ETC.                  FAP00060
C                                                                                  FAP00070
C     FV IS THE AVERAGE VALUE OF THE MAXIMUM AND MINIMUM VALUES , AND              FAP00080
C     SUBTRACTED FROM THAT SET OF FUNCTION VALUES                                  FAP00090
      IB1 = M(1)                                                                   FAP00100
      IB2 = M(2)                                                                   FAP00110
      IB3 = M(3)                                                                   FAP00120
      IB4 = M(4)                                                                   FAP00130
      IB5 = M(5)                                                                   FAP00140
      N1 = MX(1)                                                                   FAP00150
      N2 = MX(2)                                                                   FAP00160
      N3 = MX(3)                                                                   FAP00170
      N4 = MX(4)                                                                   FAP00180
      N5 = MX(5)                                                                   FAP00190
      A = -1.E10                                                                   FAP00200
      Z = 1.E10                                                                    FAP00210
      DO 100 I1=IB1,N1                                                             FAP00220
      DO 100 I2=IB2,N2                                                             FAP00230
      DO 100 I3=IB3,N3                                                             FAPJ0230
      DC 100 I4=IB4,N4                                                             FAP00240
      DC 100 I5 = IB5,N5                                                           FAP00250
      A = AMAX1(F(I1,I2,I3,I4,I5),A)                                               FAP00260
  100 Z = AMIN1(F(I1,I2,I3,I4,I5),Z)                                               FAP00270
      FV = (A + Z)/2.                                                              FAP00280
      DO 120 I1=IB1,N1                                                             FAP00290
      DC 120 I2=IB2,N2                                                             FAPG0300
      CC 120 I3=IB3,N3                                                             FAP00310
      DC 120 I4=IB4,N4                                                             FAP00320
      DO 120 I5=IB5,N5                                                             FAP00330
  120 F(I1,I2,I3,I4,I5) = F(I1,I2,I3,I4,I5) - FV                                   FAP00340
      RETURN                                                                       FAP00350
      END                                                                          FAP00360
                                                                                   FLP00370
```

Sample Data and Output for MINMAX

The following data set was run on the program as listed, a..d the
output follows. It should be noted that this data is for illustrative
purpose only.

(Input data for MINMAX, as punched)

```
     4       3      2     1      1      0      1
  1.0      2.0        3.5      4.0
  -.5      1.5        2.9      3.8
  0.0      1.0        2.2      2.5
  -1.      0.0        1.5      2.5
  -2.      -.5        0.5      2.0
  -1.5     -.2        0.3      1.9
     4       3      2     1      1      0      2
  1.0      2.0        3.5      4.0
  -.5      1.5        2.9      3.8
  0.0      1.0        2.2      2.5
  -1.      0.0        1.5      2.5
  -2.      -.5        0.5      2.0
  -1.5     -.2        0.3      1.9
```

(Output for MINMAX)

THE INPUT FUNCTION, FIRST INDEPENDENT VARIATION ACROSS THE PAGE

