THE UTILITY OF FOURIER ESTIMATES OF GRAIN SHAPE IN SEDIMENTOLOGICAL STUDIES

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BRIAN REDMOND

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ABSTRACT

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By

Brian Redmond

Although grain shape variation has always been considered an important sedimentological variable it has not been successfully used in the solution of geologic problems. Results of recent research (Ehrlich & Weinberg, 1969) have indicated that use of a novel mathematical model of shape should permit shape to be utilized successfully. This paper concerns an evaluation of the Ehrlich-Weinberg shape variable in terms of its functional behavior and in a study of local provenance.

The results of the investigation show that there is no detectable correlation between size and shape in quartz as measured by the Fourier series for a size range of .1 to .3 mm mean radius. Standard deviation is not independent of the shape variable, the harmonic amplitude. High correlations between certain harmonic, especially the sixth and ninth harmonics, indicate possible structural control of quartz shape. The movement of sediments from tributary creeks to the Red Cedar River in central Michigan can be detected through roughness coefficient patterns. Thus the present results indicate that the Fourier series technique gives more promise for successful provenance work than any heretofore suggested.

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Brian Redmond

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INTRODUCTION

It is paradoxical that, although shape is one of the most prominent characteristics of matter in nature, the study of shape has received so little development in the geologic sciences. Such lack of rigor is not typical of the other sciences. For instance, thousands of years ago Euclid achieved fame when he founded a branch of mathematics based on shape. Modern-day chemists receive Nobel prizes for defining the shape of a molecule. Physicists and astronomers are able to so precisely compute projectile orbits that men have traveled to the moon's surface and back. Can it be that shape holds no signigicance for the geologist? Is the shape of a small particle devoid of meaning? Or is it that the shape of this small particle is not adequately described?

It is not for lack of appreciation of the utility of shape in solving geologic problems that geologists have failed to make better use of the shape parameter. Numerous geologic papers have been published dealing with this parameter. Unfortunately, the potential of shape to serve as a useful variable has remained unrealized.

Until recently, the shape of small particles has been described in terms of sphericity and roundness. Sphericity is a function of the ratio of particle surface area to volume. However, surface area, especially of a small and rugged sand grain, is quite difficult to measure. Such difficulty has given rise to various operational definitions of sphericity. These definitions usually involve the easier to measure circumscribed and inscribed circles of the grain projection (Riley, 1941), (Wadell, 1935), (Tickell, 1931), (Pentland, 1927), (Cox, 1927) or circumscribed spherical volume and actual volume (Krumbein &

Sloss, 1963), (Krumbein, 1941), (Wadell, 1933). Roundness is defined as being a measure of the change in the radius of curvature of segments of the particle's projection perimeter (Flemming, 1965). Some people feel that, together, sphericity and roundness might adequately describe grain shape but such is not the case.

The use of sphericity or any other regular polyhedron as a reference form in a shape approximation assumes that an irregular shape can be adequately approximated to that regular shape. To be sure, the sphere, rectangle, or any other regular shape is aesthetically pleasing and much easier to work with. The sphere can be quickly described with a radius, the rectangle by two orthoganal axes. However, few particles, unless strongly controlled by cleavage, approach or maintain the shape of a regular polyhedron. An adequate grain shape description should enable one to reconstruct the shape of the grain and this, one cannot uniquely do with just sphericity and roundness. A frankfurter, for instance, could be reconstructed from sphericity and roundness indices but the frankfurter would not be a unique solution for these indices. The final proof of the inadequacy of sphericity and roundness is in the singular lack of success in using such shape approximations to aid in the solution of geologic problems. Roundness and sphericity were differentiated by Robertus Anglicus in 1271 and little progress has been made since (Krynine, 1956).

Recently, a new approach to the problem of shape description was advanced using a Fourier series approximation (Ehrlich & Weinberg, 1969). Such an approximation, unlike previous shape statistics, does not reference the shape of a grain to a regular polyhedron. Moreover and most important, using the grain shape equation, the grain shape can be reproduced to within any precision. Grain shape so described has been used in the solution of a geologic problem such as the identification of different soil horizons within an Alaskan soil profile through an analysis of the shapes of the quartz grains in each horizon (Ehrlich & Weinberg, 1969).

It is the purpose of this paper to use the above method to investigate the nature of the shapes of quartz grains, to evaluate the utility of the method in a study of sediment provenance, and to examine empirical relationships among variables generated by the Fourier series and between these variables and grain size. Quartz was chosen because it is quite resistant to both chemical and mechanical weathering, because it has poorly expressed cleavage (if any at all), and because it is ubiquitous.

METHOD

The method used is the Fourier series shape approximation. For a detailed discussion of the method the reader is referred to Ehrlich & Weinberg (1969). The following description is largely taken from that source.

In general, grain shape is estimated by an expansion of the periphery radius as a function of angle about the grain's center of gravity by a Fourier series. The radius is therefore given by:

$$R(\theta) = R_0 + \sum_{n=1}^{\infty} R_n \cos(n\theta - \phi_n)$$

where θ is the polar angle measured from an arbitrary reference line. The first term in the series, R_0 , is equivalent to the average radius of the grain in the plane of interest. For the remainder of the terms, n is the harmonic order, R_n is the harmonic amplitude, and ϕ_n is the phase angle. The n'th harmonic contributes to the shape of the particle a figure with n 'bumps'. That is, the 'zeroth' harmonic is a centered circle with an area equal to the total area, the first harmonic is an offset circle, the second is a figure eight, the third a trefoil, and the fourth a four-leaf clover. The center of gravity of the shape is chosen as the origin of the radius expansion to simplify interpretation of the generated series.

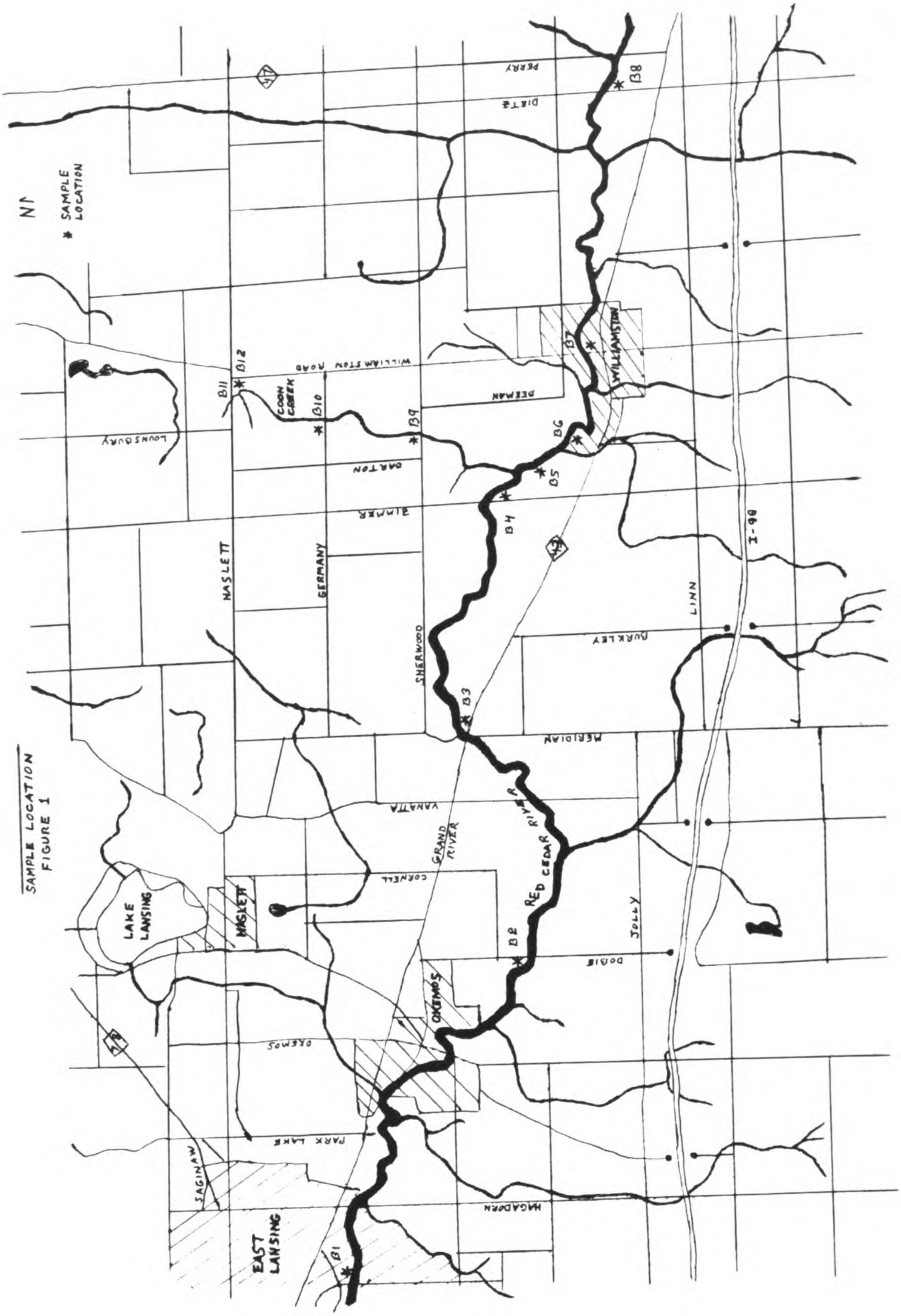
Coordinates of points on the periphery of the grain are necessary for expansion. At least twice the number of points must be known as the number of the highest harmonic. The initial origin of the periphery may be arbitrary because later in the analysis a transformation will place the origin at the grain center.

SAMPLING DESIGN

The sampling area is located in northeastern Ingham county just east of Lansing, Michigan. The object of the sampling was the upper Red Cedar River and one of its tributaries, Coon Creek (Figure 1). All samples were taken from the river and creek sediment. Sampling was conducted on the Red Cedar covering about 17 miles of river and on its tributary, Coon Creek from its headwaters to its mouth, a distance of at most five miles. Even within this small area, there is a great variety of glacial-fluvial materials laid down in the Pleistocene and soils developed from them. This study is planned to test whether that variation, which is slight geologically, is expressed by concommittant shape variation of quartz grains. The samples presumably constitute sediment in transport.

Two Red Cedar samples, one upstream and one downstream of the point where Coon Creek enters the Red Cedar, give an indication of the immediate effect of Coon Creeks contribution to the Red Cedar. At a point near the headwaters of Coon Creek, samples were taken from both the finer sediment located on the creek floodplain and from the coarser sand in the river scour. Being from the same location, these two samples can be compared to see if there is any relationship between grain shape and grain size.

A more general comparison can be made between the grains from all of the samples. Inter-relationships between harmonics can be examined. If there is a relationship between two harmonics, it would indicate that detrital quartz has a preferred shape. The number of grains for each sample required to attain a given precision for a given harmonic can also be computed.


SAMPLE LOCATION
FIGURE 1
N
* SAMPLE LOCATION
PERRY
DIETZ
WILLIAMSTON ROAD
WILLIAMSTON
PEEMAN
LOUNSBURY
DARTON
ZIMMER
HASLETT
GERMANY
SHERWOOD
BURKLEY
LINN
I-96
MERIDIAN
VANATTA
CORNELL
GRAND RIVER
RED CEDAR RIVER
LAKE LANSING
HASLETT
JOLLY
DOBIE
OKEMOS
OKEMOS
PARK LAKE
SAGINAW
HAGADORN
EAST LANSING
COON CREEK
B1
B2
B3
B4
B5
B6
B7
B8
B9
B10
B11
B12

PROCESSING

As a first step in processing, the samples are poured into a large mouthed plastic container and elutriated and decanted repeatedly with warm water in order to remove as much organic matter, silt, and clay as possible. The residue is transferred to a small glass beaker whereupon dilute hydrochloric acid with trace amounts of $SnCl_2$ is added. The beaker is then gently heated. The HCl will act to remove iron stains as well as any carbonate from the sample without altering the quartz grain shape. The presence of $SnCl_2$ will increase the rate of removal of any iron stain on the quartz. The process is repeated until the yellow stain in the solution indicating dissolved ferric ion no longer appears. The sample is then washed and dryed and mounted on standard glass slides.

The projection area of the grains is obtained by means of a microprojector which linearly magnifies the image two-hundred times. Quartz is easily distinguished from other minerals by the use of polarized light in the microprojector. The image is traced onto a piece of paper and then taken to a digitizer which determines the coordinates of peripheral points and automatically punches these points onto Hollerith cards. The average number of peripheral points per grain is 70 points. The Hollerith cards are then submitted to either a CDC 3600 or CDC 6500 computer with the appropriate program.

PRECISION

Precision concerns the closeness of repeated measurements of the same parameter of the same sample. In this study there are two things which can be considered repeated measurements, the measurement of the shape of each individual grain and the composite shape of a multi-grain sample. Also of interest is the precision of two samples from the same location.

Defining the level of precison at each level, variation within a single grain, within a multi-grain sample, and between samples, is essential for determining the amount of real variation which can be detected. The greater the precision, the greater the resolving power of the analysis. Since precision is a limiting factor on the amount of visible information, if any, determination of precision at all levels will isolate the level with least precision so that efforts may be made toward increasing that precision and thereby the visible information at all levels. The number of grains per sample required to attain a given precision can also be calculated.

Up until this time, little data on the precision of the Fourier series shape approximation method was available except for a few measurements using Mahalanobis D by Ehrlich & Weinberg (1969). The analysis of precision in this paper will make up part of this lack and will give an indication of the applicability of the method.

INDIVIDUAL GRAIN VARIATION VS. MULTI-GRAIN SAMPLE VARIATION

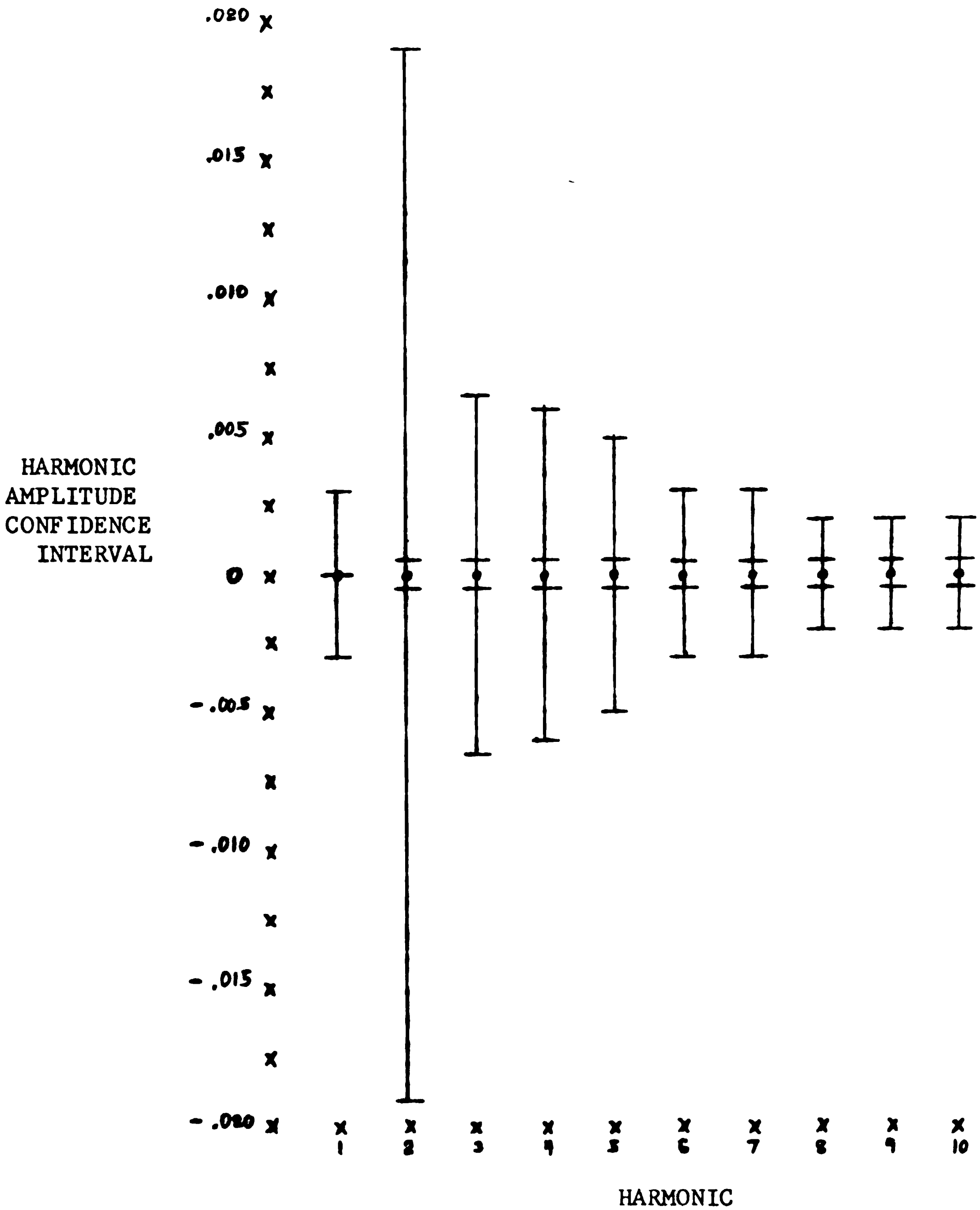
One of the 33 grains from sample B8 was chosen at random and duplicated or redigitized eleven times in order to determine the amount of induced variation in that single grain caused by measurement imprecision. Histograms of the spread of the harmonic amplitudes for the first ten harmonics were calculated (Appendix A). From the standard deviations, confidence intervals of .95 were calculated for each harmonic amplitude. This means that under repeated sampling with .95 confidence intervals constructed for each sample, about 95 out of 100 intervals will include the parametric value.

Histograms of the harmonic amplitudes were also made for the sample as a whole (Appendix B). Confidence intervals of .95 for the entire sample were calculated. The precision of the single grain can now be compared against the precision of the sample (Figure 2). As expected, the precision of the single grain is always greater than the precision of the sample since the sample variance contains as a component the within grain variation. It will be noticed that as the harmonic number increases, the within grain variation component ranges from negligible at the first harmonic to one fourth the variance of the multi-grain sample at the tenth harmonic. For the levels of precision of the individual grain and of the whole sample, it would seem that, up to the tenth harmonic, the imprecision of the sample mean is the limiting factor. An increase in the sample precision would result in an overall increase in the amount of visible information.

The sample size needed for a given precision can be determined. The estimated standard deviation is based on the amount of variation seen in the harmonic amplitude values for all samples and all harmonics from the eight Red Cedar River samples (Table 1). The amount of significant variation visible is

FIGURE 2

Comparison of the precision of a single sample versus the precision of a single grain from that sample   Confidence .95



	HARMONIC									
	1	2	3	4	5	6	7	8	9	10
SINGLE SAMPLE	.003	.019	.013	.006	.005	.003	.003	.002	.002	.002
SINGLE GRAIN	.0000	.0005	.0010	.0005	.0005	.0005	.0005	.0005	.0005	.0005

RED CEDAR RIVER
TABLE OF VALUES
TABLE 1

HARMONIC NUMBER	SAMPLE → / PARAMETER ↓		B1		B2		B3		B4		B5		B6		B7		B8		AVERAGE	
DISTANCE IN MILES			0	0	5.3	5.3	8.2	2.9	11.4	3.2	11.8	.4	12.6	.8	13.8	1.2	17.2	3.4		
1	SD	CI.95	.011	.003	.009	.003	.007	.002	.015	.004	.009	.002	.009	.003	.009	.003	.011	.003		
	MA	CI.90	.014	.003	.013	.002	.010	.002	.018	.003	.012	.002	.011	.002	.012	.002	.012	.002	.0126	.002
2	SD	CI.95	.091	.028	.079	.022	.065	.022	.083	.023	.067	.018	.077	.024	.086	.026	.064	.019		
	MA	CI.90	.156	.021	.183	.017	.140	.017	.171	.018	.143	.014	.150	.018	.148	.020	.127	.014	.1523	.017
3	SD	CI.95	.041	.013	.045	.013	.041	.014	.051	.014	.034	.009	.052	.016	.036	.011	.043	.013		
	MA	CI.90	.085	.010	.075	.010	.059	.010	.089	.011	.079	.007	.080	.012	.070	.008	.071	.010	.0760	.010
4	SD	CI.95	.022	.007	.028	.008	.027	.009	.028	.008	.024	.007	.028	.009	.021	.006	.020	.006		
	MA	CI.90	.046	.005	.047	.006	.044	.007	.048	.006	.046	.005	.043	.007	.041	.005	.018	.005	.0454	.006
5	SD	CI.95	.018	.005	.020	.006	.020	.007	.020	.006	.014	.008	.018	.006	.016	.005	.016	.005		
	MA	CI.90	.034	.004	.037	.004	.032	.005	.036	.004	.029	.003	.031	.004	.029	.004	.030	.004	.0323	.004
6	SD	CI.95	.014	.004	.013	.004	.008	.003	.013	.004	.011	.003	.015	.005	.010	.003	.011	.003		
	MA	CI.90	.024	.003	.024	.003	.021	.002	.024	.003	.021	.002	.023	.004	.021	.002	.025	.002	.0229	.003
7	SD	CI.95	.009	.003	.010	.003	.012	.004	.012	.003	.007	.002	.012	.004	.007	.002	.010	.003		
	MA	CI.90	.017	.002	.017	.002	.017	.003	.018	.003	.017	.001	.016	.003	.016	.002	.017	.002	.0169	.002
8	SD	CI.95	.007	.002	.009	.003	.009	.003	.007	.002	.006	.002	.009	.003	.006	.002	.006	.002		
	MA	CI.90	.013	.002	.016	.002	.013	.002	.014	.001	.012	.001	.015	.003	.012	.001	.014	.001	.0136	.002
9	SD	CI.95	.006	.002	.004	.001	.007	.002	.007	.002	.006	.002	.007	.002	.005	.002	.007	.002		
	MA	CI.90	.010	.001	.010	.001	.012	.002	.011	.001	.012	.001	.011	.002	.009	.001	.010	.002	.0106	.001
10	SD	CI.95	.004	.001	.005	.001	.004	.001	.004	.001	.004	.001	.006	.002	.004	.001	.006	.002		
	MA	CI.90	.009	.001	.009	.001	.008	.001	.008	.001	.008	.001	.010	.001	.009	.001	.009	.001	.0088	.001
N			31		37		26		37		39		30		32		33		33.1	

SD= STANDARD DEVIATION MA= MEAN AMPLITUDE OF HARMONIC

CI= CONFIDENCE INTERVAL AT EITHER 90 OR 95% N= NUMBER OF GRAINS IN A SAMPLE limited by intrasample precision. That is, if the standard deviation in harmonic amplitude among grains is .010, one could not expect to see a significant intersample variation of similar magnitude - it would be hidden in the intrasample variation. The intersample precision is related to the square root of the sample size - if the precision is to be doubled, the sample size will have to be increased fourfold.

Taking the eight Red Cedar River samples averaging 33 grains per sample and averaging the harmonic amplitudes between the samples for each harmonic will make possible the calculation of the amount of significant intersample variation which can be seen for that sample size for a designated size of type 1 and type 2 error. Estimates involving the type 2 error can only be made when prior estimates of the population standard deviations are available. One of the purposes of this paper is to provide such estimates. A probability of a type 2 error of .5 means that if a real difference exists, it will be manifest as a statistically significant difference about half of the time. A type 1 error set at .95 signifies that with the given standard deviation and sample size; the means of two samples drawn from identical populations will be interpreted as differing significantly five times in a hundred. Utilizing, as an example, the average size of the present sample set, and the empirical estimates of the standard deviation for data concerning type 2 error; and arbitrarily setting the type 1 error at .95; the smallest statistically discernable difference between two samples can be determined. Most of the requisite calculations can be performed beforehand and a graph can be constructed from which sample size or mean difference can be determined. Such a graph (Owen, 1962, p.25) is used for determining some of the values in Table 2. It can be seen in Table 2 that the total range of the mean of harmonic amplitude is of the same order of magnitude as the significant two sample difference. Since in this case we are

TABLE 2

Detectable Two-Sample Differences and Sample Size Calculations

Harmonic #	Average Mean	Observed Range	*2-Sample Difference	Desired 2-Sample Difference	*N For Desired Difference
1	.0126	.008	.006	.002	160
2	.1523	.056	.069	.020	190
3	.0760	.040	.035	.010	190
4	.0454	.007	.021	.006	190
5	.0323	.008	.015	.004	220
6	.0229	.004	.010	.003	190
7	.0169	.002	.008	.002	220
8	.0136	.004	.006	.002	170
9	.0106	.003	.005	.002	140
10	.0088	.002	.004	.001	240

N = Sample Size

*(Owen, 1962, p. 25)

dealing with many more than two samples, a total sample range exceeding the two sample range is to be expected by chance alone. Thus, those instances in this study where the total range exceeds the two-sample range in Table 2 must be treated circumspectly. The limited observation from Table 2 that the sample range is of the same order of magnitude as the two-sample difference means that in most cases we are at the extreme limit of our precision. If differences exist in those cases, greater sample sizes will be needed to detect them.

The only harmonic that appears to be at all robust at the present precision is the second harmonic. For this reason, only the second harmonic will be considered in a study of provenance in a succeeding section.

An estimate was made concerning sample sizes needed to render the other harmonics meaningful using Owen's graph. These sizes (Column 6, Table 2) are approximately 200 grains per sample.

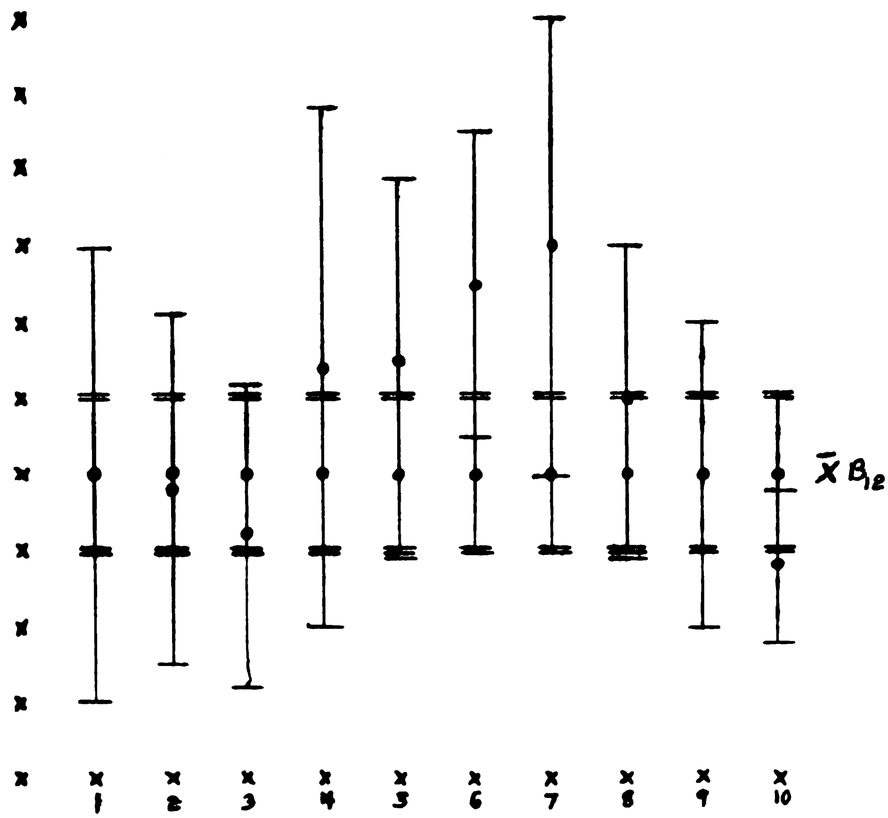
One additional manipulatable variable not heretofore discussed is the number of peripheral points per grain. It is possible that a substantial increase in the number of points per grain might allow downward revision of the sample size estimate.

PRECISION OF TWO SAMPLES FROM THE SAME LOCATION

Two samples, B11 and B12, were taken from the same location, the headwaters of Coon Creek. In this case, it was decided to see what the maximum difference between the two samples would be; for, although from the same location, B11 was taken from the finer sediment in the floodplain of the creek and B12 from the coarser sediment in the river scour. Confidence intervals of .95 were constructed for each harmonic amplitude and the samples compared in Figure 3. Since B12 has 150 grains to the 42 grains of B11, the confidence intervals of B12 are smaller. A T-test was done on the difference in means to see if the difference was significant (Table 3). According to the test, there is no discernable significant difference between the two samples. This is graphically illustrated in Figure 3. In effect, one can justifiable assume that the two samples were drawn from the same population.

FIGURE 3
Comparison of the precisions
of two samples from the same location

* Harmonic
Amplitude



Harmonic Number

single bar = .95 confidence limit of B11
double bar = .95 confidence limit of B12

* the confidence intervals and means
for the various harmonics of B12
were adjusted so that they would
all be equal

TABLE 3

T - test of the difference between the means of samples

B11 & B12

Harmonic #	(Standard Dev.)$_{B11}$	(Standard Dev.)$_{B12}$	(X_{12} - X_{11})	T
1	.010	.008	.000	.000
2	.094	.078	.003	.145
3	.040	.037	.004	.435
4	.039	.024	.004	.500
5	.018	.017	.003	.715
6	.014	.012	.005	.780
7	.011	.009	.003	1.250
8	.008	.007	.001	.556
9	.009	.006	.000	.000
10	.004	.006	.001	.910

FOR T_{95}
if T is less than 1.65 then there is
no significant difference

SIZE VS. HARMONIC AMPLITUDE

In the section of the precision of the two samples from the same location it was found that there was no discernable significant difference between the two samples and that the samples could have been drawn from the same population. The startling aspect of that finding is that although there was no shape difference detected between the two samples, there is an easily measureable size difference. The implication is that there is little or no correlation between size and shape.

To further investigate this idea that there is little or no size-shape relationship, scatter plots of the size, as measured by mean radius, versus shape, as measured by harmonic amplitude, were made for all harmonics for all Red Cedar River and Coon Creek samples (Appendix C). Correlation coefficients were calculated. The finding is that there is no significant correlation between size and shape for any sample. The conclusion is, therefore, that, at least for the area of the study and for the size range studied, .1 to .3mm mean radius, there is no discernable relationship between size and shape. Such an observation considerably simplifies shape study as no size effect need be calculated and removed.

STANDARD DEVIATION VS. HARMONIC AMPLITUDE

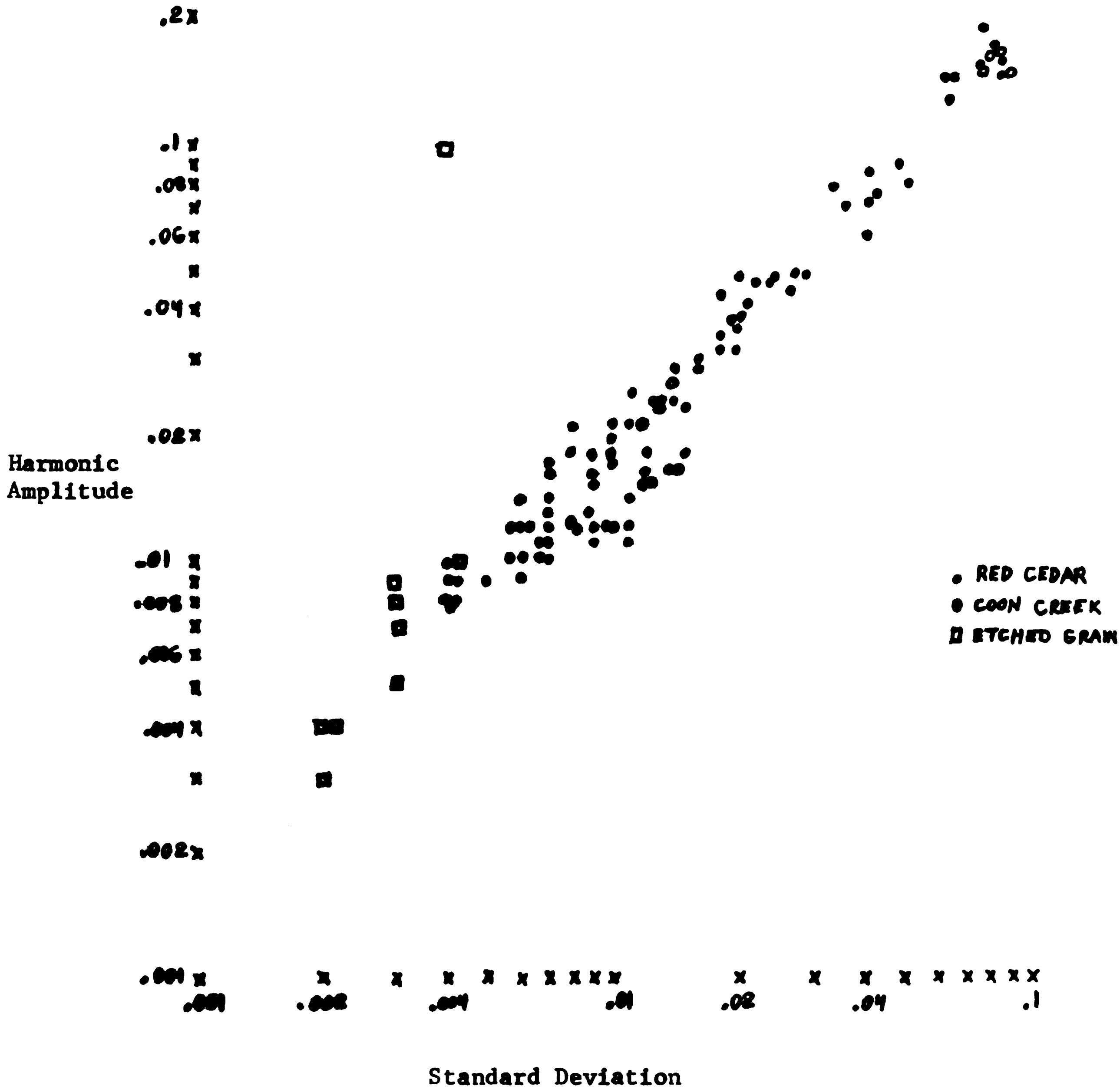
One of the necessary assumptions concerning data to be analysed by 'analysis of variance' technique is that the value of the mean is independent of that of the standard deviation. Cursory examination of the standard deviations and mean harmonic amplitudes in Table 1 suggest an exponential relationship. The two variables are therefore compared on a log-log graph (Figure 4). The various harmonic amplitudes were drawn from three sets, the Red Cedar River samples, the Coon Creek samples, and an artificially etched grain.

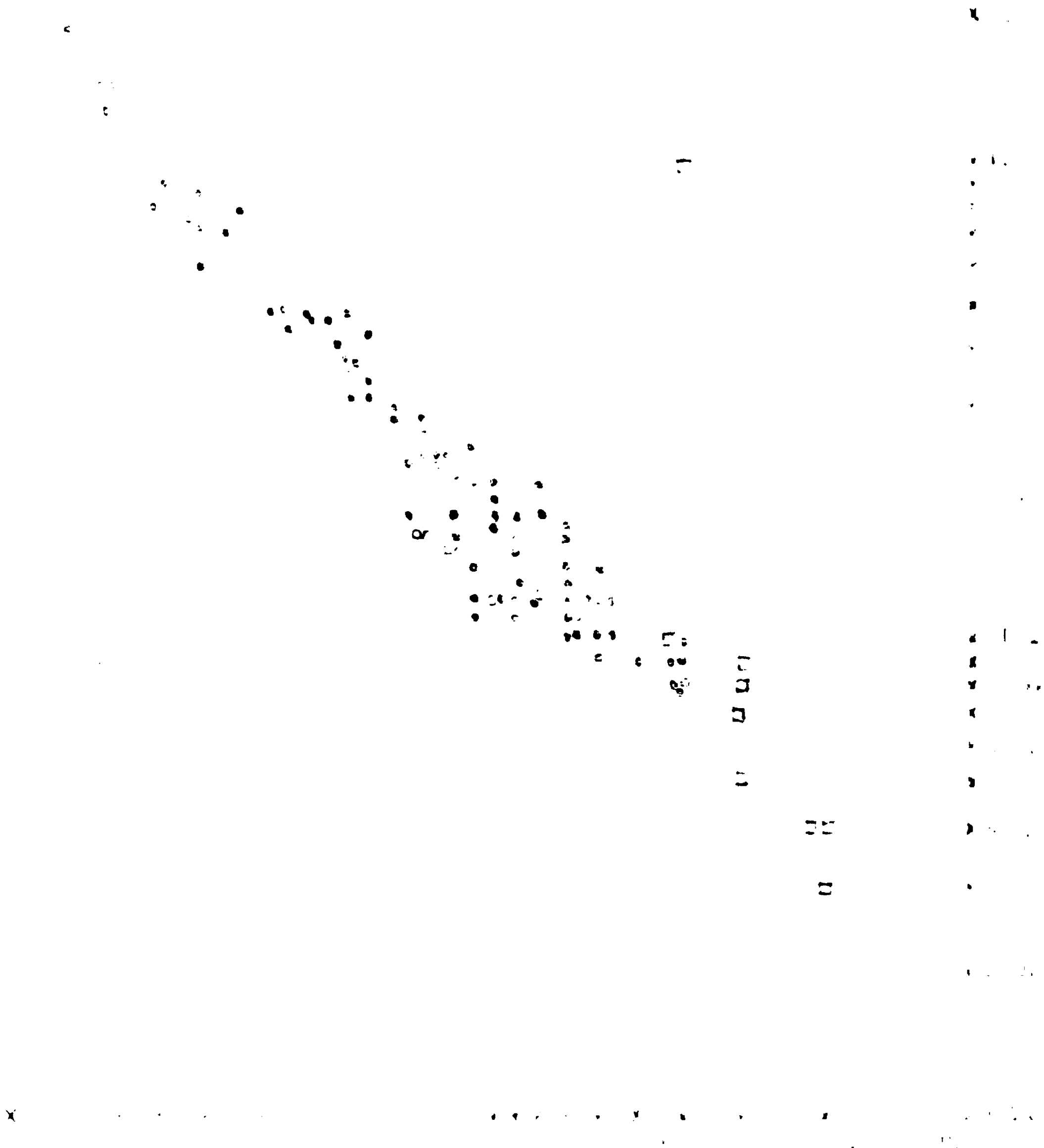
Examination of Figure 4, using the data from the Red Cedar and Coon Creek indicates a strong linear relationship between log (Standard deviation) and log (Mean harmonic amplitude). In addition, it can be seen that the linear relationship is approximately the same regardless of harmonic number. However, further inspection of the figure indicates a slightly more diffuse data array below mean amplitude values of approximately .012 and perhaps a slight lessening of slope. The mathematical and physical explanation cannot here be given with any confidence for this. However, the standard deviation can be thought to be composed of two components; one arising from intragrain variation and the other from intergrain variation.

Inspections of Tables 2 & 5 indicate that the size of the harmonic amplitudes at the higher harmonic numbers are estimated very imprecisely for their range of mean separation, many with only one significant figure. Variance achieves the same order of magnitude as the mean. This result raises the possibility that at higher harmonic numbers intragrain variation may be the principal component in the standard deviation whereas at low harmonic numbers intergrain variation is more important. This might explain the dual nature of the scatter in Figure 4.

FIGURE 4

a log-log comparison of standard deviation versus harmonic amplitude





To test this hypothesis a single grain (the artificially etched grain used in the succeeding section) was replicated 32 times and analyzed using the Fourier shape technique. All values but one fall approximately in the lower trend. The exception, the third harmonic, has too low of a standard deviation for its harmonic amplitude, that is, that value is lower by a factor of ten than what the trend would predict. The third harmonic, however, has approximately the same standard deviation as the other harmonics of that grain. One might postulate that the distance from the third harmonic to the trend might represent the contribution of intergrain variation.

The variance can be freed from its dependence on the mean by suitable data transformation such as the arcsin square root transformation. If such a transformation is not performed, there seems little use in using the patterns of variations of both the mean and the standard deviation in an investigation.

INTERHARMONIC CORRELATIONS

Information carried by one harmonic might be duplicated by the information carried by another harmonic. To check for such possible duplication, linear correlation coefficients were calculated between harmonics (Table 4 & Appendix D). With 150 grains, any correlation coefficient exceeding .159 is considered significant at the .95 level. Ten of the 35 coefficients can be considered to arise from a nonrandom array (Table 4). However, most indicate that the linear relationship accounts for less than 5% of the total variation of the dependent variable. The linear relationship between the sixth and ninth harmonics is the highest of all the correlations, accounting for some twelve percent of the variation. Lesser correlations of from nine to twelve percent exist between: the tenth and fourth, the tenth and seventh, the third and ninth, and between the third and sixth. The presence of significant correlations between harmonics suggests that quartz possesses preferred shape modes - probably crystallographically or genetically controlled. As a preliminary test of the former hypothesis shape analysis was performed on the shape of a deeply etched quartz sphere.

Because of its structure quartz, when it dissolves does so at different rates in different crystallographic directions. A sphere of quartz subjected to some silica solvent will not become a successively smaller sphere (Frondell, 1962). Rather the quartz will form a non-spherical solid which reflects the internal symmetry of quartz (Figure 5). The harmonic amplitude spectrum of the shape of a grain of quartz, originally spherical but subjected to prolonged etching with HF, was determined. The resulting spectrum was compared with that of the Red Cedar River samples (Table 5) and with the Coon Creek samples (Table 6). The shape of the etched grain is quite simple compared to that of natural detrital grains be-

TABLE 4

Interharmonic Correlation Coefficients

* Harmonic #	2	3	4	5	6	7	8
10	.174	.131	-.011	.200 ↙	.157	.215 ↙	.150
9	.093	.238 ↙	.097	.337 ↙	.340 ↙	.291 ↙	.132
8	.143	.092	.199 ↙	.112	.115	-.029	XXX
7	.159	.134	.033	.202 ↙	.172	XXX	XXX
6	.094	.192 ↙	-.013	.149	XXX	XXX	XXX
5	.155	.238 ↙	.080	XXX	XXX	XXX	XXX
4	.123	-.138	XXX	XXX	XXX	XXX	XXX
3	-.021	XXX	XXX	XXX	XXX	XXX	XXX

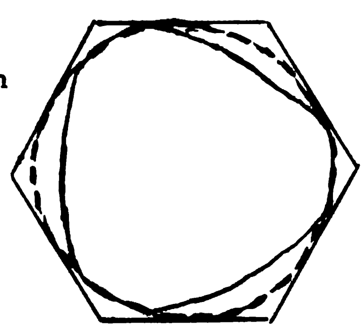
* not all possible harmonic combinations have been calculated

significant correlations ↙

FIGURE 5

Etched Quartz Grain
(Projection Shape)

Rates of solution on a sphere of left quartz



The dotted line shows the outline of the original sphere; the inner lines the outline of the solution-body remaining after long continued attack by HF.

(after Frondel, 1962)

TABLE 5

Comparisons of the Harmonic Amplitudes of the eight Red Cedar River samples and the etched grain

Harmonic #	Etched gr.	B1	B2	B3	B4	B5	B6	B7	B8
1	.001	.014	.013	.010	.018	.012	.011	.012	.012
2	.010	.156	.183	.140	.171	.143	.150	.148	.127
3	.097	.085	.075	.059	.089	.079	.080	.070	.071
4	.007	.046	.047	.044	.048	.046	.043	.041	.048
5	.005	.034	.037	.032	.036	.029	.031	.029	.030
6	.009	.024	.024	.021	.024	.021	.023	.021	.025
7	.004	.017	.017	.017	.018	.017	.016	.016	.017
8	.004	.013	.016	.013	.014	.012	.015	.012	.014
9	.008	.010	.010	.012	.011	.012	.011	.009	.010
10	.003	.009	.009	.008	.008	.008	.010	.009	.009

TABLE 6

Comparisons of the Harmonic Amplitudes of the four Coon Creek samples and the etched grain

Harmonic #	Etched gr.	B9	B10	B11	B12
1	.001	.015	.016	.012	.012
2	.010	.167	.166	.147	.150
3	.097	.075	.080	.073	.077
4	.007	.049	.050	.051	.047
5	.005	.033	.029	.034	.031
6	.009	.019	.023	.027	.022
7	.004	.017	.017	.019	.016
8	.004	.010	.016	.014	.013
9	.008	.009	.011	.010	.010
10	.003	.008	.010	.008	.009

cause its symmetry is exclusively controlled by internal structure. Therefore it is not surprising that the amplitude spectrum of the etched grain differs in two respects from natural quartz grains. The maximum amplitude of the etched grain is associated with the third harmonic rather than the second. The sixth and ninth harmonic amplitudes of the etched grain do not show the expected decrease of amplitude with increasing harmonic number as can be seen in all Red Cedar River and Coon Creek samples (Tables 5 & 6). Such a pattern is not unexpected in a trigonal mineral such as quartz.

It is interesting to note that in the preceeding section the high positive correlation between the sixth and ninth harmonics indicating, perhaps, a tendency towards crystallographic control of shape. Such control is reflected in the shape of the etched grain with its high sixth and ninth harmonic amplitudes. The slightly lower but still significant correlation between the fifth and ninth harmonics is at this time inexplicable.

PROVENANCE

The application of the data to the problem of provenance in the Red Cedar River proves more difficult than the formulation of general principles because of the lack of precision. It is only in the second harmonic with its high harmonic amplitudes that hope of detecting significant differences can blossom. Nonuniformity in the second harmonic amplitude pattern appears to consist of a set of samples (B2 & B4) with values of .17 and .18 and another set (all other Red Cedar samples) comprising 'background' level of approximately .15 (Figure 6). The higher values are from samples each immediately downstream from a major tributary suggesting that they represent a local tributary contribution which is diluted upon further transport. Corroborating evidence for the possibility lies in the value of the second harmonic amplitude of sediment taken near the mouth of Coon Creek (.17). The Red Cedar sample immediately downstream, B4, has a value of .17. Sample B2 (second harmonic amplitude of .18) lies downstream from Sloan Creek and again represents a major deviation from the general background of about .15. No rise is seen between B7 and B6 where Deer Creek enters the Red Cedar possibly because it has a much larger floodplain than either Coon Creek of Sloan Creek and because it has a lesser gradient. The lower end of Deer Creek becomes a slough when the Red Cedar is in flood, when the maximum sediment transport occurs. The Deer Creek sediment would then be deposited, not in the Red Cedar, but in the lower section of its own floodplain.

