

บรรณานุกรม

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ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย



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ภาคผนวก ก

โปรแกรม 1



สับโปรแกรมคอมพิวเตอร์สำหรับการสร้างเลขสุ่มแบบปกติและการสร้างเลขสุ่มแบบ

สม่ำเสมอ

```

SUBROUTINE GAUSS (IX,S,AM,V)
  A = 0.0
  DO 50 I = 1, 12
    CALL RANDU (IX,IY,Y)
    IX = IY
  50 A = A+Y
  V = -(A-6.0)*S+AM
  RETURN
  END

```

SUBROUTINE GAUSS จะทำหน้าที่สร้างตัวแปรปกติที่กำหนดค่าเฉลี่ยและส่วนเบี่ยงเบนมาตรฐานให้ โดยอาศัย SUBROUTINE อีกอันหนึ่งคือ SUBROUTINE RANDU

SUBROUTINE RANDU จะทำหน้าที่สร้างตัวแปรสุ่มชนิดที่มีการแจกแจงในช่วง  $[0, 1]$  SUBROUTINE RANDU ที่ใช้ในเครื่องคอมพิวเตอร์ IBM ระบบ/360 ซึ่งมีขีดความสามารถในการสร้างตัวแปรสุ่มจำนวน  $2^{29}$  จำนวน ก่อนที่จะทำซ้ำวัฏจักรอีกครั้งหนึ่ง

```

SUBROUTINE RANDU (IX, IY, YFL)
  IY = IX* 65539
  IF (IY)5, 6, 6
  5 IY = IY+2147483647+1
  6 YFL = IY
  YFL = YFL*.4656613E-9
  RETURN
  END

```

ค่า YFL จะเป็นค่าที่ SUBROUTINE RANDU ส่งค่ามาเมื่อเราต้องการสร้างตัวแปรปกติ เราจำเป็นต้องอาศัยทฤษฎีทางสถิติคือ ทฤษฎีแนวโน้มเข้าสู่ส่วนกลาง (Central Limit Theorem) กล่าวคือถ้า  $YFL_i (i=1, 2, \dots, n)$  เป็นตัวแปรอิสระ มีการแจกแจงเหมือนกันโดยที่มีค่าเฉลี่ยและค่าส่วนเบี่ยงเบนมาตรฐานที่แน่นอน ค่าเฉลี่ยของตัวอย่างจะมีการแจกแจงแบบปกติโดยประมาณ

นั่นคือจะสรุปได้ว่า

$$Z = \frac{\frac{1}{n} \sum_{i=1}^n YFL_i - \mu}{\sigma/\sqrt{n}} \approx N(0, 1)$$

SUBROUTINE GAUSS จะใช้ YFL เป็นจำนวน 12 ตัว

เราทราบว่า ถ้า  $YFL \sim \text{UNIFORM}(0, 1)$

$$\text{โดย } E(YFL) = 1/2$$

$$V(YFL) = 1/12$$

ดังนั้นเราจะสรุปได้ว่า กรณี  $n = 12, \mu = 1/2, \sigma^2 = 1/12$

$$Z = \frac{\frac{1}{12} \sum_{i=1}^{12} YFL_i - 1/2}{\sqrt{\frac{1}{12 \times 12}}} \approx N(0, 1)$$

$$Z = \frac{\sum_{i=1}^{12} YFL_i - 6.0}{\sqrt{12 \times 12}} \approx N(0, 1)$$

จากนั้นเราอาศัยทฤษฎีทางสถิติที่กล่าวไว้ว่า ถ้า  $Z$  มีการแจกแจงแบบปกติที่มีค่าเฉลี่ยเป็น 0 และค่าความแปรปรวนเป็น 1 จะได้

$X = \mu + Z\sigma$  มีการแจกแจงแบบปกติที่มีค่าเฉลี่ยเท่ากับ  $\mu$  และค่าความแปรปรวน  $\sigma^2$