```
 I2   I3   I4   I5
  1    1    1    1   1.000E 00   0.0          5.000E-01   0.0
  2    1    1    1  -5.000E-01   1.500E 00    2.900E 00   3.800E 00
  3    1    1    1   0.0         1.000E 00    2.200E 00   2.500E 00
  1    2    1    1  -1.000E 00   0.0          1.500E 00   2.500E 00
  2    2    1    1  -2.000E 00  -5.000E-01    5.000E-01   2.000E 00
  3    2    1    1  -1.500E 00   2.000E-01    3.000E-01   9.000E-01
```

THE APPROXIMATING FUNCTIONS FOLLOW. LAST OF AND NUMBER OF⟶

⟶ ITERATIONS WERE 2.06232E-05   9

FUNCTION

F1   -2.000E-01   4.500E-01   1.650E 00   1.900E 00

F2   -3.500E-01   3.500E-01 -7.501E-02

F3   0.0   -6.000E-01

THE ERROR ARRAY FOLLOWS. MAXIMUM ERROR IS 1.5500E 00

I2	I3	I4	I5				
1	1	1	1	1.550E CO	-1.000E-01	-8.000E-01	-1.550E 00
2	1	1	1	-6.500E-01	7.000E-01	9.000E-01	1.550E 00
3	1	1	1	2.750E-01	6.250E-01	6.250E-01	6.750E-01
1	2	1	1	1.500E-01	5.000E-01	8.000E-01	1.550E 00
2	2	1	1	-1.550E 00	-7.000E-01	-9.000E-01	3.500E-01
3	2	1	1	-6.250E-01	4.250E-01	-6.750E-01	-3.250E-01

THE INPUT FUNCTION, FIRST INDEPENDENT VARIATION ACROSS THE PAGE

I2	I3	I4	I5				
1	1	1	1	1.000E 00	0.0	5.000E-01	0.0
2	1	1	1	-5.000E-01	1.500E 00	2.900E 00	3.800E 00
3	1	1	1	0.0	1.000E 00	2.200E 00	2.500E 00
1	2	1	1	-1.000E 00	0.0	1.500E 00	2.500E 00
2	2	1	1	-2.000E 00	-5.000E-01	5.000E-01	2.000E 00
3	2	1	1	-1.500E 00	2.000E-01	3.000E-01	9.000E-01

THE APPROXIMATING FUNCTIONS FOLLOW. LAST DF AND NUMBER OF⌁

FUNCTION   ⟶ ITERATIONS WERE 0.0   3

FUNCTION	I2				
F12	1	0.0	0.0	1.000E 00	1.250E 00
F12	2	-1.250E 00	5.000E-01	1.700E 00	2.900E 00
F12	3	-7.500E-01	6.000E-01	1.250E 00	1.700E 00

FUNCTION	I3				
F13	1	-8.750E-01	-2.500E-01	-3.500E-01	-1.750E-01
F13	2	-8.750E-01	-2.500E-01	-3.500E-01	1.750E-01

FUNCTION	I3			
F23	1	-4.750E-01	4.750E-01	4.250E-01
F23	2	4.750E-01	-4.750E-01	-4.250E-01

THE ERROR ARRAY FOLLOWS. MAXIMUM ERROR IS 6.0000E-01

I2	I3	I4	I5				
1	1	1	1	6.000E-01	2.250E-01	-3.750E-01	-6.000E-01
2	1	1	1	-6.000E-01	2.750E-01	3.750E-01	6.000E-01
3	1	1	1	-5.500E-01	-2.750E-01	1.750E-01	5.500E-01
1	2	1	1	-6.000E-01	-2.250E-01	3.750E-01	6.000E-01
2	2	1	1	6.000E-01	-2.750E-01	-3.750E-01	-6.000E-01
3	2	1	1	5.500E-01	2.750E-01	-1.750E-01	-5.500E-01

The output is mostly self explanatory. Output of the input function and error arrays are in the same format as the information in Tables 6. The "LAST DF" is the value of max $|\Delta f|$ during the last iteration (last value of ℓ, as outlined in Section 3.1). The stopping criterion is that this value be less than EPS = $5 \cdot 10^{-5}$. The maximum number of iterations allowed is ITMAX = 20. Both of these values are easily changed.

A.4 Description of Program LSTSQ