The picture can be made clearer by a look at the roughness coefficients of the samples. The Weinberg roughness coefficient is the sum of the squares of all the harmonic amplitudes (Ehrlich & Weinberg, 1969). This represents the average of the squared deviations of the grain perimeter from a circle of equal area. The

FIGURE 6
MEAN SECOND HARMONIC
RED CEDAR AND COON CREEK

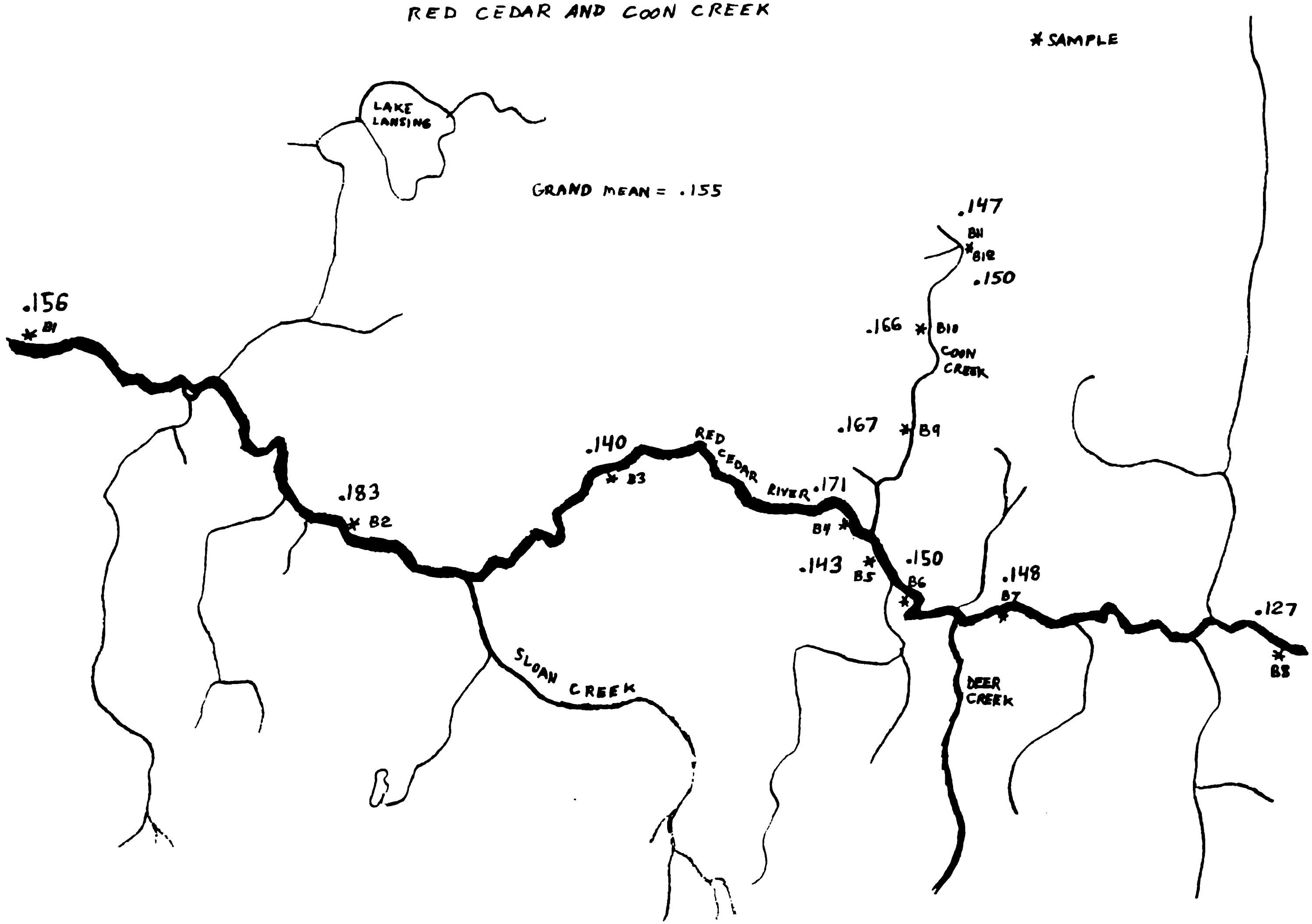
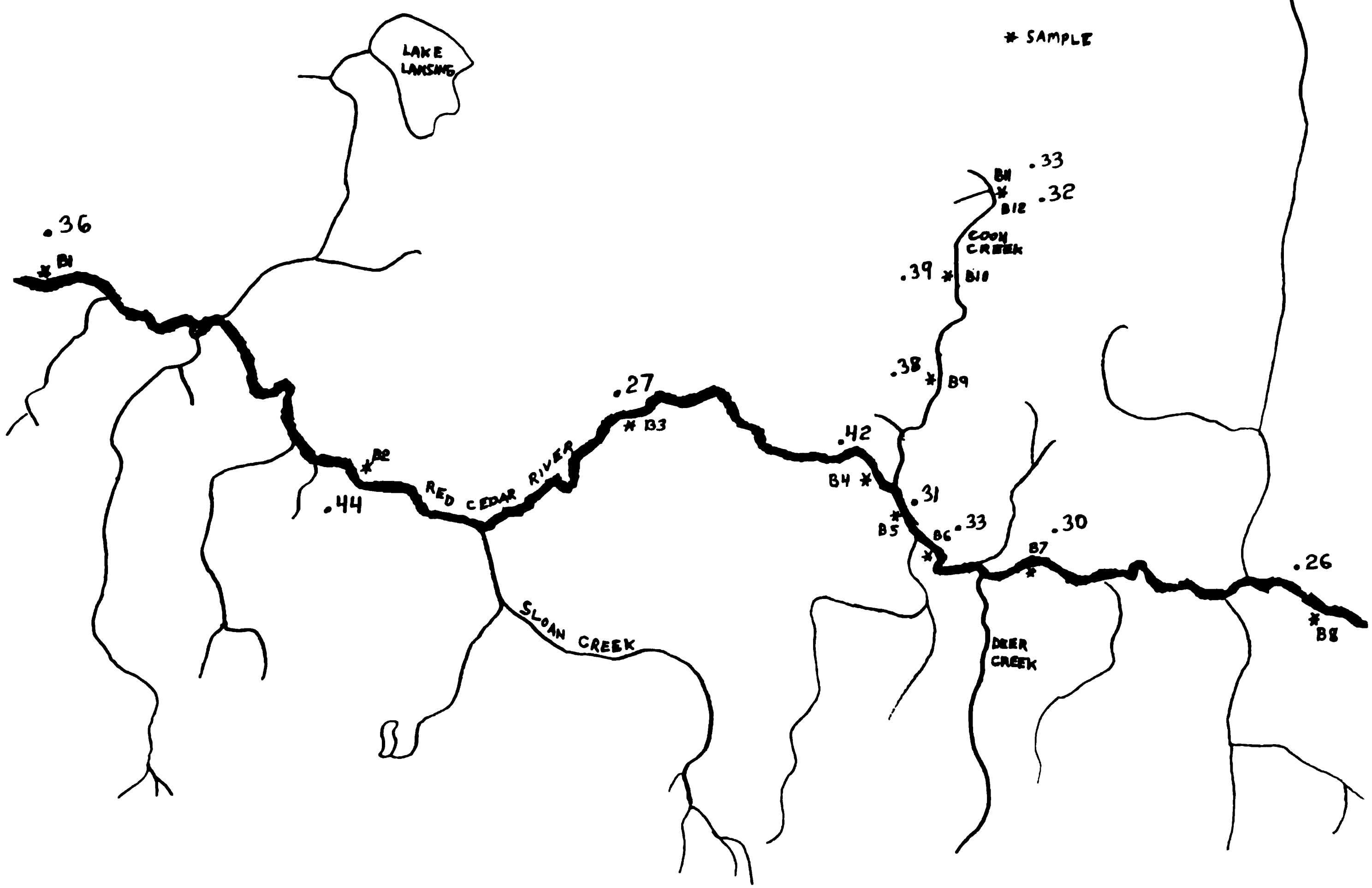


FIGURE 7
ROUGHNESS COEFFICIENT
COMPARISONS



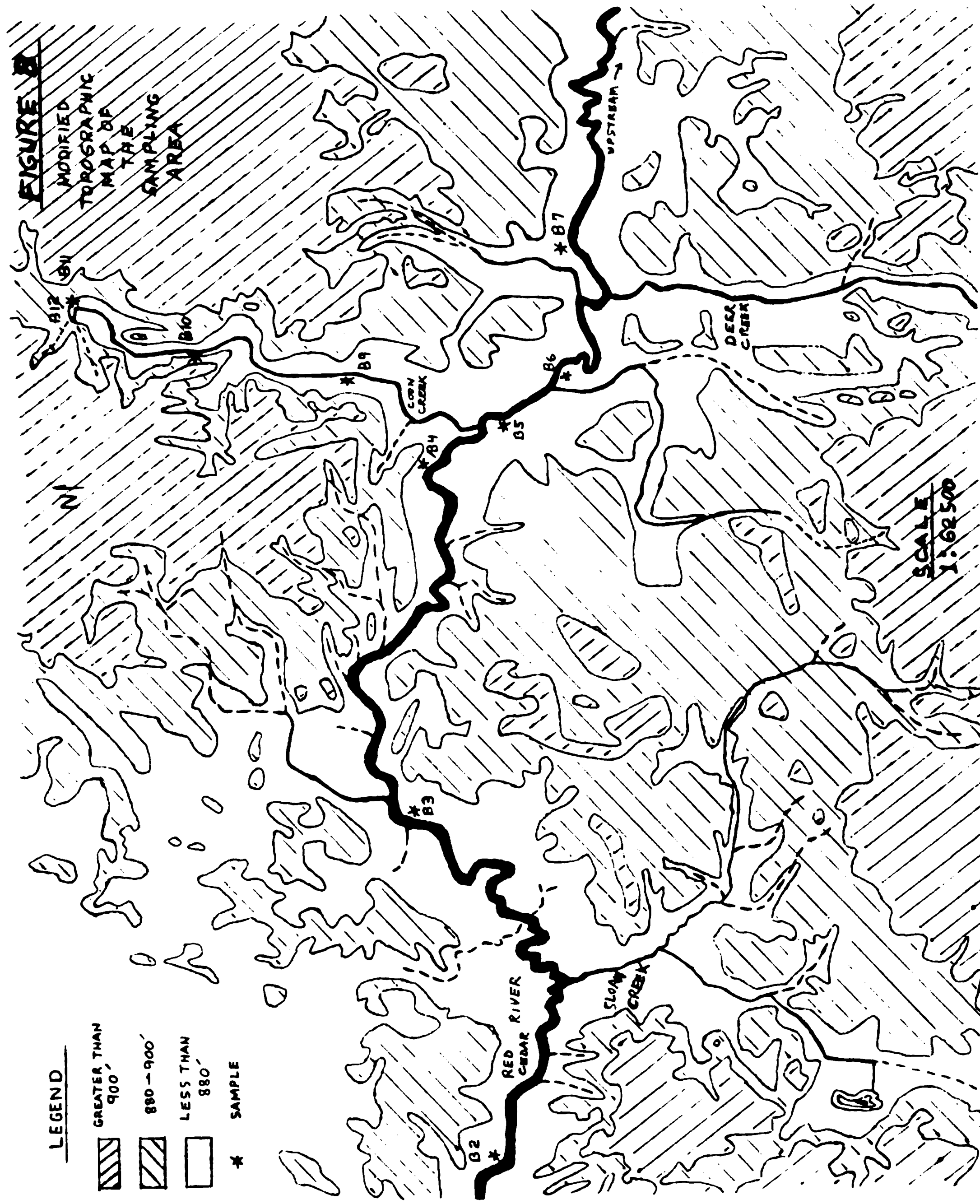


FIGURE
MODIFIED TOPOGRAPHIC MAP OF THE SAMPLING AREA
LEGEND
GREATER THAN 900'
880–900'
LESS THAN 880'
SAMPLE
SCALE 1:62500
N
RED CEDAR RIVER
SLOAN CREEK
DEER CREEK
CORN CREEK
UPSTREAM
B2
B3
B4
B5
B6
B7
B9
B10
B11
B12

higher the coefficient, the more rugged the grain shape. From Figure 7 it can be seen that the roughness coefficient values are distributed similarly to the second harmonic amplitudes of Figure 6 which is not too surprising as the second harmonic provides the greatest contribution to the roughness coefficient in the Red Cedar and Coon Creek samples. It is now seen that the tributary sediments, as illustrated by Coon Creek, consist of more rugged grains than those found in the Red Cedar. These more rugged grains are probably coming from glacial till composing the uplands through which Coon Creek and Sloan Creek are flowing (Figure 8).

With a more detailed study and greater precision it should be possible to quantify the amount of sediment entering the Red Cedar from the tributaries by an analysis of the change in the various harmonic amplitudes. It has been shown that a difference does exist between tributary and Red Cedar River sediment and that this difference is great enough to detect even under poor precision.

SUMMARY AND CONCLUSIONS

The relative precision of the harmonic values associated with the Fourier series approximations is inversely proportional to the harmonic number. Thus the number of points per grain is controlled more by consideration of precision than by the Nyquist Sampling Theorem which states that the number of points must be at least twice the order of the highest harmonic estimated. In addition, for studies such as this, more grains than thirty per sample will probably be necessary. Two-hundred grains per sample would reduce the standard error of the mean to approximately one-third the values in this study. Since no multivariate tests were performed in this study such as discriminate functions or multivariant analysis of variance, it is not known whether discrimination between samples could be improved in this way.

Empirical relationships between variables generated by the Fourier analysis should aid in further utilization of this technique. These include: There is no detectable correlation between size and shape as measured by the Fourier series approximation within the size range of the study, .1 to .3 mm mean radius. Therefore, no size effect need be calculated and removed from the shape equation. The standard deviation of the shape variable is not independent of the harmonic amplitude which means that certain statistical tests such as the T-test may be used on the data. Inspection of the correlation matrix of harmonic amplitudes indicates possible structural control of quartz shape. Results of this study demonstrate that provenance studies using this method are feasible but that the information will not come cheaply.

The movement of sediment from tributaries to the Red Cedar River can be detected through roughness coefficient patterns. The tributaries such as Coon Creek are carrying sediment with a rougher shape than that generally found in the Red Cedar. Tributary contribution to the Red Cedar can be detected by a high roughness coefficient in the Red Cedar sediment downstream from the mouth of a tributary. Sample sizes five or six times greater than those used here are probably necessary for a more detailed analysis of sediment provenance in this system. However, the present results indicate that the Fourier series technique gives more promise for successful provenance work than any heretofore suggested.

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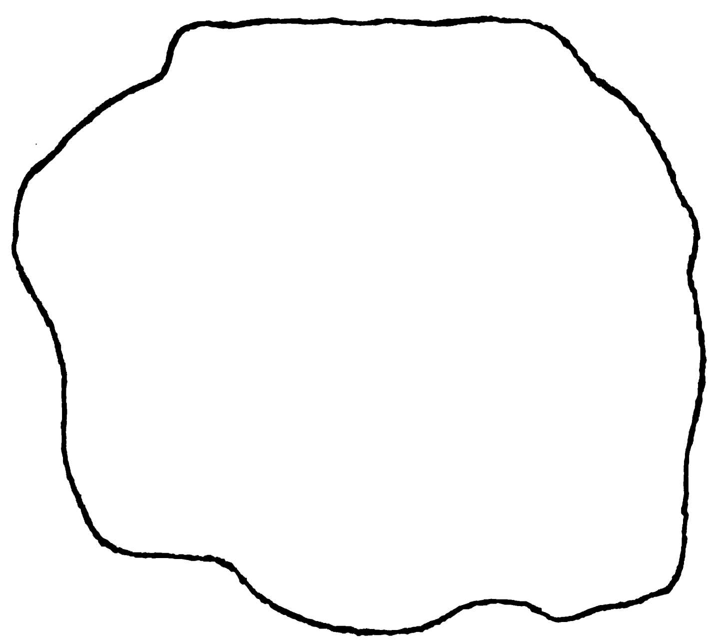
APPENDICES

APPENDIX A

Histograms of the Harmonic Amplitudes of the Test Grain With a Listing of the Harmonic Amplitudes of Each Replication

The test grain was replicated eleven times. The first nine replications had the same orientation. The last two replications each had a different orientation. The harmonic values of the last two replications are encircled.

The Test Grain



TEST GRAIN

HISTOGRAMS

```
DATA SET   1                    SIZE AND CALC CARD  UAP 1

SET    1            VARIABLE    1

          N =    11   <-- NUMBER OF REPLICATIONS
       MEAN =          0.003
  STD. DEV. =          0.000     (        0.000)
   VARIANCE =          0.000     (        0.000)
EF. OF VAR. =          7.569     (        7.938)
   SKEWNESS =          0.868     (        1.012)
   KURTOSIS =          0.127     (        1.045)

LOWER QUARTILE =          0.003
        MEDIAN =          0.003
UPPER QUARTILE =          0.004

  RANGE =       0.003 TO        0.004

                                          DIFFERENT ORIENTATION
                                          (1)
                                           1
                                       1 1 1  1 1  1 1 (1)    1
                --I-------I-------I-------I-------I-------I-------I-------I-------I--
       Z-SCORE  -4       -3      -2      -1       0       1       2       3       4
     RAW SCORE                  0.00    0.00    0.00    0.00    0.00


SET    1            VARIABLE    2   <-- HARMONIC NUMBER

          N =    11
       MEAN =          0.068
  STD. DEV. =          0.001     (        0.001)
   VARIANCE =          0.000     (        0.000)
EF. OF VAR. =          1.407     (        1.476)
   SKEWNESS =         -0.386     (       -0.450)
   KURTOSIS =         -0.850     (       -0.583)

LOWER QUARTILE =          0.067
        MEDIAN =          0.068
UPPER QUARTILE =          0.068

  RANGE =       0.066 TO        0.069

                                              (1)
                                  1 1    1 (1) 1   1 1 1 1    1
                --I-------I-------I-------I-------I-------I-------I-------I-------I--
       Z-SCORE  -4       -3      -2      -1       0       1       2       3       4
     RAW SCORE                  0.07    0.07    0.07    0.07    0.07
```

GRAIN

```
SET    1            VARIABLE     3

         N =    11
      MEAN =        0.031
  STD. DEV. =       0.002    (         0.002)
   VARIANCE =       0.000    (         0.000)
EF. OF VAR. =       5.131    (         5.381)
   SKEWNESS =       0.460    (         0.536)
   KURTOSIS =      -0.349    (         0.251)

LOWER QUARTILE =        0.030
        MEDIAN =        0.031
UPPER QUARTILE =        0.033

  RANGE =        0.029 TO        0.035

                                                    1 1 (1)
                                   1 1   1 1 1      1 1          1
           --I--------I--------I--------I--------I--------I--------I--------I--------I--
   Z-SCORE  -4       -3       -2       -1        0        1        2        3        4
 RAW SCORE                   0.03     0.03     0.03     0.03     0.03

SET    1            VARIABLE     4

         N =    11
      MEAN =        0.046
  STD. DEV. =       0.001    (         0.002)
   VARIANCE =       0.000    (         0.000)
EF. OF VAR. =       3.136    (         3.289)
   SKEWNESS =       0.487    (         0.568)
   KURTOSIS =      -1.065    (        -0.941)

LOWER QUARTILE =        0.045
        MEDIAN =        0.046
UPPER QUARTILE =        0.048

  RANGE =        0.044 TO        0.049

                                     1  (1)
                                   1 1 (1) 1   1 1   1 1   1
           --I--------I--------I--------I--------I--------I--------I--------I--------I--
   Z-SCORE  -4       -3       -2       -1        0        1        2        3        4
 RAW SCORE                   0.04     0.04     0.05     0.05     0.05
```

TEST
GRAIN

```
SET    1          VARIABLE    5

          N =    11
       MEAN =          0.009
  STD. DEV. =          0.001    (        0.001)
   VARIANCE =          0.000    (        0.000)
DEF. OF VAR. =        11.725    (       12.298)
   SKEWNESS =         -0.281    (       -0.327)
   KURTOSIS =         -1.035    (       -0.891)

LOWER QUARTILE =         0.008
        MEDIAN =         0.009
UPPER QUARTILE =         0.009

  RANGE =       0.007 TO         0.010

                                          1           1
                                    1 (1)      1    1     1  1 1 1    (1)
              --I--------I--------I--------I--------I--------I--------I--------I--------I--
     Z-SCORE   -4       -3       -2       -1        0        1        2        3        4
   RAW SCORE                     0.01     0.01     0.01     0.01     0.01

SET    1          VARIABLE    6

          N =    11
       MEAN =          0.015
  STD. DEV. =          0.001    (        0.001)
   VARIANCE =          0.000    (        0.000)
DEF. OF VAR. =         6.320    (        6.628)
   SKEWNESS =          0.580    (        0.676)
   KURTOSIS =          0.403    (        1.505)

LOWER QUARTILE =         0.014
        MEDIAN =         0.015
UPPER QUARTILE =         0.015

  RANGE =       0.013 TO         0.017

                                                  (1)
                                                   1   1
                                  (1)   1   1 1    1   1 1         1
              --I--------I--------I--------I--------I--------I--------I--------I--------I--
     Z-SCORE   -4       -3       -2       -1        0        1        2        3        4
   RAW SCORE                     0.01     0.01     0.01     0.02     0.02
```

TEST
GRAIN

```
SET    1           VARIABLE     7

          N =   11
       MEAN =        0.043
  STD. DEV. =        0.001    (         0.001)
   VARIANCE =        0.000    (         0.000)
OEF. OF VAR. =       1.931    (         2.026)
   SKEWNESS =       -0.067    (        -0.078)
   KURTOSIS =       -1.488    (        -1.647)

LOWER QUARTILE =          0.043
        MEDIAN =          0.044
UPPER QUARTILE =          0.044

  RANGE =       0.042 TO        0.045


                                                                      (1)                   1
                                                                1 1 (1) 1      1 1 1 1 1
                                        --I-------I-------I-------I-------I-------I-------I-------I-------I--
                               Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
                             RAW SCORE                  0.04    0.04    0.04    0.04    0.05


SET    1           VARIABLE     8

          N =   11
       MEAN =        0.016
  STD. DEV. =        0.001    (         0.001)
   VARIANCE =        0.000    (         0.000)
CEF. OF VAR. =       7.832    (         8.214)
   SKEWNESS =        0.332    (         0.387)
   KURTOSIS =       -0.562    (        -0.104)

LOWER QUARTILE =          0.016
        MEDIAN =          0.016
UPPER QUARTILE =          0.017

  RANGE =       0.014 TO        0.019


                                                                          1
                                                                          1
                                                     1     1 1 1 1 1   (1)    1 (1)
                                        --I-------I-------I-------I-------I-------I-------I-------I-------I--
                               Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
                             RAW SCORE                  0.01    0.02    0.02    0.02    0.02
```

TEST
GRAIN


```
SET   1          VARIABLE    9

         N =  11
      MEAN =        0.004
 STD. DEV. =        0.001    (        0.001)
  VARIANCE =        0.000    (        0.000)
COEF. OF VAR. =    34.123    (       35.789)
  SKEWNESS =       -1.754    (       -2.045)
  KURTOSIS =        2.572    (        5.120)

LOWER QUARTILE =       0.004
        MEDIAN =       0.004
UPPER QUARTILE =       0.005

  RANGE =      0.000 TO       0.005


                                                                    (1)
                                                                   1 1
                                   (1)                  1    1 1 1 1 1    1
                       --I--------I--------I--------I--------I--------I--------I--------I--------I--
            Z-SCORE    -4         -3       -2       -1        0        1        2        3        4
          RAW SCORE                        0.00     0.00     0.00     0.01     0.01


SET   1          VARIABLE   10

         N =  11
      MEAN =        0.007
 STD. DEV. =        0.001    (        0.001)
  VARIANCE =        0.000    (        0.000)
COEF. OF VAR. =    14.681    (       15.398)
  SKEWNESS =       -0.159    (       -0.185)
  KURTOSIS =        0.508    (        1.680)

LOWER QUARTILE =       0.006
        MEDIAN =       0.007
UPPER QUARTILE =       0.007

  RANGE =      0.005 TO       0.009


                                                             1    1 1
                                          (1)          1 1   1    1 1 1        (1)
                       --I--------I--------I--------I--------I--------I--------I--------I--------I--
            Z-SCORE    -4         -3       -2       -1        0        1        2        3        4
          RAW SCORE                        0.00     0.01     0.01     0.01     0.01
```

TEST GRAIN

	1	2	3	4	5	6	7	8	9	10	
OINTS 80 XCEN 4886,965 YCEN 1164,361 MEAN RAD 435,053											
ARMONICS	,00332	,06627	,02934	,04881	,00914	,01460	,04462	,01665	,00448	,00765	
NGLE	49,4	251,8	83,7	52,8	327,8	307,6	175,2	2,1	21,7	254,2	
OINTS 67 XCEN 4886,544 YCEN 1164,047 MEAN RAD 434,537											
ARMONICS	,00313	,06878	,03036	,04783	,00924	,01421	,04293	,01652	,00389	,00678	ELEVEN REPLICATIONS
NGLE	46,7	252,5	81,9	53,2	325,9	311,1	177,3	359,4	17,8	251,4	
OINTS 60 XCEN 4885,969 YCEN 1163,504 MEAN RAD 434,597											
ARMONICS	,00309	,06838	,03232	,04552	,00783	,01353	,04237	,01612	,00471	,00745	
NGLE	44,7	253,3	87,0	53,8	333,8	311,0	179,0	357,8	38,1	252,7	
OINTS 68 XCEN 4885,170 YCEN 1162,229 MEAN RAD 434,500											
ARMONICS	,00297	,06712	,03046	,04650	,00907	,01462	,04370	,01554	,00548	,00727	↑ HIGHEST VALUE ↑
NGLE	48,3	255,4	83,8	52,9	326,3	315,3	178,2	357,9	13,0	242,5	
OINTS 68 XCEN 4884,677 YCEN 1160,970 MEAN RAD 434,180											
ARMONICS	,00326	,06927	,02904	,04770	,00889	,01531	,04403	,01641	,00289	,00677	↓ LOWEST VALUE ↓
NGLE	37,6	254,0	84,7	52,4	323,4	315,1	177,3	353,8	30,2	250,8	
OINTS 67 XCEN 4884,553 YCEN 1162,470 MEAN RAD 434,813											
ARMONICS	,00315	,06611	,03214	,04424	,00961	,01384	,04429	,01516	,00446	,00742	
NGLE	46,9	252,2	86,2	53,5	318,0	312,0	176,6	357,4	14,7	252,8	
OINTS 64 XCEN 4884,908 YCEN 1160,627 MEAN RAD 434,307											
ARMONICS	,00342	,06762	,03484	,04453	,00786	,01495	,04396	,01599	,00502	,00602	
NGLE	48,6	252,5	84,8	55,3	322,5	311,7	175,8	2,0	24,8	240,3	← HARMONIC PHASE ANGLE
OINTS 69 XCEN 4884,365 YCEN 1161,636 MEAN RAD 434,588											
ARMONICS	,00382	,06847	,03085	,04664	,00684	,01668	,04227	,01857	,00417	,00727	← HARMONIC AMPLITUDE
NGLE	44,3	252,8	87,0	50,2	311,7	310,0	179,7	359,4	27,9	251,0	
OINTS 76 XCEN 4884,505 YCEN 1159,551 MEAN RAD 434,890											
ARMONICS	,00351	,06808	,03261	,04482	,00830	,01495	,04464	,01430	,00372	,00631	
NGLE	39,1	250,7	85,1	54,2	323,2	317,1	176,5	353,9	19,2	244,5	
OINTS 72 XCEN 4412,069 YCEN 1002,848 MEAN RAD 434,706											
ARMONICS	,00353	,06818	,03261	,04526	,00704	,01449	,04271	,01739	,00022	,00481	(DIFFERENT ORIENTATION)
NGLE	77,9	300,3	158,2	151,1	80,1	102,3	348,5	204,8	164,8	140,8	
I= 50 ANGLE= 1,6108 X(I)= 4332,00 Y(I)= 679,00											
OINTS 52 XCEN 4305,502 YCEN 1146,430 MEAN RAD 322,252											
ARMONICS	[illegible]	,46576	,18381	,03747	,13423	,15501	,11735	,02176	,09741	,09592	BGR THIS GRAIN NO GOOD, REMOVED
NGLE	[illegible]	95,8	51,4	76,6	150,5	120,4	77,5	235,3	168,2	127,5	
OINTS 76 XCEN 4541,021 YCEN 1249,051 MEAN RAD 434,464											
ARMONICS	,00314	,06736	,03084	,04509	,01011	,01306	,04294	,01880	,00470	,00907	(DIFFERENT ORIENTATION)
NGLE	197,6	192,5	175,3	289,9	343,9	131,4	142,8	110,1	300,6	318,5	

HARMONIC NUMBER

APPENDIX B

Histograms of the Harmonic Amplitudes of The Red Cedar River and Coon Creek Samples

SAMPLE B1

RED CEDAR


```
              DATA SET   1                  SIZE AND CALC CARD  DAP 1                    6

 SET    1          VARIABLE    1

          N =    31
       MEAN =        0.014
  STD. DEV. =        0.011    (      0.011)
   VARIANCE =        0.000    (      0.000)
COEF. OF VAR. =     76.560    (     77.826)
   SKEWNESS =        0.867    (      0.911)
   KURTOSIS =       -0.362    (     -0.207)

LOWER QUARTILE =        0.007
        MEDIAN =        0.011
UPPER QUARTILE =        0.023

 RANGE =       0.001 TO       0.039

                                            1
                                        1 1 1
                                    1 1 1 1 1 1
                                    1 1 1 1 1 1         1     1
                                    1 1 1 1 1 1 1   1 1 1 1   1 1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE              -0.01     0.00     0.01     0.02     0.04

 SET    1          VARIABLE    2

          N =    31
       MEAN =        0.156
  STD. DEV. =        0.091    (      0.093)
   VARIANCE =        0.008    (      0.009)
COEF. OF VAR. =     58.618    (     59.587)
   SKEWNESS =        0.815    (      0.857)
   KURTOSIS =        0.313    (      0.592)

LOWER QUARTILE =        0.089
        MEDIAN =        0.138
UPPER QUARTILE =        0.225

 RANGE =       0.028 TO       0.420

                                      1     1
                                      1 1 1 1   1   1     1
                                    1 1 1 1 1 1 1   1     1
                                  1 1 1 1 1 1 1 1   1 1 1 1           1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE              -0.03     0.06     0.16     0.25     0.34
```

B1

```
  SET    1              VARIABLE    3

            N =   31
         MEAN =          0.085
    STD. DEV. =          0.041    (         0.042)
     VARIANCE =          0.002    (         0.002)
COEF. OF VAR. =         48.886    (        49.694)
     SKEWNESS =          0.948    (         0.996)
     KURTOSIS =          0.789    (         1.155)

 LOWER QUARTILE =           0.054
         MEDIAN =           0.078
 UPPER QUARTILE =           0.111

  RANGE =        0.027 TO         0.209


                                                                          1
                                                                        1 1
                                                                    1   1 1     1   1
                                                                    1 1 1 1 1   1 1 1 1
                                                                  1 1 1 1 1 1 1 1 1 1 1 1     1       1
                                            --I-------I-------I-------I-------I-------I-------I-------I-------I--
                                 Z-SCORE     -4      -3      -2      -1       0       1       2       3       4
                               RAW SCORE                   0.00     0.04     0.08     0.13     0.17


  SET    1              VARIABLE    4

            N =   31
         MEAN =          0.046
    STD. DEV. =          0.022    (         0.022)
     VARIANCE =          0.000    (         0.000)
COEF. OF VAR. =         47.515    (        48.301)
     SKEWNESS =          0.332    (         0.349)
     KURTOSIS =         -0.651    (        -0.548)

 LOWER QUARTILE =           0.026
         MEDIAN =           0.045
 UPPER QUARTILE =           0.059

  RANGE =        0.008 TO         0.097


                                                                      1
                                                                      1       1   1
                                                                      1   1   1   1
                                                                      1 1 1   1 1 1   1 1
                                                                1 1 1 1 1 1 1 1 1 1   1 1 1 1   1
                                            --I-------I-------I-------I-------I-------I-------I-------I-------I--
                                 Z-SCORE     -4      -3      -2      -1       0       1       2       3       4
                               RAW SCORE                   0.00     0.02     0.05     0.07     0.09
```

B1


```
SET    1          VARIABLE    5

           N =   31
        MEAN =        0.034
   STD. DEV. =        0.018    (        0.018)
    VARIANCE =        0.000    (        0.000)
COEF. OF VAR. =      53.563    (       54.448)
    SKEWNESS =        0.827    (        0.869)
    KURTOSIS =        0.851    (        1.228)

 LOWER QUARTILE =        0.019
         MEDIAN =        0.030
 UPPER QUARTILE =        0.044

   RANGE =       0.004 TO        0.089


                                                                         1   1
                                                                         1   1
                                                                   1 1   1   1 1    1
                                                                   1 1 1 1 1 1   1 1    1
                                                                1  1 1 1 1 1 1 1 1 1    1     1
                                           --I-------I-------I-------I-------I-------I-------I-------I-------I--
                                  Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
                                RAW SCORE                 -0.00    0.02    0.03    0.05    0.07


SET    1          VARIABLE    6

           N =   31
        MEAN =        0.024
   STD. DEV. =        0.014    (        0.014)
    VARIANCE =        0.000    (        0.000)
COEF. OF VAR. =      55.955    (       56.880)
    SKEWNESS =        0.730    (        0.767)
    KURTOSIS =       -0.040    (        0.174)

 LOWER QUARTILE =        0.011
         MEDIAN =        0.022
 UPPER QUARTILE =        0.032

   RANGE =       0.006 TO        0.057


                                                                         1
                                                                   1 1   1 1   1
                                                                   1 1   1 1   1
                                                                   1 1 1 1 1   1 1
                                                                   1 1 1 1 1 1 1 1   1 1 1    1 1
                                           --I-------I-------I-------I-------I-------I-------I-------I-------I--
                                  Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
                                RAW SCORE                 -0.00    0.01    0.02    0.04    0.05
```

BI


```
SET     1             VARIABLE     7

            N =   31
         MEAN =        0.017
    STD. DEV. =        0.009    (        0.010)
     VARIANCE =        0.000    (        0.000)
COEF. OF VAR. =       56.607    (       57.543)
     SKEWNESS =        0.286    (        0.301)
     KURTOSIS =       -0.958    (       -0.911)

  LOWER QUARTILE =        0.008
          MEDIAN =        0.014
  UPPER QUARTILE =        0.024

   RANGE =        0.001 TO        0.035

                                            1       1
                                  1   1   1 1       1     1
                                  1 1 1   1 1 1 1   1     1
                                  1 1 1 1 1 1 1 1 1 1   1 1 1 1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE              -0.00     0.01     0.02     0.03     0.04
```

```
SET     1             VARIABLE     8

            N =   31
         MEAN =        0.013
    STD. DEV. =        0.007    (        0.007)
     VARIANCE =        0.000    (        0.000)
COEF. OF VAR. =       56.666    (       57.603)
     SKEWNESS =        0.394    (        0.414)
     KURTOSIS =       -0.768    (       -0.687)

  LOWER QUARTILE =        0.006
          MEDIAN =        0.013
  UPPER QUARTILE =        0.018

   RANGE =        0.002 TO        0.029

                                    1
                                    1           1
                                    1 1       1 1   1
                                    1 1 1   1 1 1   1 1   1
                                  1 1 1 1 1 1 1 1 1 1 1   1 1   1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE              -0.00     0.01     0.01     0.02     0.03
```

B1

```
SET    1           VARIABLE    9

           N =   31
        MEAN =       0.010
   STD. DEV. =       0.006    (          0.006)
    VARIANCE =       0.000    (          0.000)
COEF. OF VAR. =     60.648    (         61.650)
    SKEWNESS =       0.309    (          0.325)
    KURTOSIS =      -1.141    (         -1.127)

 LOWER QUARTILE =        0.004
         MEDIAN =        0.010
 UPPER QUARTILE =        0.016

   RANGE =       0.001 TO        0.023

                                              1
                                              1 1             1
                                              1 1   1     1   1
                                            1 1 1   1 1 1 1   1 1
                                          1 1 1 1   1 1 1 1   1 1 1 1 1
                    --I-------I-------I-------I-------I-------I-------I-------I-------I--
         Z-SCORE     -4      -3      -2      -1       0       1       2       3       4
       RAW SCORE                  -0.00     0.00     0.01     0.02     0.02
```



```
SET    1           VARIABLE   10

           N =   31
        MEAN =       0.009
   STD. DEV. =       0.004    (          0.005)
    VARIANCE =       0.000    (          0.000)
COEF. OF VAR. =     51.017    (         51.860)
    SKEWNESS =       0.271    (          0.285)
    KURTOSIS =      -0.507    (         -0.378)

 LOWER QUARTILE =        0.005
         MEDIAN =        0.008
 UPPER QUARTILE =        0.013

   RANGE =       0.001 TO        0.019

                                                1   1           1
                                              1 1   1           1
                                        1     1 1 1 1 1 1 1   1 1
                                        1 1   1 1 1 1 1 1 1 1 1 1 1       1
                    --I-------I-------I-------I-------I-------I-------I-------I-------I--
         Z-SCORE     -4      -3      -2      -1       0       1       2       3       4
       RAW SCORE                  -0.00     0.00     0.01     0.01     0.02
```

```
SET   1          VARIABLE    1

        N =    37
     MEAN =        0.013
 STD. DEV. =       0.009    (      0.009)
  VARIANCE =       0.000    (      0.000)
COEF. OF VAR. =   67.692    (     68.626)
  SKEWNESS =       1.725    (      1.799)
  KURTOSIS =       4.072    (      4.862)

LOWER QUARTILE =         0.008
        MEDIAN =         0.012
UPPER QUARTILE =         0.017

  RANGE =      0.001 TO        0.048

                                                    1
                                                    1
                                                    1
                                                    1
                                                  1 1   1   1
                                                1 1 1   1 1 1
                                              1 1 1 1 1 1 1 1 1 1
                                              1 1 1 1 1 1 1 1 1 1     1 1      1
                  --I-------I-------I-------I-------I-------I-------I-------I-------I--
      Z-SCORE       -4      -3      -2      -1       0       1       2       3       4
    RAW SCORE                    -0.00    0.00    0.01    0.02    0.03

SET   1          VARIABLE    2

        N =    37
     MEAN =        0.183
 STD. DEV. =       0.079    (      0.080)
  VARIANCE =       0.006    (      0.006)
COEF. OF VAR. =   43.137    (     43.732)
  SKEWNESS =       0.268    (      0.279)
  KURTOSIS =       0.464    (      0.714)

LOWER QUARTILE =         0.123
        MEDIAN =         0.194
UPPER QUARTILE =         0.236

  RANGE =      0.020 TO        0.410

                                                  1       1
                                                  1       1   1
                                                  1       1   1
                                                  1   1   1   1 1
                                        1       1 1 1 1   1 1 1 1
                                        1   1 1 1 1 1 1 1 1 1 1 1   1 1     1
                  --I-------I-------I-------I-------I-------I-------I-------I-------I--
      Z-SCORE       -4      -3      -2      -1       0       1       2       3       4
    RAW SCORE                     0.03    0.10    0.18    0.26    0.34
```

B2


```
SET     1          VARIABLE     3

         N =   37
      MEAN =        0.075
 STD. DEV. =        0.045    (        0.045)
  VARIANCE =        0.002    (        0.002)
COEF. OF VAR. =    59.347    (       60.166)
  SKEWNESS =        1.150    (        1.200)
  KURTOSIS =        0.814    (        1.117)

LOWER QUARTILE =        0.043
        MEDIAN =        0.067
UPPER QUARTILE =        0.095

  RANGE =      0.014 TO        0.188

                                            1     1
                                            1     1
                                            1     1
                                            1 1   1
                                        1   1 1 1 1   1               1
                                        1   1 1 1 1   1   1           1
                                      1 1 1 1 1 1 1 1 1 1 1   1       1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE              -0.01     0.03     0.08     0.12    0.16

SET     1          VARIABLE     4

         N =   37
      MEAN =        0.047
 STD. DEV. =        0.028    (        0.028)
  VARIANCE =        0.001    (        0.001)
COEF. OF VAR. =    58.460    (       59.267)
  SKEWNESS =        0.827    (        0.862)
  KURTOSIS =       -0.141    (        0.019)

LOWER QUARTILE =        0.025
        MEDIAN =        0.038
UPPER QUARTILE =        0.063

  RANGE =      0.005 TO        0.113

                                              1
                                              1
                                          1 1 1 1
                                          1 1 1 1 1       1
                                        1 1 1 1 1 1 1 1   1
                                      1 1 1 1 1 1 1 1 1 1 1 1 1   1 1 1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE              -0.01     0.02     0.05     0.07    0.10
```

```
SET     1            VARIABLE     5

             N =    37
          MEAN =         0.037
     STD. DEV. =         0.020    (          0.020)
      VARIANCE =         0.000    (          0.000)
COEF. OF VAR.  =        52.841    (         53.570)
      SKEWNESS =         0.272    (          0.284)
      KURTOSIS =        -0.964    (         -0.927)

LOWER QUARTILE =            0.022
        MEDIAN =            0.034
UPPER QUARTILE =            0.052

  RANGE =          0.006 TO          0.073

                                          1
                                          1
                                      1   1                   1
                                  1   1   1 1 1 1   1       1
                                  1 1 1   1 1 1 1   1 1     1
                                  1 1 1 1 1 1 1 1 1 1 1 1 1 1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE                -0.00     0.02     0.04     0.06     0.08
```



```
SET     1            VARIABLE     6

             N =    37
          MEAN =         0.024
     STD. DEV. =         0.013    (          0.014)
      VARIANCE =         0.000    (          0.000)
COEF. OF VAR.  =        55.891    (         56.662)
      SKEWNESS =         0.381    (          0.398)
      KURTOSIS =        -0.761    (         -0.693)

LOWER QUARTILE =            0.015
        MEDIAN =            0.022
UPPER QUARTILE =            0.034

  RANGE =          0.003 TO          0.052

                                              1
                                  1       1 1 1
                                  1     1 1 1 1 1   1
                                  1 1   1 1 1 1 1   1 1   1 1
                                  1 1 1 1 1 1 1 1   1 1 1 1 1 1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE                -0.00     0.01     0.02     0.04     0.05
```

B2

```
SET    1          VARIABLE     7

          N =   37
       MEAN =          0.017
  STD. DEV. =          0.010     (       0.010)
   VARIANCE =          0.000     (       0.000)
COEF. OF VAR. =       57.899     (      58.698)
   SKEWNESS =          0.320     (       0.334)
   KURTOSIS =         -0.817     (      -0.758)

 LOWER QUARTILE =          0.008
         MEDIAN =          0.019
 UPPER QUARTILE =          0.022

  RANGE =       0.001 TO        0.037

                                                  1
                                      1   1     1 1
                                  1   1 1 1     1 1
                                  1 1 1 1 1   1 1 1 1   1     1
                                  1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
    Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
  RAW SCORE                 -0.00    0.01     0.02     0.03     0.04
```

54

```
SET    1          VARIABLE     8

          N =   37
       MEAN =          0.016
  STD. DEV. =          0.009     (       0.010)
   VARIANCE =          0.000     (       0.000)
COEF. OF VAR. =       60.774     (      61.613)
   SKEWNESS =          0.923     (       0.962)
   KURTOSIS =         -0.083     (       0.087)

 LOWER QUARTILE =          0.008
         MEDIAN =          0.012
 UPPER QUARTILE =          0.024

  RANGE =       0.003 TO        0.040

                                      1     1
                                      1 1   1 1
                                      1 1   1 1       1
                                      1 1   1 1       1
                                    1 1 1   1 1 1     1
                                    1 1 1 1 1 1 1   1 1 1 1   1 1 1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
    Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
  RAW SCORE                 -0.00    0.01     0.02     0.03     0.03
```

```
SET     1            VARIABLE     9

          N =    37
       MEAN =         0.010
  STD. DEV. =         0.004    (          0.004)
   VARIANCE =         0.000    (          0.000)
COEF. OF VAR. =      46.384    (         47.024)
   SKEWNESS =         0.550    (          0.573)
   KURTOSIS =         0.192    (          0.403)

LOWER QUARTILE =         0.006
        MEDIAN =         0.009
UPPER QUARTILE =         0.012

  RANGE =        0.002 TO        0.022

                                                  1
                                          1       1
                                          1       1
                                      1   1       1
                                      1 1 1     1 1
                                  1   1 1 1 1   1 1 1 1 1
                                1 1 1 1 1 1 1   1 1 1 1 1     1     1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
   Z-SCORE    -4      -3      -2      -1      0       1       2       3       4
 RAW SCORE                   0.00    0.01    0.01    0.01    0.02

SET     1            VARIABLE    10

          N =    37
       MEAN =         0.009
  STD. DEV. =         0.005    (          0.005)
   VARIANCE =         0.000    (          0.000)
COEF. OF VAR. =      56.016    (         56.788)
   SKEWNESS =         1.246    (          1.299)
   KURTOSIS =         1.699    (          2.134)

LOWER QUARTILE =         0.005
        MEDIAN =         0.008
UPPER QUARTILE =         0.012

  RANGE =        0.003 TO        0.026

                                        1
                                      1 1
                                      1 1   1     1
                                      1 1 1 1   1 1
                                    1 1 1 1 1 1 1 1 1 1
                                    1 1 1 1 1 1 1 1 1 1 1 1     1       1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
   Z-SCORE    -4      -3      -2      -1      0       1       2       3       4
 RAW SCORE                  -0.00    0.00    0.01    0.01    0.02
```

```
  SET   1          VARIABLE   1

          N =   26
       MEAN =       0.010
  STD. DEV. =       0.007   (      0.007)
   VARIANCE =       0.000   (      0.000)
COEF. OF VAR. =    71.641   (     73.060)
   SKEWNESS =       1.082   (      1.150)
   KURTOSIS =       0.716   (      1.147)

LOWER QUARTILE =        0.005
        MEDIAN =        0.009
UPPER QUARTILE =        0.013

  RANGE =      0.000 TO       0.029

                                                   1
                                                 1 1   1 1 1 1
                                               1 1 1   1 1 1 1         1
                                               1 1 1 1 1 1 1 1   1     1   1
                     --I-------I-------I-------I-------I-------I-------I-------I-------I--
          Z-SCORE     -4      -3      -2      -1       0       1       2       3       4
        RAW SCORE                   -0.00    0.00    0.01    0.02    0.02
```



```
  SET   1          VARIABLE   2

          N =   26
       MEAN =       0.140
  STD. DEV. =       0.065   (      0.066)
   VARIANCE =       0.004   (      0.004)
COEF. OF VAR. =    46.648   (     47.571)
   SKEWNESS =       0.557   (      0.592)
   KURTOSIS =      -0.298   (     -0.081)

LOWER QUARTILE =        0.087
        MEDIAN =        0.135
UPPER QUARTILE =        0.182

  RANGE =      0.025 TO       0.298

                                                       1
                                             1         1
                                             1   1     1 1
                                             1 1 1     1 1   1     1
                                     1     1 1 1 1     1 1   1   1 1 1   1
                     --I-------I-------I-------I-------I-------I-------I-------I-------I--
          Z-SCORE     -4      -3      -2      -1       0       1       2       3       4
        RAW SCORE                    0.01    0.07    0.14    0.20    0.27
```

```
SET    1          VARIABLE    3

           N =    26
        MEAN =       0.059
   STD. DEV. =       0.041   (         0.042)
    VARIANCE =       0.002   (         0.002)
COEF. OF VAR. =     68.637   (        69.996)
    SKEWNESS =       1.353   (         1.437)
    KURTOSIS =       1.487   (         2.090)

 LOWER QUARTILE =        0.030
         MEDIAN =        0.048
 UPPER QUARTILE =        0.078

   RANGE =      0.010 TO        0.183


                                          1
                                          1
                                          1   1
                                          1   1
                                      1 1 1   1 1 1   1
                                      1 1 1 1 1 1 1 1 1 1   1   1       1
      Z-SCORE   --I-------I-------I-------I-------I-------I-------I-------I-------I--
      RAW SCORE -4      -3      -2      -1      0       1       2       3       4
                              -0.02   0.02    0.06    0.10    0.14


SET    1          VARIABLE    4

           N =    26
        MEAN =       0.044
   STD. DEV. =       0.027   (         0.028)
    VARIANCE =       0.001   (         0.001)
COEF. OF VAR. =     62.458   (        63.695)
    SKEWNESS =       0.770   (         0.818)
    KURTOSIS =      -0.017   (         0.251)

 LOWER QUARTILE =        0.024
         MEDIAN =        0.037
 UPPER QUARTILE =        0.060

   RANGE =      0.010 TO        0.113


                                      1   1
                                      1   1
                                      1   1 1     1 1
                                      1   1 1     1 1   1
                                      1   1 1   1 1 1 1 1 1       1 1
      Z-SCORE   --I-------I-------I-------I-------I-------I-------I-------I-------I--
      RAW SCORE -4      -3      -2      -1      0       1       2       3       4
                              -0.01   0.02    0.04    0.07    0.10
```

```
SET    1          VARIABLE    5

           N =    24
        MEAN =        0.032
   STD. DEV. =        0.020    (        0.021)
    VARIANCE =        0.000    (        0.000)
COEF. OF VAR. =      63.491    (       64.752)
    SKEWNESS =        0.362    (        0.384)
    KURTOSIS =       -1.068    (       -1.035)

  LOWER QUARTILE =      0.015
          MEDIAN =      0.029
  UPPER QUARTILE =      0.054

   RANGE =      0.003 TO      0.076

                                                   1  1        1
                                                1  1  1        1  1  1
                                                1  1  1  1  1  1  1  1
                                             1  1  1  1  1  1  1  1  1  1     1
                  --I--------I--------I--------I--------I--------I--------I--------I--------I--
          Z-SCORE   -4       -3       -2       -1        0        1        2        3        4
        RAW SCORE                   -0.01     0.01     0.03     0.05     0.07
```



```
SET    1          VARIABLE    6

           N =    24
        MEAN =        0.021
   STD. DEV. =        0.008    (        0.008)
    VARIANCE =        0.000    (        0.000)
COEF. OF VAR. =      39.374    (       40.194)
    SKEWNESS =        0.309    (        0.328)
    KURTOSIS =       -0.441    (       -0.267)

  LOWER QUARTILE =      0.014
          MEDIAN =      0.021
  UPPER QUARTILE =      0.027

   RANGE =      0.007 TO      0.039

                                                               1
                                          1              1  1
                                          1  1           1  1
                                    1     1  1     1     1  1
                              1  1  1     1  1  1  1     1  1  1        1  1
                  --I--------I--------I--------I--------I--------I--------I--------I--------I--
          Z-SCORE   -4       -3       -2       -1        0        1        2        3        4
        RAW SCORE                    0.00     0.01     0.02     0.03     0.04
```

```
SET   1            VARIABLE    7

             N =    26
          MEAN =         0.017
     STD. DEV. =         0.012     (        0,013)
      VARIANCE =         0.000     (        0,000)
 COEF. OF VAR. =        71.104     (       72,513)
      SKEWNESS =         1.355     (        1,439)
      KURTOSIS =         0.772     (        1,216)

  LOWER QUARTILE =          0.002
          MEDIAN =          0.013
  UPPER QUARTILE =          0.021

   RANGE =         0.004 TO         0.048
```

```
                              1
                              1
                            1 1 1
                          1 1 1 1   1
                          1 1 1 1   1   1             1
                          1 1 1 1   1   1     1   1   1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
    Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
  RAW SCORE                -0,01    0,00     0,02    0,03    0,04
```



```
SET   1            VARIABLE    8

             N =    26
          MEAN =         0.013
     STD. DEV. =         0.009     (        0,009)
      VARIANCE =         0.000     (        0,000)
 COEF. OF VAR. =        65.115     (       66,405)
      SKEWNESS =         0.787     (        0,836)
      KURTOSIS =        -0.068     (        0,188)

  LOWER QUARTILE =          0.007
          MEDIAN =          0.013
  UPPER QUARTILE =          0.018

   RANGE =         0.002 TO         0.036
```

```
                                  1
                                  1
                        1 1 1     1
                        1 1 1   1 1 1     1     1
                        1 1 1 1 1 1 1 1   1 1   1     1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
    Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
  RAW SCORE                -0,00    0,00     0,01    0,02    0,03
```

```
SET    1           VARIABLE    9

          N =    24
       MEAN =           0.012
  STD. DEV. =           0.007    (        0.007)
   VARIANCE =           0.000    (        0.000)
COEF. OF VAR. =        58.864    (       60.030)
   SKEWNESS =           0.537    (        0.570)
   KURTOSIS =          -0.907    (       -0.935)

 LOWER QUARTILE =        0.008
         MEDIAN =        0.009
 UPPER QUARTILE =        0.016

  RANGE =      0.001 TO      0.024

                                          1
                                          1
                                          1
                                          1
                                          1
                                          1                 1
                                    1 1   1 1   1     1     1
                                  1 1 1 1 1 1   1   1 1 1 1 1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE              -0.00      0.00     0.01    0.02    0.03
```

```
SET    1           VARIABLE   10

          N =    24
       MEAN =           0.008
  STD. DEV. =           0.004    (        0.004)
   VARIANCE =           0.000    (        0.000)
COEF. OF VAR. =        51.248    (       52.263)
   SKEWNESS =          -0.147    (       -0.156)
   KURTOSIS =          -1.213    (       -1.212)

 LOWER QUARTILE =        0.005
         MEDIAN =        0.010
 UPPER QUARTILE =        0.011

  RANGE =      0.001 TO      0.016

                                                  1
                                                  1 1
                                      1 1         1 1
                                  1   1 1   1     1 1     1
                                1 1 1 1 1   1   1 1 1 1   1 1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE              -0.00      0.00     0.01    0.01    0.02
```

```
 SET   1            VARIABLE    1

           N =   37
        MEAN =        0.018
   STD. DEV. =        0.015    (        0.015)
    VARIANCE =        0.000    (        0.000)
COEF. OF VAR. =      82.555    (       83.694)
    SKEWNESS =        0.973    (        1.014)
    KURTOSIS =        0.126    (        0.326)

 LOWER QUARTILE =        0.006
          MEDIAN =        0.012
 UPPER QUARTILE =        0.028

   RANGE =        0.001 TO        0.061


                                              1
                                              1   1             1
                                              1 1 1             1
                                              1 1 1 1           1
                                              1 1 1 1   1       1
                                              1 1 1 1   1   1   1
                                            1 1 1 1 1   1   1 1 1       1   1
                    --I-------I-------I-------I-------I-------I-------I-------I-------I--
             Z-SCORE -4      -3      -2      -1       0       1       2       3       4
           RAW SCORE                    -0.01   0.00     0.02     0.03     0.05


 SET   1            VARIABLE    2

           N =   37
        MEAN =        0.171
   STD. DEV. =        0.083    (        0.084)
    VARIANCE =        0.007    (        0.007)
COEF. OF VAR. =      48.591    (       49.262)
    SKEWNESS =        0.181    (        0.188)
    KURTOSIS =       -0.575    (       -0.479)

 LOWER QUARTILE =        0.116
          MEDIAN =        0.176
 UPPER QUARTILE =        0.226

   RANGE =        0.031 TO        0.363


                                                    1   1
                                                    1   1     1
                                          1 1       1 1 1     1
                                          1 1 1   1 1 1 1 1   1   1
                                        1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   1
                    --I-------I-------I-------I-------I-------I-------I-------I-------I--
             Z-SCORE -4      -3      -2      -1       0       1       2       3       4
           RAW SCORE                   0.00     0.09     0.17     0.25     0.34
```

```
SET    1             VARIABLE     3

           N =   37
        MEAN =         0,089
   STD. DEV. =         0,051     (          0,052)
    VARIANCE =         0,003     (          0,003)
COEF. OF VAR. =       57,134     (         57,922)
    SKEWNESS =         0,548     (          0,571)
    KURTOSIS =        -0,427     (         -0,309)

 LOWER QUARTILE =         0,055
         MEDIAN =         0,079
 UPPER QUARTILE =         0,120

   RANGE =        0,005 TO        0,207


                                           1
                                           1 1
                                         1 1 1
                                   1   1 1 1 1
                                   1 1 1 1 1 1   1 1       1
                               1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
           --I-------I-------I-------I-------I-------I-------I-------I-------I--
    Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
  RAW SCORE                 -0,01    0,04    0,09    0,14    0.19
```



```
SET    1             VARIABLE     4

           N =   37
        MEAN =         0,048
   STD. DEV. =         0,028     (          0,028)
    VARIANCE =         0,001     (          0,001)
COEF. OF VAR. =       58,539     (         59,346)
    SKEWNESS =         0,699     (          0,729)
    KURTOSIS =         0,054     (          0,243)

 LOWER QUARTILE =         0,025
         MEDIAN =         0,045
 UPPER QUARTILE =         0,062

   RANGE =        0,005 TO        0,125


                                       1     1
                                   1   1   1 1 1
                                   1   1   1 1 1
                                   1 1 1 1 1 1 1   1 1   1
                                 1 1 1 1 1 1 1 1 1 1 1 1 1   1     1
           --I-------I-------I-------I-------I-------I-------I-------I-------I--
    Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
  RAW SCORE                 -0,01    0,02    0,05    0,08    0.10
```

```
    SET     1            VARIABLE      5

           N =    37
        MEAN =          0.036
    STD. DEV. =          0.020     (          0.020)
     VARIANCE =          0.000     (          0.000)
COEF. OF VAR. =         54.495     (         55.247)
     SKEWNESS =          0.840     (          0.876)
     KURTOSIS =         -0.256     (         -0.112)

  LOWER QUARTILE =          0.022
          MEDIAN =          0.029
  UPPER QUARTILE =          0.052

    RANGE =         0.006 TO          0.084
```

```
                                                                            1
                                                                            1
                                                                            1 1 1
                                                                            1 1 1
                                                                            1 1 1 1       1
                                                                        1 1 1 1 1 1       1 1     1
                                                                      1 1 1 1 1 1 1 1 1 1 1 1 1   1   1
                                               --I-------I-------I-------I-------I-------I-------I-------I-------I--
                                    Z-SCORE     -4      -3      -2      -1       0       1       2       3       4
                                  RAW SCORE                  -0.00      0.02     0.04     0.06     0.07
```

```
    SET     1            VARIABLE      6

           N =    37
        MEAN =          0.024
    STD. DEV. =          0.013     (          0.013)
     VARIANCE =          0.000     (          0.000)
COEF. OF VAR. =         53.643     (         54.383)
     SKEWNESS =          0.923     (          0.962)
     KURTOSIS =          0.390     (          0.630)

  LOWER QUARTILE =          0.014
          MEDIAN =          0.021
  UPPER QUARTILE =          0.035

    RANGE =         0.007 TO          0.063
```

```
                                                                                1
                                                                          1 1   1
                                                                          1 1 1 1
                                                                          1 1 1 1         1 1
                                                                        1 1 1 1 1 1 1     1 1
                                                                        1 1 1 1 1 1 1 1 1 1 1 1 1        1
                                               --I-------I-------I-------I-------I-------I-------I-------I-------I--
                                    Z-SCORE     -4      -3      -2      -1       0       1       2       3       4
                                  RAW SCORE                  -0.00      0.01     0.02     0.04     0.05
```

```
SET    1            VARIABLE    7

           N =   37
        MEAN =          0.018
   STD. DEV. =          0.012    (        0.012)
    VARIANCE =          0.000    (        0.000)
COEF. OF VAR. =        64.857    (       65.751)
    SKEWNESS =          1.387    (        1.446)
    KURTOSIS =          2.060    (        2.549)

 LOWER QUARTILE =         0.009
         MEDIAN =         0.017
 UPPER QUARTILE =         0.023

   RANGE =       0.004 TO         0.058


                                                        1 1       1
                                                        1 1       1 1     1
                                                        1 1 1 1 1 1 1     1
                                                      1 1 1 1 1 1 1 1     1
                                                      1 1 1 1 1 1 1 1     1   1       1     1
                              --I-------I-------I-------I-------I-------I-------I-------I-------I--
                     Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
                   RAW SCORE                -0.01     0.01     0.02     0.03     0.04

SET    1            VARIABLE    8

           N =   37
        MEAN =          0.014
   STD. DEV. =          0.007    (        0.007)
    VARIANCE =          0.000    (        0.000)
COEF. OF VAR. =        50.881    (       51.583)
    SKEWNESS =          0.783    (        0.816)
    KURTOSIS =          0.381    (        0.619)

 LOWER QUARTILE =         0.008
         MEDIAN =         0.013
 UPPER QUARTILE =         0.018

   RANGE =       0.003 TO         0.034


                                                        1           1       1
                                                        1           1       1 1
                                                        1 1         1       1 1 1
                                                    1 1 1 1 1 1         1 1 1     1           1
                                                    1 1 1 1 1 1 1 1 1 1 1 1     1           1     1
                              --I-------I-------I-------I-------I-------I-------I-------I-------I--
                     Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
                   RAW SCORE                -0.00     0.01     0.01     0.02     0.03
```

B4

```
SET    1            VARIABLE    9

          N =   37
       MEAN =        0.011
  STD. DEV. =        0.007    (        0.007)
   VARIANCE =        0.000    (        0.000)
COEF. OF VAR. =     65.835    (       66.743)
   SKEWNESS =        1.166    (        1.216)
   KURTOSIS =        1.481    (        1.884)

LOWER QUARTILE =      0.005
        MEDIAN =      0.008
UPPER QUARTILE =      0.015

  RANGE =       0.001 TO        0.034

                                         1
                                         1
                                         1
                                       1 1 1     1   1
                                       1 1 1 1   1   1
                                     1 1 1 1 1 1 1   1 1   1
                                     1 1 1 1 1 1 1 1 1 1   1 1           1
             --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE                -0.00     0.00     0.01     0.02     0.02

SET    1            VARIABLE   10

          N =   37
       MEAN =        0.008
  STD. DEV. =        0.004    (        0.004)
   VARIANCE =        0.000    (        0.000)
COEF. OF VAR. =     54.709    (       55.464)
   SKEWNESS =        0.601    (        0.627)
   KURTOSIS =       -0.266    (       -0.124)

LOWER QUARTILE =      0.005
        MEDIAN =      0.006
UPPER QUARTILE =      0.011

  RANGE =       0.001 TO        0.019

                                           1
                                     1   1 1 1
                                     1   1 1 1   1   1     1
                                   1 1   1 1 1 1 1 1 1 1   1
                                   1 1 1 1 1 1 1 1 1 1 1   1   1   1
             --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE                -0.00     0.00     0.01     0.01     0.02
```

```
SET   1          VARIABLE   1

         N =   39
      MEAN =        0.012
 STD. DEV. =        0.009    (       0.009)
  VARIANCE =        0.000    (       0.000)
COEF. OF VAR. =    74.107    (      75.075)
  SKEWNESS =        1.815    (       1.888)
  KURTOSIS =        3.830    (       4.541)

LOWER QUARTILE =       0.007
        MEDIAN =       0.009
UPPER QUARTILE =       0.015

RANGE =      0.002 TO        0.044

                                                 1
                                                 1
                                             1   1 1
                                             1   1 1   1
                                             1   1 1   1
                                             1   1 1   1
                                             1 1 1 1 1 1   1 1 1
                                           1 1 1 1 1 1 1 1 1 1 1             1     1
                   --I-------I-------I-------I-------I-------I-------I-------I-------I--
           Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
         RAW SCORE                -0.01     0.00     0.01    0.02     0.03
```



```
SET   1          VARIABLE   2

         N =   39
      MEAN =        0.143
 STD. DEV. =        0.067    (       0.068)
  VARIANCE =        0.004    (       0.005)
COEF. OF VAR. =    46.938    (      47.552)
  SKEWNESS =        0.628    (       0.654)
  KURTOSIS =       -0.136    (       0.016)

LOWER QUARTILE =       0.092
        MEDIAN =       0.139
UPPER QUARTILE =       0.183

RANGE =      0.041 TO        0.316

                                           1   1     1
                                           1   1 1   1   1
                                           1   1 1   1 1 1
                                           1 1 1 1   1 1 1 1 1 1     1
                                         1 1 1 1 1 1 1 1 1 1 1 1     1   1
                   --I-------I-------I-------I-------I-------I-------I-------I-------I--
           Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
         RAW SCORE                 0.01     0.08     0.14     0.21     0.28
```

```
SET    1            VARIABLE    3

           N =   39
        MEAN =        0.079
   STD. DEV. =        0.034    (        0.034)
    VARIANCE =        0.001    (        0.001)
CEF. OF VAR. =       42.889    (       43.449)
    SKEWNESS =        1.759    (        1.830)
    KURTOSIS =        4.378    (        5.167)

 LOWER QUARTILE =        0.053
         MEDIAN =        0.072
 UPPER QUARTILE =        0.097

   RANGE =        0.043 TO        0.215

                                      1 1
                                      1 1
                                      1 1
                                      1 1 1 1   1       1
                                      1 1 1 1 1 1       1
                                      1 1 1 1 1 1   1   1
                                      1 1 1 1 1 1 1 1 1 1 1                   1
           ---I-------I-------I-------I-------I-------I-------I-------I-------I--
  Z-SCORE    -4      -3      -2      -1       0       1       2       3       4
RAW SCORE                   0.01     0.05    0.08      0.11     0.15


SET    1            VARIABLE    4

           N =   39
        MEAN =        0.046
   STD. DEV. =        0.024    (        0.024)
    VARIANCE =        0.001    (        0.001)
CEF. OF VAR. =       52.406    (       53.091)
    SKEWNESS =        0.708    (        0.737)
    KURTOSIS =       -0.301    (       -0.172)

 LOWER QUARTILE =        0.027
         MEDIAN =        0.037
 UPPER QUARTILE =        0.066

   RANGE =        0.012 TO        0.110

                                      1
                                      1 1 1
                                      1 1 1   1
                                      1 1 1   1 1   1 1
                                    1 1 1 1   1 1   1 1   1 1
                                  1 1 1 1 1 1 1 1 1 1 1   1 1       1
           ---I-------I-------I-------I-------I-------I-------I-------I-------I--
  Z-SCORE    -4      -3      -2      -1       0       1       2       3       4
RAW SCORE                  -0.00     0.02    0.05      0.07     0.09
```

B5

```
SET   1          VARIABLE    5

           N =   39
        MEAN =         0.029
   STD. DEV. =         0.014   (        0.014)
    VARIANCE =         0.000   (        0.000)
COEF. OF VAR. =       48.375   (       49.007)
    SKEWNESS =         0.507   (        0.527)
    KURTOSIS =        -0.076   (        0.085)

LOWER QUARTILE =          0.018
        MEDIAN =          0.029
UPPER QUARTILE =          0.038

  RANGE =        0.007 TO        0.068
```

```
                          1         1 1
                          1         1 1
                          1     1 1 1 1 1 1
                        1 1 1 1 1 1 1 1 1 1     1 1
                        1 1 1 1 1 1 1 1 1 1 1   1 1       1
           --I-------I-------I-------I-------I-------I-------I-------I-------I--
   Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
 RAW SCORE                   0.00     0.02     0.03     0.04     0.06
```

```
SET   1          VARIABLE    6

           N =   39
        MEAN =         0.021
   STD. DEV. =         0.011   (        0.011)
    VARIANCE =         0.000   (        0.000)
COEF. OF VAR. =       50.032   (       50.686)
    SKEWNESS =         0.539   (        0.561)
    KURTOSIS =        -0.205   (       -0.063)

LOWER QUARTILE =          0.014
        MEDIAN =          0.020
UPPER QUARTILE =          0.028

  RANGE =        0.001 TO        0.049
```

```
                                    1
                                1   1
                            1   1 1 1         1
                            1 1 1 1 1         1
                          1 1 1 1 1 1   1     1   1
                    1   1 1 1 1 1 1 1 1 1 1 1 1 1 1     1
           --I-------I-------I-------I-------I-------I-------I-------I-------I--
   Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
 RAW SCORE                  -0.00     0.01     0.02     0.03     0.04
```

SET 1 VARIABLE 7

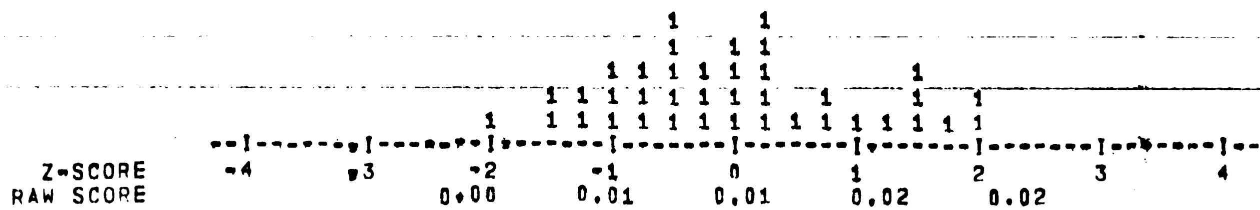
N =	39	
MEAN =	0.017	
STD. DEV. =	0.007	(0.007)
VARIANCE =	0.000	(0.000)
COEF. OF VAR. =	42.984	(43.546)
SKEWNESS =	0.720	(0.749)
KURTOSIS =	0.158	(0.352)
LOWER QUARTILE =	0.011	
MEDIAN =	0.017	
UPPER QUARTILE =	0.021	

RANGE = 0.005 TO 0.038

SET 1 VARIABLE 8

N =	39	
MEAN =	0.012	
STD. DEV. =	0.006	(0.006)
VARIANCE =	0.000	(0.000)
COEF. OF VAR. =	49.888	(50.540)
SKEWNESS =	0.330	(0.343)
KURTOSIS =	-0.659	(-0.581)
LOWER QUARTILE =	0.008	
MEDIAN =	0.012	
UPPER QUARTILE =	0.017	

RANGE = 0.000 TO 0.025



```
SET    1              VARIABLE    9

         N =   39
      MEAN =        0.012
 STD. DEV. =        0.006    (        0.006)
  VARIANCE =        0.000    (        0.000)
COEF. OF VAR. =    51.126    (       51.794)
  SKEWNESS =        0.444    (        0.462)
  KURTOSIS =       -0.489    (       -0.387)

LOWER QUARTILE =        0.007
        MEDIAN =        0.011
UPPER QUARTILE =        0.017

   RANGE =       0.001 TO       0.028
```

```
                                            1   1
                                        1   1   1
                                        1 1 1   1 1 1 1 1
                                        1 1 1 1 1 1 1 1 1   1
                                    1   1 1 1 1 1 1 1 1 1 1 1 1 1 1   1
                --I-------I-------I-------I-------I-------I-------I-------I-------I--
         Z-SCORE -4      -3      -2      -1       0       1       2       3       4
       RAW SCORE               -0.00    0.01     0.01    0.02     0.03
```

```
SET    1              VARIABLE   10

         N =   39
      MEAN =        0.008
 STD. DEV. =        0.004    (        0.005)
  VARIANCE =        0.000    (        0.000)
COEF. OF VAR. =    55.006    (       55.726)
  SKEWNESS =        0.797    (        0.829)
  KURTOSIS =        0.012    (        0.185)

LOWER QUARTILE =        0.005
        MEDIAN =        0.007
UPPER QUARTILE =        0.011

   RANGE =       0.002 TO       0.020
```

```
                                          1       1
                                          1 1   1 1
                                        1 1 1 1 1 1     1
                                        1 1 1 1 1 1 1 1 1 1   1       1
                                      1 1 1 1 1 1 1 1 1 1 1   1 1     1
                --I-------I-------I-------I-------I-------I-------I-------I-------I--
         Z-SCORE -4      -3      -2      -1       0       1       2       3       4
       RAW SCORE               -0.00    0.00     0.01    0.01     0.02
```

```
SET    1            VARIABLE     1

          N =    30
       MEAN =        0.011
  STD. DEV. =        0.009    (        0.009)
   VARIANCE =        0.000    (        0.000)
COEF. OF VAR. =     80.826    (       82.207)
   SKEWNESS =        1.643    (        1.731)
   KURTOSIS =        2.581    (        3.299)

LOWER QUARTILE =        0.005
        MEDIAN =        0.008
UPPER QUARTILE =        0.016

  RANGE =        0.000 TO        0.041

                                            1
                                        1   1
                                        1   1
                                        1 1 1
                                        1 1 1       1
                                      1 1 1 1     1 1
                                    1 1 1 1 1 1   1 1 1 1         1     1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
   Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
  RAW SCORE                -0.01     0.00     0.01     0.02    0.03
```



```
SET    1            VARIABLE     2

          N =    30
       MEAN =        0.150
  STD. DEV. =        0.077    (        0.078)
   VARIANCE =        0.006    (        0.006)
COEF. OF VAR. =     51.190    (       52.065)
   SKEWNESS =        1.502    (        1.582)
   KURTOSIS =        3.360    (        4.226)

LOWER QUARTILE =        0.103
        MEDIAN =        0.140
UPPER QUARTILE =        0.192

  RANGE =        0.042 TO        0.427

                                              1
                                          1   1
                                          1   1
                                          1 1 1
                                    1 1 1 1 1 1     1 1
                                  1 1 1 1 1 1 1 1 1 1 1 1 1               1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
   Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
  RAW SCORE                -0.00     0.07     0.15     0.23    0.30
```

A16

```
SET   1            VARIABLE    3

          N =   30
       MEAN =         0.080
  STD. DEV. =         0.052    (         0.052)
   VARIANCE =         0.003    (         0.003)
COEF. OF VAR. =      64.464    (        65.566)
   SKEWNESS =         1.112    (         1.171)
   KURTOSIS =         0.260    (         0.539)

 LOWER QUARTILE =        0.041
         MEDIAN =        0.061
 UPPER QUARTILE =        0.119

   RANGE =       0.024 TO        0.213

                                        1
                                    1   1   1
                                    1 1 1   1
                                    1 1 1   1
                                    1 1 1 1 1     1 1
                                    1 1 1 1 1     1 1   1   1 1 1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
   Z-SCORE    -4      -3      -2      -1      0       1       2       3       4
 RAW SCORE                -0.02     0.03     0.08     0.13     0.18


SET   1            VARIABLE    4

          N =   30
       MEAN =         0.043
  STD. DEV. =         0.028    (         0.028)
   VARIANCE =         0.001    (         0.001)
COEF. OF VAR. =      64.942    (        66.052)
   SKEWNESS =         0.979    (         1.032)
   KURTOSIS =         1.177    (         1.629)

 LOWER QUARTILE =        0.026
         MEDIAN =        0.042
 UPPER QUARTILE =        0.059

   RANGE =       0.002 TO        0.123

                                        1
                                        1   1   1
                                        1   1 1 1
                                1 1 1   1 1 1 1 1 1
                                1 1 1 1 1 1 1 1 1 1   1         1   1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
   Z-SCORE    -4      -3      -2      -1      0       1       2       3       4
 RAW SCORE                -0.01     0.02     0.04     0.07     0.10
```

```
SET    1           VARIABLE    5

           N =   30
        MEAN =        0.031
   STD. DEV. =        0.018     (        0.018)
    VARIANCE =        0.000     (        0.000)
COEF. OF VAR. =      57.533     (       56.517)
    SKEWNESS =        1.096     (        1.155)
    KURTOSIS =        1.069     (        1.501)

 LOWER QUARTILE =         0.018
         MEDIAN =         0.028
 UPPER QUARTILE =         0.039

   RANGE =        0.007 TO          0.082


                                                          1         1
                                                        1 1 1 1   1 1 1
                                                        1 1 1 1 1 1 1 1
                                                        1 1 1 1 1 1 1 1 1   1 1     1       1
                                      --I-------I-------I-------I-------I-------I-------I-------I-------I-------I--
                           Z-SCORE     -4      -3      -2      -1       0       1       2       3       4
                         RAW SCORE                   -0.00    0.01    0.03    0.05    0.07


SET    1           VARIABLE    6

           N =   30
        MEAN =        0.023
   STD. DEV. =        0.015     (        0.016)
    VARIANCE =        0.000     (        0.000)
COEF. OF VAR. =      66.467     (       67.603)
    SKEWNESS =        0.705     (        0.743)
    KURTOSIS =       -0.383     (       -0.226)

 LOWER QUARTILE =         0.012
         MEDIAN =         0.018
 UPPER QUARTILE =         0.032

   RANGE =        0.000 TO          0.058


                                                          1
                                                          1
                                                          1 1 1
                                                          1 1 1   1
                                                    1     1 1 1   1 1     1 1
                                                    1 1 1 1 1 1   1 1 1   1 1   1 1
                                      --I-------I-------I-------I-------I-------I-------I-------I-------I-------I--
                           Z-SCORE     -4      -3      -2      -1       0       1       2       3       4
                         RAW SCORE                   -0.01    0.01    0.02    0.04    0.05
```

B6

```
SET     1            VARIABLE     7

              N =   30
           MEAN =          0.016
      STD. DEV. =          0.012    (           0.012)
       VARIANCE =          0.000    (           0.000)
COEF. OF VAR.   =         73.238    (          74.490)
       SKEWNESS =          1.655    (           1.743)
       KURTOSIS =          2.619    (           3.345)

  LOWER QUARTILE =            0.009
          MEDIAN =            0.013
  UPPER QUARTILE =            0.019

    RANGE =         0.001 TO           0.057


                                              1
                                              1
                                            1 1
                                            1 1
                                        1 1 1 1 1
                                        1 1 1 1 1       1
                                      1 1 1 1 1 1 1 1 1 1     1   1       1
              --I-------I-------I-------I-------I-------I-------I-------I-------I--
       Z-SCORE -4      -3      -2      -1       0       1       2       3       4
     RAW SCORE              -0.01     0.00     0.02     0.03     0.04
```



```
SET     1            VARIABLE     8

              N =   30
           MEAN =          0.015
      STD. DEV. =          0.009    (           0.009)
       VARIANCE =          0.000    (           0.000)
COEF. OF VAR.   =         60.526    (          61.560)
       SKEWNESS =          0.311    (           0.328)
       KURTOSIS =         -1.008    (          -0.969)

  LOWER QUARTILE =            0.008
          MEDIAN =            0.012
  UPPER QUARTILE =            0.023

    RANGE =         0.000 TO           0.032


                                              1
                                          1 1 1 1       1
                                      1 1 1 1 1 1     1 1 1
                                  1 1 1 1 1 1 1 1   1 1 1 1 1 1 1
              --I-------I-------I-------I-------I-------I-------I-------I-------I--
       Z-SCORE -4      -3      -2      -1       0       1       2       3       4
     RAW SCORE              -0.00     0.01     0.01     0.02     0.03
```

B6

```
SET    1              VARIABLE    9

            N =   30
         MEAN =            0.011
    STD. DEV. =            0.007    (        0.007)
     VARIANCE =            0.000    (        0.000)
COEF. OF VAR. =           56.806    (       57.777)
     SKEWNESS =            0.743    (        0.783)
     KURTOSIS =           -0.475    (       -0.335)

 LOWER QUARTILE =            0.007
         MEDIAN =            0.010
 UPPER QUARTILE =            0.015

  RANGE =          0.003 TO          0.025

                                                  1
                                            1     1
                                            1     1
                                    1   1 1   1
                                    1 1 1 1 1 1           1
                                    1 1 1 1 1 1 1 1 1   1 1 1 1 1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE                -0.00     0.00     0.01     0.02     0.02
```



```
SET    1              VARIABLE    10

            N =   30
         MEAN =            0.010
    STD. DEV. =            0.006    (        0.006)
     VARIANCE =            0.000    (        0.000)
COEF. OF VAR. =           58.919    (       59.927)
     SKEWNESS =            1.050    (        1.106)
     KURTOSIS =            1.431    (        1.932)

 LOWER QUARTILE =            0.006
         MEDIAN =            0.009
 UPPER QUARTILE =            0.015

  RANGE =          0.001 TO          0.029

                                      1
                                      1             1
                                      1 1           1
                                      1 1   1 1     1
                                      1 1 1 1 1   1 1
                                  1   1 1 1 1 1   1 1 1 1   1           1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE                -0.00     0.00     0.01     0.02     0.02
```

```
SET    1          VARIABLE    1

          N =    32
       MEAN =         0.012
  STD. DEV. =         0.009   (       0.009)
   VARIANCE =         0.000   (       0.000)
COEF. OF VAR. =      78.435   (      79.691)
   SKEWNESS =         1.713   (       1.798)
   KURTOSIS =         3.353   (       4.156)

 LOWER QUARTILE =          0.005
         MEDIAN =          0.010
 UPPER QUARTILE =          0.015

   RANGE =      0.002 TO      0.044

                                              1
                                              1  1
                                              1  1  1  1
                                              1  1  1  1  1
                                              1  1  1  1  1  1  1
                                              1  1  1  1  1  1  1  1  1     1     1       1
                    --I-------I-------I-------I-------I-------I-------I-------I-------I--
         Z-SCORE     -4      -3      -2      -1       0       1       2       3       4
       RAW SCORE                   -0.01    0.00    0.01    0.02    0.03
```



```
SET    1          VARIABLE    2

          N =    32
       MEAN =         0.148
  STD. DEV. =         0.086   (       0.088)
   VARIANCE =         0.007   (       0.008)
COEF. OF VAR. =      58.093   (      59.023)
   SKEWNESS =         0.773   (       0.812)
   KURTOSIS =        -0.095   (       0.207)

 LOWER QUARTILE =          0.084
         MEDIAN =          0.127
 UPPER QUARTILE =          0.202

   RANGE =      0.024 TO      0.359

                                                 1
                                              1  1        1
                                           1  1  1        1     1
                                     1     1  1  1  1  1  1     1
                                     1  1  1  1  1  1  1  1  1  1  1  1     1  1  1
                    --I-------I-------I-------I-------I-------I-------I-------I-------I--
         Z-SCORE     -4      -3      -2      -1       0       1       2       3       4
       RAW SCORE                   -0.02    0.06    0.15    0.23    0.32
```

```
SET    1          VARIABLE    3

             N =    32
          MEAN =         0.070
     STD. DEV. =         0.036    (      0.036)
      VARIANCE =         0.001    (      0.001)
 COEF. OF VAR. =        51.055    (     51.872)
      SKEWNESS =         0.347    (      0.364)
      KURTOSIS =        -0.777    (     -0.700)

 LOWER QUARTILE =          0.040
         MEDIAN =          0.066
 UPPER QUARTILE =          0.096

   RANGE =        0.007 TO        0.145

                                          1
                                          1
                                      1   1   1     1   1
                                    1 1 1 1 1 1 1   1   1     1
                                1 1 1 1 1 1 1 1 1 1 1 1 1   1 1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE                -0.00    0.03    0.07    0.11     0.14

SET    1          VARIABLE    4

             N =    32
          MEAN =         0.041
     STD. DEV. =         0.021    (      0.022)
      VARIANCE =         0.000    (      0.000)
 COEF. OF VAR. =        51.653    (     52.480)
      SKEWNESS =         0.376    (      0.397)
      KURTOSIS =        -0.552    (     -0.435)

 LOWER QUARTILE =          0.025
         MEDIAN =          0.040
 UPPER QUARTILE =          0.054

   RANGE =        0.006 TO        0.090

                                                  1
                                                  1
                                    1   1         1
                                    1   1   1 1   1
                                    1 1 1   1 1   1   1   1
                                1   1 1 1 1 1 1 1 1 1 1   1   1 1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE                -0.00    0.02    0.04    0.06     0.08
```

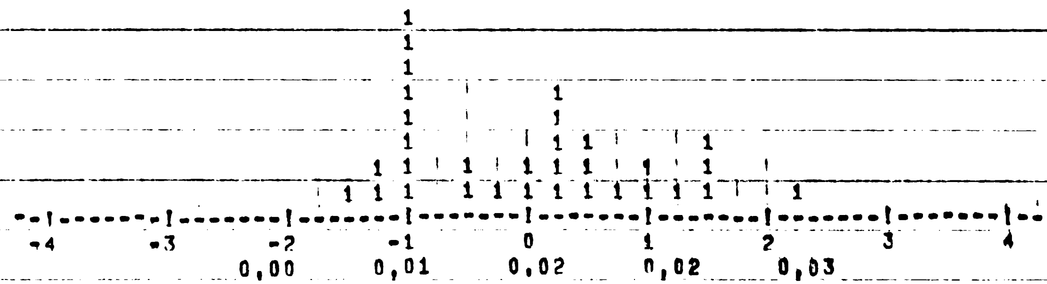
```
SET    1          VARIABLE    5

          N =    32
       MEAN =      0.029
  STD. DEV. =      0.016    (     0,016)
   VARIANCE =      0.000    (     0,000)
COEF. OF VAR. =   55.001    (    55,881)
   SKEWNESS =      0.560    (     0,588)
   KURTOSIS =     -0.690    (    -0,597)

 LOWER QUARTILE =      0.017
         MEDIAN =      0.027
 UPPER QUARTILE =      0.040

   RANGE =      0.005 TO      0.064
```

```
                                        1 1
                                        1 1   1
                                  1     1 1   1
                                  1   1 1 1 1 1 1       1 1 1
                                  1   1 1 1 1 1 1 1 1   1 1 1   1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
   Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
  RAW SCORE                -0,00     0,01     0,03     0,05     0,06
```

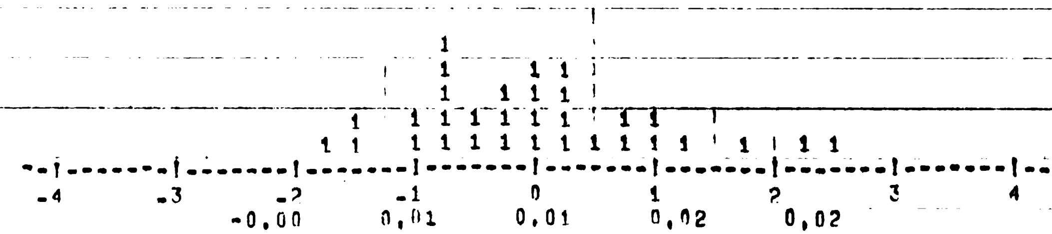
```
SET    1          VARIABLE    6

          N =    32
       MEAN =      0.021
  STD. DEV. =      0.010    (     0,010)
   VARIANCE =      0.000    (     0,000)
COEF. OF VAR. =   47.493    (    48,243)
   SKEWNESS =      0.234    (     0,245)
   KURTOSIS =     -0.756    (    -0,675)

 LOWER QUARTILE =      0.011
         MEDIAN =      0.020
 UPPER QUARTILE =      0.030

   RANGE =      0.005 TO      0.044
```

```
                                      1     1   1     1
                                  1   1   1 1   1     1
                                  1 1 1   1 1   1 1   1   1
                                  1 1 1   1 1 1 1 1 1 1 1 1     1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
   Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
  RAW SCORE                 0.00     0,01     0,02     0,03     0,04
```

```
SET    1          VARIABLE    7

          N =    32
       MEAN =       0.016
  STD. DEV. =       0.007    (        0.007)
   VARIANCE =       0.000    (        0.000)
COEF. OF VAR. =    44.028    (       44.732)
   SKEWNESS =       0.333    (        0.349)
   KURTOSIS =      -0.801    (       -0.729)

 LOWER QUARTILE =        0.009
         MEDIAN =        0.017
 UPPER QUARTILE =        0.020

  RANGE =        0.005 TO        0.032
```




```
SET    1          VARIABLE    8

          N =    32
       MEAN =       0.012
  STD. DEV. =       0.006    (        0.006)
   VARIANCE =       0.000    (        0.000)
COEF. OF VAR. =    52.871    (       53.717)
   SKEWNESS =       0.639    (        0.671)
   KURTOSIS =      -0.034    (        0.173)

 LOWER QUARTILE =        0.007
         MEDIAN =        0.011
 UPPER QUARTILE =        0.016

  RANGE =        0.002 TO        0.028
```



B7


```
SET    1            VARIABLE    9

           N =    32
        MEAN =        0.009
   STD. DEV. =        0.005    (        0.005)
    VARIANCE =        0.000    (        0.000)
COEF. OF VAR. =      56.051    (       56.948)
    SKEWNESS =        0.295    (        0.310)
    KURTOSIS =       -0.513    (       -0.390)

 LOWER QUARTILE =      0.005
         MEDIAN =      0.008
 UPPER QUARTILE =      0.013

   RANGE =       0.000 TO        0.021

                                             1
                                   1         1
                                1  1     1   1
                              1 1  1     1   1
                            1 1 1 1 1    1   1
                          1 1 1 1 1 1 1 1 1 1    1  1
                 --I-------I-------I-------I-------I-------I-------I-------I-------I--
        Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
      RAW SCORE                 -0.00    0.00    0.01    0.01    0.02


SET    1            VARIABLE    10

           N =    32
        MEAN =        0.009
   STD. DEV. =        0.004    (        0.004)
    VARIANCE =        0.000    (        0.000)
COEF. OF VAR. =      48.325    (       49.099)
    SKEWNESS =        0.157    (        0.164)
    KURTOSIS =       -1.046    (       -1.016)

 LOWER QUARTILE =      0.005
         MEDIAN =      0.008
 UPPER QUARTILE =      0.012

   RANGE =       0.002 TO        0.016

                                     1                 1
                           1 1     1 1   1             1   1
                           1 1 1   1 1 1 1 1 1         1   1
                           1 1 1 1 1 1 1 1 1 1         1   1
                 --I-------I-------I-------I-------I-------I-------I-------I-------I--
        Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
      RAW SCORE                  0.00    0.00    0.01    0.01    0.02
```

HISTOGRAMS

```
SET 1          VARIABLE 1

             N =   33    <-- SIZE OF SAMPLE
          MEAN =   0.012
     STD. DEV. =   0.011   (   0.011)
      VARIANCE =   0.000   (   0.000)
  COEF. OF VAR. = 89.567   (  90.956)
      SKEWNESS =   1.634   (   1.713)
      KURTOSIS =   3.859   (   4.721)

LOWER QUARTILE =     0.004
        MEDIAN =     0.010
UPPER QUARTILE =     0.018

         RANGE =   0.001 TO     0.053

                                        1 1
                                        1 1
                                        1 1     1   1
                                        1 1 1   1   1 1
                                        1 1 1 1 1   1 1 1
                                        1 1 1 1 1   1 1 1 1 1                 1
                --I-------I-------I-------I-------I-------I-------I-------I-------I--
       Z-SCORE    -4      -3      -2      -1       0       1       2       3       4
     RAW SCORE                  -0.01    0.00    0.01    0.02    0.03
```



```
SET 1          VARIABLE 2    <-- HARMONIC NUMBER

             N =   33
          MEAN =   0.127
     STD. DEV. =   0.064   (   0.065)
      VARIANCE =   0.004   (   0.004)
  COEF. OF VAR. = 50.416   (  51.192)
      SKEWNESS =   0.099   (   0.104)
      KURTOSIS =  -0.342   (  -0.193)

LOWER QUARTILE =     0.065
        MEDIAN =     0.130
UPPER QUARTILE =     0.169

         RANGE =   0.013 TO     0.286

                                              1     1
                                        1     1 1 1 1 1 1
                                  1 1 1 1     1 1 1 1 1 1
                                  1 1 1 1   1 1 1 1 1 1 1 1   1     1
                --I-------I-------I-------I-------I-------I-------I-------I-------I--
       Z-SCORE    -4      -3      -2      -1       0       1       2       3       4
     RAW SCORE                  -0.00    0.06    0.13    0.19    0.25
```

B8


```
SET          VARIABLE   3

            N =    33
         MEAN =      0.071
    STD. DEV. =      0.043    (      0.043)
     VARIANCE =      0.002    (      0.002)
COEF. OF VAR. =     59.499    (     60.422)
     SKEWNESS =      0.415    (      0.424)
     KURTOSIS =     -0.929    (     -0.963)

 LOWER QUARTILE =      0.035
         MEDIAN =      0.065
 UPPER QUARTILE =      0.102

    RANGE =     0.012 TO      0.155

                                            1
                                            1
                                            1  1 1 1 1
                                            1 1 1 1 1 1 1 1    1 1 1
                                          1 1 1 1 1 1 1 1 1    1 1 1 1
                  --I-------I-------I-------I-------I-------I-------I-------I-------I--
         Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
       RAW SCORE                 -0.01    0.03    0.07    0.11    0.16
```

```
SET    1     VARIABLE   4

            N =    33
         MEAN =      0.048
    STD. DEV. =      0.020    (      0.020)
     VARIANCE =      0.000    (      0.000)
COEF. OF VAR. =     40.916    (     41.550)
     SKEWNESS =      0.031    (      0.032)
     KURTOSIS =     -0.572    (     -0.462)

 LOWER QUARTILE =      0.038
         MEDIAN =      0.045
 UPPER QUARTILE =      0.065

    RANGE =     0.005 TO      0.086

                                                  1
                                                  1 1         1
                                                  1 1 1     1 1
                                            1 1 1 1 1 1     1 1   1
                                    1   1   1 1 1 1 1 1 1 1 1 1   1 1 1
                  --I-------I-------I-------I-------I-------I-------I-------I-------I--
         Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
       RAW SCORE                  0.01    0.03    0.05    0.07    0.09
```

```
SET    1            VARIABLE    5

            N =    33
         MEAN =         0.030
    STD. DEV. =         0.016    (        0.016)
     VARIANCE =         0.000    (        0.000)
COEF. OF VAR. =        52.350    (       53.162)
     SKEWNESS =         0.667    (        0.699)
     KURTOSIS =        -0.238    (       -0.072)

 LOWER QUARTILE =         0.017
         MEDIAN =         0.027
 UPPER QUARTILE =         0.040

   RANGE =        0.008 TO        0.072

                                            1
                                            1
                                      1     1
                                    1 1     1 1   1
                                    1 1 1 1 1 1   1   1   1
                                  1 1 1 1 1 1 1 1 1 1 1 1 1   1   1
              --I-------I-------I-------I-------I-------I-------I-------I-------I--
   Z-SCORE     -4      -3      -2      -1       0       1       2       3       4
 RAW SCORE                  -0.00     0.01     0.03     0.05     0.06
```



```
SET    1            VARIABLE    6

            N =    33
         MEAN =         0.025
    STD. DEV. =         0.011    (        0.011)
     VARIANCE =         0.000    (        0.000)
COEF. OF VAR. =        44.524    (       45.214)
     SKEWNESS =         0.136    (        0.143)
     KURTOSIS =        -0.671    (       -0.579)

 LOWER QUARTILE =         0.017
         MEDIAN =         0.026
 UPPER QUARTILE =         0.032

   RANGE =        0.005 TO        0.047

                                              1
                                            1 1
                                1     1 1   1 1 1
                                1     1 1   1 1 1   1 1     1
                                1 1   1 1 1 1 1 1 1 1 1 1 1 1 1
              --I-------I-------I-------I-------I-------I-------I-------I-------I--
   Z-SCORE     -4      -3      -2      -1       0       1       2       3       4
 RAW SCORE                   0.00     0.01     0.02     0.04     0.05
```

```
SET   1            VARIABLE    7

           N =    33
        MEAN =           0.017
   STD. DEV. =           0.010   (          0.011)
    VARIANCE =           0.000   (          0.000)
COEF. OF VAR. =         62.293   (         63.256)
    SKEWNESS =           1.025   (          1.073)
    KURTOSIS =           0.627   (          0.940)

LOWER QUARTILE =             0.009
        MEDIAN =             0.015
UPPER QUARTILE =             0.024

  RANGE =        0.004 TO         0.045
```

```
                                                    1
                                          1 1 1     1
                                        1 1 1 1     1   1
                                        1 1 1 1 1 1 1   1 1
                                        1 1 1 1 1 1 1   1 1 1   1     1 1
                --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE     -4      -3      -2      -1        0       1       2       3       4
   RAW SCORE                    -0,00   0,01     0,02     0,03     0,04
```



```
SET   1            VARIABLE    8

           N =    33
        MEAN =           0.014
   STD. DEV. =           0.006   (          0.006)
    VARIANCE =           0.000   (          0.000)
COEF. OF VAR. =         42.989   (         43.655)
    SKEWNESS =           0.227   (          0.258)
    KURTOSIS =          -0.541   (         -0.426)

LOWER QUARTILE =             0.009
        MEDIAN =             0.014
UPPER QUARTILE =             0.018

  RANGE =        0.004 TO         0.028
```

```
                                                  1 1
                                            1     1 1   1
                                    1   1 1 1 1 1 1 1 1 1 1     1
                                    1 1 1 1 1 1 1 1 1 1 1 1   1 1   1
                --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE     -4      -3      -2      -1        0       1       2       3       4
   RAW SCORE                   0,00     0,01     0,01     0,02     0,03
```

```
SET    1           VARIABLE    9

          N =    33
       MEAN =       0,010
  STD. DEV. =       0,007    (        0,007)
   VARIANCE =       0,000    (        0,000)
COEF. OF VAR. =    59,922    (       71,007)
   SKEWNESS =       0,291    (        0,305)
   KURTOSIS =      -1,220    (       -1,220)

 LOWER QUARTILE =       0,003
         MEDIAN =       0,007
 UPPER QUARTILE =       0,015

  RANGE =      0,000 TO       0,023

                                        1
                                        1
                                        1     1         1
                                        1 1 1 1       1 1
                                        1 1 1 1     1 1 1 1     1
                                        1 1 1 1 1   1 1 1 1 1 1 1 1
                  --I-------I-------I-------I-------I-------I-------I-------I-------I--
        Z-SCORE    -4      -3      -2      -1       0       1       2       3       4
      RAW SCORE                   -0,00    0,00     0,01     0,02     0,02
```



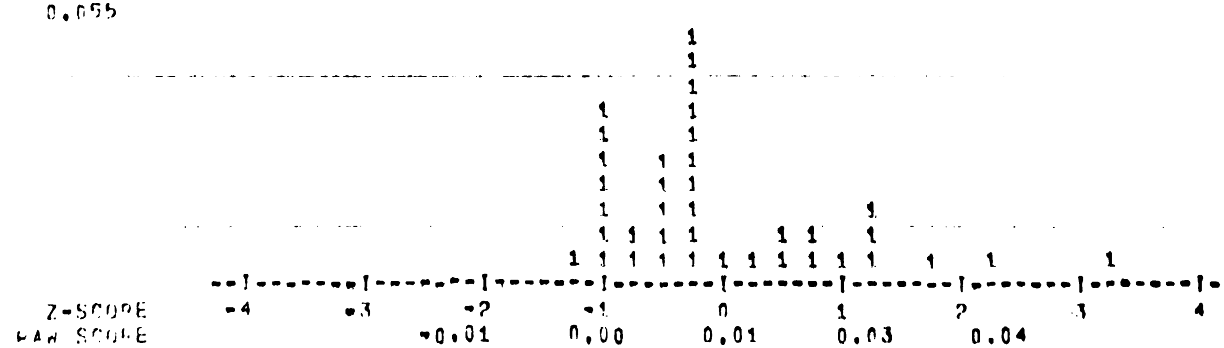
```
SET    1           VARIABLE   10

          N =    33
       MEAN =       0,009
  STD. DEV. =       0,006    (        0,006)
   VARIANCE =       0,000    (        0,000)
COEF. OF VAR. =    65,356    (       66,370)
   SKEWNESS =       1,329    (        1,393)
   KURTOSIS =       1,348    (        1,784)

 LOWER QUARTILE =       0,005
         MEDIAN =       0,007
 UPPER QUARTILE =       0,013

  RANGE =      0,002 TO       0,027

                                              1
                                            1 1
                                          1 1 1         1
                                          1 1 1 1 1     1
                                          1 1 1 1 1 1   1
                                        1 1 1 1 1 1 1   1 1 1 1         1 1
                  --I-------I-------I-------I-------I-------I-------I-------I-------I--
        Z-SCORE    -4      -3      -2      -1       0       1       2       3       4
      RAW SCORE                   -0,00    0,00     0,01     0,02     0,02
```

SET 1 VARIABLE 1

N =	38	
MEAN =	0.015	
STD. DEV. =	0.012	(0.012)
VARIANCE =	0.000	(0.000)
COEF. OF VAR. =	81.291	(82.382)
SKEWNESS =	1.334	(1.369)
KURTOSIS =	1.696	(2.121)

LOWER QUARTILE =	0.005
MEDIAN =	0.012
UPPER QUARTILE =	0.021

RANGE = 0.001 TO 0.055

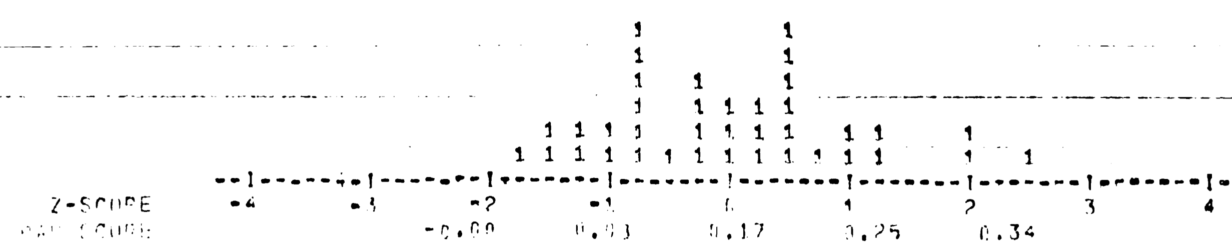


SET 1 VARIABLE 2

N =	38	
MEAN =	0.167	
STD. DEV. =	0.086	(0.087)
VARIANCE =	0.007	(0.008)
COEF. OF VAR. =	51.176	(51.663)
SKEWNESS =	0.427	(0.445)
KURTOSIS =	-0.318	(-0.186)

LOWER QUARTILE =	[illegible]
MEDIAN =	0.167
UPPER QUARTILE =	[illegible]

RANGE = 0.012 TO 0.377



```
SET    1            VARIABLE     3

              N =   38
           MEAN =           0.075
      STD. DEV. =           0.038     (         0.039)
       VARIANCE =           0.001     (         0.001)
 COEF. OF VAR. =           50.511     (        51.493)
       SKEWNESS =           0.721     (         0.751)
       KURTOSIS =          -0.103     (         0.059)

 LOWER QUARTILE =           0.044
         MEDIAN =           0.070
 UPPER QUARTILE =           0.099

   RANGE =        0.016 TO         0.171


                                                      1
                                              1 1 1 1 1 1
                                              1 1 1 1 1 1   1
                                          1   1 1 1 1 1 1   1     1   1
                                          1 1 1 1 1 1 1 1   1 1 1 1   1   1
                      --I-------I-------I-------I-------I-------I-------I-------I-------I--
             Z-SCORE    -4      -3      -2      -1      0       1       2       3       4
           RAW SCORE                  -0.00     0.04     0.07     0.11     0.15
```



```
SET    1            VARIABLE     4

              N =   38
           MEAN =           0.049
      STD. DEV. =           0.023     (         0.023)
       VARIANCE =           0.001     (         0.001)
 COEF. OF VAR. =           47.272     (        47.906)
       SKEWNESS =           0.748     (         0.780)
       KURTOSIS =           0.424     (         0.661)

 LOWER QUARTILE =           0.032
         MEDIAN =           0.045
 UPPER QUARTILE =           0.063

   RANGE =        0.010 TO         0.117


                                                1
                                                1 1
                                                1 1       1
                                            1   1 1 1   1 1
                                            1   1 1 1 1 1 1 1 1 1
                                        1 1 1 1 1 1 1 1 1 1 1 1 1   1 1       1
                      --I-------I-------I-------I-------I-------I-------I-------I-------I--
             Z-SCORE    -4      -3      -2      -1      0       1       2       3       4
           RAW SCORE                   0.00     0.03     0.05     0.07     0.10
```

```
SET    1          VARIABLE    5

           N =   38
        MEAN =        0.033
   STD. DEV. =        0.017    (      0.017)
    VARIANCE =        0.000    (      0.000)
CEF. OF VAR. =       51.314    (     52.003)
    SKEWNESS =        1.040    (      1.084)
    KURTOSIS =        0.901    (      1.208)

LOWER QUARTILE =        0.021
        MEDIAN =        0.031
UPPER QUARTILE =        0.044

  RANGE =       0.009 TO        0.082


                                                     1
                                                     1
                                                     1 1
                                                 1   1 1   1 1   1
                                                 1   1 1   1 1   1
                                                 1   1 1 1 1 1 1 1                1
                                               1 1   1 1 1 1 1 1 1 1    1 1       1
                      --I-------I-------I-------I-------I-------I-------I-------I-------I-------I--
            Z-SCORE     -4      -3      -2      -1       0       1       2       3       4
          RAW SCORE                  -0.00    0.02    0.03    0.05    0.07
```



```
SET    1          VARIABLE    6

           N =   58
        MEAN =        0.019
   STD. DEV. =        0.010    (      0.010)
    VARIANCE =        0.000    (      0.000)
CEF. OF VAR. =       51.077    (     51.763)
    SKEWNESS =        0.493    (      0.513)
    KURTOSIS =       -0.341    (     -0.214)

LOWER QUARTILE =        0.012
        MEDIAN =        0.018
UPPER QUARTILE =        0.025

  RANGE =       0.004 TO        0.044


                                                        1
                                               1    1 1 1  1
                                               1    1 1 1 1  1  1
```