Program LSTSQ is a Fortran IV version of the idea in Section 3.4. The program package consists of the main program, subroutines LLSQFT, WLSQ, RD, and function PHI. The latter two are supplied by the user. RD is used to read the variable and function data. The user specifies in Function PHI(I,X) up to three basis functions $\phi_1(x)$, $\phi_2(x)$, and $\phi_3(x)$. (ϕ_3, or ϕ_3 and ϕ_2 may be identically zero to obtain approximations with 2 or 1 basis function, respectively.) The program will then perform a weighted (weights user specified) least squares fit in one variable. This variable may be specified; a search may be made for the variable in which the fit is best, and the approximation computed in that variable; or the rms and maximum errors may be computed for each variable.

Subroutine LLSQFT picks the appropriate data from the arrays F,X, and W, and then calls subroutine WLSQ which does a weighted least squares fit on the data. This is done by first computing an orthogonal basis, and then transforming back to the basis ϕ_1, ϕ_2, ϕ_3 .

The user must also supply the proper common statement of the form

COMMON/TABLE/N1,N2,N3,N4,N5,N6,F(1,2,3,4,5,6),X(25,6),W(25,6)

The actual dimensions of F must be sufficient to store the input F array, plus 3 more than that for any variable in which the approximation is to be output, since the coefficients of ϕ_1, ϕ_2, and ϕ_3 are stored in these extra

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locations.   The second dimension of X and W must be as large as

Max N_i.   The common statement appears in the main program and sub-
$1 \le i \le 6$

routines RD and LLSQFT.

The input to LSTSQ consists of a variable number of cards, depend-

ing on the option concerning user specified weights.   The first card is

punched in format (13I5), as follows.   A blank card ends the computer run.

Columns (right adjusted)	Program Symbol	Variable	Comments
1-5	N(1)	N_1	Number of entries for 1st variable
6-10	N(2)	N_2	Number of entries for 2nd variable
11-15	N(3)	N_3	Number of entries for 3rd variable
16-20	N(4)	N_4	Number of entries for 4th variable
21-25	N(5)	N_5	Number of entries for 5th variable
26-30	N(6)	N_6	Number of entries for 6th variable
31-35	NW(1)		NW(I) = 0 indicates weights are to
36-40	NW(2)		be all equal to one. NW(I) $\ne$ 0
41-45	NW(3)		indicates weights are to be input
46-50	NW(4)		for the Ith varible, as card two.
51-55	NW(5)		
56-60	NW(6)		
61-65	NCØDE		NCØDE = K ($1 \le K \le 6$) indicates a fit on the Kth variable is to be performed. NCØDE = 0 indicates a search for rms and maximum errors for the fit in each variable. NCØDE < 0 indicates a search as above, and the approximation output for smallest rms error.

If the weights are to be input, they are read in order under format (8E10.0).

More than one card may be necessary for each set of weights read.   Each set

begins on a new card.