B9

```
SET   1          VARIABLE    7

           N =   38
        MEAN =       0.017
   STD. DEV. =       0.010    (          0.010)
    VARIANCE =       0.000    (          0.000)
COEF. OF VAR. =     62.446    (         63.285)
    SKEWNESS =       1.167    (          1.216)
    KURTOSIS =       2.322    (          2.835)

 LOWER QUARTILE =      0.008
         MEDIAN =      0.016
 UPPER QUARTILE =      0.023

   RANGE =       0.002 TO       0.054

                                                                      1
                                                                      1
                                                              1 1   1 1     1
                                                            1 1 1   1 1   1 1   1
                                                            1 1 1 1 1 1 1 1 1   1
                                                          1 1 1 1 1 1 1 1 1 1   1   1       1
                                    --I-------I-------I-------I-------I-------I-------I-------I-------I--
                          Z-SCORE   -4       -3      -2      -1       0       1       2       3       4
                        RAW SCORE                 -0.00    0.01    0.02    0.03    0.04

SET   1          VARIABLE    8

           N =   38
        MEAN =       0.010
   STD. DEV. =       0.005    (          0.005)
    VARIANCE =       0.000    (          0.000)
COEF. OF VAR. =     52.007    (         52.705)
    SKEWNESS =       0.978    (          1.018)
    KURTOSIS =       0.783    (          1.073)

 LOWER QUARTILE =      0.007
         MEDIAN =      0.009
 UPPER QUARTILE =      0.012

   RANGE =       0.000 TO       0.027

                                                                     1
                                                                   1 1 1
                                                                 1 1 1 1
                                                               1 1 1 1 1 1
```

```
SET    1            VARIABLE    9

          N =     38
       MEAN =          0.009
  STD. DEV. =          0.005    (         0.005)
   VARIANCE =          0.000    (         0.000)
COEF. OF VAR. =       52.174    (        52.874)
   SKEWNESS =          0.991    (         1.033)
   KURTOSIS =          0.899    (         1.206)

LOWER QUARTILE =          0.006
        MEDIAN =          0.008
UPPER QUARTILE =          0.012

  RANGE =        0.001 TO         0.025

                                        1
                                        1
                                        1
                                      1 1 1 1         1
                                  1   1 1 1 1   1     1
                                  1 1 1 1 1 1   1     1
                              1   1 1 1 1 1 1 1 1 1 1 1 1   1         1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
Z-SCORE      -4      -3      -2      -1       0       1       2       3       4
RAW SCORE                    -0.00   0.00     0.01     0.01    0.02
```



```
SET    1            VARIABLE   10

          N =     38
       MEAN =          0.008
  STD. DEV. =          0.004    (         0.004)
   VARIANCE =          0.000    (         0.000)
COEF. OF VAR. =       54.683    (        55.417)
   SKEWNESS =          0.854    (         0.889)
   KURTOSIS =          1.759    (         2.190)

LOWER QUARTILE =          0.005
        MEDIAN =          0.007
UPPER QUARTILE =          0.010

  RANGE =        0.000 TO         0.021

                                              1
                                      1 1 1 1 1
                                      1 1 1 1 1 1 1
                              1   1   1 1 1 1 1 1 1
                              1 1 1 1 1 1 1 1 1 1 1 1 1 1   1         1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
Z-SCORE      -4      -3      -2      -1       0       1       2       3       4
RAW SCORE                    -0.00   0.00     0.01     0.01    0.02
```

```
SET   1           VARIABLE   1

          N =    37
       MEAN =         0,016
  STD. DEV. =         0,014   (        0,014)
   VARIANCE =         0,000   (        0,000)
COEF. OF VAR. =      87,093   (       88,295)
   SKEWNESS =         1,420   (        1,553)
   KURTOSIS =         1,386   (        2,350)

 LOWER QUARTILE =          0,005
         MEDIAN =          0,013
 UPPER QUARTILE =          0,019

   RANGE =      0,002 TO        0,056


                                                 1
                                                 1
                                                 1 1   1
                                                 1 1 1 1   1
                                                 1 1 1 1 1 1   1
                                                 1 1 1 1 1 1   1        1
                                                 1 1 1 1 1 1 1 1 1  1  1        1
                   --I-------I-------I-------I-------I-------I-------I-------I-------I--
         Z-SCORE   -4        -3      -2      -1       0       1       2       3       4
       RAW SCORE                   -0,01    0,00    0,02    0,03    0,04
```



```
SET   1           VARIABLE   2

          N =    37
       MEAN =         0,166
  STD. DEV. =         0,094   (        0,096)
   VARIANCE =         0,009   (        0,009)
COEF. OF VAR. =      56,969   (       57,694)
   SKEWNESS =         0,327   (        0,341)
   KURTOSIS =        -0,737   (       -0,665)

 LOWER QUARTILE =          0,109
         MEDIAN =          0,144
 UPPER QUARTILE =          0,236

   RANGE =      0,018 TO        0,352


                                                       1 1
                                                       1 1   1
                                              1 1      1 1 1 1   1
                                              1 1 1    1 1 1 1   1        1 1
                                              1 1 1 1  1 1 1 1 1 1 1 1 1 1 1
```

```
SET   1          VARIABLE    3

           N =   37
        MEAN =        0,080
   STD. DEV. =        0,041    (        0,041)
    VARIANCE =        0,002    (        0,002)
COEF. OF VAR. =      50,686    (       51,588)
    SKEWNESS =        0,082    (        0,065)
    KURTOSIS =       -1,173    (       -1,167)

 LOWER QUARTILE =     0,039
         MEDIAN =     0,082
 UPPER QUARTILE =     0,113

   RANGE =       0,011 TO       0,153

                                     1
                                     1
                                     1     1   1
                                   1 1     1   1 1 1
                                 1 1 1     1 1 1 1 1 1 1 1 1
                               1 1 1 1   1 1 1 1 1 1 1 1 1 1
           --I-------I-------I-------I-------I-------I-------I-------I-------I--
  Z-SCORE    -4      -3      -2      -1       0       1       2       3       4
RAW SCORE                  -0,00     0,04    0,08     0,12     0,16
```



```
SET   1          VARIABLE    4

           N =   37
        MEAN =        0,050
   STD. DEV. =        0,031    (        0,031)
    VARIANCE =        0,001    (        0,001)
COEF. OF VAR. =      61,560    (       62,429)
    SKEWNESS =        0,577    (        0,602)
    KURTOSIS =       -0,669    (       -0,587)

 LOWER QUARTILE =     0,028
         MEDIAN =     0,042
 UPPER QUARTILE =     0,065

   RANGE =       0,004 TO       0,119

                                     1         1
                                     1 1 1 1   1
                                     1 1 1 1   1 1       1
                                   1 1 1 1 1   1 1     1 1
                                 1 1 1 1 1 1 1 1 1     1 1 1 1 1
           --I-------I-------I-------I-------I-------I-------I-------I-------I--
  Z-SCORE    -4      -3      -2      -1       0       1       2       3       4
RAW SCORE                  -0,01     0,02    0,05     0,08     0,11
```

```
SET   1          VARIABLE   5

           N =   37
        MEAN =         0.029
   STD. DEV. =         0.017    (        0.017)
    VARIANCE =         0.000    (        0.000)
COEF. OF VAR. =       57.779    (       56.576)
    SKEWNESS =         0.150    (        0.156)
    KURTOSIS =        -1.193    (       -1.196)

 LOWER QUARTILE =      0.013
         MEDIAN =      0.031
 UPPER QUARTILE =      0.043

   RANGE =       0.003 TO       0.064

                                            1
                                            1             1
                                            1   1         1
                                            1   1   1     1 1   1
                                          1 1 1 1   1   1 1 1 1 1
                                          1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
                    --I-------I-------I-------I-------I-------I-------I-------I-------I--
          Z-SCORE    -4      -3      -2      -1       0       1       2       3       4
        RAW SCORE                   -0.00    0.01    0.03     0.05    0.06

SET   1          VARIABLE   6

           N =   37
        MEAN =         0.023
   STD. DEV. =         0.013    (        0.013)
    VARIANCE =         0.000    (        0.000)
COEF. OF VAR. =       55.071    (       55.641)
    SKEWNESS =         0.393    (        0.409)
    KURTOSIS =        -0.777    (       -0.712)

 LOWER QUARTILE =      0.011
         MEDIAN =      0.021
 UPPER QUARTILE =      0.034

   RANGE =       0.004 TO       0.053

                                            1       1
                                            1     1 1 1         1
                                            1 1   1 1 1         1 1
                                          1 1 1   1 1 1 1   1   1 1
                                          1 1 1   1 1 1 1 1 1 1 1 1     1
                    --I-------I-------I-------I-------I-------I-------I-------I-------I--
          Z-SCORE    -4      -3      -2      -1       0       1       2       3       4
        RAW SCORE                   -0.00    0.01    0.02     0.04    0.05
```

```
SET    1          VARIABLE    7

          N =    37
       MEAN =          0.017
  STD. DEV. =          0.009    (        0.009)
   VARIANCE =          0.000    (        0.000)
COEF. OF VAR. =       51.769    (       52.463)
   SKEWNESS =          0.917    (        0.956)
   KURTOSIS =          0.200    (        0.412)

 LOWER QUARTILE =        0.011
         MEDIAN =        0.015
 UPPER QUARTILE =        0.022

   RANGE =       0.004 TO       0.040

                                              1
                                              1 1
                                            1 1 1     1   1
                                          1 1 1 1   1 1   1
                                        1 1 1 1 1 1 1 1 1 1 1 1 1   1
                                        1 1 1 1 1 1 1 1 1 1   1     1 1 1
                 --I-------I-------I-------I-------I-------I-------I-------I-------I--
        Z-SCORE  -4       -3       -2       -1        0        1        2        3        4
      RAW SCORE                 -0.00     0.01     0.02     0.03     0.03
```



```
SET    1          VARIABLE    8

          N =    37
       MEAN =          0.016
  STD. DEV. =          0.009    (        0.009)
   VARIANCE =          0.000    (        0.000)
COEF. OF VAR. =       54.914    (       55.702)
   SKEWNESS =          0.715    (        0.746)
   KURTOSIS =         -0.129    (       -0.048)

 LOWER QUARTILE =        0.009
         MEDIAN =        0.013
 UPPER QUARTILE =        0.023

   RANGE =       0.004 TO       0.037

                                            1 1         1
                                          1   1 1 1     1
                                          1   1 1 1     1 1   1   1
                                          1 1 1 1 1 1 1     1 1 1       1
                                        1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
                 --I-------I-------I-------I-------I-------I-------I-------I-------I--
        Z-SCORE  -4       -3       -2       -1        0        1        2        3        4
      RAW SCORE                 -0.00     0.01     0.02     0.02     0.03
```

B10


```
SET     1            VARIABLE     9

           N =    37
        MEAN =         0.011
   STD. DEV. =         0.005    (        0.005)
    VARIANCE =         0.000    (        0.000)
COEF. OF VAR. =       50.088    (       50.779)
    SKEWNESS =         0.362    (        0.377)
    KURTOSIS =        -0.667    (       -0.535)

 LOWER QUARTILE =          0.007
         MEDIAN =          0.009
 UPPER QUARTILE =          0.014

  RANGE =        0.001 TO        0.023
```

```
                                                 1
                                                 1
                                             1   1
                                             1   1
                                             1 1 1       1
                                       1 1   1 1 1   1 1 1 1   1 1
                                     1 1 1 1 1 1 1 1 1 1 1 1 1 1 1   1
                 --I-------I-------I-------I-------I-------I-------I-------I-------I--
        Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
      RAW SCORE                 -0.00    0.01     0.01     0.02     0.02
```

```
SET     1            VARIABLE    10

           N =    37
        MEAN =         0.010
   STD. DEV. =         0.005    (        0.005)
    VARIANCE =         0.000    (        0.000)
COEF. OF VAR. =       53.043    (       53.774)
    SKEWNESS =         0.626    (        0.653)
    KURTOSIS =        -0.229    (       -0.662)

 LOWER QUARTILE =          0.005
         MEDIAN =          0.009
 UPPER QUARTILE =          0.012

  RANGE =        0.001 TO        0.023
```

```
                                             1
                                             1
                                             1
                                           1 1       1 1
                                           1 1   1 1 1 1     1
                                           1 1   1 1 1 1     1   1
                                     1 1 1 1 1 1 1 1 1 1 1   1 1 1     1
                 --I-------I-------I-------I-------I-------I-------I-------I-------I--
        Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
      RAW SCORE                 -0.00    0.00     0.01     0.01     0.02
```

```
SET    1          VARIABLE    1

          N =   42
       MEAN =        0.012
  STD. DEV. =        0.010    (        0.010)
   VARIANCE =        0.000    (        0.000)
COEF. OF VAR. =     87.930    (       88.996)
   SKEWNESS =        2.760    (        2.863)
   KURTOSIS =        9.889    (       11.333)

 LOWER QUARTILE =       0.005
         MEDIAN =       0.010
 UPPER QUARTILE =       0.014

  RANGE =       0.002 TO        0.061

                                              1
                                              1
                                        1     1
                                        1     1
                                        1 1   1
                                        1 1 1 1
                                        1 1 1 1
                                        1 1 1 1   1
                                      1 1 1 1 1 1 1     1
                                      1 1 1 1 1 1 1 1 1 1       1               1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
    Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
  RAW SCORE               -0.01     0.00     0.01     0.02     0.03
```



```
SET    1          VARIABLE    2

          N =   42
       MEAN =        0.147
  STD. DEV. =        0.094    (        0.095)
   VARIANCE =        0.009    (        0.009)
COEF. OF VAR. =     63.798    (       64.572)
   SKEWNESS =        1.706    (        1.769)
   KURTOSIS =        3.254    (        3.835)

 LOWER QUARTILE =       0.087
         MEDIAN =       0.119
 UPPER QUARTILE =       0.179

  RANGE =       0.029 TO        0.496

                                          1
                                          1
                                          1
                                        1 1   1
                                        1 1   1
                                      1 1 1   1 1
                                      1 1 1 1 1 1
                                      1 1 1 1 1 1   1
                                    1 1 1 1 1 1 1 1 1 1 1   1 1   1         1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
    Z-SCORE  -4      -3      -2      -1       0       1       2       3       4
  RAW SCORE               -0.04     0.05     0.15     0.24     0.33
```

```
SET    1           VARIABLE     3

           N =   42
        MEAN =         0.073
   STD. DEV. =         0.040     (          0.041)
    VARIANCE =         0.002     (          0.002)
COEF. OF VAR. =       54.978     (         55.645)
    SKEWNESS =         0.397     (          0.412)
    KURTOSIS =        -0.828     (         -0.778)

 LOWER QUARTILE =         0.039
         MEDIAN =         0.071
 UPPER QUARTILE =         0.107

   RANGE =        0.005 TO         0.162
```

```
                                            1
                                            1
                                        1   1             1
                                        1   1       1     1
                                        1 1 1     1 1 1   1
                                        1 1 1 1 1 1 1 1 1 1
                                    1   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
                --I-------I-------I-------I-------I-------I-------I-------I-------I--
Z-SCORE          -4      -3      -2      -1       0       1       2       3       4
RAW SCORE                      -0.01     0.03     0.07    0.11     0.15
```



```
SET    1           VARIABLE     4

           N =   42
        MEAN =         0.051
   STD. DEV. =         0.039     (          0.039)
    VARIANCE =         0.001     (          0.002)
COEF. OF VAR. =       75.874     (         76.793)
    SKEWNESS =         1.626     (          1.687)
    KURTOSIS =         3.308     (          3.896)

 LOWER QUARTILE =         0.024
         MEDIAN =         0.038
 UPPER QUARTILE =         0.068

   RANGE =        0.007 TO         0.200
```

```
                                              1
                                              1
                                              1
                                            1 1
                                          1 1 1   1
                                          1 1 1   1 1
                                          1 1 1   1 1 1
                                          1 1 1   1 1 1   1
                                        1 1 1 1 1 1 1 1 1 1 1 1 1 1             1
                --I-------I-------I-------I-------I-------I-------I-------I-------I--
Z-SCORE          -4      -3      -2      -1       0       1       2       3       4
RAW SCORE                      -0.03     0.01     0.05    0.09     0.13
```

```
SET    1          VARIABLE     5

          N =   42
       MEAN =        0.034
  STD. DEV. =        0.018    (         0.018)
   VARIANCE =        0.000    (         0.000)
COEF. OF VAR. =     51.585    (        52.210)
   SKEWNESS =        0.627    (         0.650)
   KURTOSIS =       -0.458    (        -0.360)

 LOWER QUARTILE =        0.021
         MEDIAN =        0.030
 UPPER QUARTILE =        0.047

   RANGE =       0.006 TO        0.075
```

```
                                          1
                                        1 1
                                    1   1 1 1   1
                                    1 1 1 1 1   1   1
                                    1 1 1 1 1 1 1 1 1   1       1
                                1   1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE              -0.00     0.02     0.03    0.05     0.07
```

```
SET    1          VARIABLE     6

          N =   42
       MEAN =        0.027
  STD. DEV. =        0.014    (         0.015)
   VARIANCE =        0.000    (         0.000)
COEF. OF VAR. =     53.582    (        54.232)
   SKEWNESS =        1.689    (         1.752)
   KURTOSIS =        4.130    (         4.825)

 LOWER QUARTILE =        0.019
         MEDIAN =        0.025
 UPPER QUARTILE =        0.030

   RANGE =       0.005 TO        0.083
```

```
                                              1
                                            1 1
                                            1 1
                                            1 1
                                      1     1 1
                                      1   1 1 1
                                      1   1 1 1 1
                                  1   1   1 1 1 1 1 1
                                  1 1 1 1 1 1 1 1 1 1 1 1     1   1           1
            --I-------I-------I-------I-------I-------I-------I-------I-------I--
     Z-SCORE -4      -3      -2      -1       0       1       2       3       4
   RAW SCORE              -0.00     0.01     0.03    0.04     0.06
```

```
SET    1          VARIABLE    7

           N =   42
      . MEAN =        0.019
   STD. DEV. =        0.011     (        0.011)
    VARIANCE =        0.000     (        0.000)
COEF. OF VAR. =      58.527     (       59.237)
    SKEWNESS =        1.898     (        1.969)
    KURTOSIS =        5.947     (        6.879)

LOWER QUARTILE =           0.012
        MEDIAN =           0.018
UPPER QUARTILE =           0.023

  RANGE =        0.003 TO         0.064
```

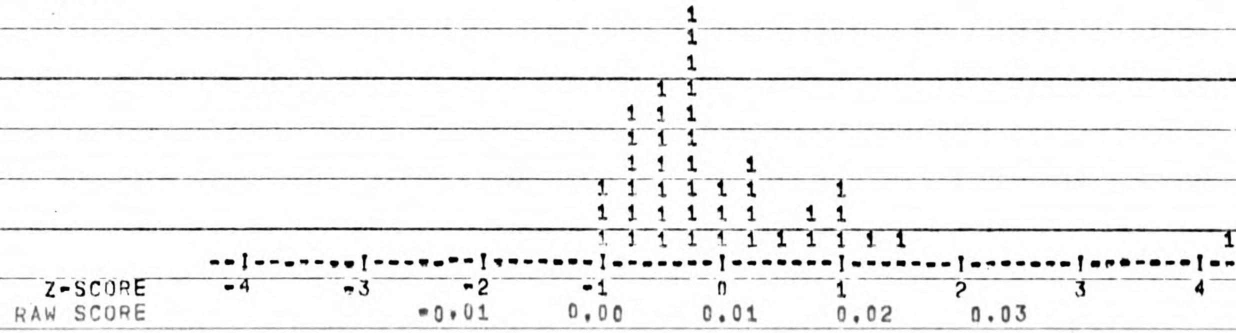
```
                                                        1
                                                      1 1
                                                      1 1 1
                                                      1 1 1
                                                  1   1 1 1
                                          1     1 1 1 1 1 1
                                          1 1 1 1 1 1 1 1 1
                                          1 1 1 1 1 1 1 1 1 1 1             1           1
                    --I-------I-------I-------I-------I-------I-------I-------I-------I--
           Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
         RAW SCORE                  -0,00    0,01     0,02     0,03    0,04
```

```
SET    1          VARIABLE    8

           N =   42
        MEAN =        0.014
   STD. DEV. =        0.008     (        0.008)
    VARIANCE =        0.000     (        0.000)
COEF. OF VAR. =      52.682     (       53.320)
    SKEWNESS =        0.170     (        0.176)
    KURTOSIS =       -1.001     (       -0.974)

LOWER QUARTILE =           0.009
        MEDIAN =           0.013
UPPER QUARTILE =           0.022

  RANGE =        0.001 TO         0.029
```

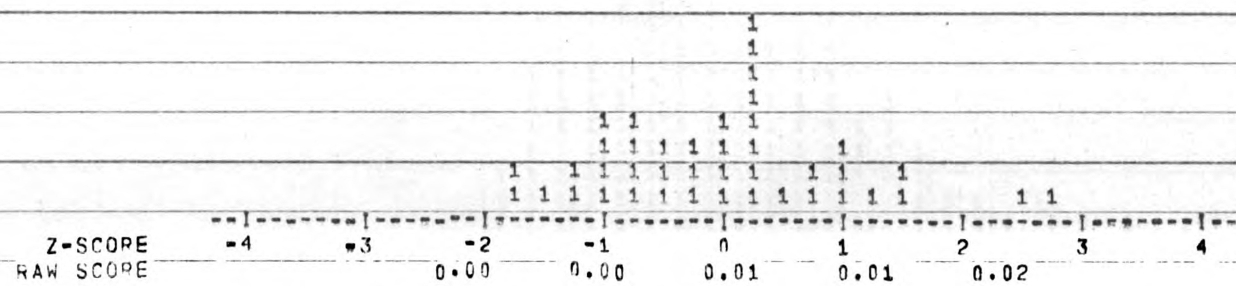
```
                                                1
                                                1
                                              1 1 1 1     1     1
                                              1 1 1 1 1   1     1 1
                                        1 1   1 1 1 1 1   1   1 1 1
                                        1 1   1 1 1 1 1 1 1 1 1 1 1 1 1
                    --I-------I-------I-------I-------I-------I-------I-------I-------I--
           Z-SCORE   -4      -3      -2      -1       0       1       2       3       4
         RAW SCORE                  -0,00    0,01     0,01     0,02    0,03
```

B11

```
SET    1            VARIABLE    9

            N =   42
         MEAN =         0.010
    STD. DEV. =         0.009    (         0.009)
     VARIANCE =         0.000    (         0.000)
COEF. OF VAR. =        82.014    (        83.008)
     SKEWNESS =         2.796    (         2.900)
     KURTOSIS =        10.514    (        12.040)

  LOWER QUARTILE =         0.005
          MEDIAN =         0.008
  UPPER QUARTILE =         0.013

   RANGE =       0.002 TO        0.052
```

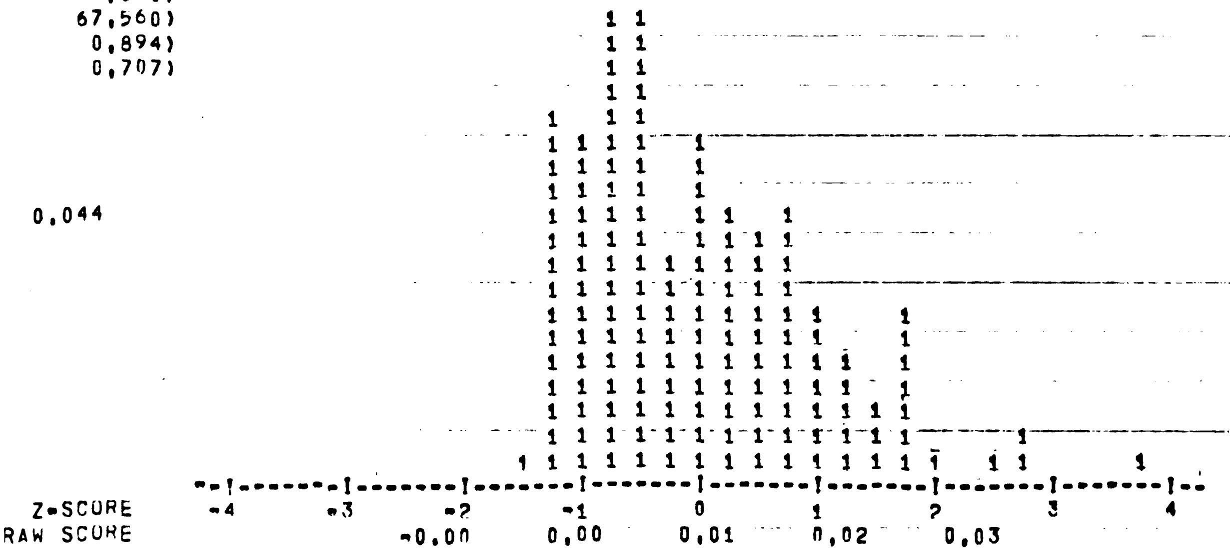


```
SET    1            VARIABLE   10

            N =   42
         MEAN =         0.008
    STD. DEV. =         0.004    (         0.004)
     VARIANCE =         0.000    (         0.000)
COEF. OF VAR. =        43.501    (        44.028)
     SKEWNESS =         0.589    (         0.612)
     KURTOSIS =         0.551    (         0.780)

  LOWER QUARTILE =         0.006
          MEDIAN =         0.009
  UPPER QUARTILE =         0.010

   RANGE =       0.002 TO        0.019
```



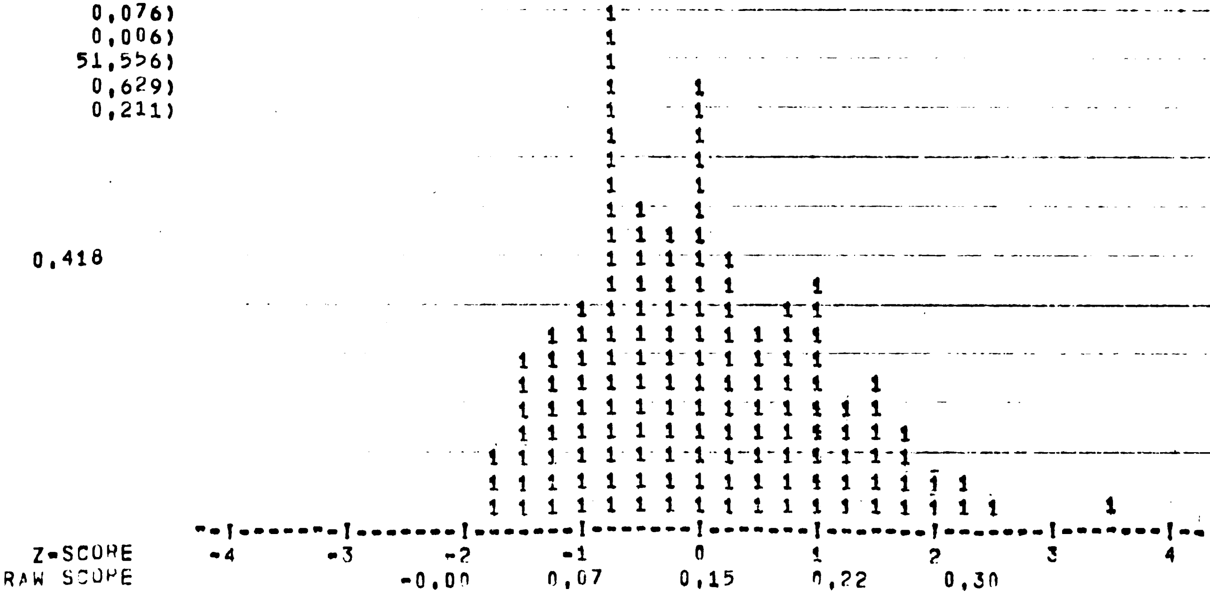
SET 1 VARIABLE 1

```
            N =  150
         MEAN =        0.012
    STD. DEV. =        0.008   (      0.008)
     VARIANCE =        0.000   (      0.000)
COEF. OF VAR. =       67.334   (     67.560)
     SKEWNESS =        0.885   (      0.894)
     KURTOSIS =        0.644   (      0.707)

 LOWER QUARTILE =        0.006
         MEDIAN =        0.011
 UPPER QUARTILE =        0.018

   RANGE =      0.001 TO       0.044
```



SET 1 VARIABLE 2

```
            N =  150
         MEAN =        0.148
    STD. DEV. =        0.076   (      0.076)
     VARIANCE =        0.006   (      0.006)
COEF. OF VAR. =       51.384   (     51.556)
     SKEWNESS =        0.622   (      0.629)
     KURTOSIS =        0.164   (      0.211)

 LOWER QUARTILE =        0.091
         MEDIAN =        0.140
 UPPER QUARTILE =        0.200

   RANGE =      0.005 TO       0.418
```



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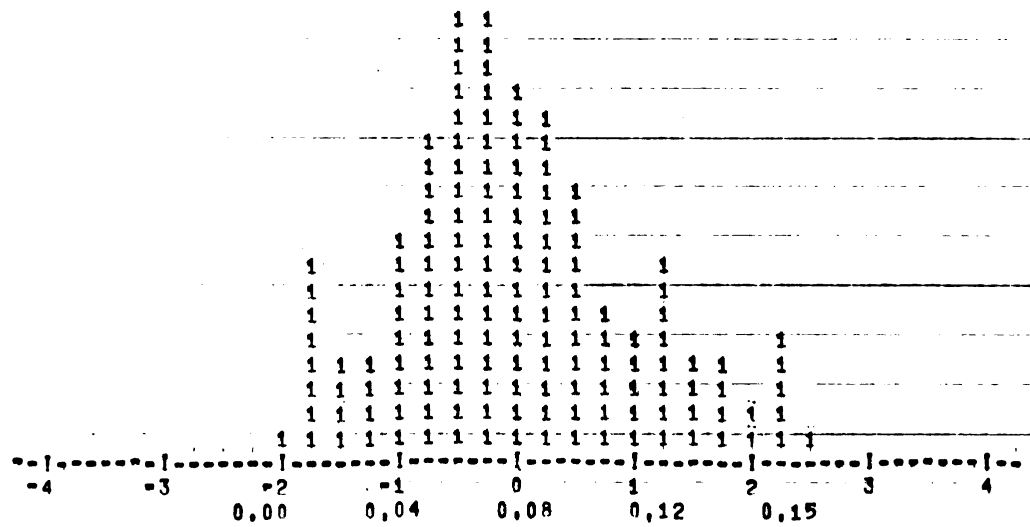
SET 1 VARIABLE 3

N =	150	
MEAN =	0.078	
STD. DEV. =	0.038	(0.038)
VARIANCE =	0.001	(0.001)
COEF. OF VAR. =	48.382	(48.544)
SKEWNESS =	0.379	(0.383)
KURTOSIS =	-0.308	(-0.278)
LOWER QUARTILE =	0.053	
MEDIAN =	0.077	
UPPER QUARTILE =	0.100	

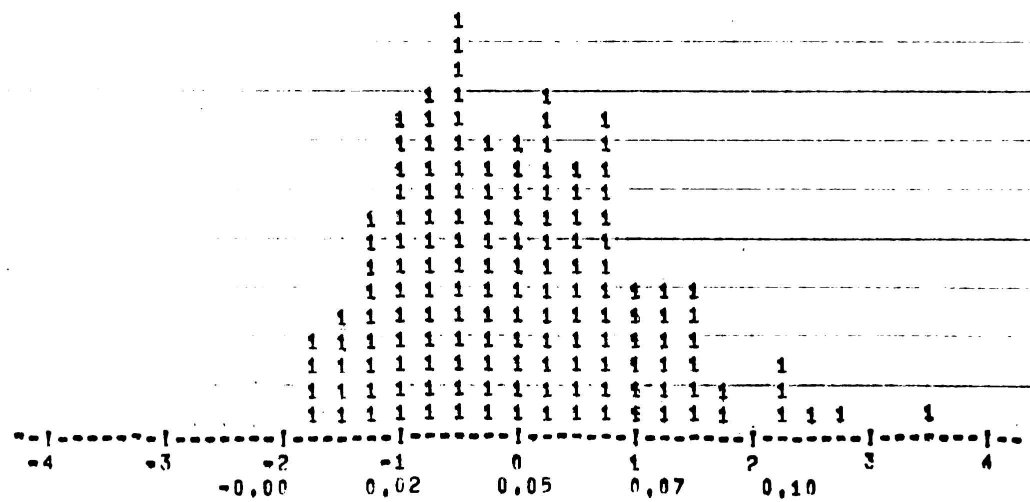
RANGE = 0.000 TO 0.168



SET 1 VARIABLE 4

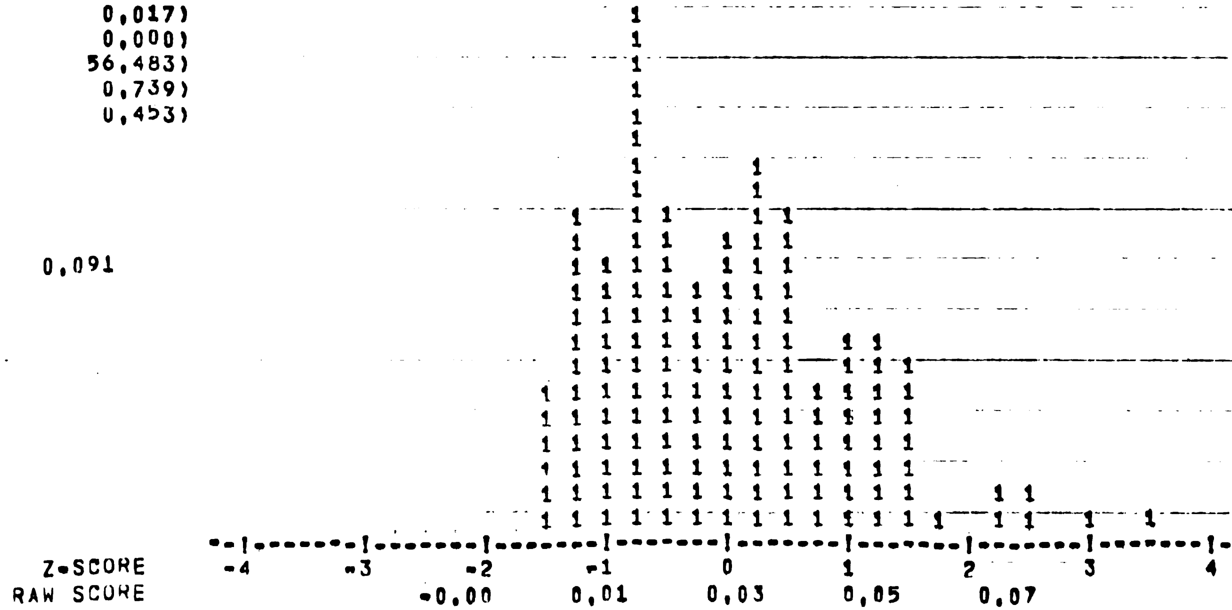
N =	150	
MEAN =	0.047	
STD. DEV. =	0.024	(0.024)
VARIANCE =	0.001	(0.001)
COEF. OF VAR. =	51.304	(51.475)
SKEWNESS =	0.597	(0.603)
KURTOSIS =	0.286	(0.337)
LOWER QUARTILE =	0.030	
MEDIAN =	0.044	
UPPER QUARTILE =	0.064	

RANGE = 0.002 TO 0.132



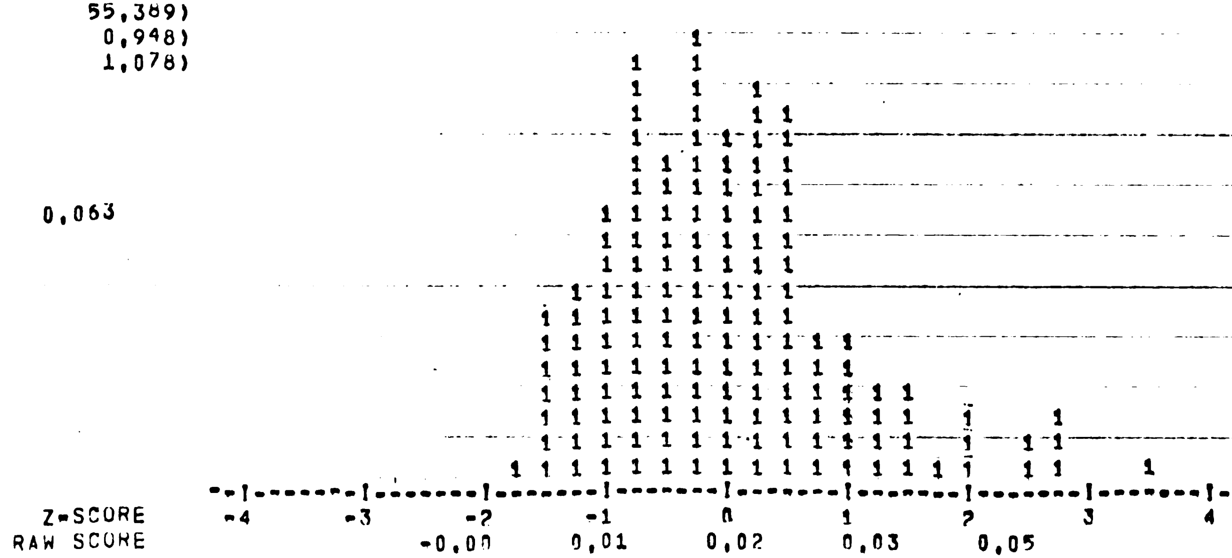
SET 1 VARIABLE 5

```
               N =  151
            MEAN =        0.031
       STD. DEV. =        0.017   (        0.017)
        VARIANCE =        0.000   (        0.000)
 COEF. OF VAR. =         56.295   (       56.483)
        SKEWNESS =        0.731   (        0.739)
        KURTOSIS =        0.398   (        0.453)

  LOWER QUARTILE =          0.018
          MEDIAN =          0.029
  UPPER QUARTILE =          0.041

   RANGE =       0.003 TO         0.091
```

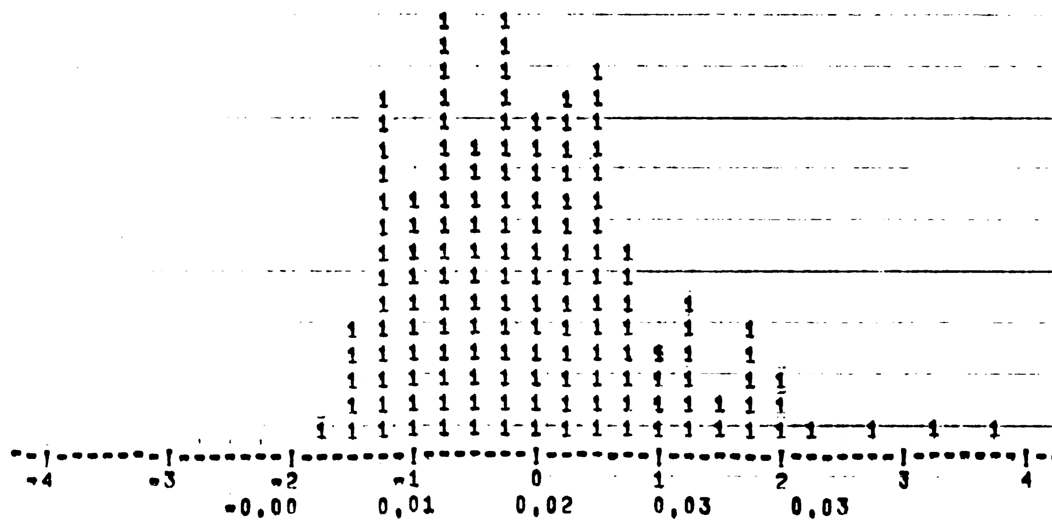


SET 1 VARIABLE 6

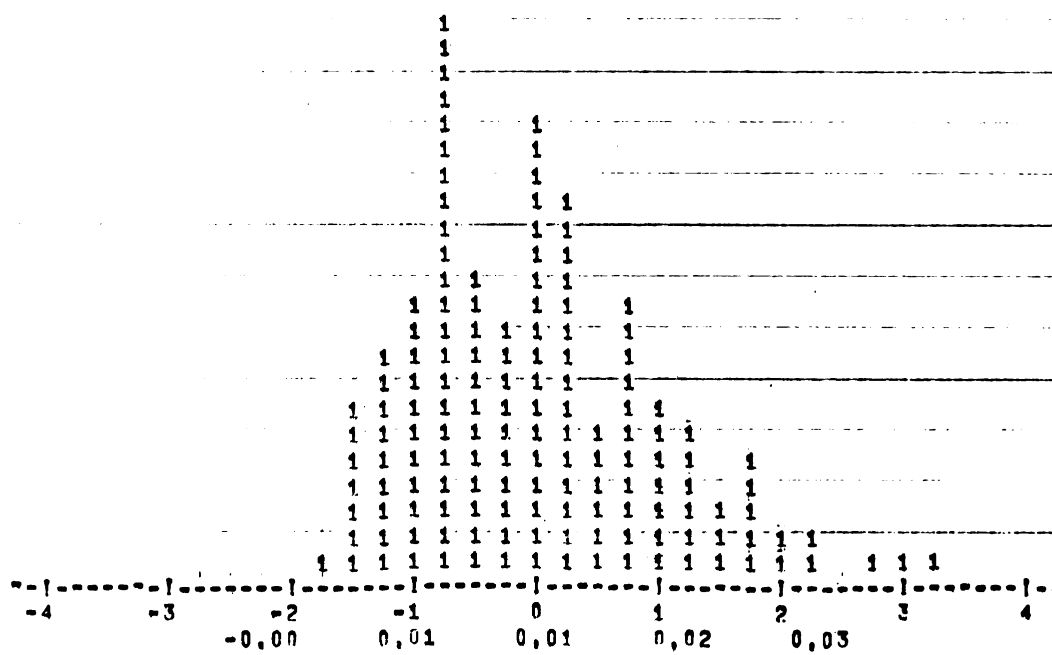
```
               N =  150
            MEAN =        0.022
       STD. DEV. =        0.012   (        0.012)
        VARIANCE =        0.000   (        0.000)
 COEF. OF VAR. =         55.204   (       55.389)
        SKEWNESS =        0.938   (        0.948)
        KURTOSIS =        1.002   (        1.078)

  LOWER QUARTILE =          0.013
          MEDIAN =          0.020
  UPPER QUARTILE =          0.028

   RANGE =       0.002 TO         0.063
```



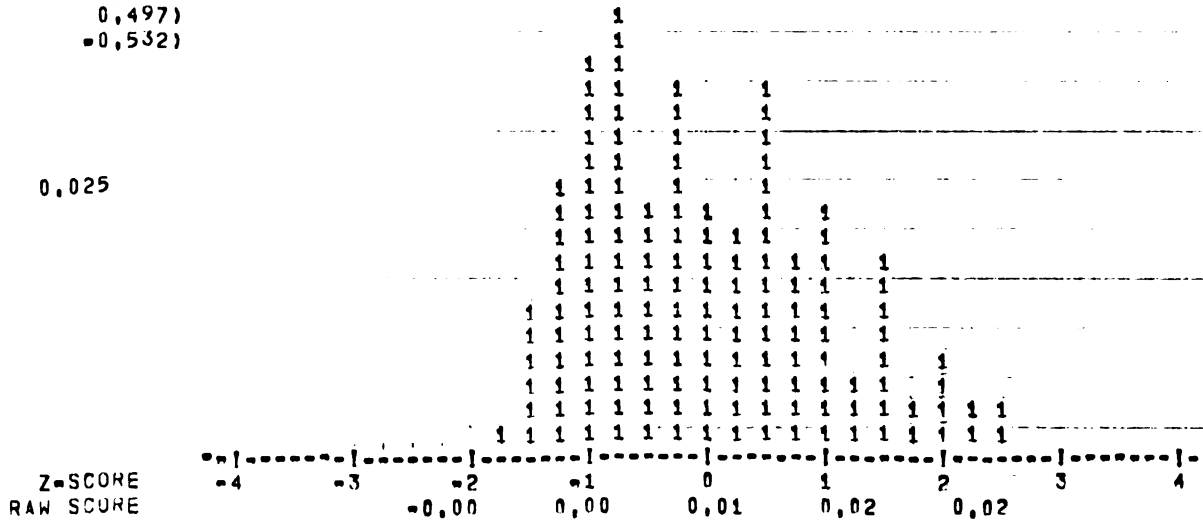
```
SET    1          VARIABLE     7

        N =  150
     MEAN =          0.016
 STD. DEV. =          0.009    (        0.009)
  VARIANCE =          0.000    (        0.000)
COEF. OF VAR. =      55.630    (       55.816)
  SKEWNESS =          0.865    (        0.874)
  KURTOSIS =          0.985    (        1.060)

LOWER QUARTILE =          0.010
        MEDIAN =          0.015
UPPER QUARTILE =          0.021

 RANGE =        0.002 TO        0.051
```



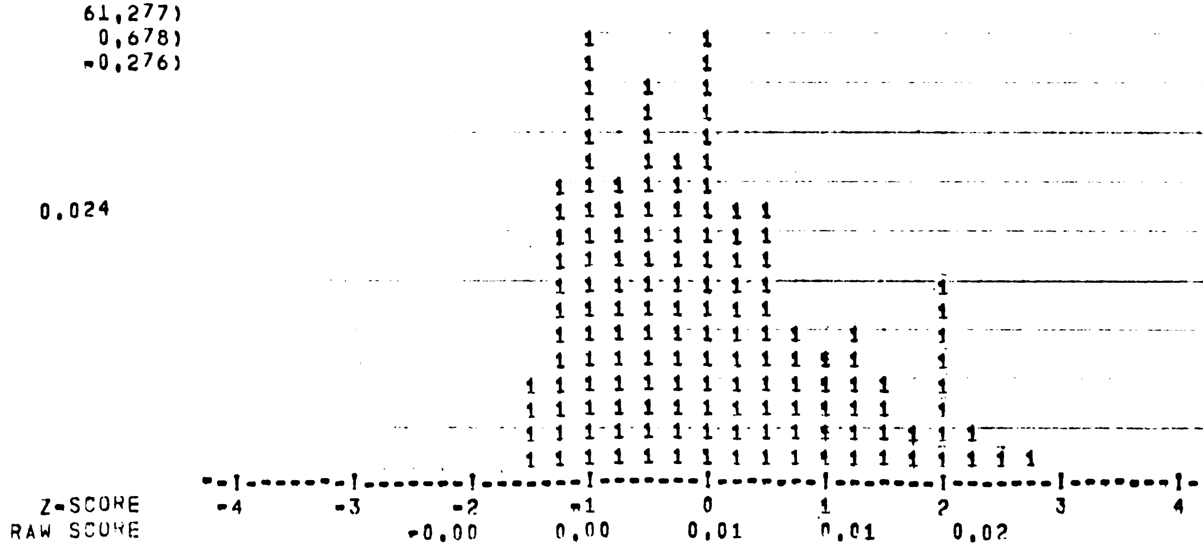

```
SET    1          VARIABLE     8

        N =  150
     MEAN =          0.013
 STD. DEV. =          0.007    (        0.007)
  VARIANCE =          0.000    (        0.000)
COEF. OF VAR. =      54.125    (       54.306)
  SKEWNESS =          0.709    (        0.716)
  KURTOSIS =          0.175    (        0.222)

LOWER QUARTILE =          0.007
        MEDIAN =          0.012
UPPER QUARTILE =          0.018

 RANGE =        0.001 TO        0.035
```



```
SET    1          VARIABLE    9

           N =   150
        MEAN =         0.010
   STD. DEV. =         0.006     (        0.006)
    VARIANCE =         0.000     (        0.000)
COEF. OF VAR. =       54.504     (       54.666)
    SKEWNESS =         0.492     (        0.497)
    KURTOSIS =        -0.554     (       -0.532)

 LOWER QUARTILE =         0.006
         MEDIAN =         0.010
 UPPER QUARTILE =         0.014

  RANGE =        0.001 TO         0.025
```




```
SET    1          VARIABLE   10

           N =   150
        MEAN =         0.009
   STD. DEV. =         0.005     (        0.005)
    VARIANCE =         0.000     (        0.000)
COEF. OF VAR. =       61.072     (       61.277)
    SKEWNESS =         0.671     (        0.678)
    KURTOSIS =        -0.307     (       -0.276)

 LOWER QUARTILE =         0.004
         MEDIAN =         0.008
 UPPER QUARTILE =         0.012

  RANGE =        0.000 TO         0.024
```



APPENDIX C

Scatter Plots of the Mean Radius versus Harmonic Amplitude for Two Representative Samples from Coon Creek and the Red Cedar River

SAMPLE B5
RED CEDAR

DATA SET 1

N = 39 ← HARMONIC NUMBER

	VARIABLE 11 (Y)	VARIABLE 1 (X)
MEAN =	247,894	0,012
STD.DEV. =	50,401	0,009
VARIANCE =	2540,213	0,000

COVARIANCE = -0.133

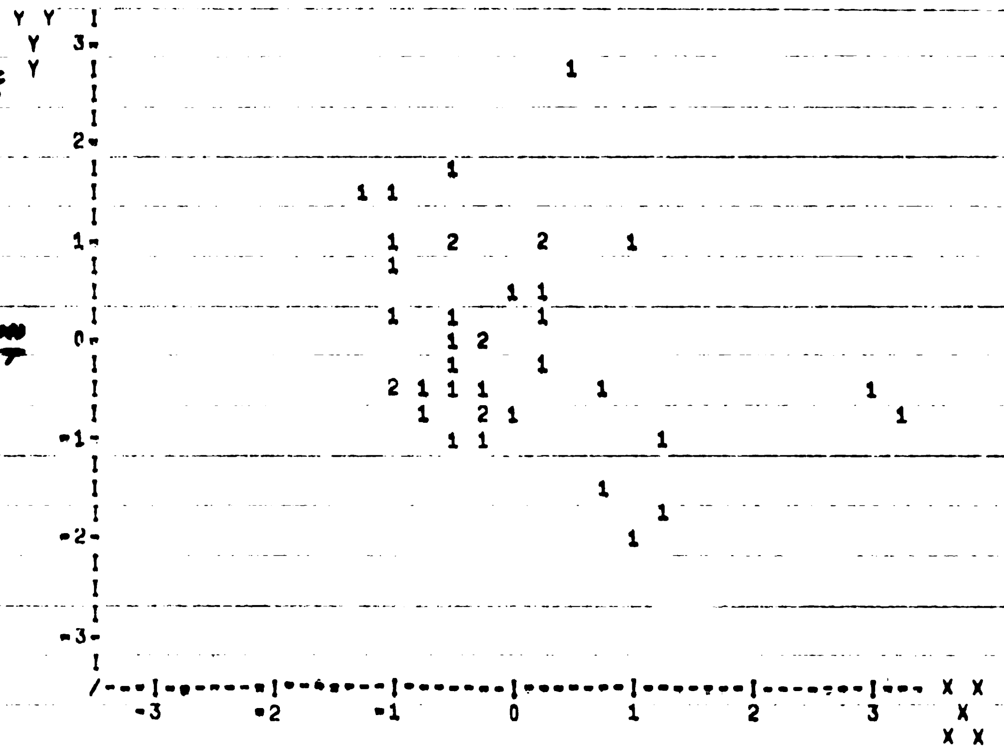
R = -0,299297 ← CORRELATION COEFFICIENT

ETA(Y,X) =0,74991 ETA(X,Y) =0.49063

REGR. COEFS.

A(Y,X) = 268,25 A(X,Y) = 0,02

B(Y,X) =********** B(X,Y) = -0,0001



DATA SET 1 ← SAMPLE SIZE

N = 39

	VARIABLE 11 (Y)	VARIABLE 2 (X)
MEAN =	247,894	0,143
STD.DEV. =	50,401	0,067
VARIANCE =	2540,213	0,004

MEAN RADIUS → (MEAN); HARMONIC AMPLITUDE ← (X)

COVARIANCE = -0.896

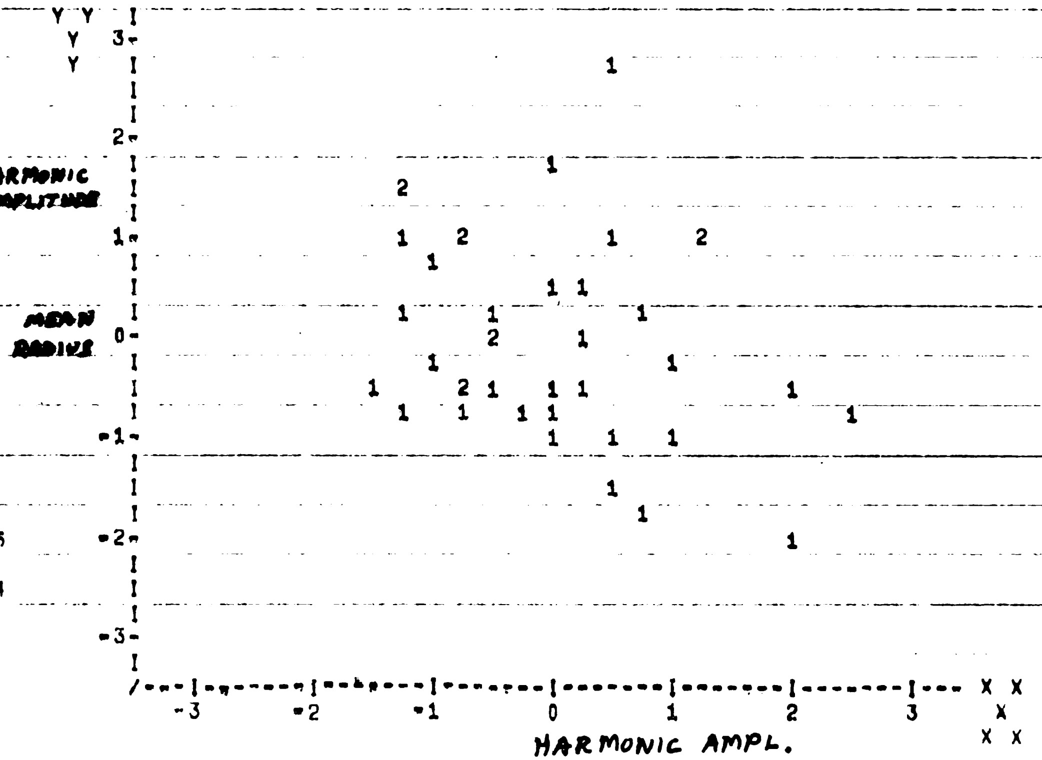
R = -0,265595

ETA(Y,X) =0,53807 ETA(X,Y) =0,53440

REGR. COEFS.

A(Y,X) = 276,41 A(X,Y) = 0,23

B(Y,X) =-200,0838 B(X,Y) = -0,0004



DATA SET 1

N = 39

	VARIABLE 11 (Y)	VARIABLE 3 (X)
MEAN =	247,894	0,079
STD.DEV. =	50,401	0,034
VARIANCE =	2540,213	0,001

COVARIANCE = -0,218

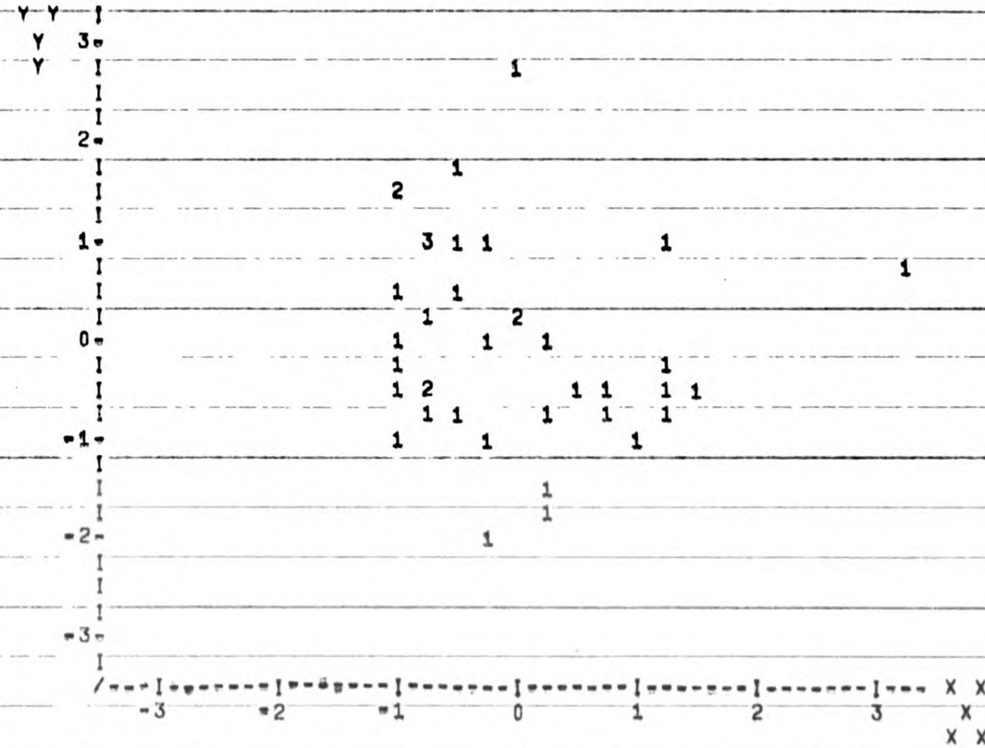
R = -0,127823

ETA(Y,X) =0,59090 ETA(X,Y) =0.68188

REGR. COEFS.

A(Y,X) = 262,91 A(X,Y) = 0,10

B(Y,X) =-190,1665 B(X,Y) = -0,0001



DATA SET 1

N = 39

	VARIABLE 11 (Y)	VARIABLE 4 (X)
MEAN =	247,894	0,046
STD.DEV. =	50,401	0,024
VARIANCE =	2540,213	0,001

COVARIANCE = -0,380

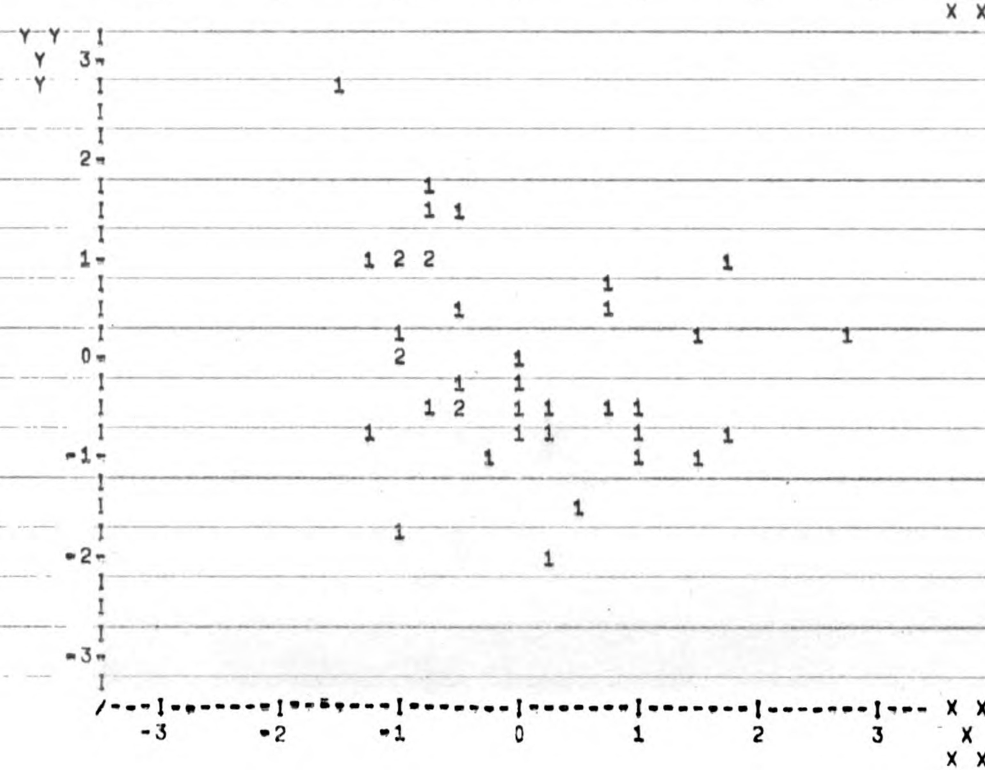
R = -0,313548

ETA(Y,X) =0,74482 ETA(X,Y) =0.60700

REGR. COEFS.

A(Y,X) = 278,05 A(X,Y) = 0,08

B(Y,X) =-657,6932 B(X,Y) = -0,0001



B5

DATA SET 1

N = 39

	VARIABLE 11 (Y)	VARIABLE 5 (X)
MEAN =	247.894	0.029
STD.DEV. =	50.401	0.014
VARIANCE =	2540.213	0.000

COVARIANCE = 0.076

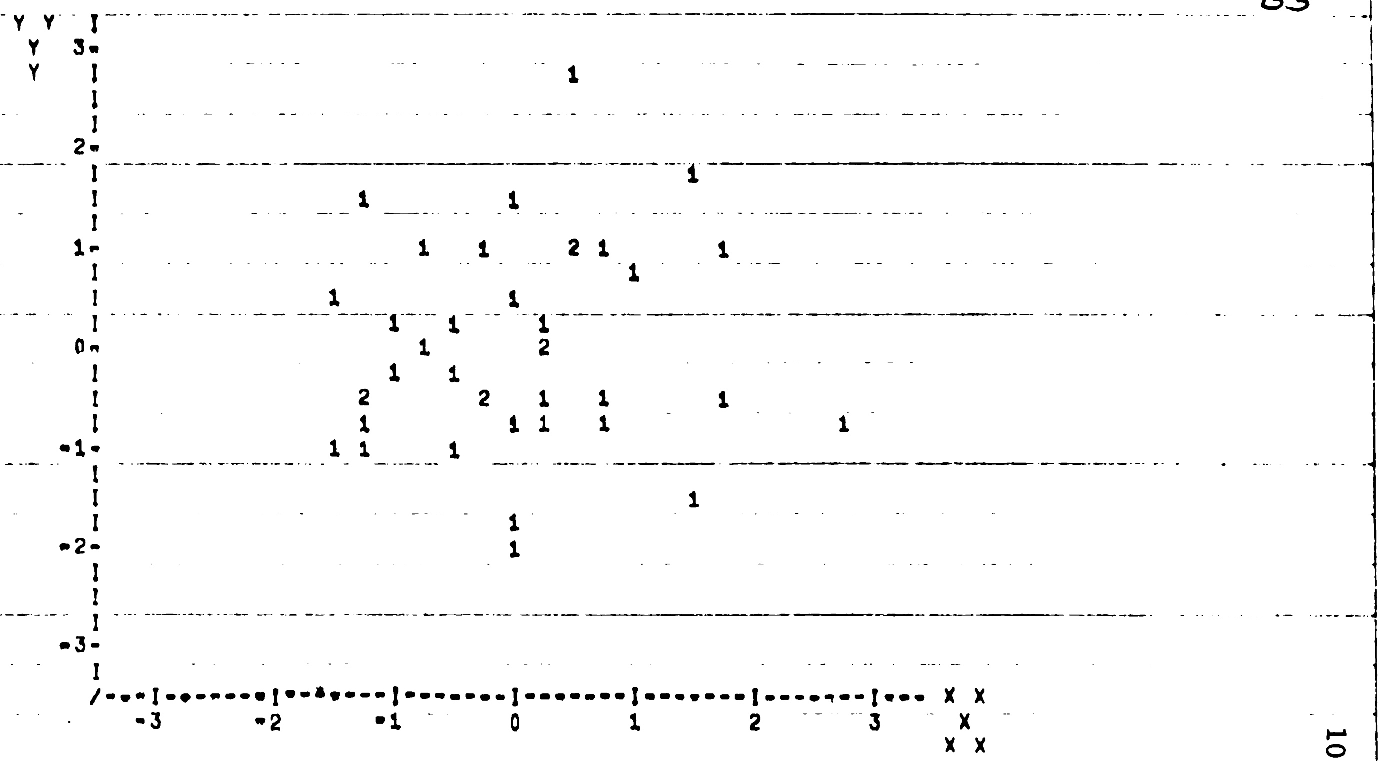
R = 0.106683

ETA(Y,X) =0.54146 ETA(X,Y) =0.62864

REGR. COEFS.

A(Y,X) = 236.78 A(X,Y) = 0.02

B(Y,X) = 379.5200 B(X,Y) = 0.0000



DATA SET 1

N = 39

	VARIABLE 11 (Y)	VARIABLE 6 (X)
MEAN =	247.894	0.021
STD.DEV. =	50.401	0.011
VARIANCE =	2540.213	0.000

COVARIANCE = -0.013

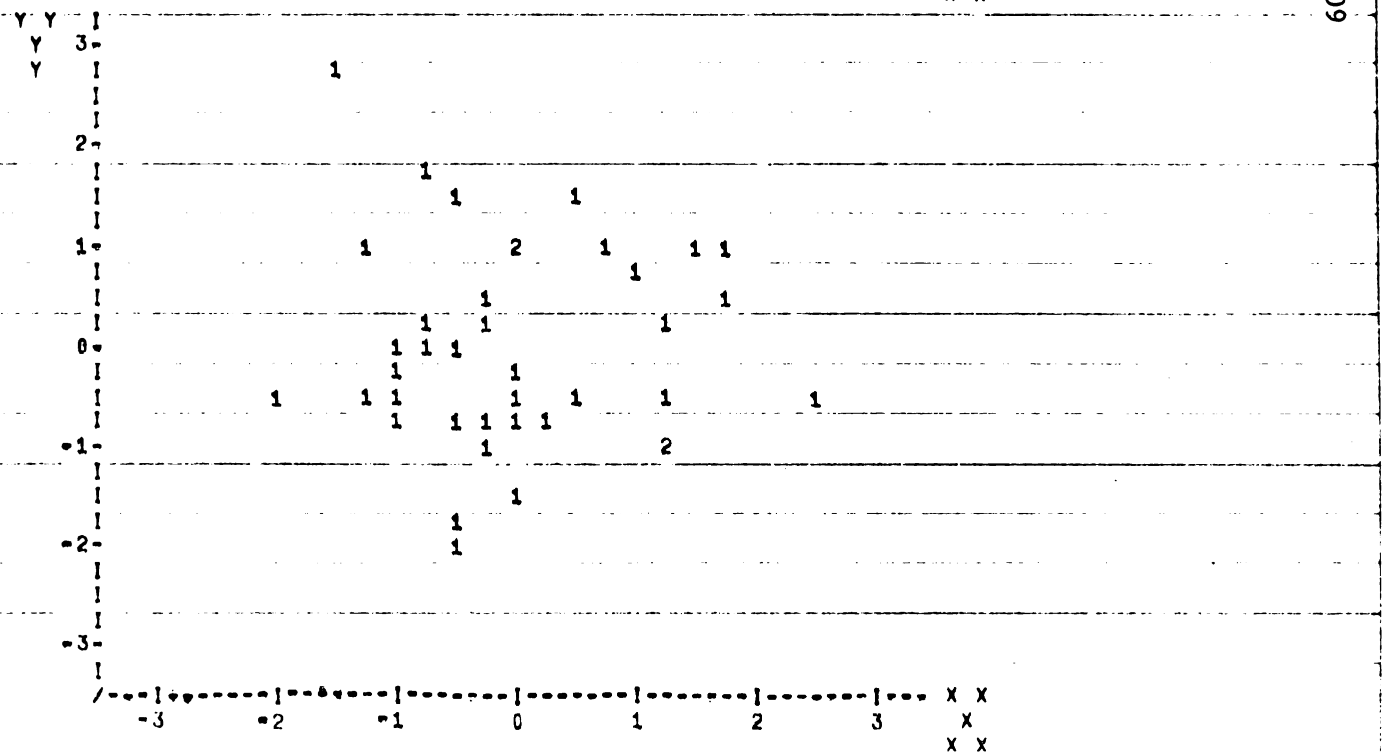
R = -0.024183

ETA(Y,X) =0.68203 ETA(X,Y) =0.52845

REGR. COEFS.

A(Y,X) = 250.33 A(X,Y) = 0.02

B(Y,X) =-115.4513 B(X,Y) = -0.0000



DATA SET 1

N = 39

	VARIABLE 11 (Y)	VARIABLE 7 (X)
MEAN =	247.894	0.017
STD.DEV. =	50.401	0.007
VARIANCE =	2540.213	0.000

COVARIANCE = -0.018

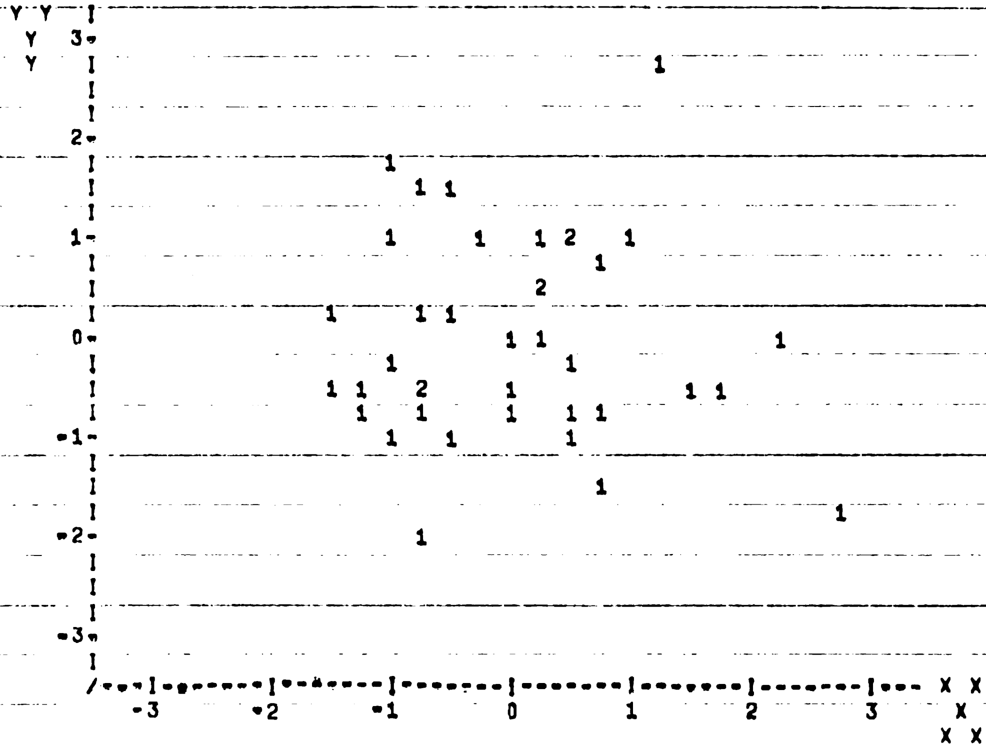
R = -0.050102

ETA(Y,X) = 0.66904 ETA(X,Y) = 0.67872

REGR. COEFS.

A(Y,X) = 253.77 A(X,Y) = 0.02

B(Y,X) = -344.9517 B(X,Y) = -0.0000



DATA SET 1

N = 39

	VARIABLE 11 (Y)	VARIABLE 8 (X)
MEAN =	247.894	0.012
STD.DEV. =	50.401	0.006
VARIANCE =	2540.213	0.000

COVARIANCE = 0.018

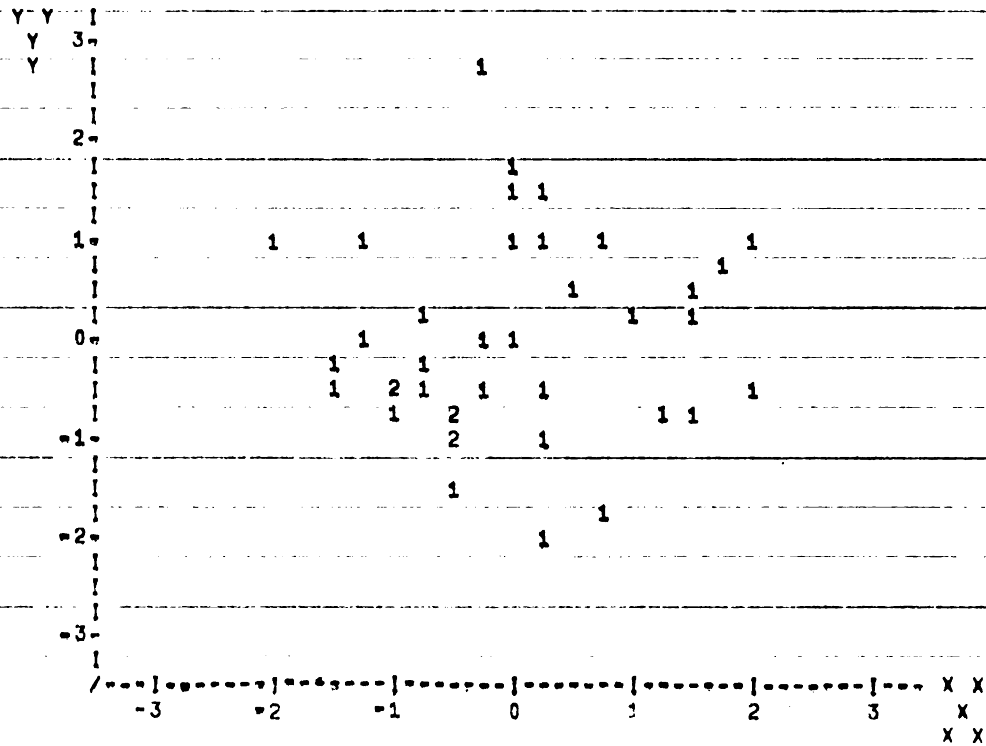
R = 0.056834

ETA(Y,X) = 0.64009 ETA(X,Y) = 0.53444

REGR. COEFS.

A(Y,X) = 242.15 A(X,Y) = 0.01

B(Y,X) = 462.3625 B(X,Y) = 0.0000



B5

DATA SET 1

N = 39

	VARIABLE 11 (Y)	VARIABLE 9 (X)
MEAN =	247.894	0.012
STD.DEV. =	50.401	0.006
VARIANCE =	2540.213	0.000

COVARIANCE = 0.039

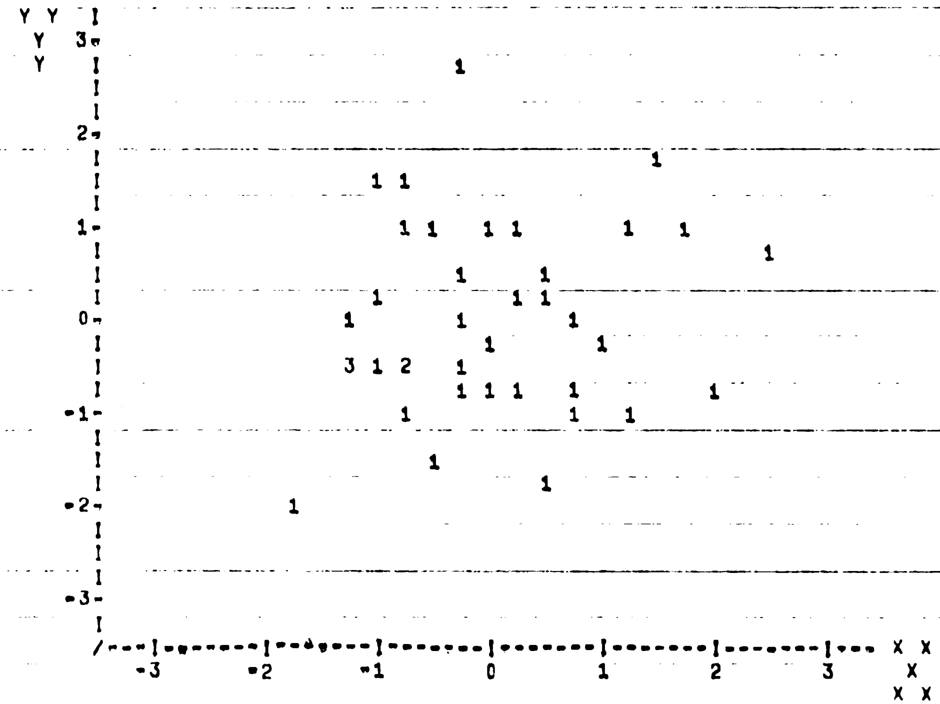
R = 0.122564

ETA(Y,X) =0.54895 ETA(X,Y) =0.77765

REGR. COEFS.

A(Y,X) = 235.81 A(X,Y) = 0.01

B(Y,X) = 269.0333 B(X,Y) = 0.0000



DATA SET 1

N = 39

	VARIABLE 11 (Y)	VARIABLE 10 (X)
MEAN =	247.894	0.008
STD.DEV. =	50.401	0.004
VARIANCE =	2540.213	0.000

COVARIANCE = 0.033

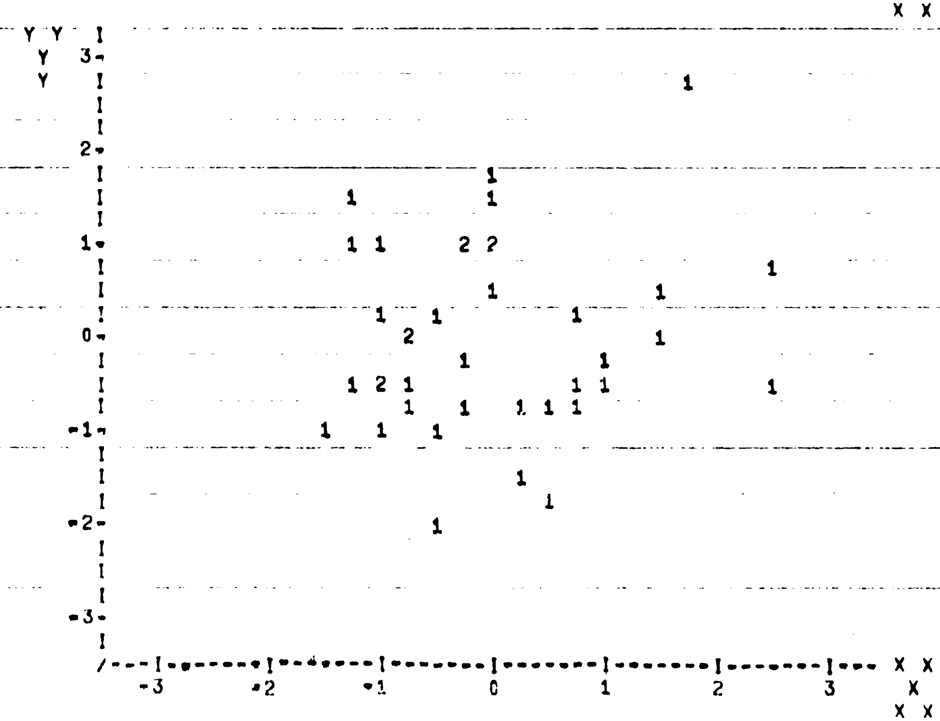
R = 0.146686

ETA(Y,X) =0.81586 ETA(X,Y) =0.64723

REGR. COEFS.

A(Y,X) = 234.45 A(X,Y) = 0.00

B(Y,X) =1649.3757 B(X,Y) = 0.0000



B8

DATA SET 1

N = 33

VARIABLE 11 (Y) VARIABLE 1 (X)

	(Y)	(X)
MEAN =	352.547	0.012
STD.DEV. =	74.863	0.011
VARIANCE =	5604.464	0.000

COVARIANCE = -0.237

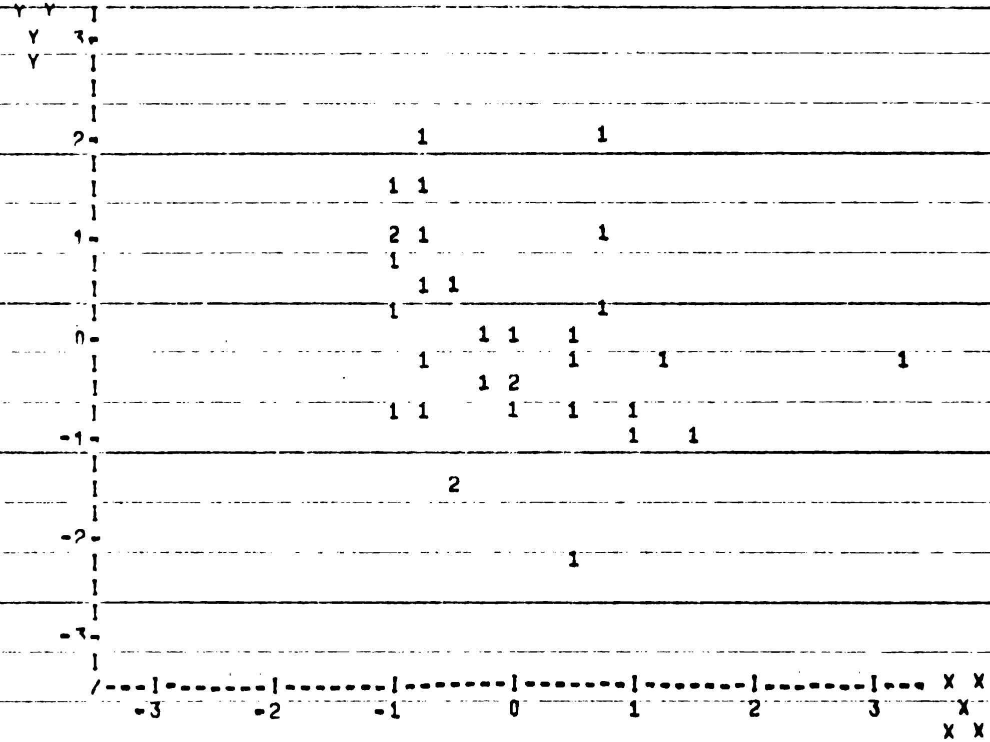
R = -0.295729

ETA(Y,X) =0.71265 ETA(X,Y) =0.66063

REGR. COEFS.

A(Y,X) = 377.26 A(X,Y) = 0.03

B(Y,X) =********* B(X,Y) = -0.0000



DATA SET 1

N = 33

VARIABLE 11 (Y) VARIABLE 2 (X)

	(Y)	(X)
MEAN =	352.547	0.127
STD.DEV. =	74.863	0.064
VARIANCE =	5604.464	0.004

COVARIANCE = -0.135

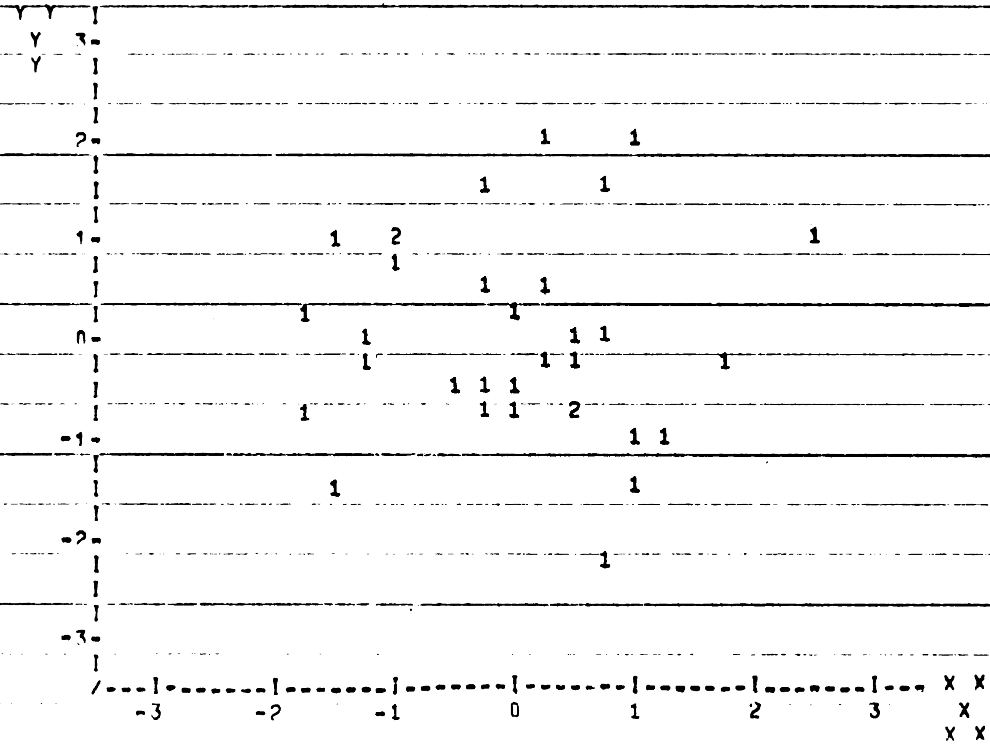
R = -0.028265

ETA(Y,X) =0.56159 ETA(X,Y) =0.47541

REGR. COEFS.

A(Y,X) = 356.74 A(X,Y) = 0.14

B(Y,X) = -33.1194 B(X,Y) = -0.0000



DATA SET 1

N = 33

	VARIABLE 11 (Y)	VARIABLE 3 (X)
MEAN =	352.547	0.071
STD.DEV. =	74.863	0.043
VARIANCE =	5604.464	0.002

COVARIANCE = -1.120

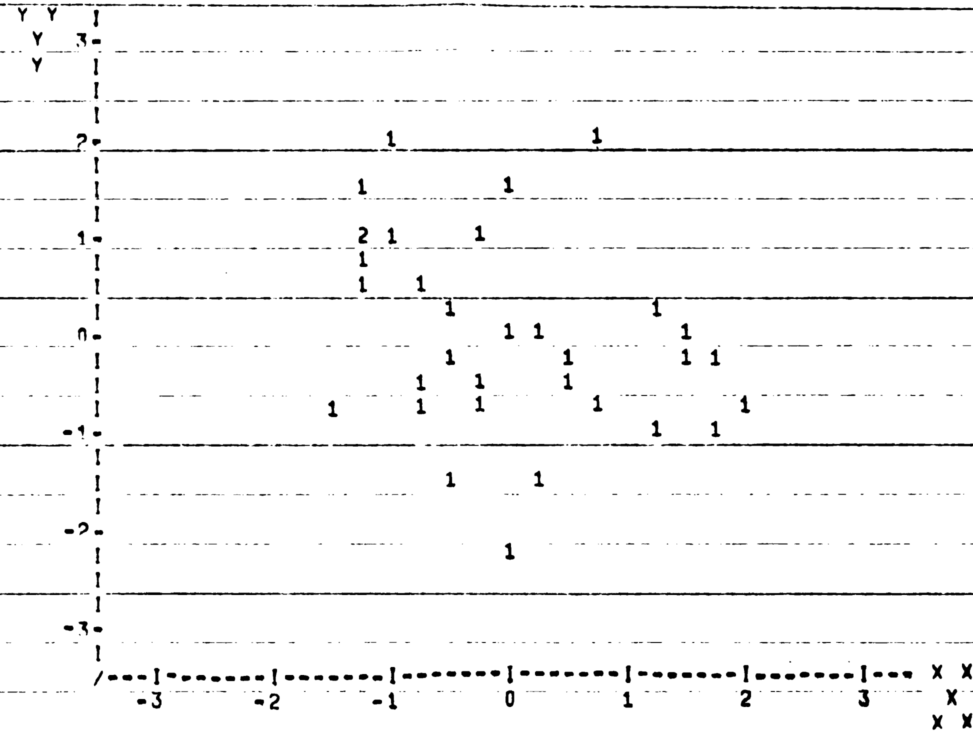
R = -0.352061

ETA(Y',X) =0.66351 ETA(Y,Y) =0.69397

REGR. COEFS.

A(Y',X) = 394.84 A(X,Y) = 0.14

B(Y',X) =-629.6967 B(X,Y) = -0.0002



DATA SET 1

N = 33

	VARIABLE 11 (Y)	VARIABLE 4 (X)
MEAN =	352.547	0.048
STD.DEV. =	74.863	0.020
VARIANCE =	5604.464	0.000

COVARIANCE = 0.238

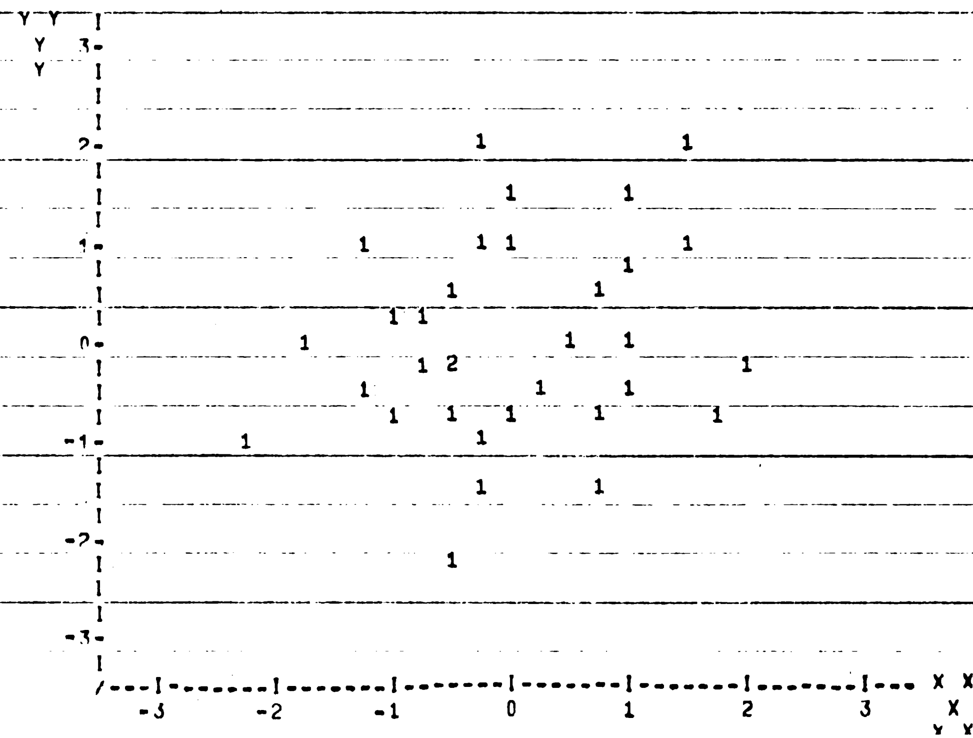
R = 0.161083

ETA(Y',X) =0.58441 ETA(X,Y) =0.47594

REGR. COEFS.

A(Y',X) = 323.07 A(X,Y) = 0.03

B(Y',X) = 610.8503 B(X,Y) = 0.0000



B8

DATA SET 1

N = 33

VARIABLE 11 (Y)		VARIABLE 5 (X)
MEAN =	352.547	0.030
STD.DEV. =	74.863	0.016
VARIANCE =	5604.464	0.000

COVARIANCE = -0.287

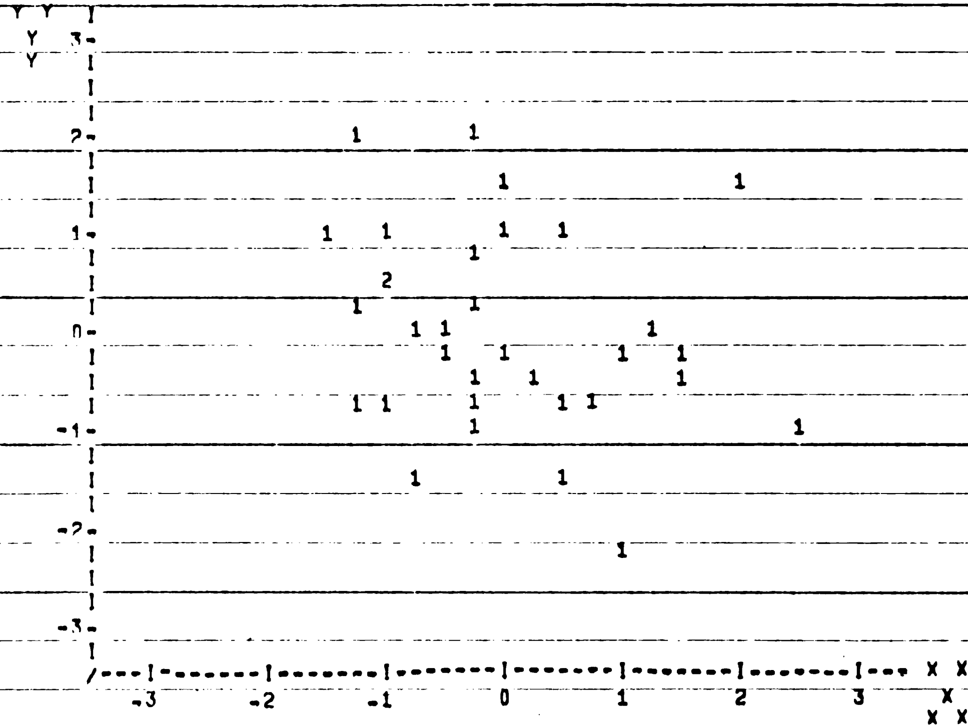
R = -0.240111

ETA(Y,X) =0.62879 ETA(X,Y) =0.62972

REGR. COEFS.

A(Y,X) = 346.68 A(X,Y) = 0.05

B(Y,X) =********** B(X,Y) = -0.0001



DATA SET 1

N = 33

VARIABLE 11 (Y)		VARIABLE 6 (X)
MEAN =	352.547	0.025
STD.DEV. =	74.863	0.011
VARIANCE =	5604.464	0.000

COVARIANCE = 0.008

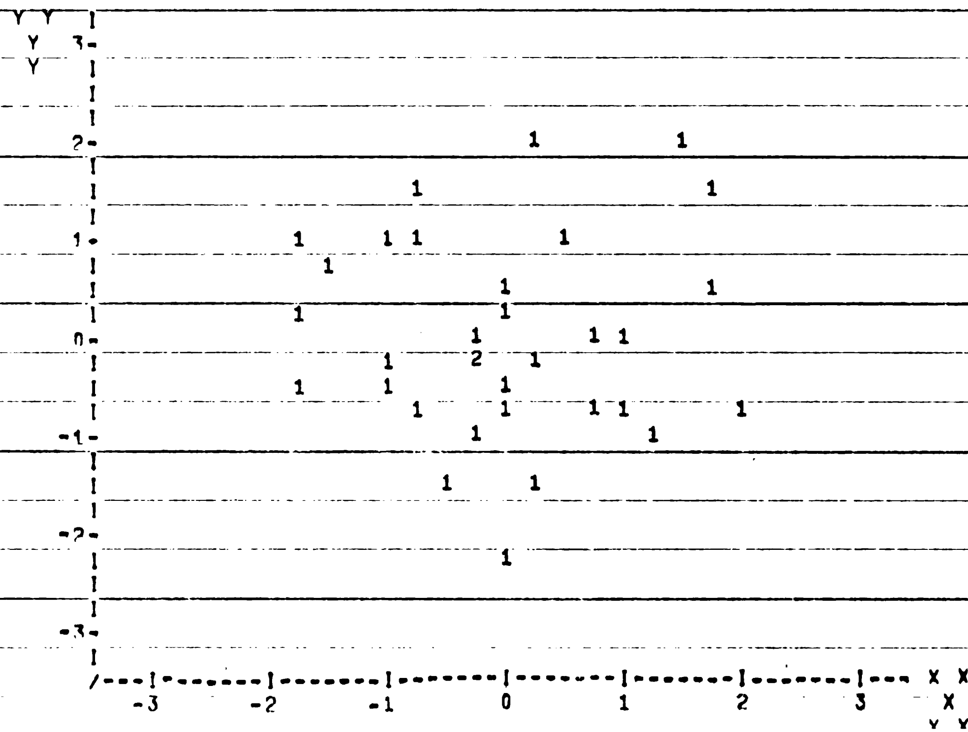
R = 0.009048

ETA(Y,X) =0.67952 ETA(X,Y) =0.67601

REGR. COEFS.

A(Y,X) = 351.03 A(X,Y) = 0.02

B(Y,X) = 60.8625 B(X,Y) = 0.0000



B8

DATA SET 1

N = 33

	VARIABLE 11 (Y)	VARIABLE 7 (X)
MEAN =	352.547	0.017
STD.DEV. =	74.863	0.010
VARIANCE =	5604.464	0.000

COVARIANCE = 0.122

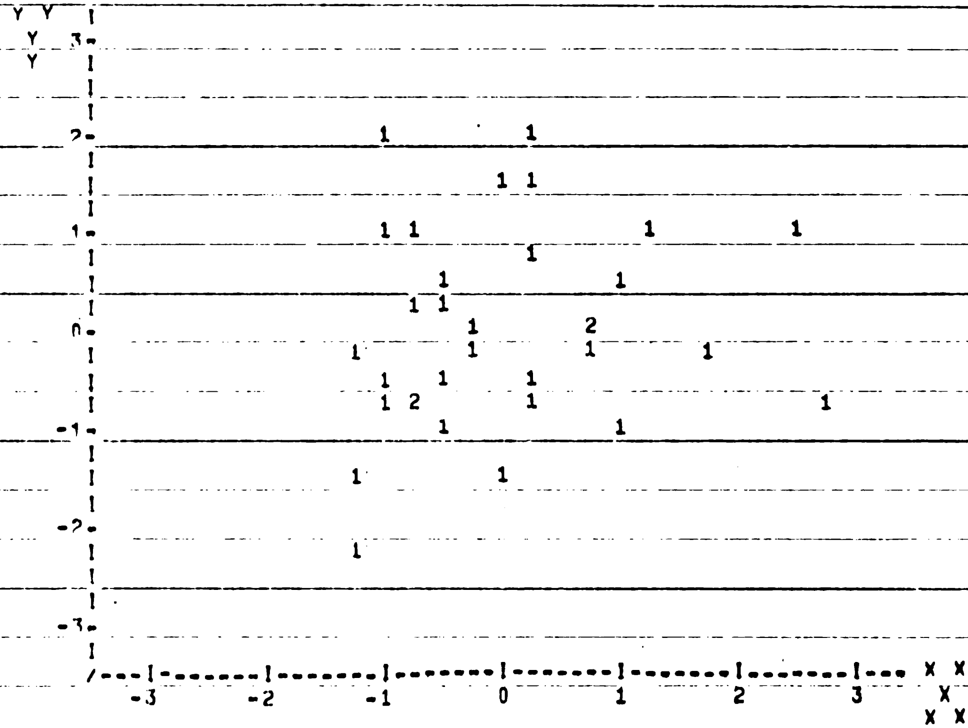
R = 0.156304

ETA(Y,X) =0.57318 ETA(X,Y) =0.41977

REGR. COEFS.

A(Y,X) = 333.70 A(X,Y) = 0.01

B(Y,X) =1124.1870 B(X,Y) = 0.0000



DATA SET 1

N = 33

	VARIABLE 11 (Y)	VARIABLE 8 (X)
MEAN =	352.547	0.014
STD.DEV. =	74.863	0.006
VARIANCE =	5604.464	0.000

COVARIANCE = 0.055

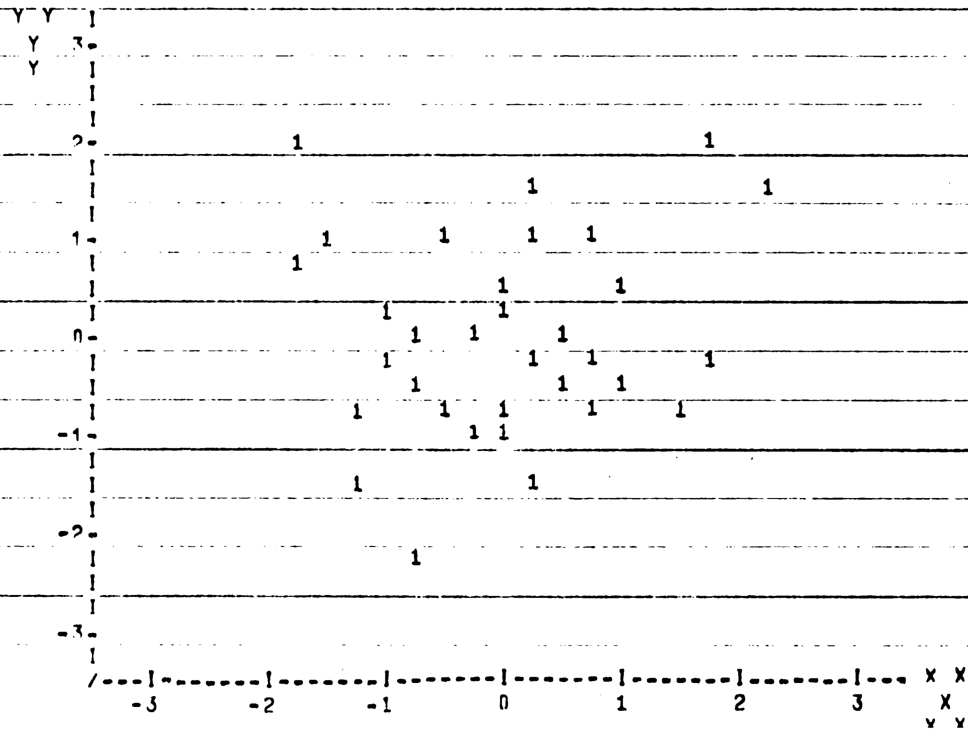
R = 0.123414

ETA(Y,X) =0.67866 ETA(X,Y) =0.53417

REGR. COEFS.

A(Y,X) = 331.05 A(X,Y) = 0.01

B(Y,X) =1545.6152 B(X,Y) = 0.0000



B8

DATA SET 1

N = 33

	VARIABLE 11 (Y)	VARIABLE 9 (X)
MEAN =	352.547	0.010
STD.DEV. =	74.863	0.007
VARIANCE =	5604.464	0.000

COVARIANCE = 0.135

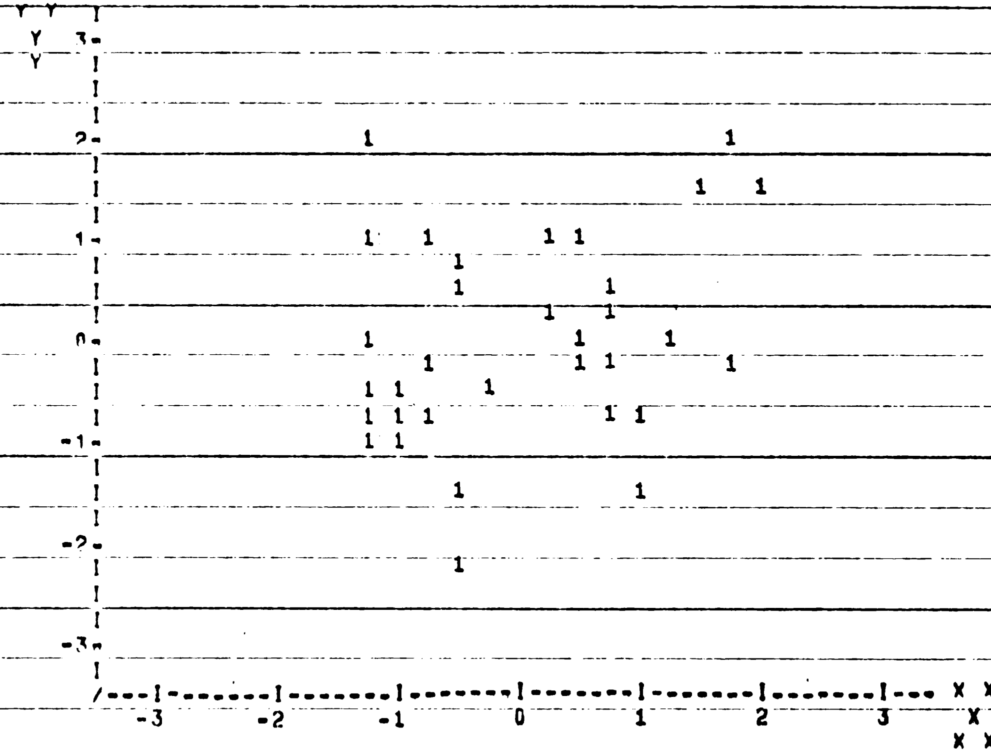
R = 0.261905

ETA(Y,X) =0.63054 ETA(X,Y) =0.64149

REGR. COEFS.

A(Y,X) = 324.51 A(X,Y) = 0.00

B(Y,X) =2851.8045 B(X,Y) = 0.0000



DATA SET 1

N = 33

	VARIABLE 11 (Y)	VARIABLE 10 (X)
MEAN =	352.547	0.009
STD.DEV. =	74.863	0.006
VARIANCE =	5604.464	0.000

COVARIANCE = -0.015

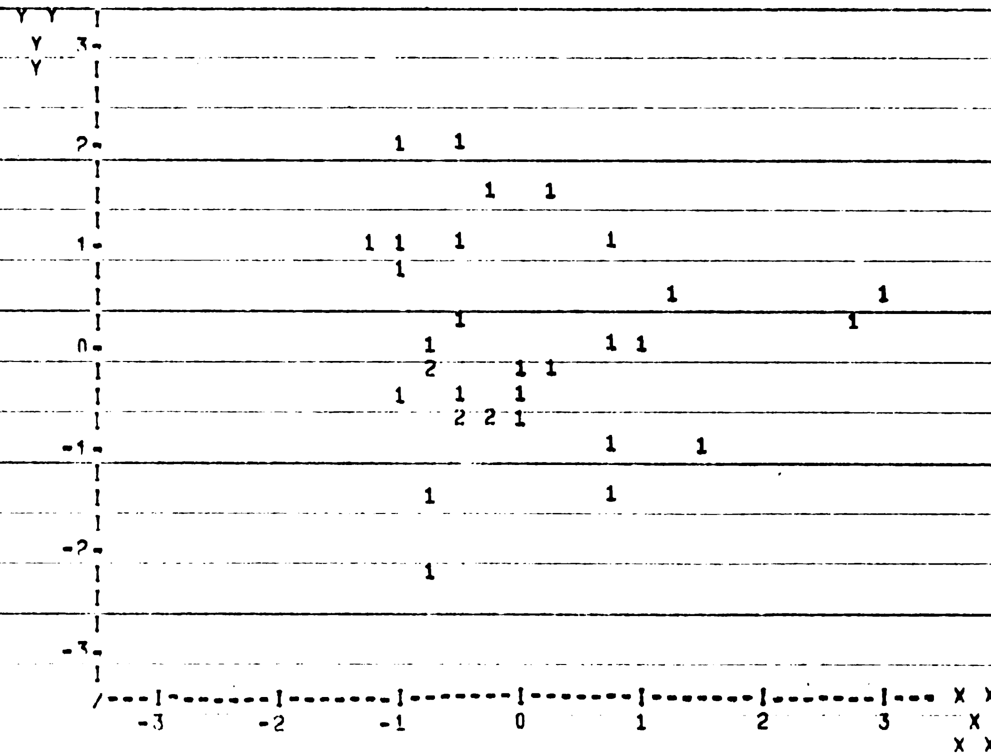
R = -0.033353

ETA(Y,X) =0.58137 ETA(X,Y) =0.76334

REGR. COEFS.