```
      MAINPROGRAM LSTSQ                                                  LST00010
      COMMON/TABLE/N1,N2,N3,N4,N5,N6,F(25,12,11,1,1,1),X(25,6),W(25,6)   LST00020
      DIMENSION N(6),NW(6)                                              LST00030
      EQUIVALENCE (N(1),N1),(NW(1),K1),(NW(2),K2),(NW(3),K3),(NW(4),K4), LST00040
     1 (NW(5),K5),(NW(6),K6)                                            LST00050
      PROGRAM LSTSQ PERFORMS A WEIGHTED LEAST SQUARES CURVE FIT IN ONE   LST00060
      VARIABLE OF MULTIDIMENSIONAL TABLE.  THERE MAY BE UP TO SIX        LST00070
      INDEPENDENT VARIABLES.                                            LST00080
                                                                        LST00090
      SUBROUTINE RD MUST BE SUPPLIED BY THE USER AND READS THE          LST00100
      INDEPENDENT AND DEPENDENT VARIABLE ARRAYS.                        LST00110
                                                                        LST00120
       A STATEMENT OF THE FORM                                         LST00130
                                                                        LST00140
      COMMON /TABLE/N1,N2,N3,N4,N5,N6,F(1,2,3,4,5,6),X(M,6),W(M,6)       LST00150
                                                                        LST00160
      MUST BE SUPPLIED BY THE USER.  THE DIMENSIONS OF F MUST BE         LST00170
      ADEQUATE FOR THE INPUT F.  THE FIRST DIMENSION OF X AND W MUST     LST00180
      BE AS LARGE AS THE LARGEST DIMENSION OF F.  THE COMMON STATEMENT   LST00190
      APPEARS IN SUBROUTINES RD AND LLSQFT AS WELL AS THE MAIN PROGRAM.  LST00200
      X(J,I),J=1,NI   AND W(J,I),J=1,NI   ARE THE ABSCISSAS AND WEIGHTS  LST00210
      FOR THE ITH VARIABLE.                                            LST00220
                                                                        LST00230
      THE FITTING FUNCTIONS MUST BE SUPPLIED IN THE FORM OF A FUNCTION   LST00240
      TYPE SUBROUTINE.   IF ONLY ONE OR TWO FUNCTIONS ARE TO BE USED IN  LST00250
      THE APPROXIMATION, THEN PHI(2,X) AND PHI(3,X)  OR PHI(3,X),        LST00260
      RESPECTIVELY, ARE SET TO ZERO FOR ALL X.                          LST00270
                                                                        LST00280
      INPUT DESCRIPTION                                                 LST00290
       CARD ONE        FORMAT(13I5)                                     LST00300
      N1,N2,N3,N4,N5,N6   THE DIMENSIONS OF THE INPUT ARRAY F           LST00310
      NW(I),I=1,6     NW(I) = 1 INDICATES THAT AN ARRAY OF N(I) WEIGHTS  LST00320
      IS TO BE INPUT.  IF NW(I) = 0, THE WEIGHTS ARE ALL SET TO 1.       LST00330
      NCODE   (COLUMN 61-65)  = -1       INDICATES A SEARCH IS TO BE MADE LST00340
                                         FOR THE VARIABLE THAT YIELDS THE LST00350
                                         APPROXIMATION WITH THE SMALLEST RMS LST00360
                                         ERROR, AND THE APPROXIMATION TO BE LST00370
                                         OUTPUT.                        LST00380
                        = 0              INDICATES THAT THE APPROXIMATION IS LST00390
                                         TO BE COMPUTED FOR EACH VARIABLE LST00400
                                         AND THE RMS AND MAXIMUM ERROR GIVEN LST00410
                        = K              INDICATES THAT AN APPROXIMATION IN LST00420
                                         THE KTH VARIABLE IS TO BE COMPUTED LST00430
                                                                        LST00440
      CARD TWO    FORMAT(8E10.0)                                        LST00450
      THIS CARD IS REPEATED ONE FOR EACH NON-ZERO NW(I).   THUS, THIS    LST00460
      CARD MAY APPEAR ZERO TO SIX TIMES. EACH 'CARD' MAY CONSIST OF MORE LST00470
      THAN ONE CARD IF N(I) IS GREATER THAN EIGHT.                      LST00480
      THE VALUES OF THE WEIGHT ARE LISTED IN ORDER FOR THE VARIABLES FOR LST00490
      WHICH NW(I) IS NON-ZERO                                           LST00500
                                                                        LST00510
                                                                        LST00520
  100 READ(5,1)N,NW, NCODE                                             LST00530
      IF(N1.LE.0)STOP                                                   LST00540
      WRITE(6,7)                                                        LST00550
      M = MAX0(N(1),N(2),N(3),N(4),N(5),N(6))                           LST00560
      DO 105 J=1,6                                                      LST00570
      DO 105 I=1,M                                                      LST00580
  105 W(I,J) = 1.                                                       LST00590
      DO 110 J=1,6                                                      LST00600
      IF(NW(J).EQ.0)GO TO 110                                           LST00610
      M = N(J)                                                          LST00620
      READ(5,4)(W(I,J),I=1,M)                                           LST00630
  110 CONTINUE                                                          LST00640
      CALL RD                                                           LST00650
      DO 120 J=1,6                                                      LST00660
      M = N(J)                                                          LST00670
      IF(M.EQ.1)GO TO 120                                               LST00680
      WRITE(6,9)J,(W(I,J),I=1,M)                                        LST00690
      WRITE(6,5)J,(X(I,J),I=1,M)                                        LST00700
```