A(Y,X) = 356.37 A(X,Y) = 0.01

B(Y,X) =-414.8317 B(X,Y) = -0.0000



DATA SET 1

N = 38

	VARIABLE 11 (Y)	VARIABLE 1 (X)
MEAN =	323.597	0.015
STD.DEV. =	87.934	0.012
VARIANCE =	7732.346	0.000

COVARIANCE = 0.244

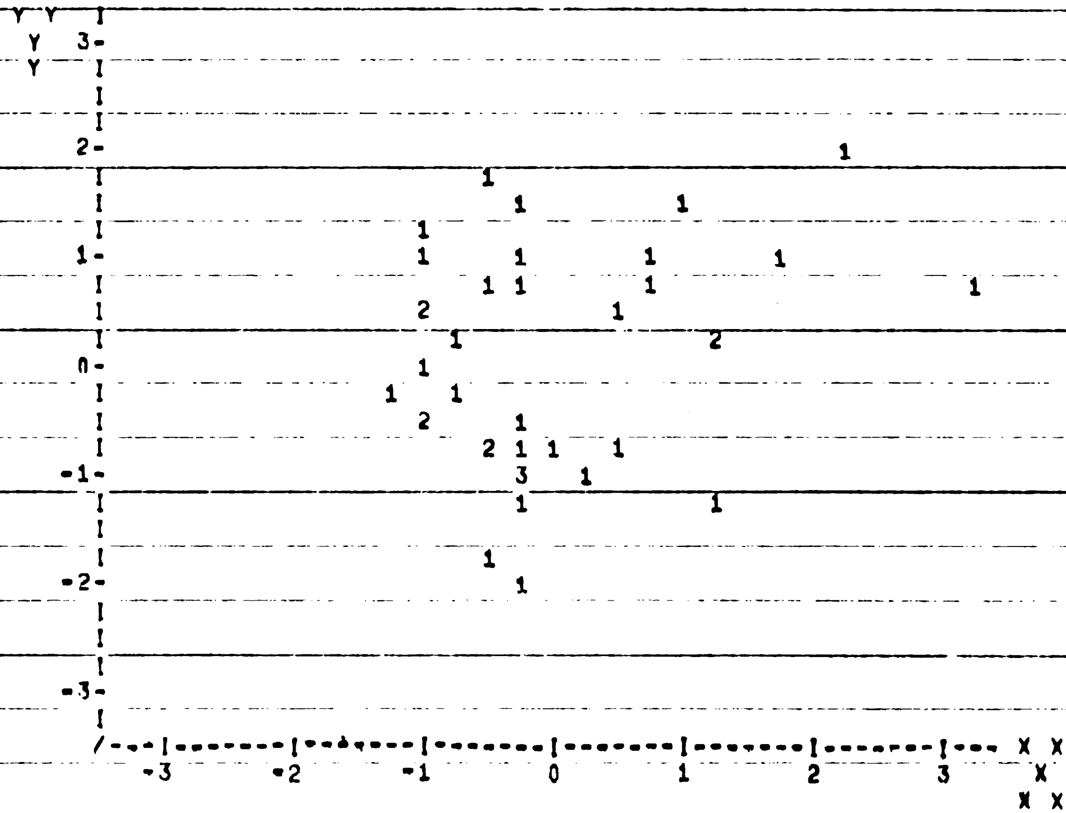
R = 0.231776

ETA(Y,X) =0.60133 ETA(X,Y) =0.67358

REGR. COEFS.

A(Y,X) = 298.53 A(X,Y) = 0.00

B(Y,X) =1703.5355 B(X,Y) = 0.0000



DATA SET 1

N = 38

	VARIABLE 11 (Y)	VARIABLE 2 (X)
MEAN =	323.597	0.167
STD.DEV. =	87.934	0.086
VARIANCE =	7732.346	0.007

COVARIANCE = -0.516

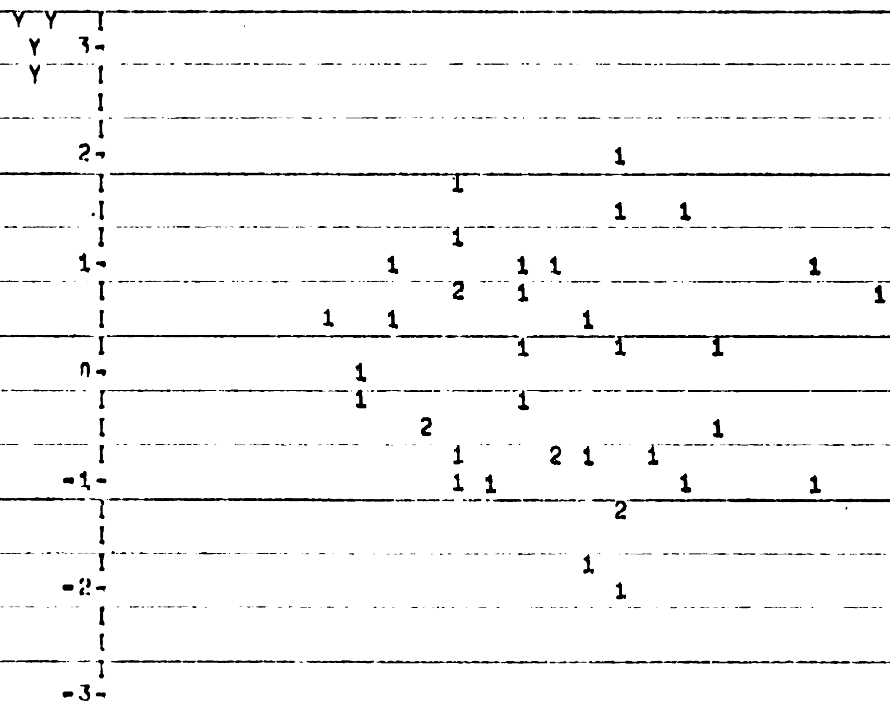
R = -0.068554

ETA(Y,X) =0.44897 ETA(X,Y) =0.54945

REGR. COEFS.

A(Y,X) = 335.33 A(X,Y) = 0.19

B(Y,X) = -70.4472 B(X,Y) = -0.0001



DATA SET 1

N = 38

	VARIABLE 11 (Y)	VARIABLE 3 (X)
MEAN =	323.597	0.075
STD.DEV. =	87.934	0.038
VARIANCE =	7732.346	0.001

COVARIANCE = 0.555

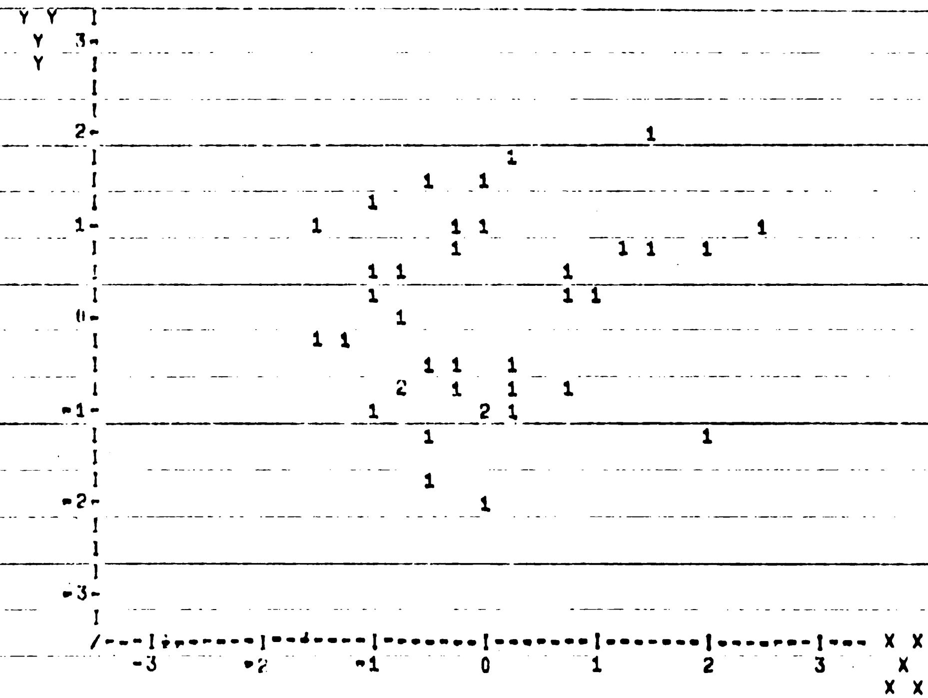
R = 0.165936

ETA(Y,X) =0.45552 ETA(X,Y) =0.64268

REGR. COEFS.

A(Y,X) = 294.88 A(X,Y) = 0.05

B(Y,X) = 383.7094 B(X,Y) = 0.0001



DATA SET 1

N = 38

	VARIABLE 11 (Y)	VARIABLE 4 (X)
MEAN =	323.597	0.049
STD.DEV. =	87.934	0.023
VARIANCE =	7732.346	0.001

COVARIANCE = -0.042

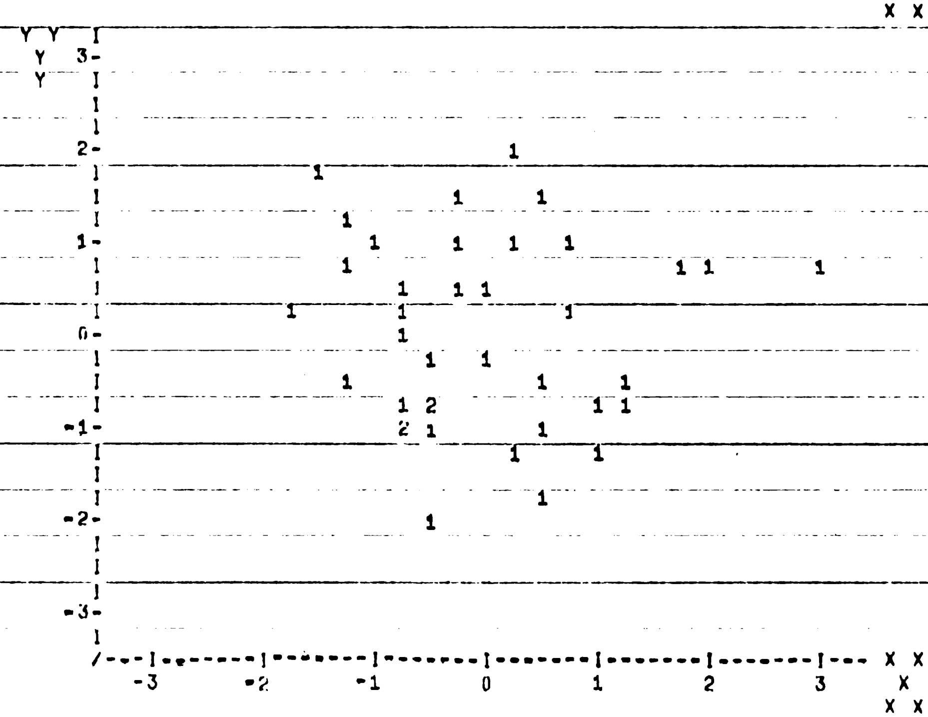
R = -0.020425

ETA(Y,X) =0.72561 ETA(X,Y) =0.62806

REGR. COEFS.

A(Y,X) = 327.40 A(X,Y) = 0.05

B(Y,X) = -77.7152 B(X,Y) = -0.0000



DATA SET 1

N = 38

	VARIABLE 11 (Y)	VARIABLE 5 (X)
MEAN =	323.597	0.033
STD.DEV. =	87.934	0.017
VARIANCE =	7732.344	0.000

COVARIANCE = 0.061

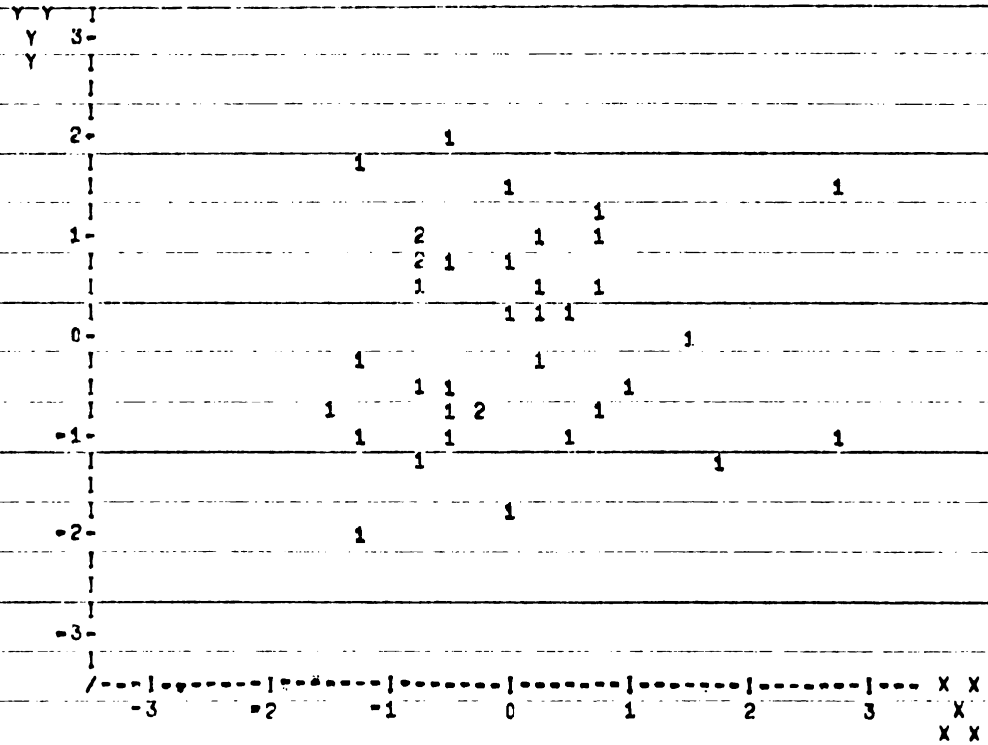
R = 0.040530

ETA(Y,X) =0.42563 ETA(X,Y) =0.59267

REGR. COEFS.

A(Y,X) = 316.65 A(X,Y) = 0.03

B(Y,X) = 208.1055 B(X,Y) = 0.0000



DATA SET 1

N = 38

	VARIABLE 11 (Y)	VARIABLE 6 (X)
MEAN =	323.597	0.019
STD.DEV. =	87.934	0.010
VARIANCE =	7732.346	0.000

COVARIANCE = -0.292

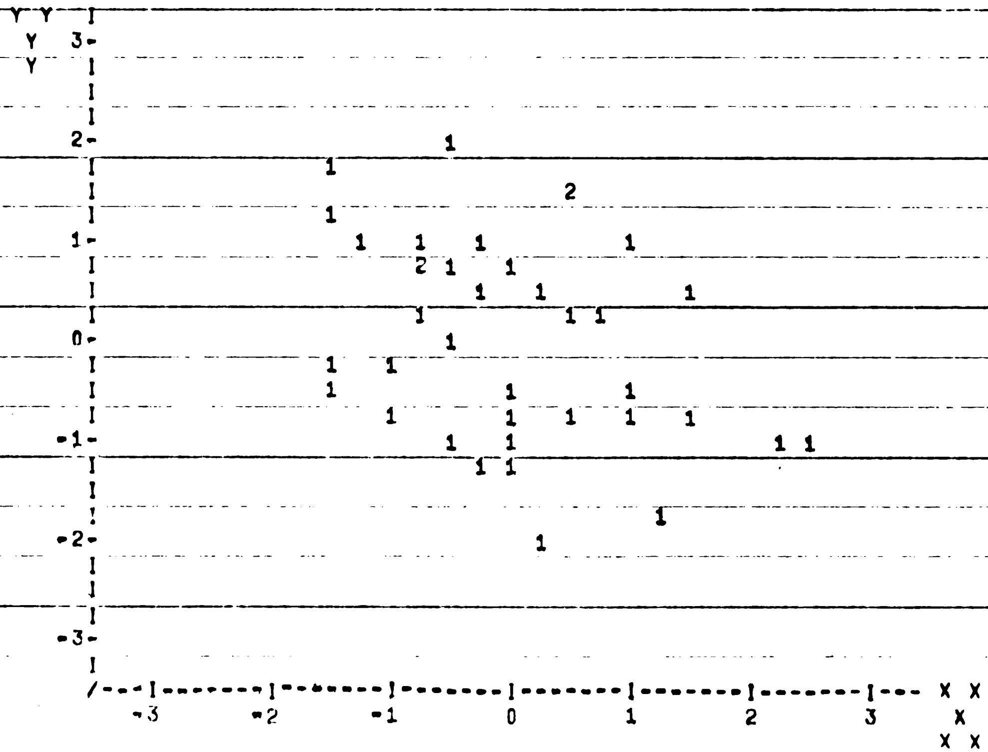
R = -0.337315

ETA(Y,X) =0.62254 ETA(X,Y) =0.66578

REGR. COEFS.

A(Y,X) = 380.98 A(X,Y) = 0.03

B(Y,X) ********** B(X,Y) = -0.0000



DATA SET 1

N = 38

	VARIABLE 11 (Y)	VARIABLE 7 (X)
MEAN =	323.597	0.617
STD.DEV. =	67.934	0.010
VARIANCE =	7732.346	0.000

COVARIANCE = 0.243

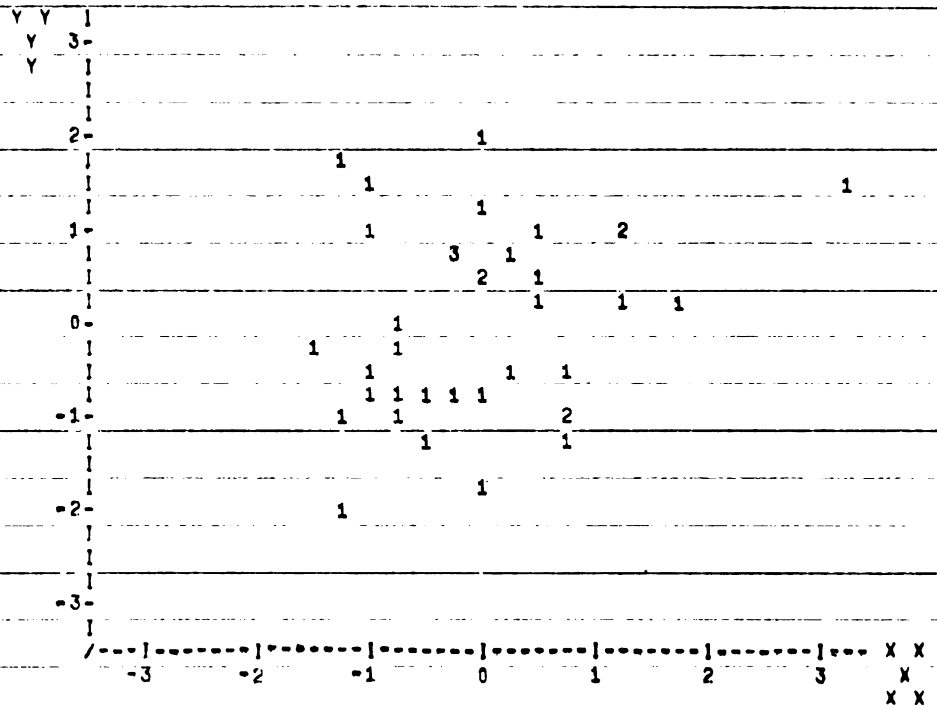
R = 0.267191

ETA(Y,X) =0.59663 ETA(X,Y) =0.65831

REGR. COEFS.

A(Y,X) = 285.97 A(X,Y) = 0.01

B(Y,X) =2274.7196 B(X,Y) = 0.0000



DATA SET 1

N = 38

	VARIABLE 11 (Y)	VARIABLE 8 (X)
MEAN =	323.597	0.010
STD.DEV. =	67.934	0.005
VARIANCE =	7732.346	0.000

COVARIANCE = 0.145

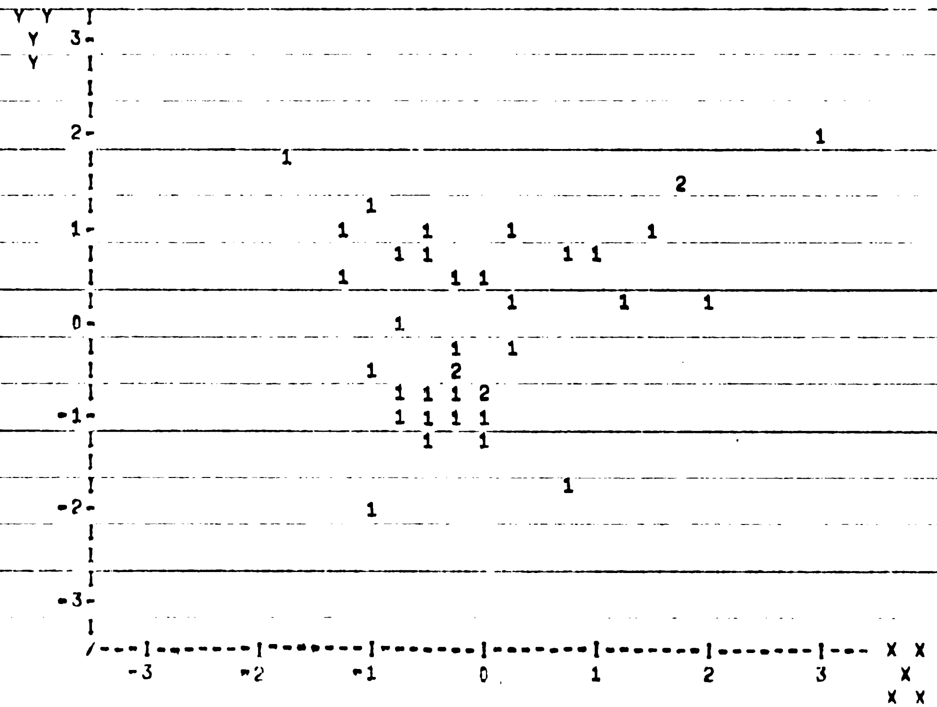
R = 0.307496

ETA(Y,X) =0.71330 ETA(X,Y) =0.85632

REGR. COEFS.

A(Y,X) = 271.61 A(X,Y) = 0.00

B(Y,X) =5024.9714 B(X,Y) = 0.0000



DATA SET 1

N = 38

VARIABLE 11 (Y) VARIABLE 9 (X)

	(Y)	(X)
MEAN =	323.597	0.009
STD.DEV. =	87.934	0.005
VARIANCE =	7732.346	0.000

COVARIANCE = 0.206

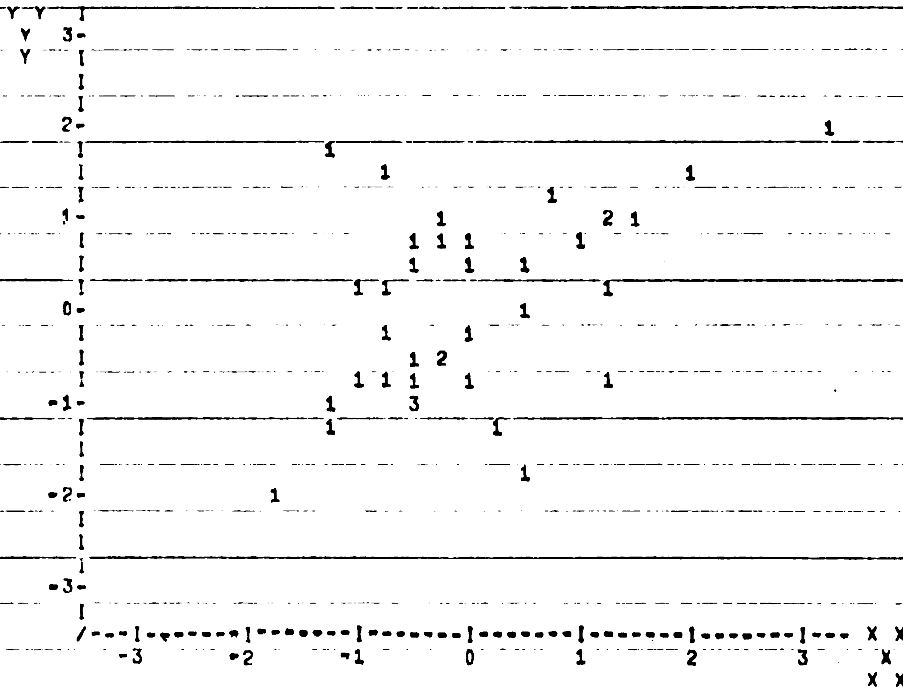
R = 0.482837

ETA(Y,X) =0.68262 ETA(X,Y) =0.77763

REGR. COEFS.

A(Y,X) = 242.22 A(X,Y) = 0.00

B(Y,X) =8746.7619 B(X,Y) = 0.0000



DATA SET 1

N = 38

VARIABLE 11 (Y) VARIABLE 10 (X)

	(Y)	(X)
MEAN =	323.597	0.008
STD.DEV. =	87.934	0.004
VARIANCE =	7732.346	0.000

COVARIANCE = 0.017

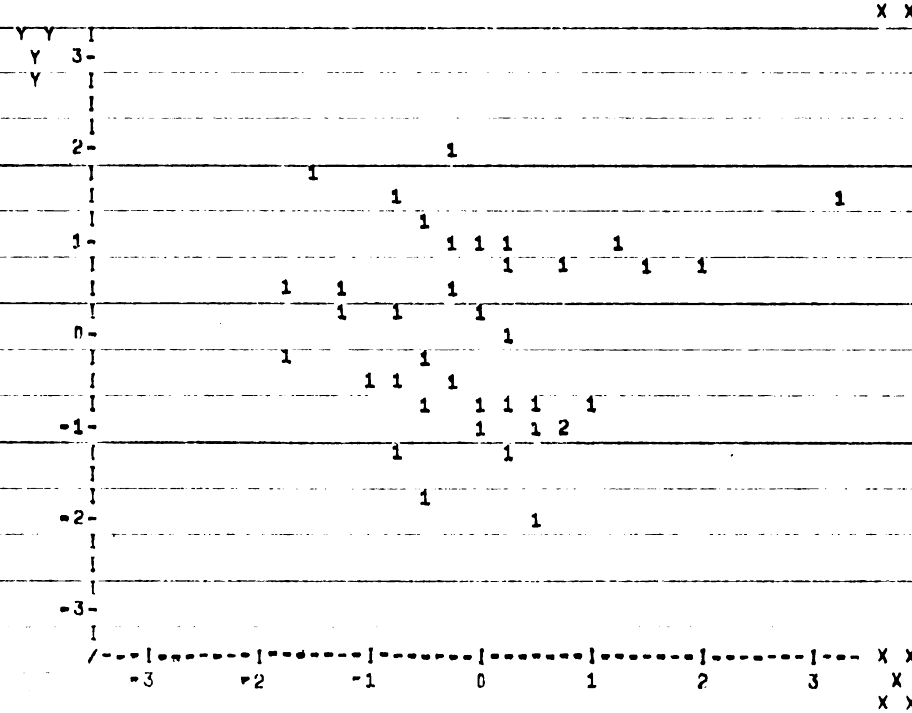
R = 0.047508

ETA(Y,X) =0.66011 ETA(X,Y) =0.75730

REGR. COEFS.

A(Y,X) = 315.96 A(X,Y) = 0.01

B(Y,X) =1011.5582 B(X,Y) = 0.0000



SAMPLE B12
COON CREEK

DATA SET 1

N = 150

	VARIABLE 11 (Y)	VARIABLE 1 (X)
MEAN =	383.572	0.012
STD.DEV. =	104.330	0.008
VARIANCE =	10884.574	0.000

COVARIANCE = -0.055

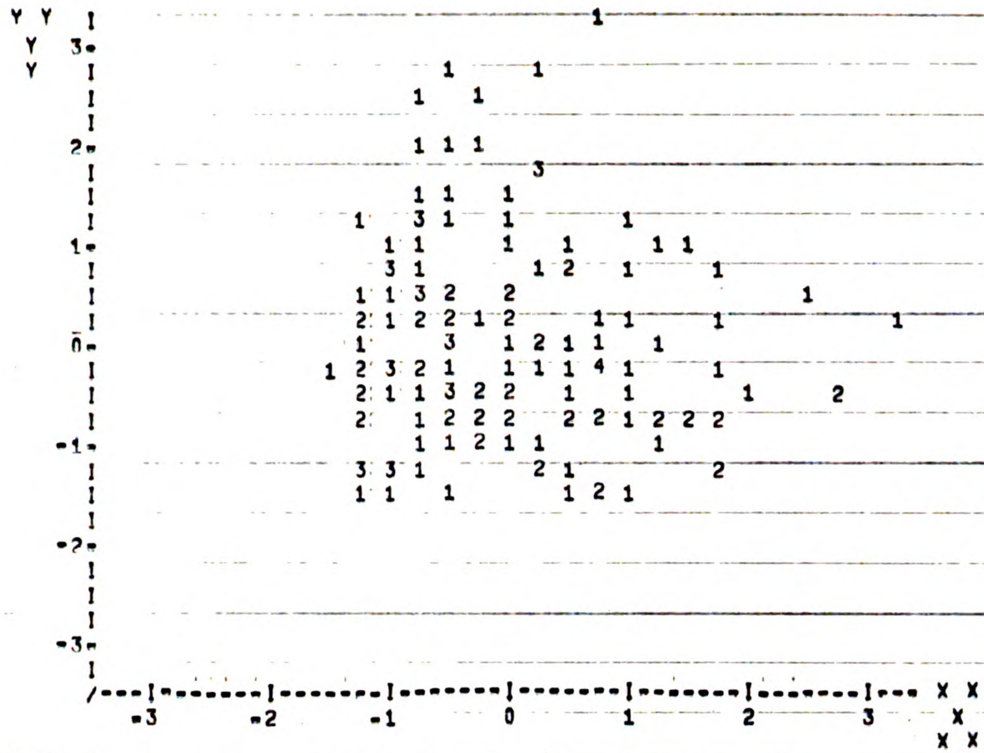
R = -0.063316

ETA(Y,X) =0.31511 ETA(X,Y) =0.26009

REGR. COEFS.

A(Y,X) = 393.38 A(X,Y) = 0.01

B(Y,X) =-793.5487 B(X,Y) = -0.0000



DATA SET 1

N = 150

	VARIABLE 11 (Y)	VARIABLE 2 (X)
MEAN =	383.572	0.148
STD.DEV. =	104.330	0.076
VARIANCE =	10884.574	0.006

COVARIANCE = -0.011

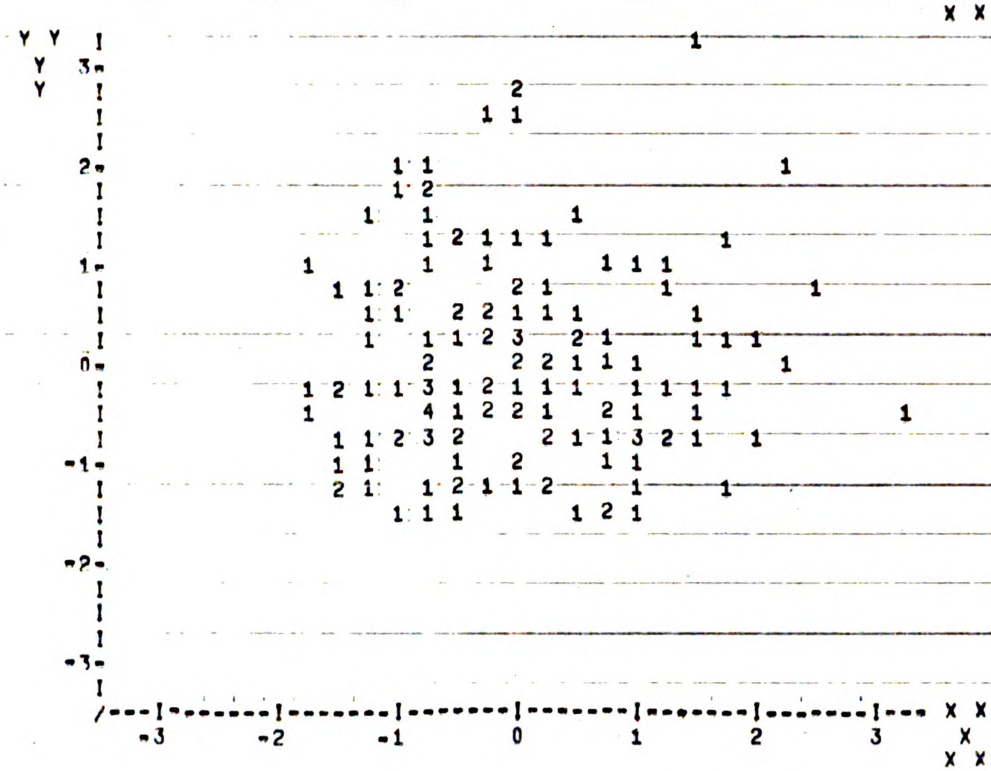
R = -0.001394

ETA(Y,X) =0.34945 ETA(X,Y) =0.26558

REGR. COEFS.

A(Y,X) = 383.86 A(X,Y) = 0.15

B(Y,X) = -1.9113 B(X,Y) = -0.0000



DATA SET 1

N = 150

	VARIABLE 11 (Y)	VARIABLE 3 (X)
MEAN =	383,572	0,078
STD.DEV. =	104,330	0,038
VARIANCE =	10884,674	0,001

COVARIANCE = 0.162

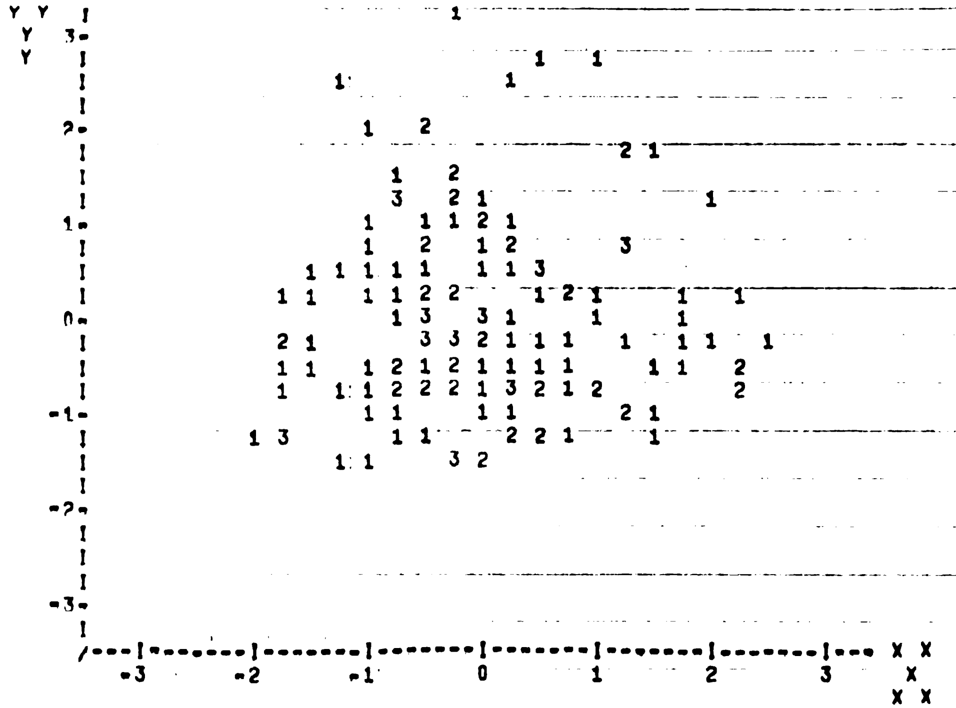
R = 0,041430

ETA(Y,X) =0,27450 ETA(X,Y) =0,32391

REGR. COEFS.

A(Y,X) = 374,64 A(X,Y) = 0,07

B(Y,X) = 115,0675 B(X,Y) = 0,0000



DATA SET 1

N = 150

	VARIABLE 11 (Y)	VARIABLE 4 (X)
MEAN =	383,572	0,047
STD.DEV. =	104,330	0,024
VARIANCE =	10884,674	0,001

COVARIANCE = -0.134

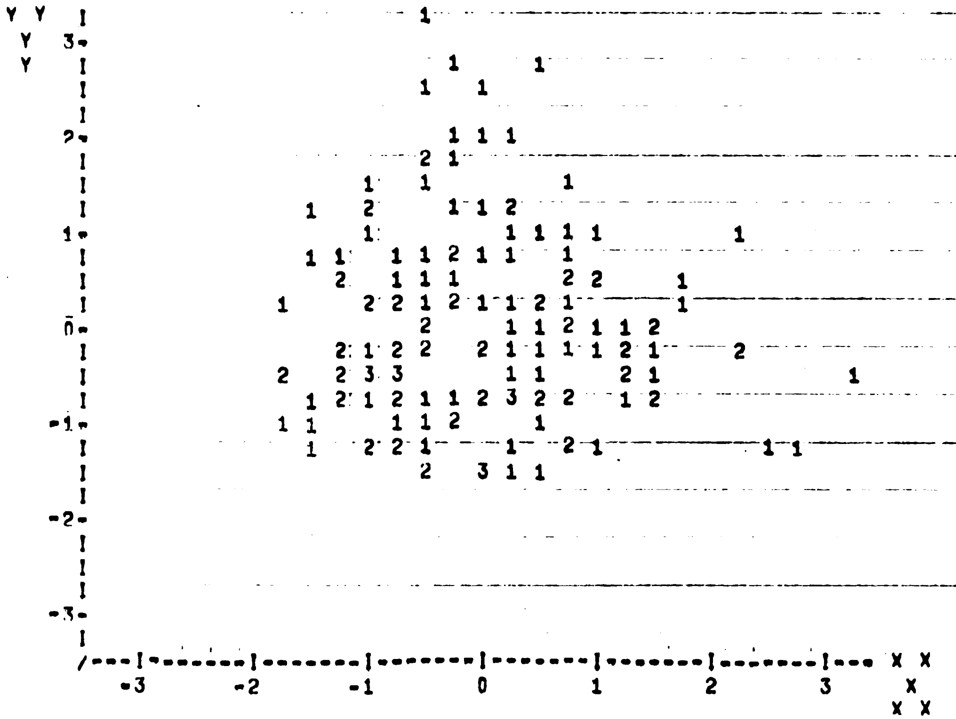
R = -0,053284

ETA(Y,X) =0,32009 ETA(X,Y) =0,33421

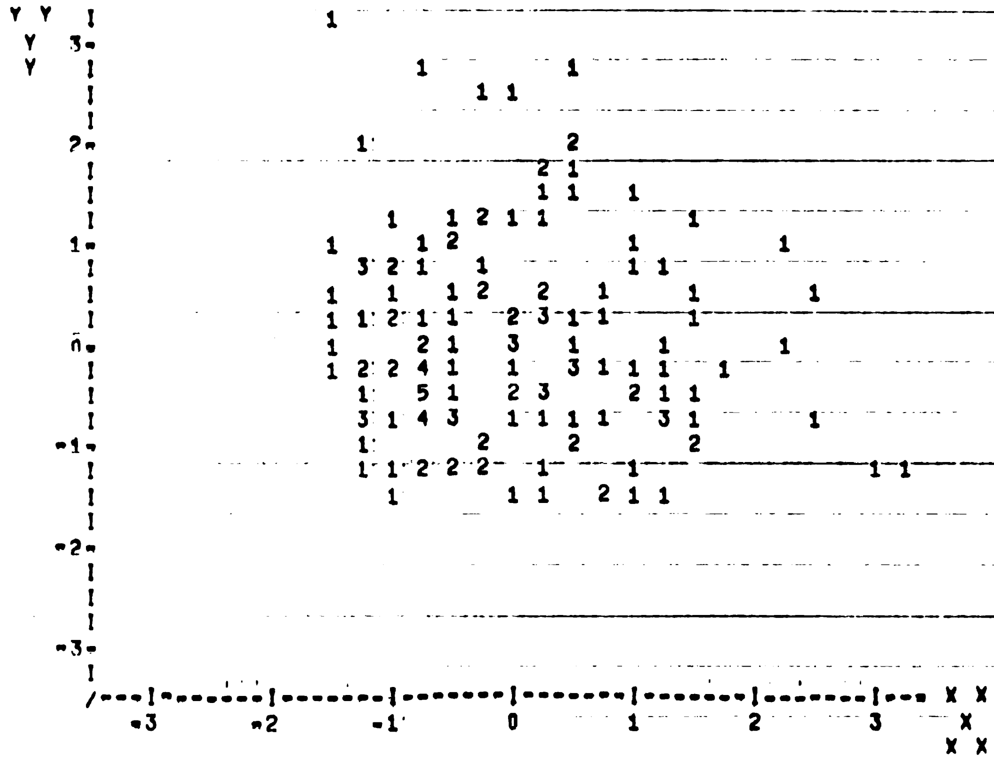
REGR. COEFS.

A(Y,X) = 394,41 A(X,Y) = 0,05

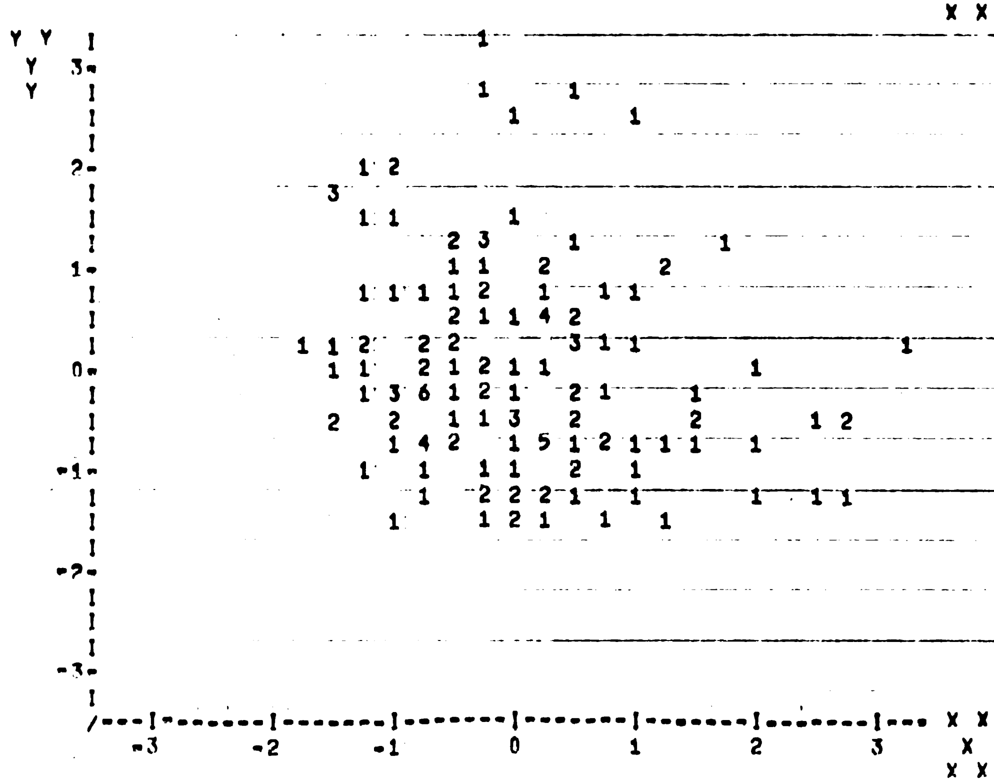
B(Y,X) =-229,9601 B(X,Y) = -0,0000



```
DATA SET   1

        N =   150

    VARIABLE  11     VARIABLE   5
       (Y)              (X)

 MEAN =      383,372          0,031
TD,DEV. =     104,330          0,017
ARIANCE =   10884,574          0,000

  COVARIANCE =        -0.177

       R = -0,097783

TA(Y,X) =0,33802  ETA(X,Y) =0,25524

     REGR, COEFS.

A(Y,X) =    401,69     A(X,Y) =      0.04

B(Y,X) =-586,9604     B(X,Y) =   -0,0000
```



```
DATA SET   1

        N =   150

    VARIABLE  11     VARIABLE   6
       (Y)              (X)

 MEAN =      383,372          0,022
TD,DEV. =     104,330          0,012
ARIANCE =   10884,574          0,000

  COVARIANCE =        -0.238

       R = -0,191541

TA(Y,X) =0,36859  ETA(X,Y) =0,42237

     REGR, COEFS.

A(Y,X) =    419,77     A(X,Y) =      0.03

B(Y,X) =*********     B(X,Y) =   -0,0000
```



DATA SET 1

N = 150

	VARIABLE 11 (Y)	VARIABLE 7 (X)
MEAN =	383.572	0.016
STD.DEV. =	104.330	0.009
VARIANCE =	10884.574	0.000

COVARIANCE = -0.064

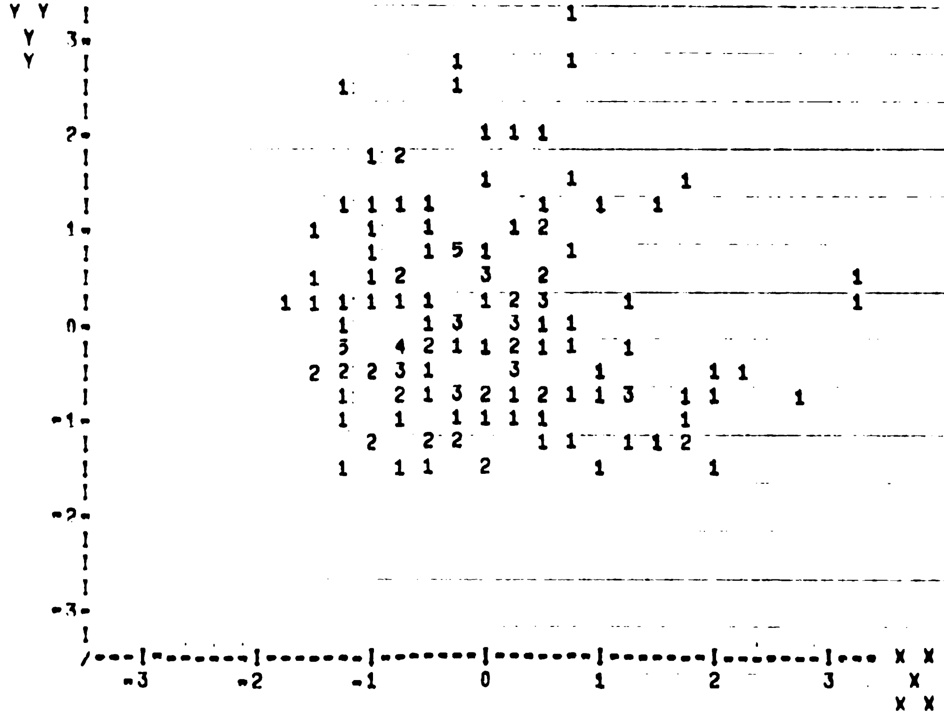
R = -0.067206

ETA(Y,X) =0.31311 ETA(X,Y) =0.34020

REGR. COEFS.

A(Y,X) = 395.18 A(X,Y) = 0.02

B(Y,X) =-769.0146 B(X,Y) = -0.0000



DATA SET 1

N = 150

	VARIABLE 11 (Y)	VARIABLE 8 (X)
MEAN =	383.572	0.013
STD.DEV. =	104.330	0.007
VARIANCE =	10884.574	0.000

COVARIANCE = -0.031

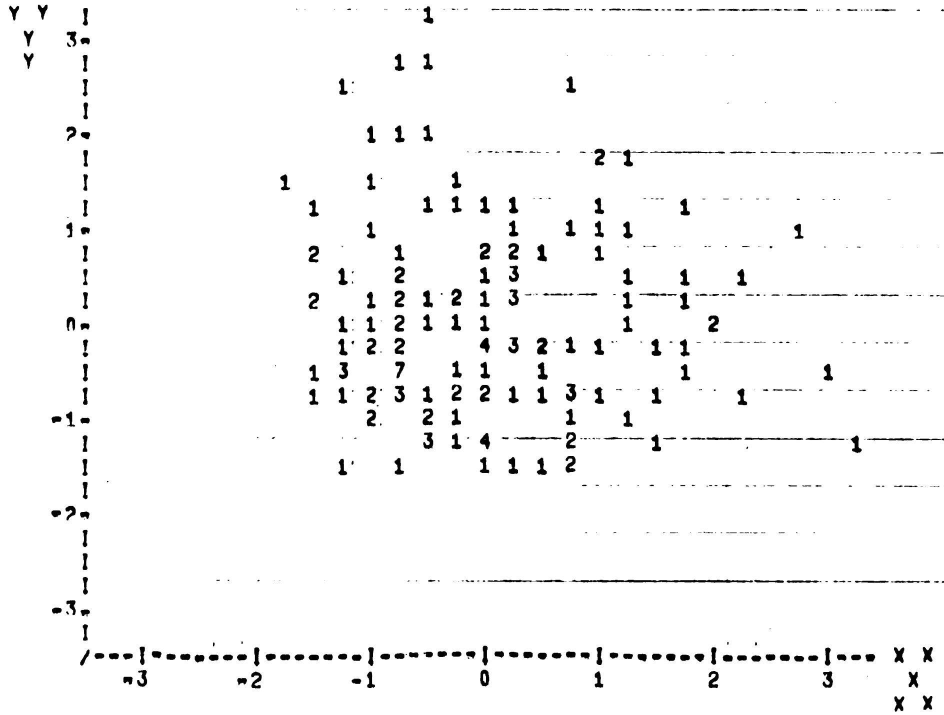
R = -0.042378

ETA(Y,X) =0.37010 ETA(X,Y) =0.35920

REGR. COEFS.

A(Y,X) = 391.74 A(X,Y) = 0.01

B(Y,X) =-634.1291 B(X,Y) = -0.0000



DATA SET 1

N = 150

	VARIABLE 11 (Y)	VARIABLE 9 (X)
MEAN =	383,372	0,010
STD.DEV. =	104,330	0,006
VARIANCE =	10884,574	0,000

COVARIANCE = -0.008

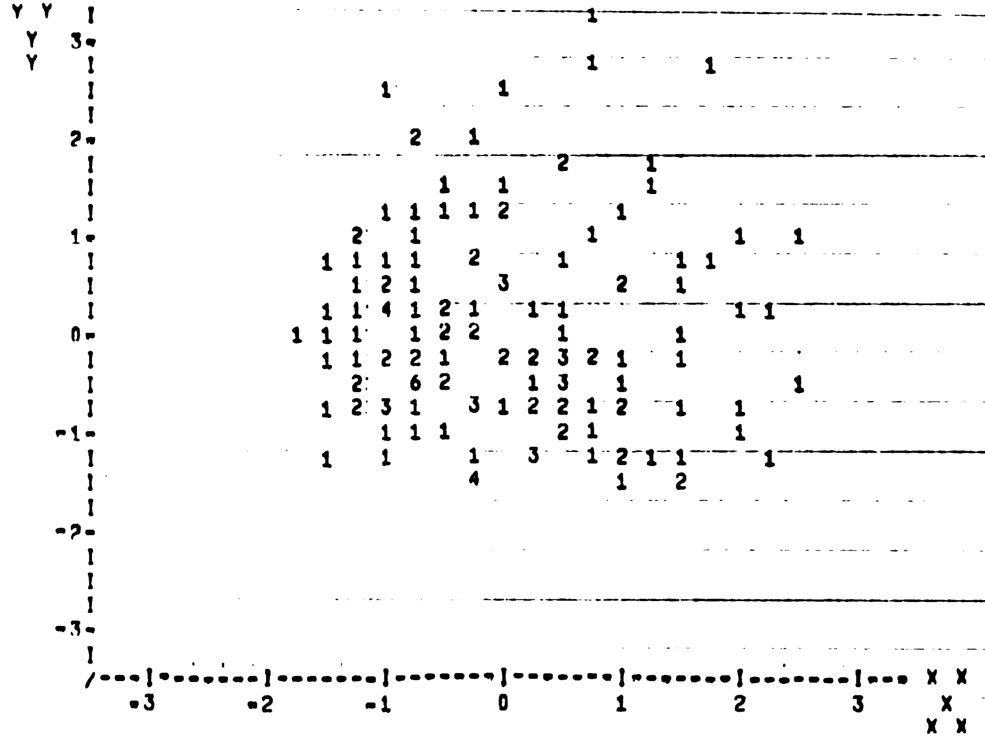
R = -0,013744

ETA(Y,X) =0,40242 ETA(X,Y) =0,33141

REGR. COEFS.

A(Y,X) = 386,20 A(X,Y) = 0.01

B(Y,X) =-251,6397 B(X,Y) = -0,0000



DATA SET 1

N = 150

	VARIABLE 11 (Y)	VARIABLE 10 (X)
MEAN =	383,372	0,009
STD.DEV. =	104,330	0,005
VARIANCE =	10884,574	0,000

COVARIANCE = -0.053

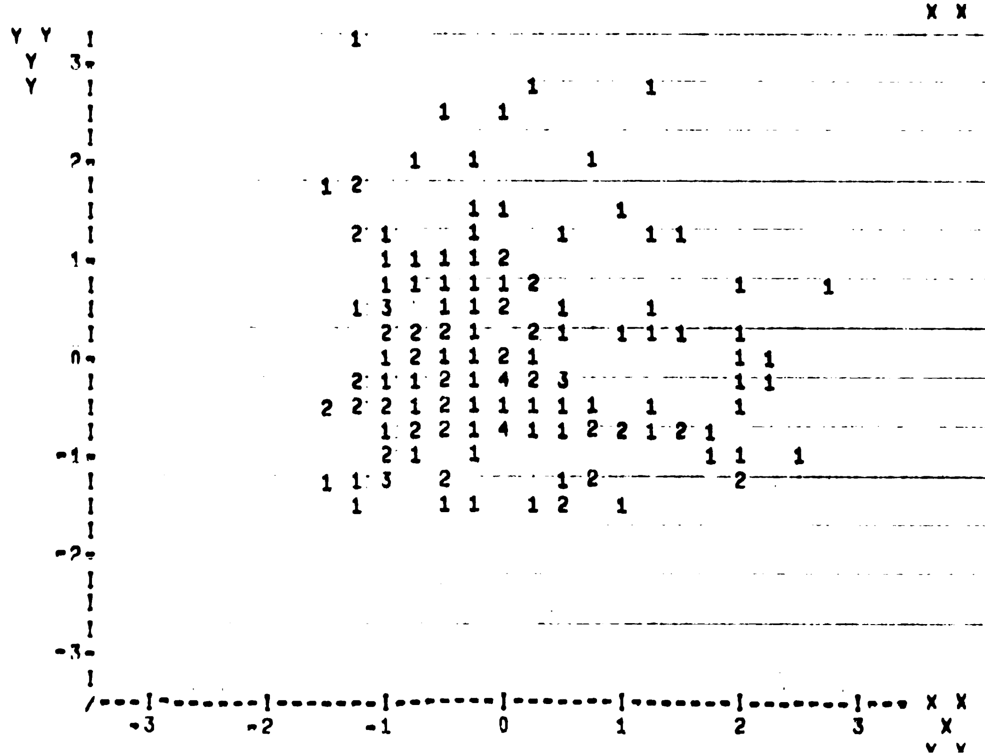
R = -0,093422

ETA(Y,X) =0,31014 ETA(X,Y) =0,33596

REGR. COEFS.

A(Y,X) = 399,53 A(X,Y) = 0.01

B(Y,X) =********** B(X,Y) = -0,0000



APPENDIX D

Scatter Plots of Interharmonic Correlations in Sample B12 of Coon Creek

SAMPLE B12
COON CREEK

DATA SET 1

HARMONIC NUMBER

N = 149

VARIABLE 2 (Y) VARIABLE 3 (X)

	(Y)	(X)
MEAN =	0,142	0,077
STD.DEV. =	0,076	0,037
VARIANCE =	0,006	0,001

COVARIANCE = -0,000

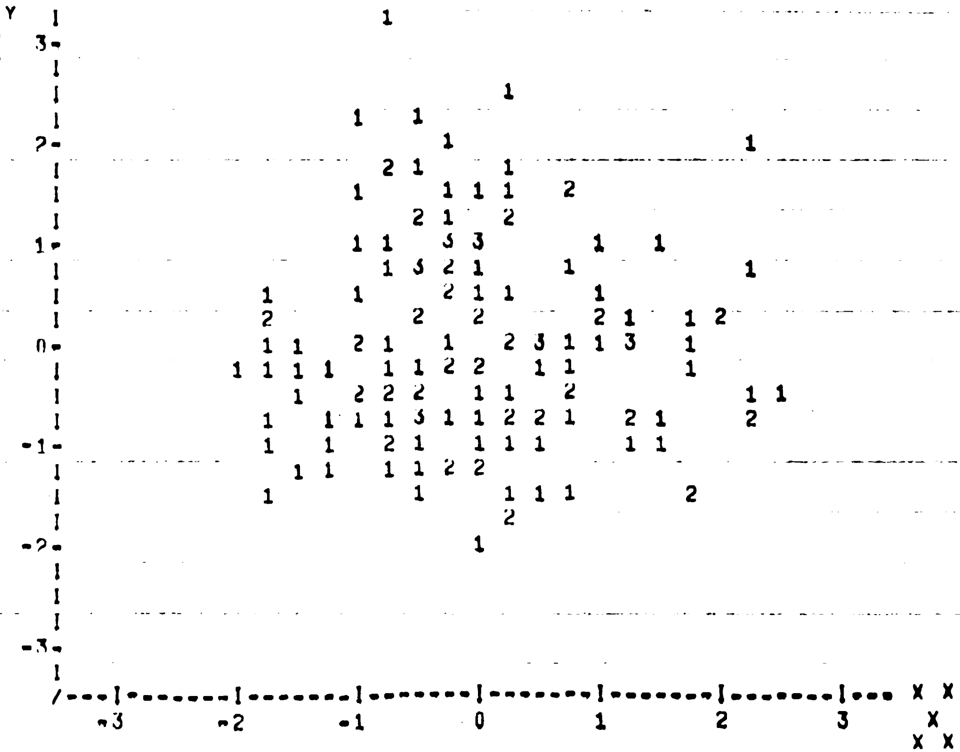
R = -0,021276 ← CORRELATION COEFFICIENT

ETA(Y,X) =0,32031 ETA(X,Y) =0,30295

REGR. COEFS.

A(Y,X) = 0,15 A(X,Y) = 0,08

B(Y,X) = -0,0432 B(X,Y) = -0,0105



DATA SET 1

N = 149 ← SAMPLE SIZE

VARIABLE 2 (Y) VARIABLE 4 (X)

	(Y)	(X)
MEAN =	0,149	0,047
STD.DEV. =	0,076	0,024
VARIANCE =	0,006	0,001

HARMONIC AMPLITUDE

COVARIANCE = 0,000

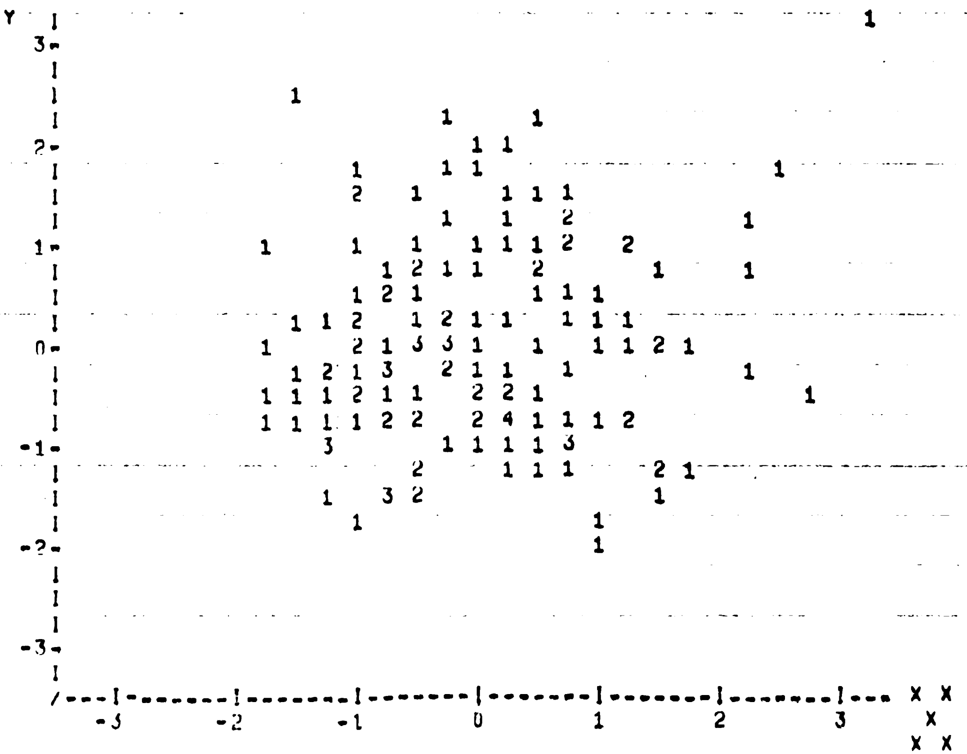
R = 0,122899

ETA(Y,X) =0,45742 ETA(X,Y) =0,42419

REGR. COEFS.

A(Y,X) = 0,13 A(X,Y) = 0,04

B(Y,X) = 0,3861 B(X,Y) = 0,0391



B12

DATA SET 1

N = 149

	VARIABLE 2 (Y)	VARIABLE 5 (X)
MEAN =	0,149	0,031
STD,DEV, =	0,176	0,017
VARIANCE =	0,006	0,000

COVARIANCE = 0,000

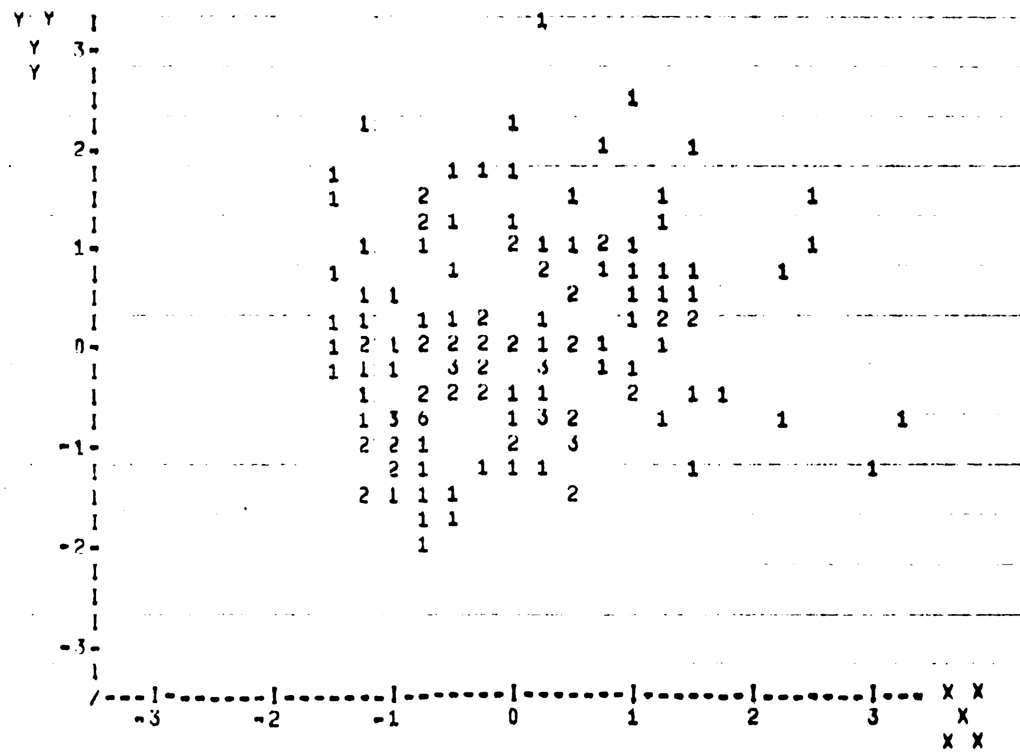
R = 0,155278

ETA(Y,X) =0,41637 ETA(X,Y) =0,35841

REGR, COEFS,

A(Y,X) = 0,13 A(X,Y) = 0,03

B(Y,X) = 0,4785 B(X,Y) = 0,0355



DATA SET 1

N = 149

	VARIABLE 2 (Y)	VARIABLE 6 (X)
MEAN =	0,149	0,022
STD,DEV, =	0,176	0,012
VARIANCE =	0,006	0,000

COVARIANCE = 0,000

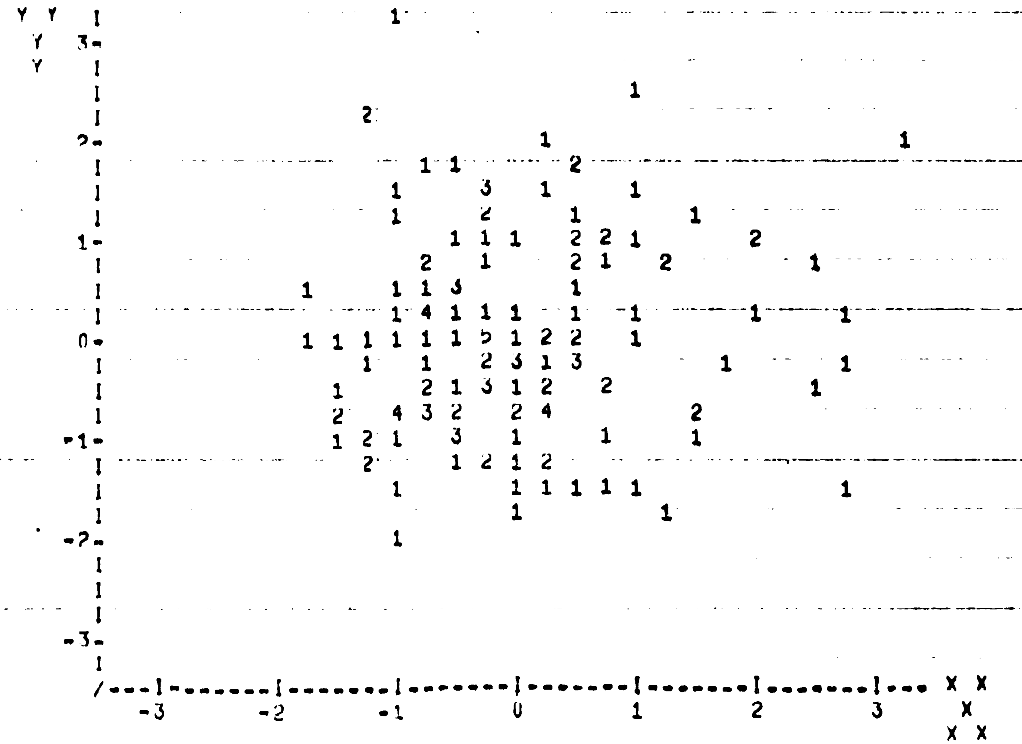
R = 0,094011

ETA(Y,X) =0,37606 ETA(X,Y) =0,48397

REGR, COEFS,

A(Y,X) = 0,14 A(X,Y) = 0,02

B(Y,X) = 0,6027 B(X,Y) = 0,0147



DATA SET 1

N = 149

	VARIABLE 2 (Y)	VARIABLE 7 (X)
MEAN =	0.149	0.016
STD.DEV. =	0.176	0.009
VARIANCE =	0.106	0.000

COVARIANCE = 0.000

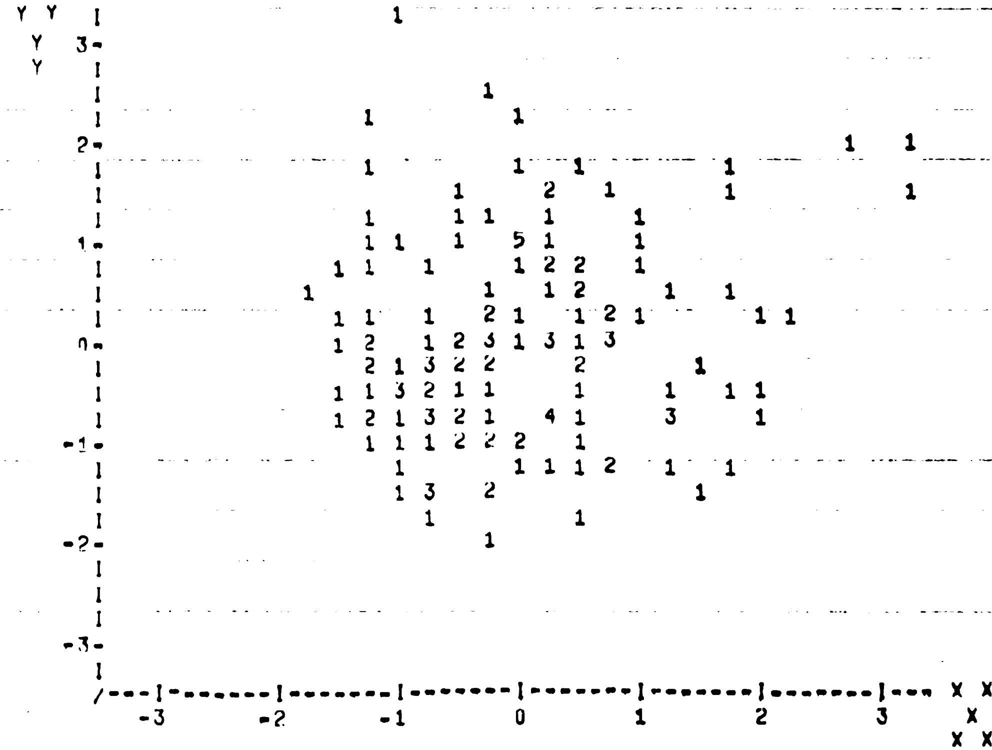
R = 0.158835

ETA(Y,X) =0.45998 ETA(X,Y) =0.48890

REGR. COEFS.

A(Y,X) = 0.13 A(X,Y) = 0.01

B(Y,X) = 1.3242 B(X,Y) = 0.0191



DATA SET 1

N = 149

	VARIABLE 2 (Y)	VARIABLE 8 (X)
MEAN =	0.149	0.013
STD.DEV. =	0.176	0.007
VARIANCE =	0.106	0.000

COVARIANCE = 0.000

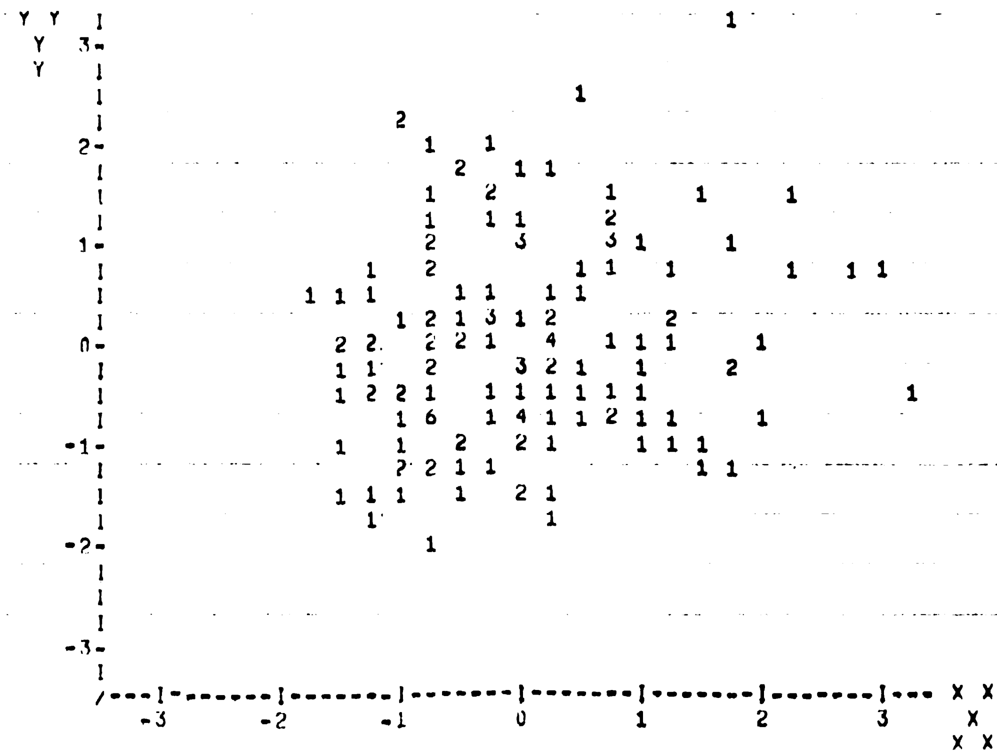
R = 0.143456

ETA(Y,X) =0.32929 ETA(X,Y) =0.38823

REGR. COEFS.

A(Y,X) = 0.13 A(X,Y) = 0.01

B(Y,X) = 1.5663 B(X,Y) = 0.0131



DATA SET 1

N = 149

	VARIABLE 2 (Y)	VARIABLE 9 (X)
MEAN =	0,149	0,010
STD.DEV. =	0,076	0,006
VARIANCE =	0,005	0,000

COVARIANCE = 0.000

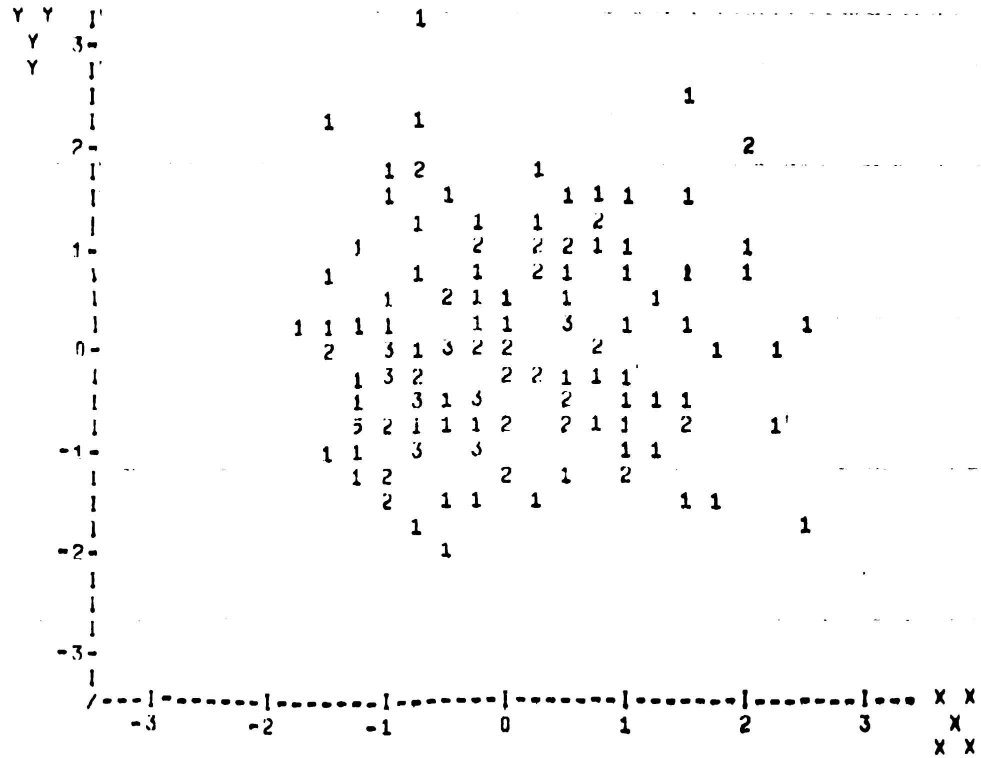
R = 0.093423

ETA(Y,X) =0.39061 ETA(X,Y) =0,38890

REGR. COEFS.

A(Y,X) = 0,14 A(X,Y) = 0,01

B(Y,X) = 1.2463 B(X,Y) = 0,0070



DATA SET 1

N = 149

	VARIABLE 2 (Y)	VARIABLE 10 (X)
MEAN =	.149	0,009
STD.DEV. =	.076	0,005
VARIANCE =	0,005	0,000

COVARIANCE = 0,000

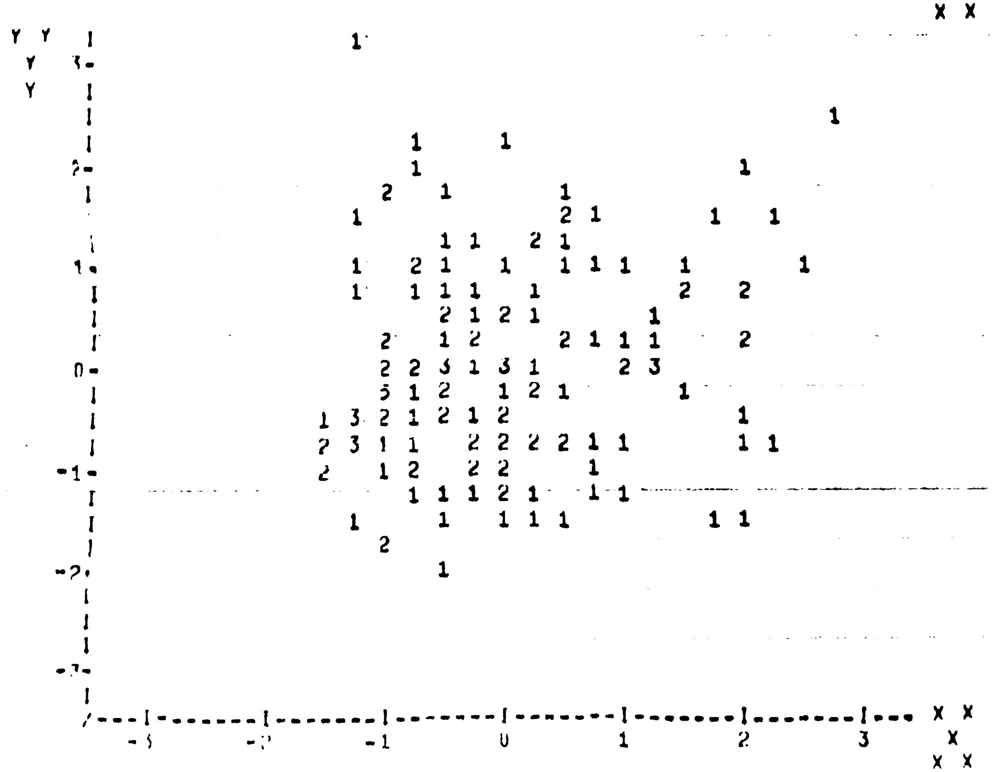
R = 0.173571

ETA(Y,X) =0.33749 ETA(X,Y) =0,45923

REGR. COEFS.

A(Y,X) = 0,13 A(X,Y) = 0,01

B(Y,X) = 2,4920 B(X,Y) = 0,0128



B12

DATA SET 1

N = 149

	VARIABLE 3 (Y)	VARIABLE 4 (X)
MEAN =	0.077	0.047
STD.DEV. =	0.337	0.024
VARIANCE =	0.001	0.001

COVARIANCE = -0.000

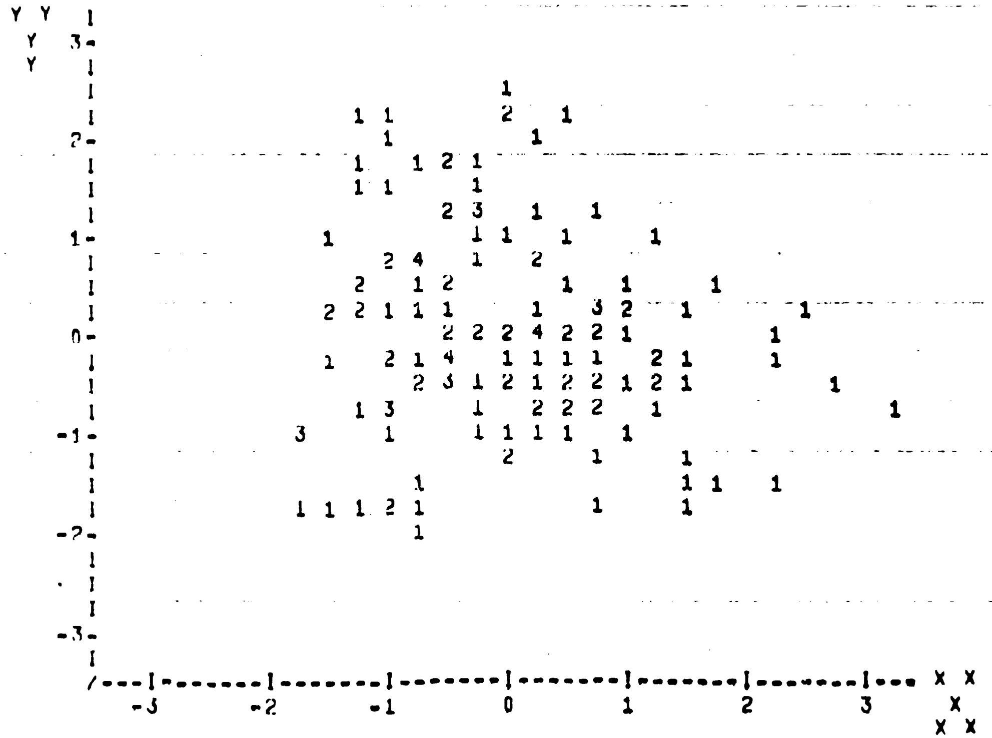
R = -1.137666

ETA(Y,X) =0.38150 ETA(X,Y) =0.42090

REGR. COEFS.

A(Y,X) = 0.09 A(X,Y) = 0.05

B(Y,X) = -0.2129 B(X,Y) = -0.0890



DATA SET 1

N = 149

	VARIABLE 3 (Y)	VARIABLE 2 (X)
MEAN =	0.077	0.031
STD.DEV. =	0.337	0.017
VARIANCE =	0.001	0.000

COVARIANCE = 0.000

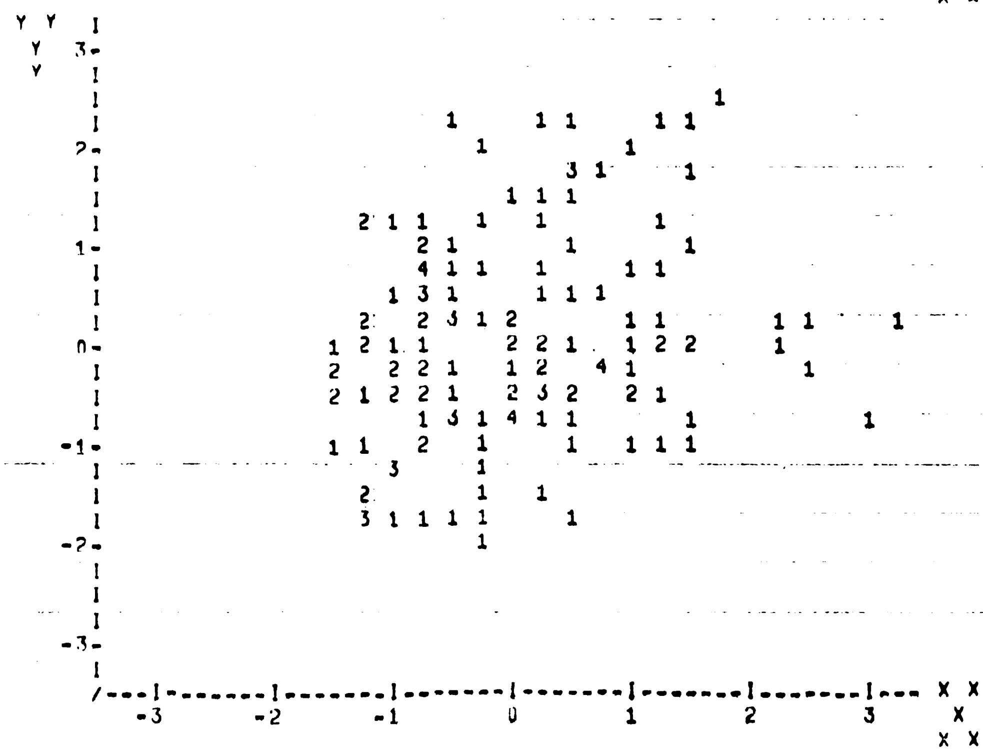
R = 0.238160

ETA(Y,X) =0.38377 ETA(X,Y) =0.38503

REGR. COEFS.

A(Y,X) = 0.06 A(X,Y) = 0.02

B(Y,X) = 0.5120 B(X,Y) = 0.1108



DATA SET 1

N = 149

	VARIABLE 3 (Y)	VARIABLE 6 (X)
MEAN =	0.077	0.022
STD.DEV. =	0.007	0.015
VARIANCE =	0.001	0.000

COVARIANCE = 0.000

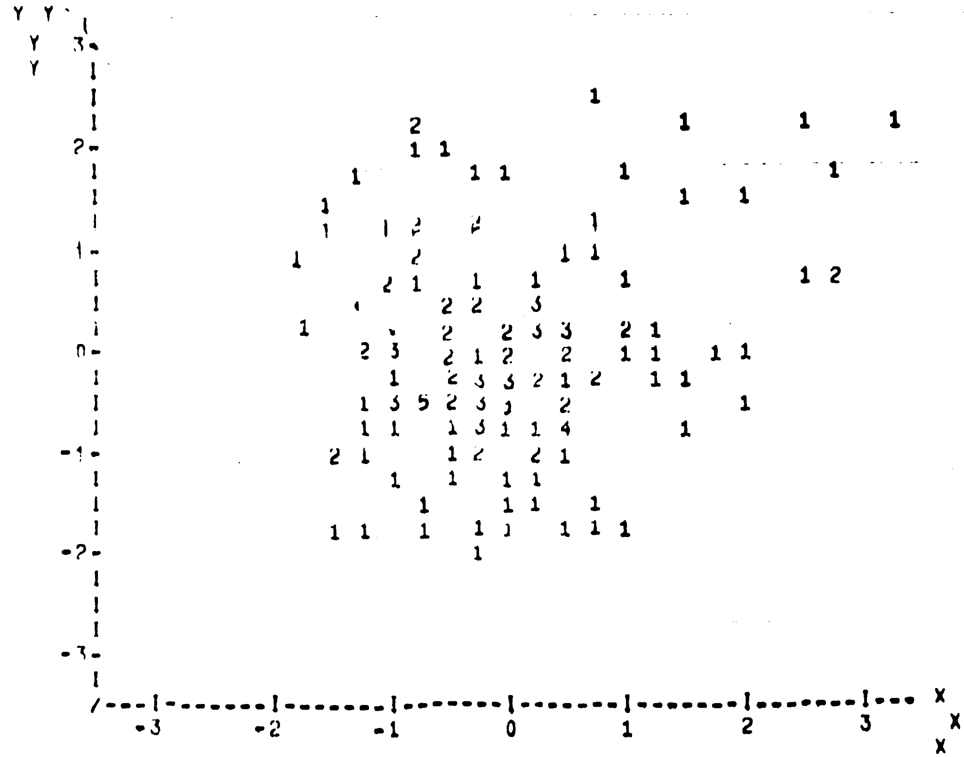
R = 0.191772

ETA(Y,X) = [illegible] ETA(X,Y) = 0.40533

REGR. COEFS.

A(Y,X) = 0.06 A(X,Y) = 0.02

B(Y,X) = 0.6050 B(X,Y) = 0.0608



DATA SET 1

N = 149

	VARIABLE 3 (Y)	VARIABLE 7 (X)
MEAN =	0.077	0.016
STD.DEV. =	0.037	0.009
VARIANCE =	0.001	0.000

COVARIANCE = 0.000

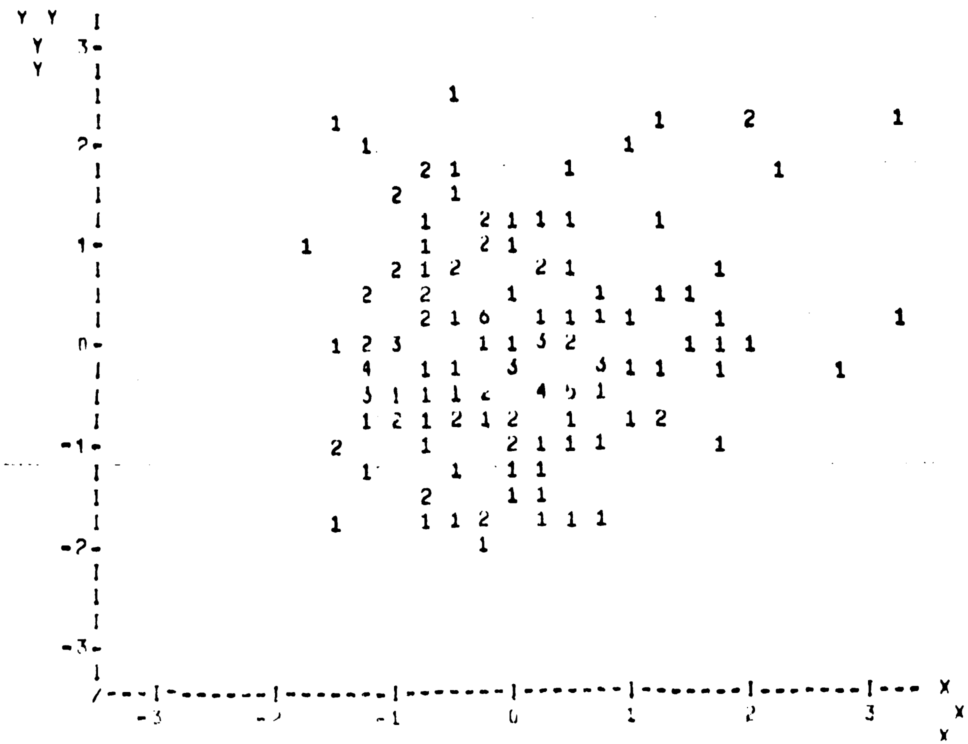
R = 0.133854

ETA(Y,X) = 0.37717 ETA(X,Y) = 0.34665

REGR. COEFS.

A(Y,X) = 0.07 A(X,Y) = 0.01

B(Y,X) = 0.5492 B(X,Y) = 0.0326



B12

DATA SET 1

N = 149

	VARIABLE 3 (Y)	VARIABLE 8 (X)
MEAN =	0.077	0.013
STD.DEV. =	0.037	0.007
VARIANCE =	0.001	0.000

COVARIANCE = 0.000

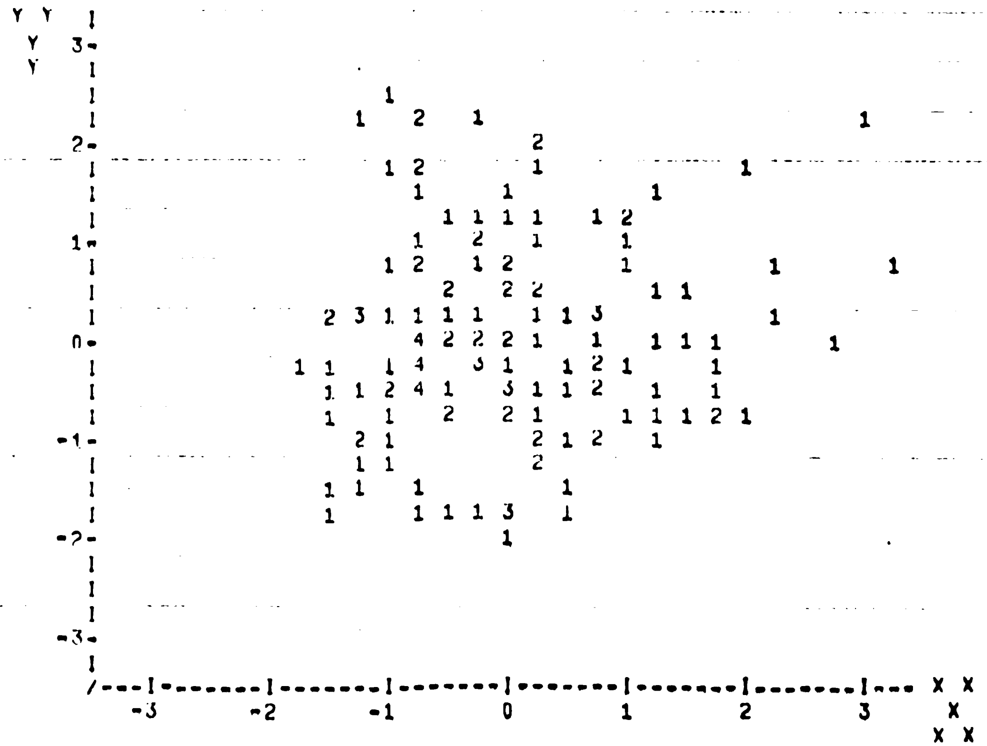
R = 0.091726

ETA(Y,X) = 0.38240 ETA(X,Y) = 0.30310

REGR. COEFS.

A(Y,X) = 0.07 A(X,Y) = 0.01

B(Y,X) = 0.4929 B(X,Y) = 0.0171



DATA SET 1

N = 149

	VARIABLE 3 (Y)	VARIABLE 9 (X)
MEAN =	0.077	0.010
STD.DEV. =	0.037	0.006
VARIANCE =	0.001	0.000

COVARIANCE = 0.000

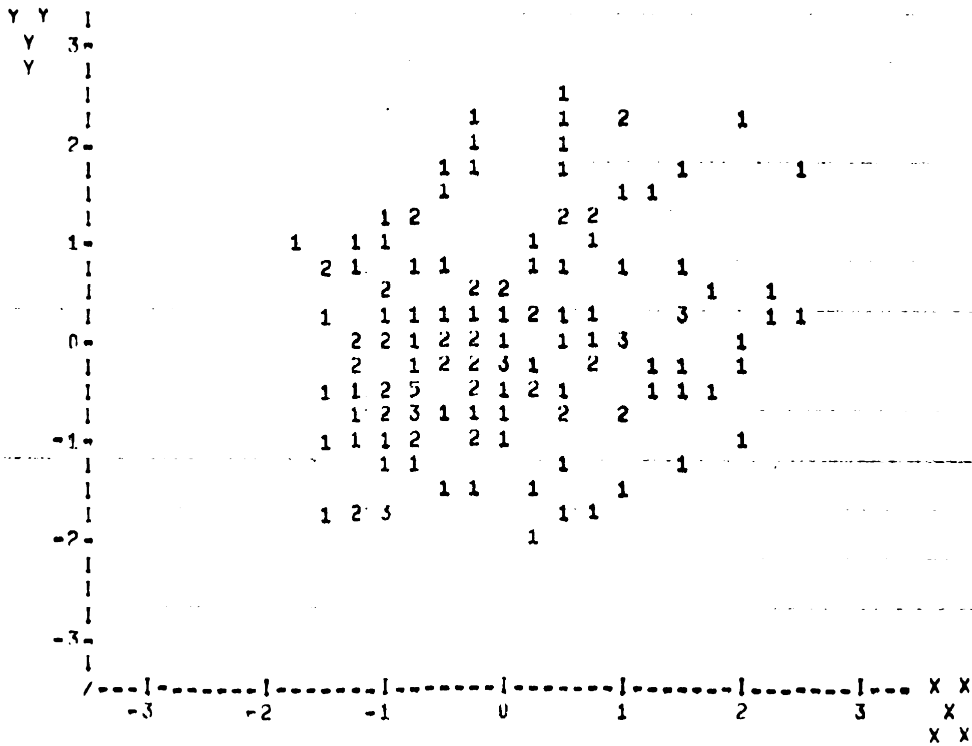
R = 0.237625

ETA(Y,X) = 0.33191 ETA(X,Y) = 0.37722

REGR. COEFS.

A(Y,X) = 0.06 A(X,Y) = 0.01

B(Y,X) = 1.5590 B(X,Y) = 0.0362



DATA SET 1

N = 149

	VARIABLE 3 (Y)	VARIABLE 10 (X)
MEAN =	0.[illegible]77	0.009
STD.DEV. =	[illegible].[illegible]37	0.005
VARIANCE =	[illegible].[illegible]	0.000

COVARIANCE = 0.0[illegible]0

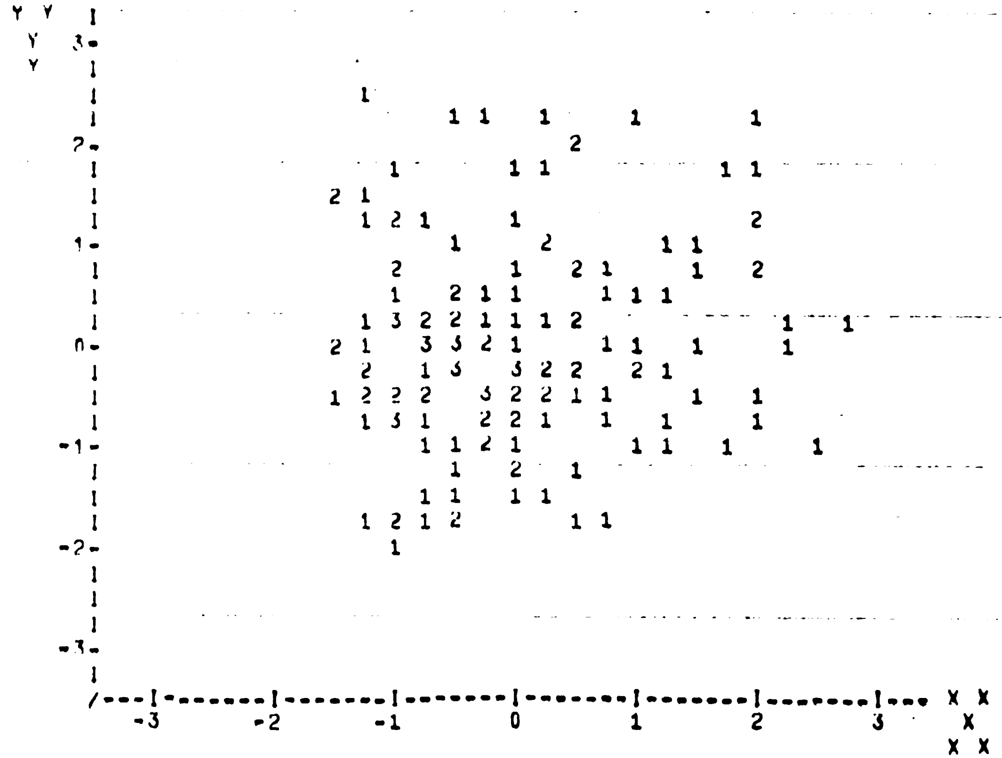
R = 0.131343

ETA(Y,X) =0.30637 ETA(X,Y) =0.33811

REGR. COEFS.

A(Y,X) = [illegible].[illegible]7 A(X,Y) = 0.01

B(Y,X) = 0.[illegible]0[illegible]1 B(X,Y) = 0.0191



DATA SET 1

N = 149

	VARIABLE 4 (Y)	VARIABLE 5 (X)
MEAN =	0.[illegible]47	0.031
STD.DEV. =	0.[illegible]24	0.017
VARIANCE =	0.[illegible]01	0.000

COVARIANCE = 0.000

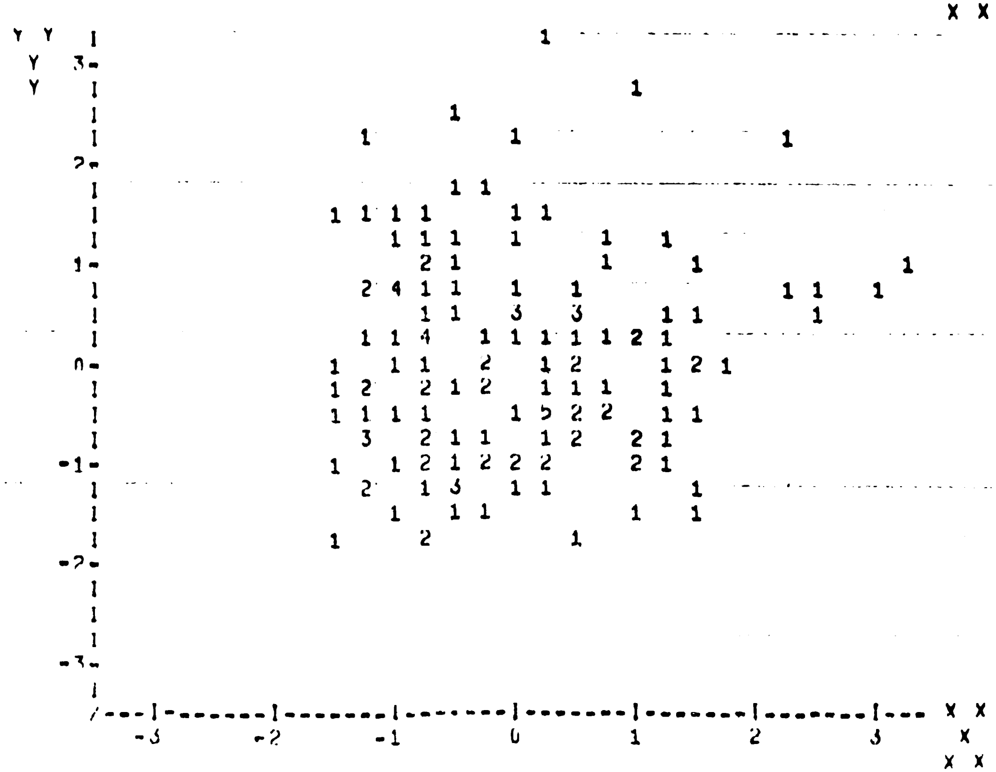
R = 0.079858

ETA(Y,X) =0.28540 ETA(X,Y) =0.31891

REGR. COEFS.