```
120 CONTINUE                                                              LST00710
    WRITE(6,8)                                                            LST00720
    DO 200 I6=1,N6                                                        LST00730
    DO 200 I5=1,N5                                                        LST00740
    DO 200 I4=1,N4                                                        LST00750
    DO 200 I3=1,N3                                                        LST00760
    DO 200 I2=1,N2                                                        LST00770
200 WRITE(6,3)I2,I3,I4,I5,I6,(F(I1,I2,I3,I4,I5,I6),I1=1,N1)              LST00780
    IF(NCODE.GT.0)GO TO 400                                               LST00790
    RMSL = 1.E10                                                          LST00800
    DO 300 I=1,6                                                          LST00810
    IF(N(I).LE.1)GO TO 300                                                LST00820
    CALL LLSQFT(I,RMS,ERM,0)                                              LST00830
    WRITE(6,6)I,RMS,ERM                                                   LST00840
    IF(RMS.GT.RMSL)GO TO 300                                              LST00850
    RMSL = RMS                                                            LST00860
    LR = I                                                                LST00870
300 CONTINUE                                                              LST00880
    IF(NCODE.EQ.0)GO TO 100                                               LST00890
    NCODE = LR                                                            LST00900
400 CALL LLSQFT(NCODE,RMS,ERM,1)                                          LST00910
    WRITE(6,11)                                                           LST00920
    DO 500 I6=1,N6                                                        LST00930
    DO 500 I5=1,N5                                                        LST00940
    DO 500 I4=1,N4                                                        LST00950
    DO 500 I3=1,N3                                                        LST00960
    DO 500 I2=1,N2                                                        LST00970
500 WRITE(6,3)I2,I3,I4,I5,I6,(F(I1,I2,I3,I4,I5,I6),I1=1,N1)              LST00980
    DO 510 I=1,6                                                          LST00990
510 NW(I) = 1                                                             LST01000
    NW(NCODE) = N(NCODE) + 1                                              LST01010
    N(NCODE) = NW(NCODE) + 2                                              LST01020
    WRITE(6,10)NCODE,RMS,ERM,NCODE,NW(NCODE),N(NCODE),NCODE               LST01030
    DO 520 I6=K6,N6                                                       LST01040
    DO 520 I5=K5,N5                                                       LST01050
    DO 520 I4=K4,N4                                                       LST01060
    DO 520 I3=K3,N3                                                       LST01070
    DO 520 I2=K2,N2                                                       LST01080
520 WRITE(6,3)I2,I3,I4,I5,I6,(F(I1,I2,I3,I4,I5,I6),I1=K1,N1)            LST01090
    GO TO 100                                                             LST01100
C                                                                         LST01110
  1 FORMAT(16I5)                                                          LST01120
  2 FORMAT(8E10.0)                                                        LST01130
  3 FORMAT(5I3,1P10E11.3/(15X,10E11.3))                                   LST01140
  4 FORMAT(8E10.0)                                                        LST01150
  5 FORMAT(3H  X,I1,5X,1P10E11.3/(9X,10E11.3))                           LST01160
  6 FORMAT(8H0FOR THE,I3,43HTH VARIABLE THE RMS AND MAXIMUM ERRORS ARELST01170
 1   ,1P2E13.4)                                                          LST01180
  7 FORMAT(26H1THE INDEPENDENT VARIABLES//)                             LST01190
  8 FORMAT(68H0THE DEPENDENT VARIABLE, FIRST INDEPENDENT VARIATION ACRLST01200
 10SS THE PAGE /15H0I2 I3 I4 I5 I6)                                      LST01210
  9 FORMAT(3H WT,I1,5X,1P10E11.3/(9X,10E11.3))                          LST01220
 10 FORMAT(15H1THE FIT ON THE,I3,29HTH VARIABLE, WITH RMS ERROR =,      LST01230
 1 1PE11.3  /32X,15HMAXIMUM ERROR =,E11.3/58H0THE COEFFICIENTS OF PLST01240
 2HI1, PHI2, AND PHI3 ARE FUNCTIONS OF/12H ALL BUT THE,I3,39HTH VARILST01250
 3ABLE, AND ARE LISTED HERE AS THE,I3,2HTH/12H THROUGH THE,I3,        LST01260
 4 15HTH VALUES FOR I,I1,15H, RESPECTIVELY./15H0I2 I3 I4 I5 I6)         LST01270
 11 FORMAT(24H1THE ERROR ARRAY FOLLOWS/15H0I2 I3 I4 I5 I6)             LST01280
    END                                                                   LST01290
```


SUBROUTINE   R D