A(Y,X) = 0.[illegible]4 A(X,Y) = 0.03

B(Y,X) = 0.[illegible]1[illegible]0 B(X,Y) = 0.0574



B12

DATA SET 1

N = 149

	VARIABLE 4 (Y)	VARIABLE 6 (X)
MEAN =	0.147	0.022
STD.DEV. =	0.024	0.012
VARIANCE =	0.001	0.000

COVARIANCE = -0.000

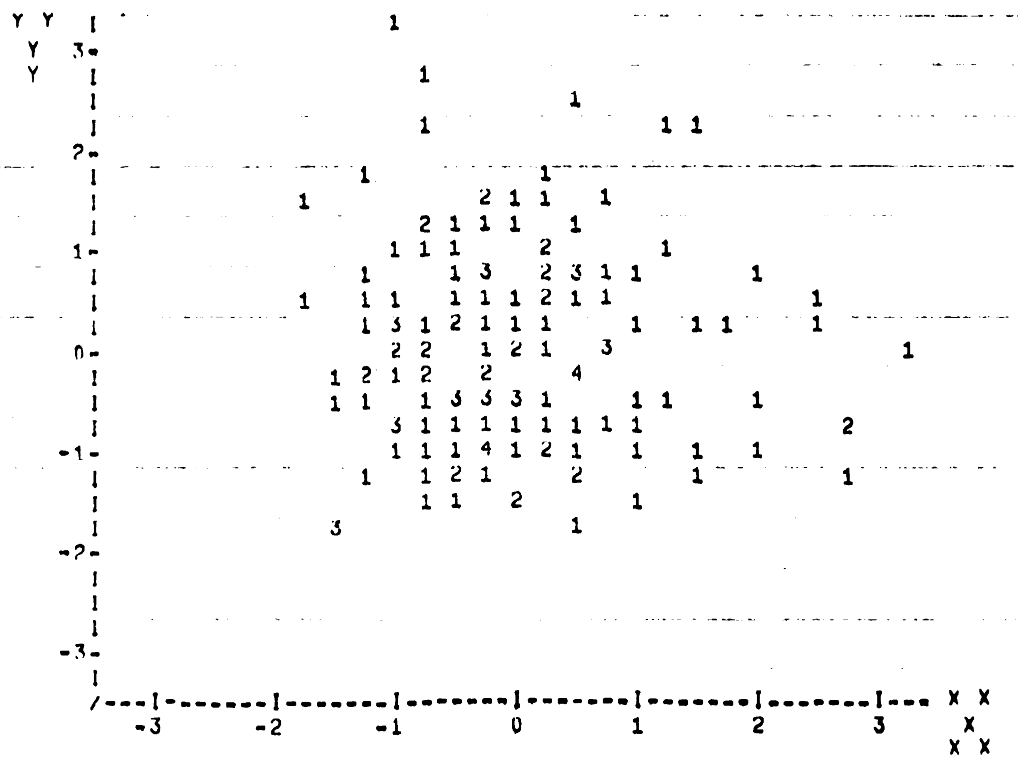
R = -0.012832

ETA(Y,X) =0.37585 ETA(X,Y) =0.30629

REGR. COEFS.

A(Y,X) = 0.05 A(X,Y) = 0.02

B(Y,X) = -0.0262 B(X,Y) = -0.0063



DATA SET 1

N = 149

	VARIABLE 4 (Y)	VARIABLE 7 (X)
MEAN =	0.147	0.016
STD.DEV. =	0.024	0.009
VARIANCE =	0.001	0.000

COVARIANCE = 0.000

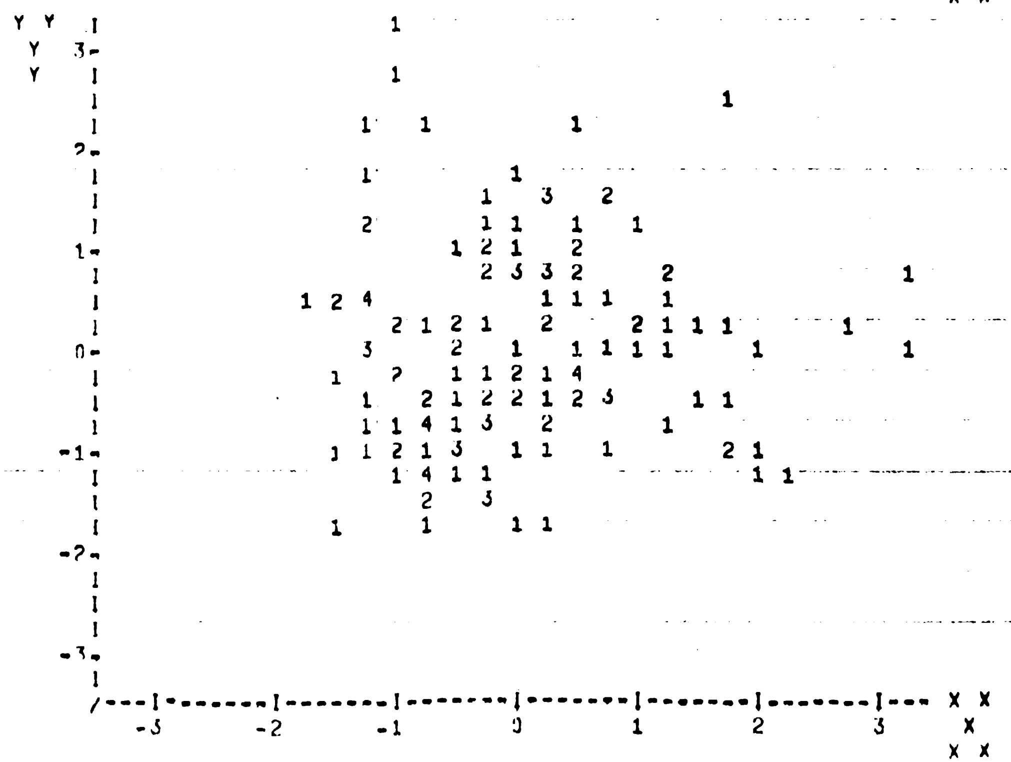
R = 0.033200

ETA(Y,X) =0.39653 ETA(X,Y) =0.40504

REGR. COEFS.

A(Y,X) = 0.05 A(X,Y) = 0.02

B(Y,X) = 0.0881 B(X,Y) = 0.0125



DATA SET 1

N = 149

	VARIABLE 4 (Y)	VARIABLE 8 (X)
MEAN =	0.047	0.013
STD.DEV. =	0.024	0.007
VARIANCE =	0.001	0.000

COVARIANCE = 0.000

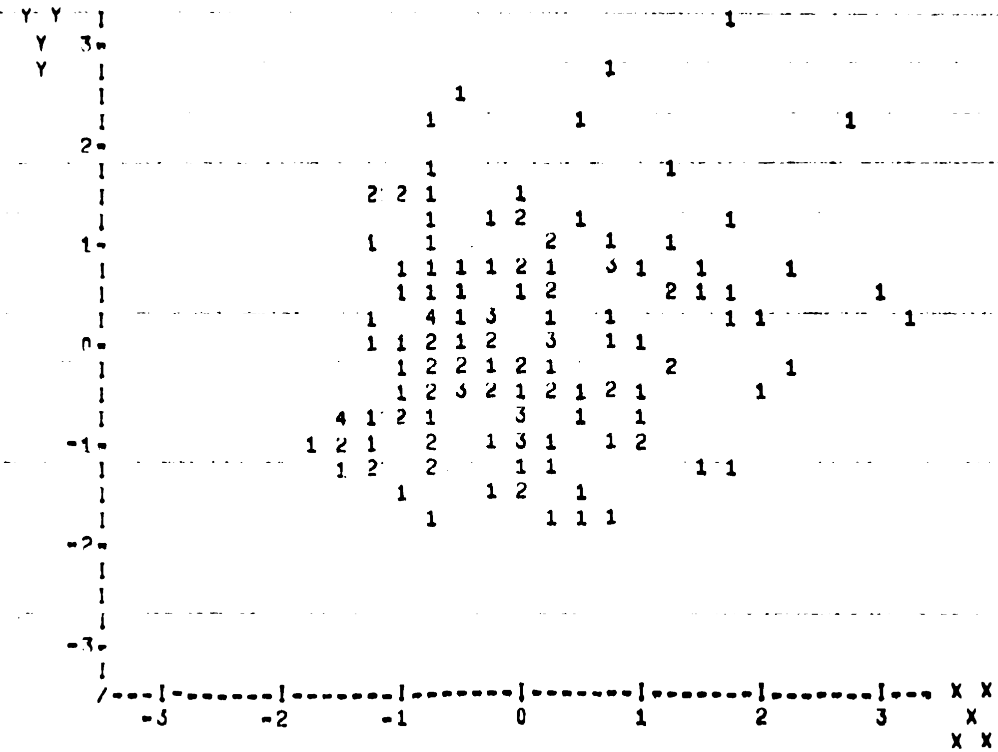
R = 0.199350

ETA(Y,X) =0.37245 ETA(X,Y) =0.41657

REGR. COEFS.

A(Y,X) = 0.04 A(X,Y) = 0.01

B(Y,X) = 0.6928 B(X,Y) = 0.0574



DATA SET 1

N = 149

	VARIABLE 4 (Y)	VARIABLE 9 (X)
MEAN =	0.047	0.010
STD.DEV. =	0.024	0.006
VARIANCE =	0.001	0.000

COVARIANCE = 0.000

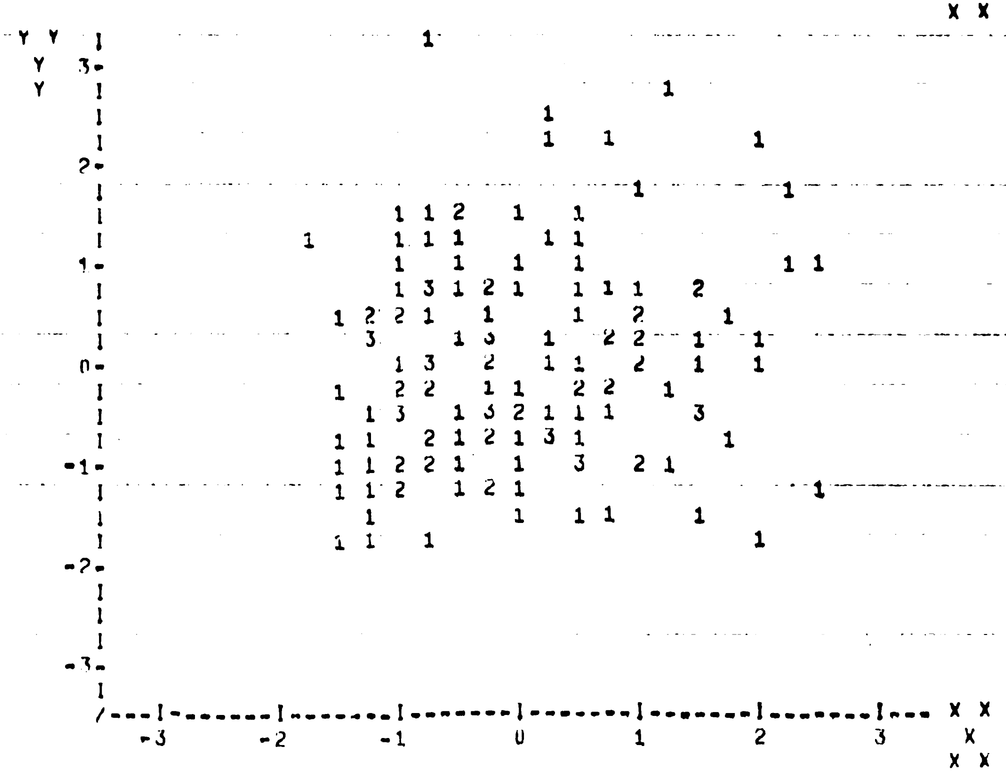
R = 0.097497

ETA(Y,X) =0.33441 ETA(X,Y) =0.36779

REGR. COEFS.

A(Y,X) = 0.04 A(X,Y) = 0.01

B(Y,X) = 0.4137 B(X,Y) = 0.0230



DATA SET 1

N = 149

	VARIABLE 4 (Y)	VARIABLE 10 (X)
MEAN =	0.[illegible]47	0.009
STD.DEV. =	0.[illegible]24	0.0[illegible]5
VARIANCE =	0.[illegible]	0.00[illegible]

COVARIANCE = -0.0[illegible]

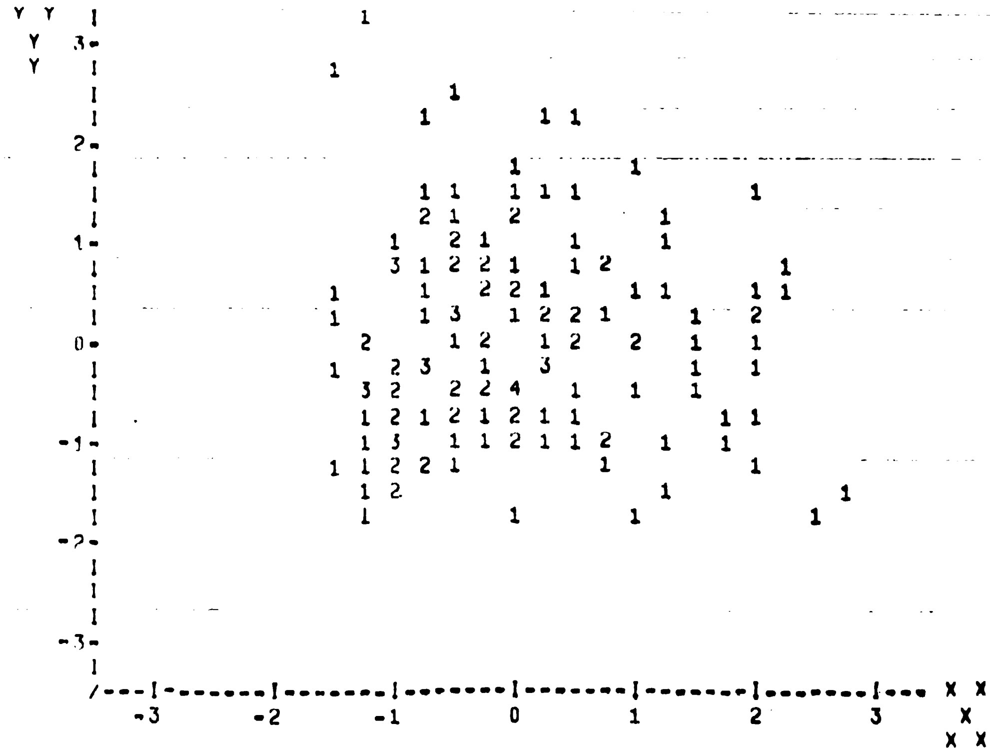
R = -0.011483

ETA(Y,X) =0.35[illegible]3 ETA(X,Y) =0.29733

REGR. COEFS.

A(Y,X) = 0.[illegible]5 A(X,Y) = 0.01

B(Y,X) = -0.[illegible]5[illegible]1 B(X,Y) = -0.0026



DATA SET 1

N = 149

	VARIABLE 5 (Y)	VARIABLE 6 (X)
MEAN =	0.[illegible]31	0.022
STD.DEV. =	0.[illegible]17	0.017
VARIANCE =	0.[illegible]	0.00[illegible]

COVARIANCE = 0.000

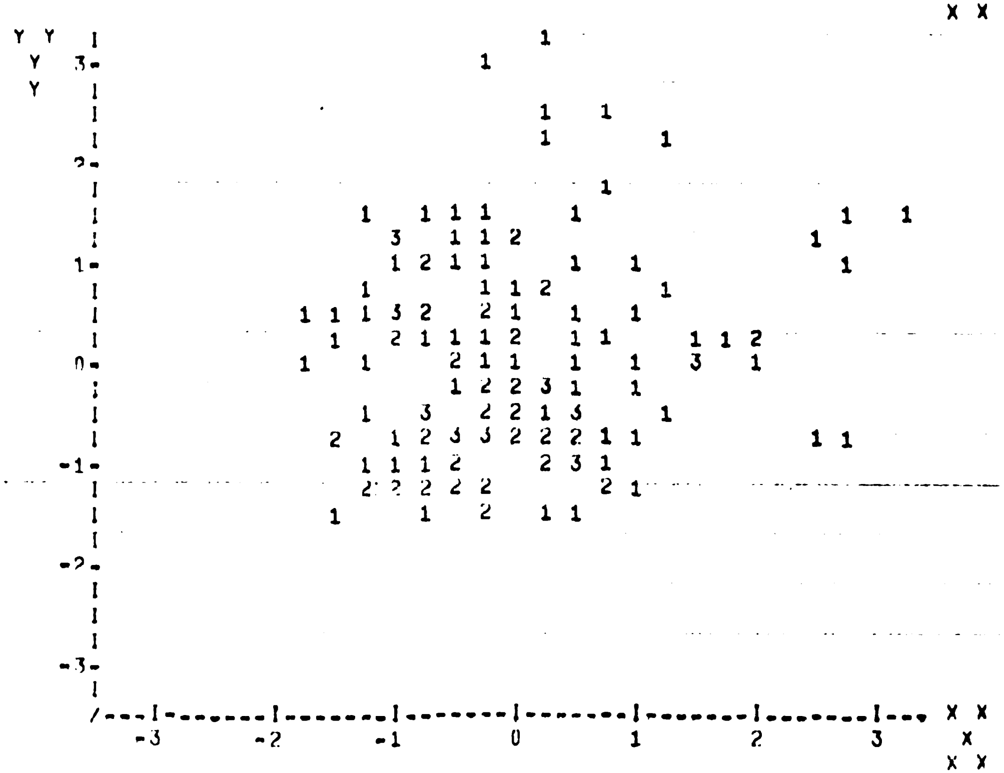
R = 0.149047

ETA(Y,X) =0.273[illegible]3 ETA(X,Y) =0.31740

REGR. COEFS.

A(Y,X) = 0.[illegible]3 A(X,Y) = 0.02

B(Y,X) = 0.[illegible]1[illegible]7 B(X,Y) = 0.1015



DATA SET 1

N = 149

	VARIABLE 5 (Y)	VARIABLE 7 (X)
MEAN =	0.031	0.016
STD.DEV. =	0.017	0.009
VARIANCE =	0.000	0.000

COVARIANCE = 0.000

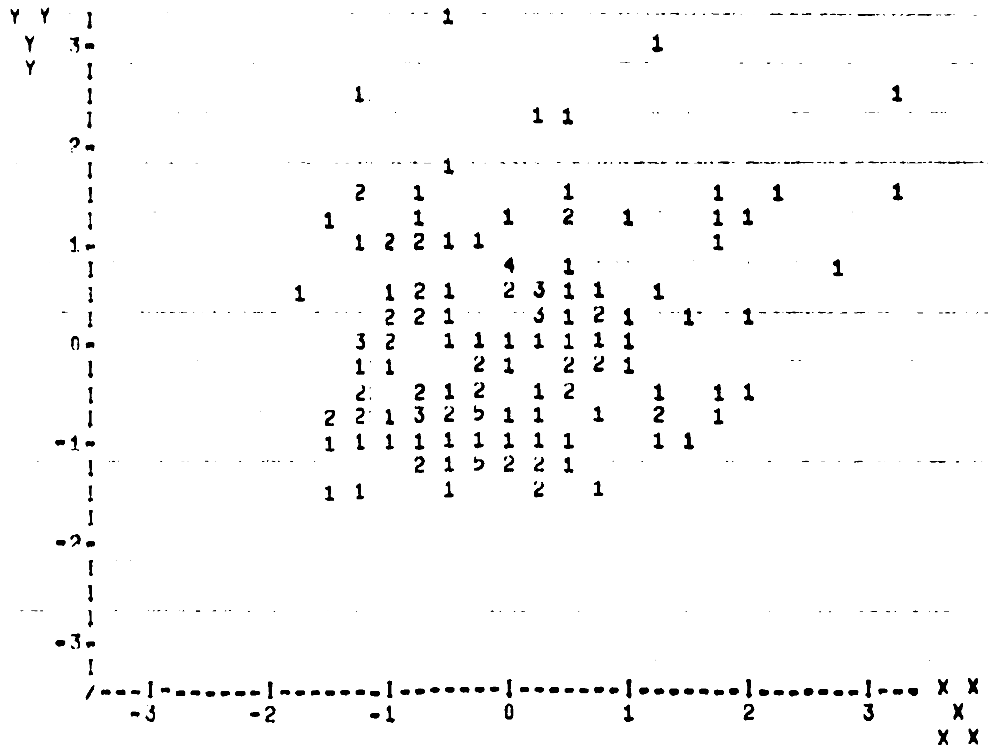
R = 0.202303

ETA(Y,X) =0.41087 ETA(X,Y) =0.34627

REGR. COEFS.

A(Y,X) = 0.02 A(X,Y) = 0.01

B(Y,X) = 0.3861 B(X,Y) = 0.1060



DATA SET 1

N = 149

	VARIABLE 5 (Y)	VARIABLE 8 (X)
MEAN =	0.031	0.013
STD.DEV. =	0.017	0.007
VARIANCE =	0.000	0.000

COVARIANCE = 0.000

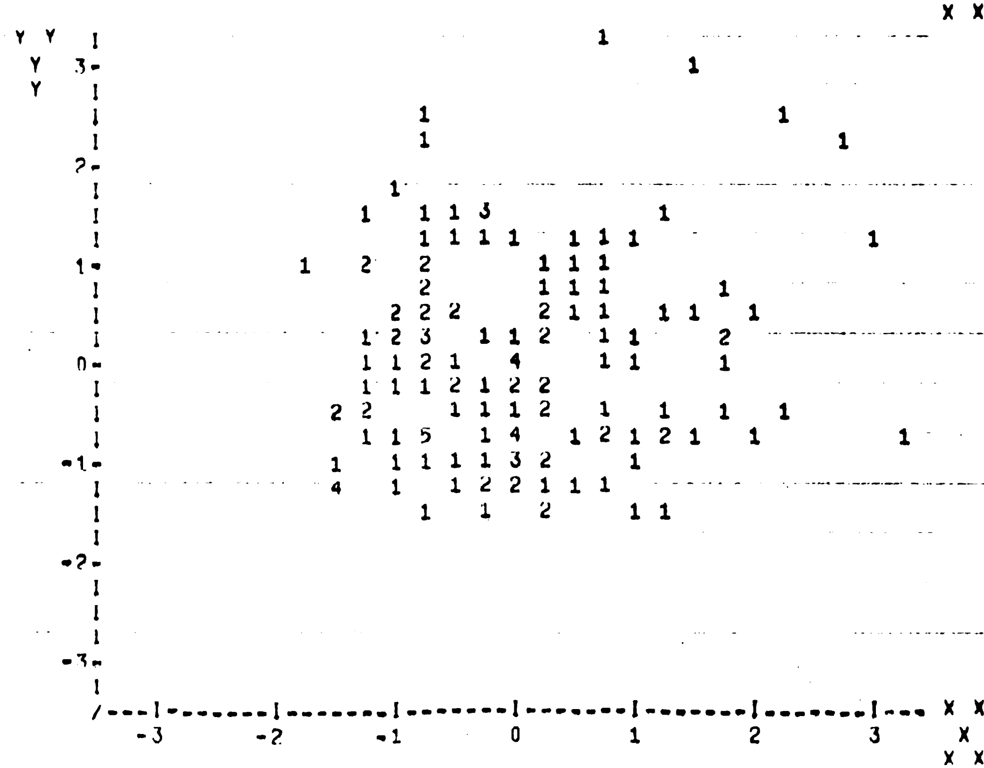
R = 0.112412

ETA(Y,X) =0.44534 ETA(X,Y) =0.36324

REGR. COEFS.

A(Y,X) = 0.03 A(X,Y) = 0.01

B(Y,X) = 0.2810 B(X,Y) = 0.0450



DATA SET 1

N = 149

	VARIABLE 5 (Y)	VARIABLE 9 (X)
MEAN =	0.131	0.010
STD.DEV. =	0.117	0.006
VARIANCE =	0.014	0.000

COVARIANCE = 0.000

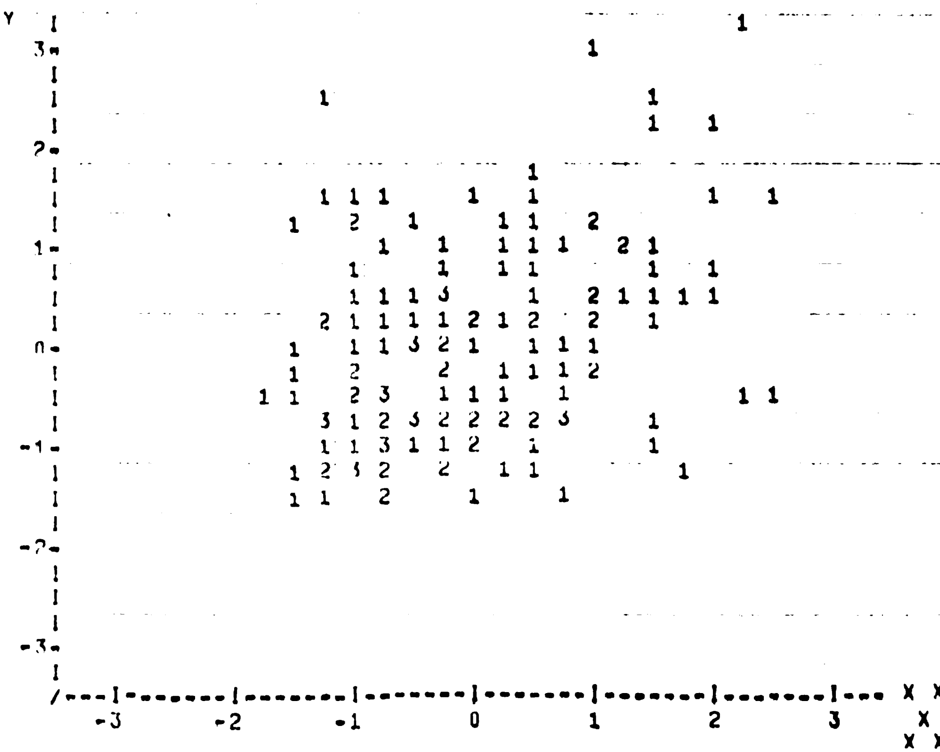
R = 0.336664

ETA(Y,X) = 0.45859 ETA(X,Y) = 0.13226

REGR. COEFS.

A(Y,X) = 0.02 A(X,Y) = 0.01

B(Y,X) = 1.[illegible]273 B(X,Y) = 0.1103



DATA SET 1

N = 149

	VARIABLE 5 (Y)	VARIABLE 10 (X)
MEAN =	0.131	0.009
STD.DEV. =	0.117	0.005
VARIANCE =	0.014	0.000

COVARIANCE = 0.000

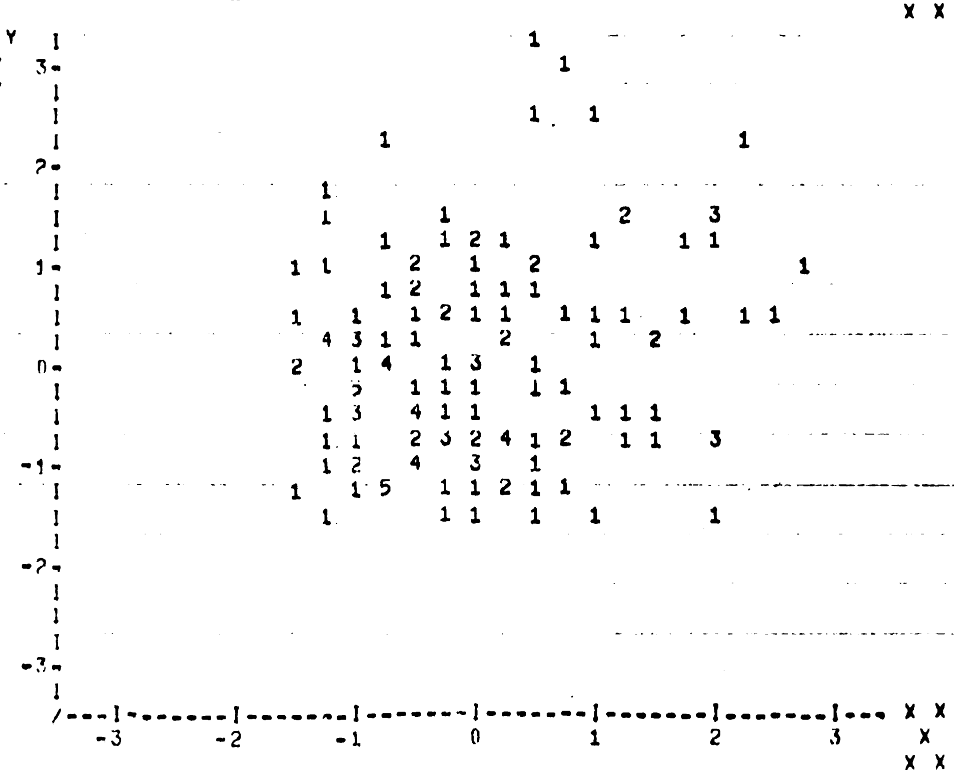
R = 0.199971

ETA(Y,X) = 0.31735 ETA(X,Y) = 0.46362

REGR. COEFS.

A(Y,X) = [illegible].03 A(X,Y) = 0.01

B(Y,X) = 0.[illegible]395 B(X,Y) = 0.0625



B12

DATA SET 1

N = 149

	VARIABLE 6 (Y)	VARIABLE 7 (X)
MEAN =	0.022	0.016
STD.DEV. =	0.012	0.009
VARIANCE =	0.000	0.000

COVARIANCE = 0.000

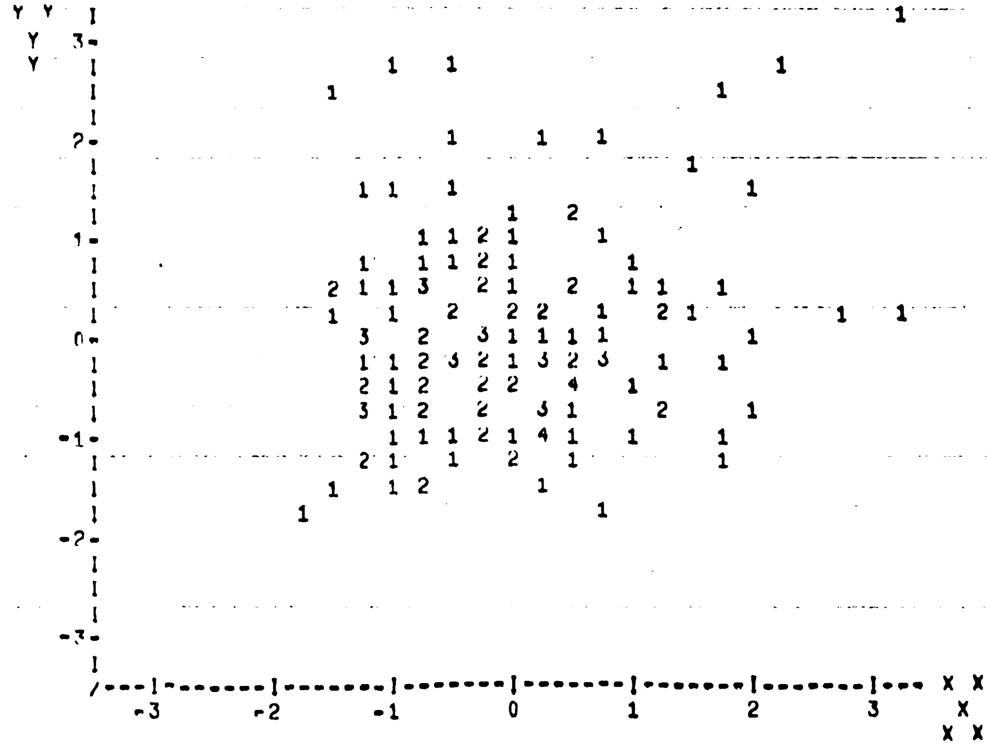
R = 0.171915

ETA(Y,X) =0.43224 ETA(X,Y) =0.40528

REGR. COEFS.

A(Y,X) = 0.02 A(X,Y) = 0.01

B(Y,X) = 0.2236 B(X,Y) = 0.1322



DATA SET 1

N = 149

	VARIABLE 6 (Y)	VARIABLE 8 (X)
MEAN =	0.022	0.013
STD.DEV. =	0.012	0.007
VARIANCE =	0.000	0.000

COVARIANCE = 0.000

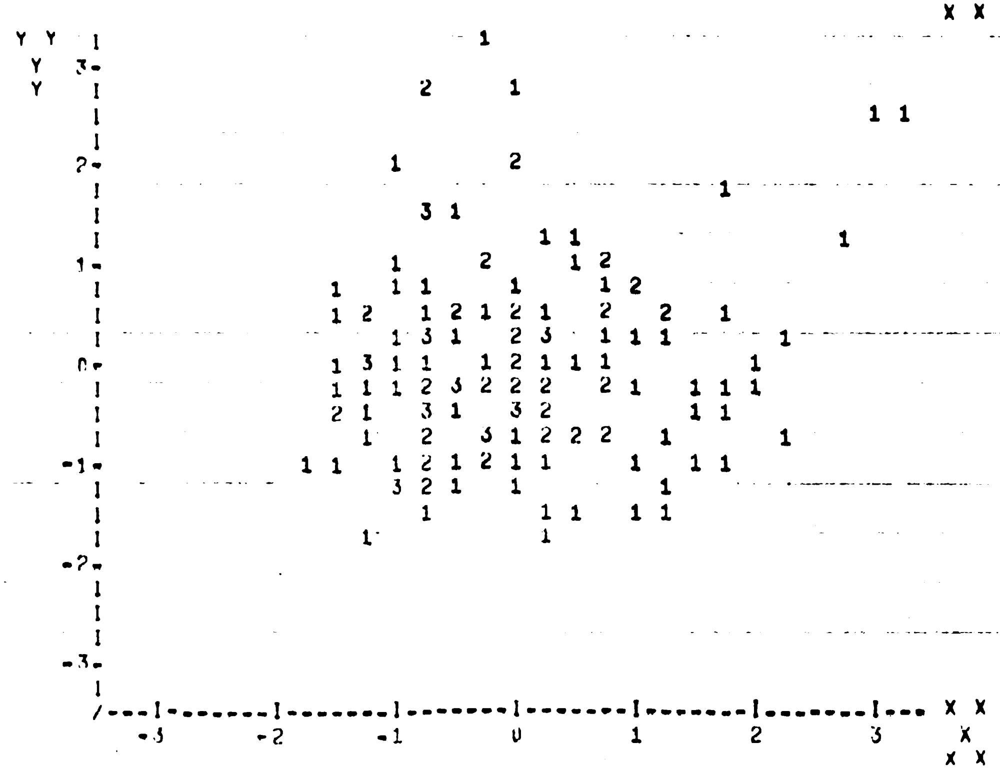
R = 0.315902

ETA(Y,X) =0.38376 ETA(X,Y) =0.49129

REGR. COEFS.

A(Y,X) = 0.02 A(X,Y) = 0.01

B(Y,X) = 0.1974 B(X,Y) = 0.0580



DATA SET 1

N = 149

	VARIABLE 6 (Y)	VARIABLE 9 (X)
MEAN =	0.122	0.010
STD.DEV. =	0.012	0.006
VARIANCE =	0.000	0.000

COVARIANCE = 0.000

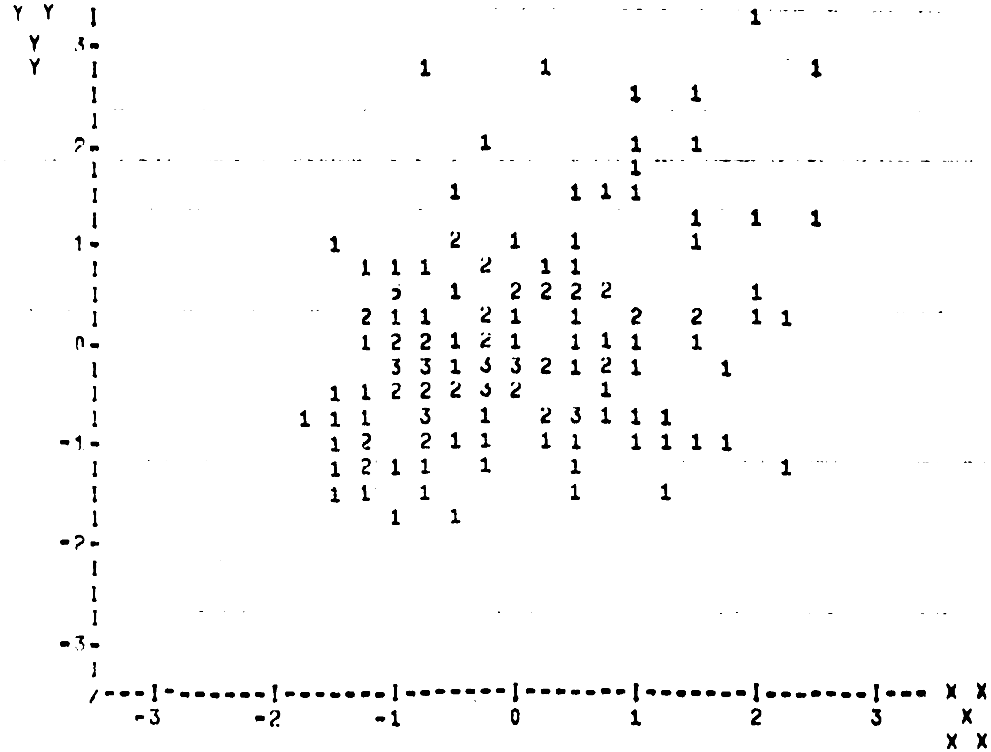
R = 0.340441

ETA(Y,X) =0.50642 ETA(X,Y) =0.46011

REGR. COEFS.

A(Y,X) = 0.01 A(X,Y) = 0.01

B(Y,X) = 0.7079 B(X,Y) = 0.1637



DATA SET 1

N = 149

	VARIABLE 6 (Y)	VARIABLE 10 (X)
MEAN =	0.122	0.009
STD.DEV. =	0.012	0.005
VARIANCE =	0.000	0.000

COVARIANCE = 0.000

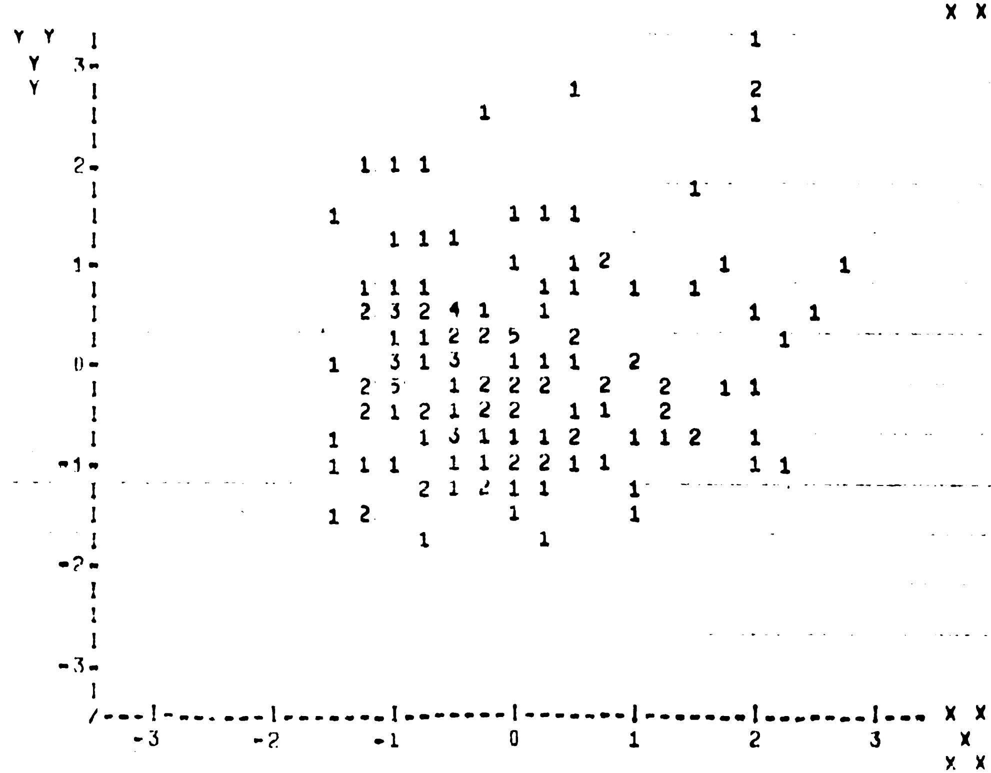
R = 0.157346

ETA(Y,X) =0.38122 ETA(X,Y) =0.46989

REGR. COEFS.

A(Y,X) = 0.62 A(X,Y) = 0.01

B(Y,X) = 0.3429 B(X,Y) = 0.0722



DATA SET 1

N = 149

	VARIABLE 7 (Y)	VARIABLE 8 (X)
MEAN =	0.016	0.013
STD.DEV. =	0.109	0.067
VARIANCE =	0.000	0.000

COVARIANCE = -0.000

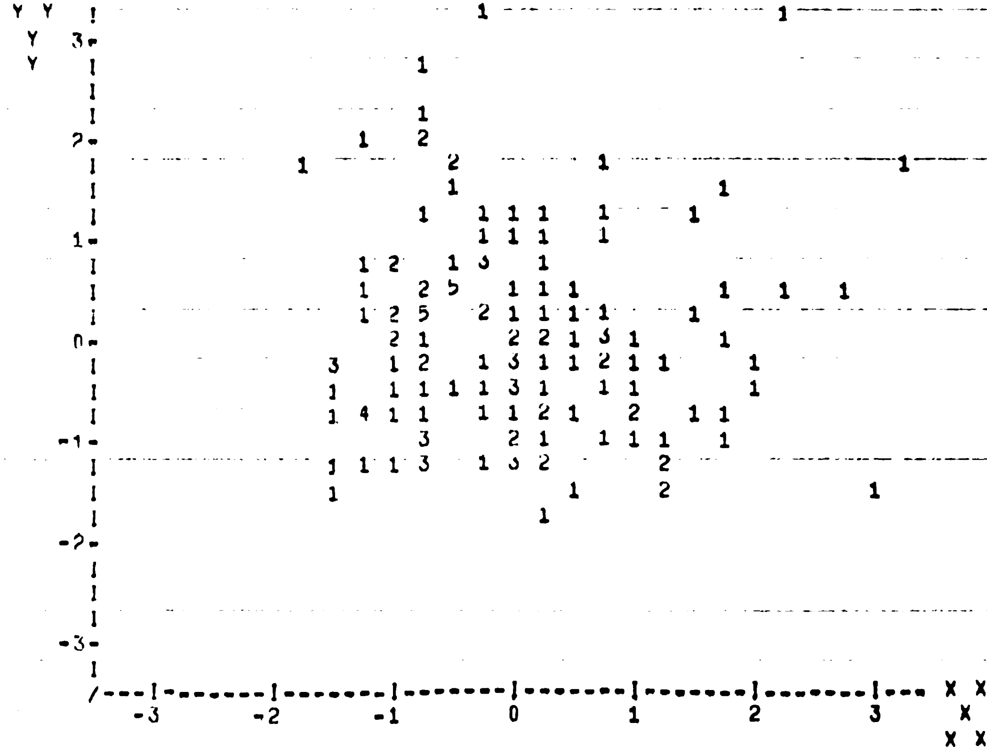
R = -0.020313

ETA(Y,X) =0.53318 ETA(X,Y) =0.34604

REGR. COEFS.

A(Y,X) = 0.02 A(X,Y) = 0.01

B(Y,X) = -0.1384 B(X,Y) = -0.0224



DATA SET 1

N = 149

	VARIABLE 7 (Y)	VARIABLE 9 (X)
MEAN =	0.015	0.016
STD.DEV. =	0.109	0.006
VARIANCE =	0.000	0.006

COVARIANCE = 0.000

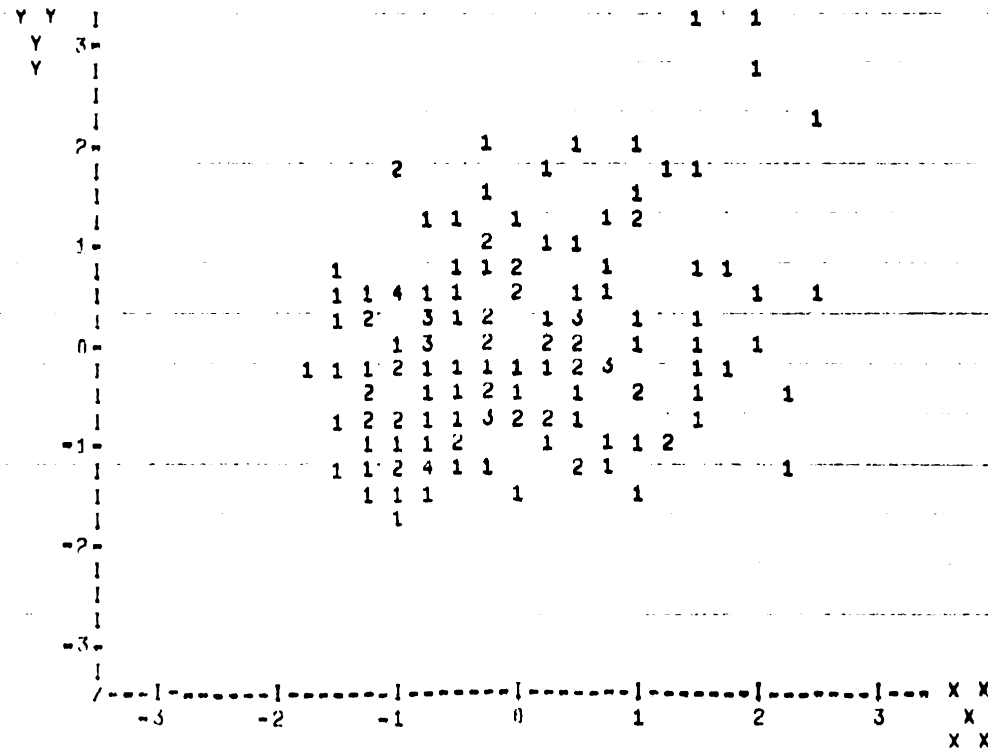
R = 0.291011

ETA(Y,X) =0.42084 ETA(X,Y) =0.41061

REGR. COEFS.

A(Y,X) = 0.01 A(X,Y) = 0.01

B(Y,X) = 0.4693 B(X,Y) = 0.1820



DATA SET 1

N = 149

	VARIABLE 7 (Y)	VARIABLE 10 (Y)
MEAN =	0.016	0.009
STD. DEV. =	0.109	0.005
VARIANCE =	0.00?	0.000

COVARIANCE = 0.000

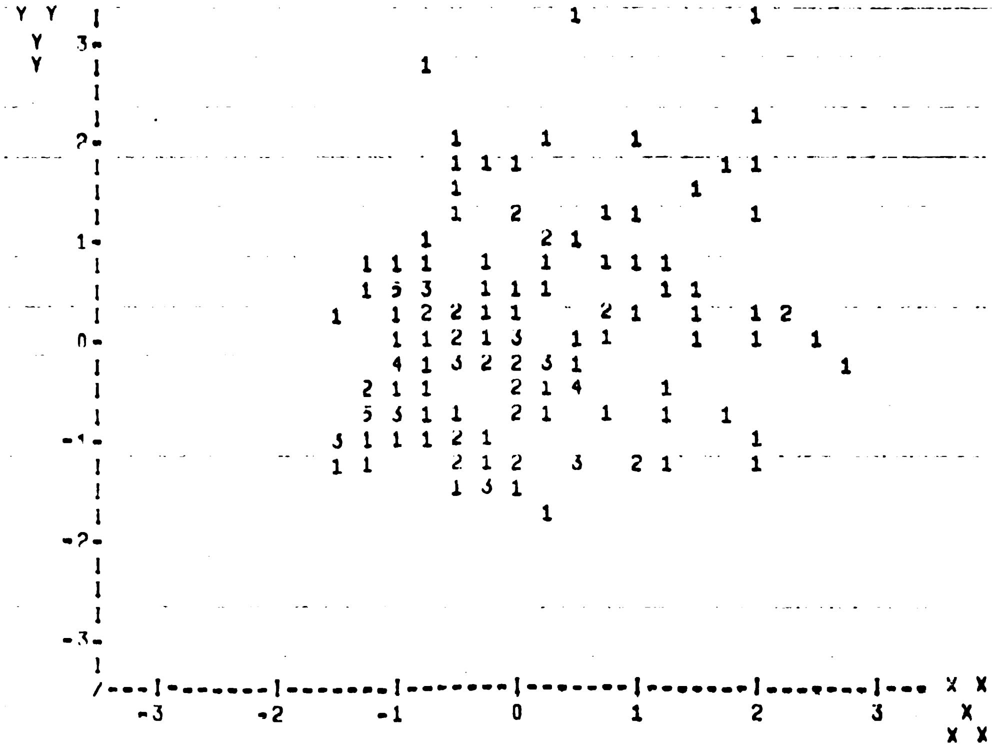
R = 0.215072

ETA(Y,X) = 0.35144 ETA(X,Y) = 0.41823

REGR. COEFS.

A(Y,X) = 0.01 A(X,Y) = 0.01

B(Y,X) = 0.?693 B(X,Y) = 0.1283



DATA SET 1

N = 149

	VARIABLE 8 (Y)	VARIABLE 9 (X)
MEAN =	0.013	0.019
STD. DEV. =	0.107	0.006
VARIANCE =	0.000	0.000

COVARIANCE = 0.000

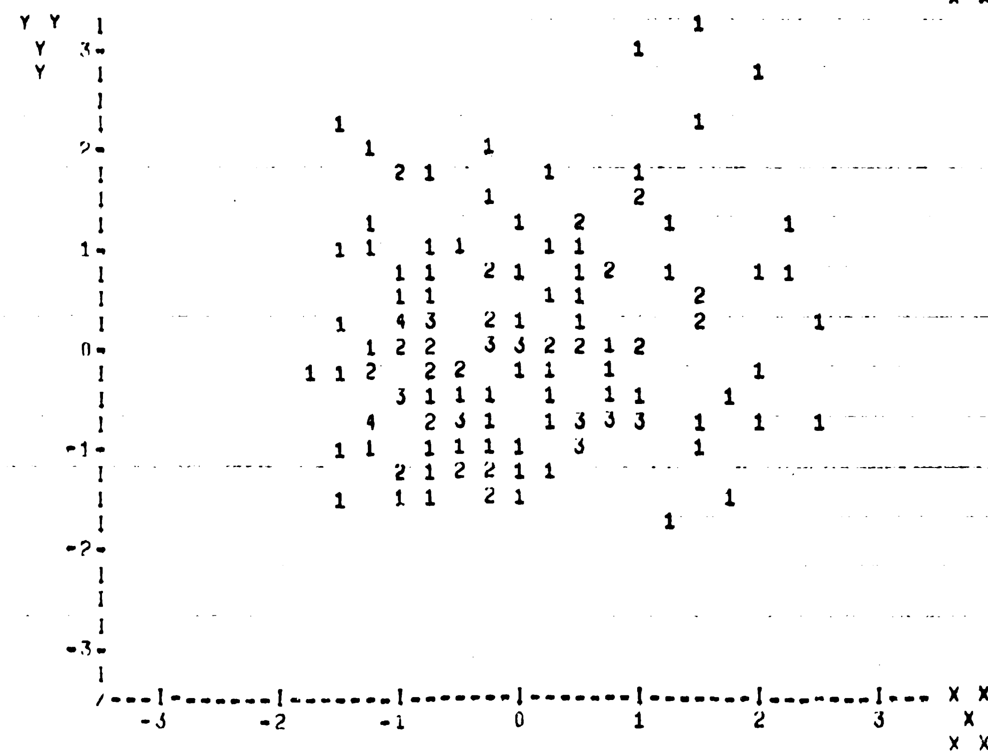
R = 0.131718

ETA(Y,X) = 0.32853 ETA(X,Y) = 0.40465

REGR. COEFS.

A(Y,X) = 0.01 A(X,Y) = 0.01

B(Y,X) = 0.1608 B(X,Y) = 0.1079



B12

DATA SET 1

N = 149

	VARIABLE 6 (Y)	VARIABLE 10 (X)
MEAN =	0,013	0,009
STD.DEV. =	0,007	0,005
VARIANCE =	0,000	0,000

COVARIANCE = 0.000

R = 0,149886

ETA(Y,X) =0,37630 ETA(X,Y) =0,42509

REGR. COEFS.

A(Y,X) = 0,01 A(X,Y) = 0,01

B(Y,X) = 0,1918 B(X,Y) = 0,1171