```
    SUBROUTINE RD                                                         RD 00010
    COMMON/TABLE/N1,N2,N3,N4,N5,N6,F(25,12,11,1,1,1),X(25,6),W(25,6)      RD 00020
    DO 100 I3=1,N3                                                        RD 00030
    DO 100 I2=1,N2                                                        RD 00040
100 READ(5,1)(F(I1,I2,I3,1,1,1),X(I1,1),I1=1,9),X(I3,3),X(I2,2),         RD 00050
  1 (F(I1,I2,I3,1,1,1),X(I1,1),I1=10,N1)                                 RD 00060
    RETURN                                                                RD 00070
  1 FORMAT(9(1X,F5.2,F2.0),1X,F2.1,F3.0/9(1X,F5.2,F2.0)/                RD 00080
  1 3(1X,F5.2,F2.0))                                                     RD 00090
    END                                                                   RD 00100
```

[52]

```
                    S U B R O U T I N E    L L S Q F T

    SUBROUTINE LLSQFT(NVF,RMS,ERM,MODE)                                  LLS00010
    COMMON/TABLE/N1,N2,N3,N4,N5,N6,F(25,12,11,1,1,1),X(25,6),W(25,6)      LLS00020
    DIMENSION I(6),N(6),G(26),A(3)                                       LLS00030
    EQUIVALENCE         (I(1),I1),(I(2),I2),(I(3),I3),(I(4),I4),(I(5),   LLS00040
   1 I5),(I(6),I6),(N(1),N1)                                            LLS00050
                                                                        LLS00060
    SUBROUTINE LLSQFT PICKS OFF THE APPROPRIATE VALUES FROM THE ARRAY    LLS00070
    F TO BE FIT BY WLSQ.                                                 LLS00080
                                                                        LLS00090
    ERM = 0.                                                            LLS00100
    RMS = 0.                                                            LLS00110
    I1 = 0                                                              LLS00120
101 I1 = I1 + 1                                                         LLS00130
    I2 = 0                                                              LLS00140
102 I2 = I2 + 1                                                         LLS00150
    I3 = 0                                                              LLS00160
103 I3 = I3 + 1                                                         LLS00170
    I4 = 0                                                              LLS00180
104 I4 = I4 + 1                                                         LLS00190
    I5 = 0                                                              LLS00200
105 I5 = I5 + 1                                                         LLS00210
    I6 = 0                                                              LLS00220
106 I6 = I6 + 1                                                         LLS00230
    M = N(NVF)                                                          LLS00240
    J = 0                                                              LLS00250
110 J = J + 1                                                          LLS00260
    I(NVF) = J                                                          LLS00270
    G(J) = F(I1,I2,I3,I4,I5,I6)                                         LLS00280
    IF(J.LT.M)GO TO 110                                                 LLS00290
    CALL WLSQ(M,X(1,NVF),W(1,NVF),G,A,R,E)                              LLS00300
    RMS = RMS + R                                                       LLS00310
    ERM = AMAX1(ERM,E)                                                  LLS00320
    IF(MODE.EQ.0)GO TO 130                                              LLS00330
    DO 115 J=1,M                                                        LLS00340
    I(NVF) = J                                                          LLS00350
115 F(I1,I2,I3,I4,I5,I6) = G(J)                                         LLS00360
    DO 120 J=1,3                                                        LLS00370
    I(NVF) = J + N(NVF)                                                 LLS00380
120 F(I1,I2,I3,I4,I5,I6) = A(J)                                         LLS00390
    I(NVF) = M                                                          LLS00400
130 IF(I6.LT.N6)GO TO 106                                               LLS00410
    IF(I5.LT.N5)GO TO 105                                               LLS00420
    IF(I4.LT.N4)GO TO 104                                               LLS00430
    IF(I3.LT.N3)GO TO 103                                               LLS00440
    IF(I2.LT.N2)GO TO 102                                               LLS00450
    IF(I1.LT.N1)GO TO 101                                               LLS00460
    WTS = 0.                                                            LLS00470
    DO 140 J=1,M                                                        LLS00480
140 WTS = WTS + W(J,NVF)                                                LLS00490
    WTS = WTS*N1*N2*N3*N4*N5*N6/M                                       LLS00500
    RMS = SQRT(RMS/WTS)                                                 LLS00510
    RETURN                                                              LLS00520
    END                                                                 LLS00530




                    F U N C T I O N    P H I

    FUNCTION PHI(I,X)                                                   PHI00010
    GO TO (100,200,300),I                                              PHI00020
100 PHI = 1.                                                           PHI00030
    RETURN                                                             PHI00040
200 PHI = X                                                            PHI00050
    RETURN                                                             PHI00060
300 PHI = X*X                                                          PHI00070
    RETURN                                                             PHI00080
    END                                                                PHI00090
```

[53]

```
                     S U B R O U T I N E     W L S Q

      SUBROUTINE WLSQ(M,X,W,F,A,R,E)                                      WLS00010
      DIMENSION X(1),F(1),W(1),A(1)                                       WLS00020
C                                                                         WLS00030
C     SUBROUTINE WLSQ OBTAINS A WEIGHTED LEAST SQUARES APPROXIMATION OF   WLS00040
C     THE FORM A(1)*PHI(1,X) + A(2)*PHI(2,X) + A(3)*PHI(3,X)             WLS00050
C                                                                         WLS00060
C     THE CALCULATION IS PERFORMED BY FIRST OBTAINING AN ORTHOGONAL       WLS00070
C     BASIS PH1,PH2,PH3  AND THEN FINDING THE APPROXIMATION WITH RESPECT  WLS00080
C     TO THESE FUNCTIONS.  FINALLY, THE COEFFICIENTS OF THE PHI'S ARE     WLS00090
C     FOUND.                                                              WLS00100
C                                                                         WLS00110
      PH1(X) = PHI(1,X)                                                   WLS00120
      PH2(X) = PHI(2,X) - Q1*PHI(1,X)                                     WLS00130
      PH3(X) = PHI(3,X) - Q2*PHI(2,X) - Q4*PHI(1,X)                       WLS00140
      A(2) = 0.                                                          WLS00150
      A(3) = 0.                                                          WLS00160
      C1 = 0.                                                            WLS00170
      D1 = 0.                                                            WLS00180
      B = 0.                                                             WLS00190
      DO 100 I=1,M                                                        WLS00200
      FT = PHI(1,X(I))                                                    WLS00210
      C1 = C1 + W(I)*FT**2                                                WLS00220
      D1 = D1 + W(I)*FT*F(I)                                              WLS00230
  100 B = B + W(I)*FT*PHI(2,X(I))                                         WLS00240
      A(1) = D1/C1                                                        WLS00250
      Q1 = B/C1                                                           WLS00260
      C2 = 0.                                                            WLS00270
      D2 = 0.                                                            WLS00280
      B2 = 0.                                                            WLS00290
      B3 = 0.                                                            WLS00300
      DO 120 I=1,M                                                        WLS00310
      FT = PH2(X(I))                                                      WLS00320
      C2 = C2 + W(I)*FT**2                                                WLS00330
      D2 = D2 + W(I)*FT*F(I)                                              WLS00340
      FS = PHI(3,X(I))                                                    WLS00350
      B2 = B2 + W(I)*FT*FS                                                WLS00360
  120 B3 = B3 + W(I)*FS*PHI(1,X(I))                                       WLS00370
      IF(C2.EQ.0.)GO TO 300                                               WLS00380
      P2 = D2/C2                                                          WLS00390
      Q2 = B2/C2                                                          WLS00400
      Q4 = B3/C1 - Q1*Q2                                                  WLS00410
      C3 = 0.                                                            WLS00420
      D3 = 0.                                                            WLS00430
      DO 140 I=1,M                                                        WLS00440
      FT = PH3(X(I))                                                      WLS00450
      C3 = C3 + W(I)*FT**2                                                WLS00460
  140 D3 = D3 + W(I)*FT*F(I)                                              WLS00470
      IF(C3.EQ.0.)GO TO 210                                               WLS00480
      P3 = D3/C3                                                          WLS00490
      A(1) = A(1) - P3*Q4                                                 WLS00500
      A(2) = -P3*C2                                                       WLS00510
      A(3) = P3                                                           WLS00520
  210 A(1) = A(1) - P2*Q1                                                 WLS00530
      A(2) = A(2) + P2                                                    WLS00540
  300 R = 0.                                                             WLS00550
      E = 0.                                                             WLS00560
      DO 310 I=1,M                                                        WLS00570
      FV = 0.                                                            WLS00580
      DO 305 J=1,3                                                        WLS00590
      FV = FV + A(J)*PHI(J,X(I))                                          WLS00600
  305 CONTINUE                                                            WLS00610
      F(I) = F(I) - FV                                                    WLS00620
      ET = ABS(F(I))                                                      WLS00630
      R = R + ET**2                                                      WLS00640
  310 E = AMAX1(E,ET)                                                     WLS00650
      RETURN                                                              WLS00660
      END                                                                 WLS00670
```

A.6 Sample Data and Output for LSTSQ

Essentially the same data was run on LSTSQ as on MINMAX. Val es for

the abscissae are necessary, and were simply given as equally spaced.

The version of RD given in the listing was modified to read fewer than

10 entries in the first variable by replacing the read statement by

100 READ(5,1)(F(I1,I2,I3,1,1,1),X(I1,1),I1=1,4),X(I2,2),X(I3,3)   .

The input data and output follow:

(Input data for LSTSQ, as punched)

4	3	2	1	1	1	1	0	0	0	0	0	1
.5		1.		1.		.5						
1.0	0 2.0	1 3.5	2 4.0	3 0.0	0							
-.5	0 1.5	1 2.9	2 3.8	3 1.0	0							
0.0	0 1.5	1 2.2	2 2.5	3 2.0	0							
-1.	0 0.0	1 1.5	2 2.5	3 0.0	1							
-2.	0 -.5	1 .05	2 2.0	3 1.0	1							
-1.5	0 -.2	1 0.3	2 1.9	3 2.0	1							

THE INDEPENDENT VARIABLES

```
WT1        5.000E-01   1.000E 00   1.000E 00   5.000E-01
 X1        0.0         1.000E 00   2.000E 00   3.000E 00
WT2        1.000E 00   1.000E 00   1.000E 00
 X2        C.0         1.000E 00   2.000E 00
WT3        1.000E 00   1.000E 00
 X3        C.0         1.000E 00
```

THE DEPENDENT VARIABLE, FIRST INDEPENDENT VARIATION ACROSS THE PAGE

```
I2 I3 I4 I5 I6
 1  1  1  1  1   1.000E 00   2.000E 00   3.500E 00   4.000E 00
 2  1  1  1  1  -5.000E-01   1.500E 00   2.900E 00   3.800E 00
 3  1  1  1  1   0.0         1.500E 00   2.200E 00   2.500E 00
 1  2  1  1  1  -1.000E 00   0.0         1.500E 00   2.500E 00
 2  2  1  1  1  -2.000E 00  -5.000E-01   5.000E-02   2.000E 00
 3  2  1  1  1  -1.500E 00  -2.000E-01   3.000E-01   1.900E 00
```

THE ERROR ARRAY FOLLOWS

```
I2 I3 I4 I5 I6
 1  1  1  1  1   1.364E-01  -2.045E-01   2.045E-01  -1.364E-01
 2  1  1  1  1  -9.094E-03   1.364E-02  -1.363E-02   9.090E-03
 3  1  1  1  1  -3.637E-02   5.455E-02  -5.454E-02   3.636E-02
 1  2  1  1  1   9.091E-02  -1.364E-01   1.364E-01  -9.091E-02
 2  2  1  1  1  -2.136E-01   3.205E-01  -3.205E-01   2.136E-01
 3  2  1  1  1  -1.727E-01   2.591E-01  -2.591E-01   1.727E-01
```

THE FIT ON THE 1TH VARIABLE, WITH RMS ERROR =   1.935E-01
                               MAXIMUM ERROR =   3.205E-01

THE COEFFICIENTS OF PHI1, PHI2, AND PHI3 ARE FUNCTIONS OF
ALL BUT THE 1TH VARIABLE, AND ARE LISTED HERE AS THE 5TH
THROUGH THE 7TH VALUES FOR I1, RESPECTIVELY.

```
I2 I3 I4 I5 I6
 1  1  1  1  1   8.636E-01   1.466E 00  -1.250E-01
 2  1  1  1  1  -4.909E-01   2.252E 00  -2.750E-01
 3  1  1  1  1   3.637E-02   1.709E 00  -3.000E-01
 1  2  1  1  1  -1.091E 00   1.227E 00   3.576E-07
 2  2  1  1  1  -1.786E 00   8.534E-01   1.125E-01
 3  2  1  1  1  -1.327E 00   7.932E-01   7.500E-02
```
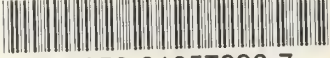
The output is largely self explanatory. The input function and error array are output in a format similar to that of Tables 2-6. The coefficients of the desired approximation are stored in the same array as the input function. On output, when the approximation was in the j variable, the coefficients of ϕ_1, ϕ_2, and ϕ_3 are output as the $(N_j + 1)^{st}$, $(N_j + 2)^{nd}$ and $(N_j + 3)^{rd}$ values of the jth variables. This is explained in the output, also.

Distribution List