สรุปขั้นตอนในการสร้างตัวแปรปกติ  $N(\mu, \sigma^2)$

1. เรียก GAUSS

2. ปรับค่า  $X = \mu + Z\sigma$  หลังจากกำหนดค่า  $\mu, \sigma^2$  แล้ว

## โปรแกรม 2

โปรแกรมคอมพิวเตอร์สำหรับสร้างข้อมูลให้มีการแจกแจงแบบปกติสองตัวแปรที่ระดับ

$\rho = 0.1 \ 0.3 \ 0.5 \ 0.7 \ 0.9$  และสร้างตารางการแจกแจงขนาดต่าง ๆ พร้อมทั้งคำนวณหา

ค่าตัวสถิติที่ใช้วัดความสัมพันธ์ทั้ง 6 ตัว และคำนวณหาค่าคลาดเคลื่อนกว่าสี่ล่องน้อยที่สุด

```

C *****
C *
C *          PROGRAM  THESIS
C *          COMPARE  6  STATISTICS  VALUE
C *          FROM  CONTIGENCY  TABLE
C *****
1  DIMENSION  X(500),Y(500)
2  DIMENSION  F(6,6),CLASSX(4),CLASSY(4)
3  DIMENSION  FMAXR(6),FMAXC(6),SQFR(6),SQFC(6)
C      X , Y      IS  SAMPLE FROM RANDOM GENERATE
C      F(I,J)     IS  FREQUENCY IN CONTIGENCY TABLE
C      CLASSX(I)  IS  LIMIT SCORE TO CLASSIFY CONTIGENCY TABLE
C      CLASSY(I)  IS  LIMIT SCORE TO CLASSIFY CONTIGENCY TABLE
C      R , C      IS  NO. OF ROW  AND COLUMN
C      ROUND     IS  NO. OF ROUND TO GENERATE SAMPLE
C      N         IS  NO. OF SAMPLE X AND Y
C      FMAXR,FMAXC  IS  MAX FREQUENCY IN EACH ROW OR COLUMN
C      SQFR,SQFC   IS  SQUARE OF FREQUENCY IN EACH ROW OR COLUMN
C
4  INTEGER  ROUND,R,C,RS1,CS1
5  IX = 13
6  AM = 0.
7  S = 1.
8  N = 30
9  ROUND = 500
10 R = 3
11 C = 5
12 DO 5000  IRHO = 1,1,2
13 RHO = 0.1*IRHO
14 XMEAN1 = 0.
15 XMEAN2 = 0.
16 XMEAN3 = 0.
17 XMEAN4 = 0.
18 XMEAN5 = 0.
19 XMEAN6 = 0.
20 WRITE(6,9) RHO,N,ROUND,R,C
21 9  FORMAT(1H1,///20X,'A COMPARE OF MEASURING CORRELATION STATISTIC',
* /30X,'IN CONTIGENCY TABLE'//10X,'RHO = ',F4.2/10X,'SAMPLE ',
*I3,' NO. '/10X,'GRNERATE ',I4,' ROUNDS'//10X,'TABLE SIZE ',
*I2,' X',I2/80(' '))
C
C      *----- TRIAL  500  ROUNDS  -----*
22 DO 100  NROUND = 1,ROUND

```

```

C
C
C          *-----          GENERATE X,Y RANDOM          -----*
23      XMAX = -100
24      YMAX = -100
25      XMIN = 100
26      YMIN = 100

27      DO 110 J = 1,N
28          CALL GAUSS (IX,S,AM,X(J))
29          CALL GAUSS (IX,S,AM,W)
30          Y(J) = W*SQRT(1.0 - RHO**2) + X(J)*RHO
31          IF (XMAX .LT. X(J)) XMAX = X(J)
33          IF (YMAX .LT. Y(J)) YMAX = Y(J)
35          IF (XMIN .GT. X(J)) XMIN = X(J)
37          IF (YMIN .GT. Y(J)) YMIN = Y(J)
39      110 CONTINUE
C      WRITE(6,29) (X(I),I=1,N)
C      WRITE(6,29) (Y(I),I=1,N)
40      29 FORMAT(/(10F7.3))
C
C          *-----          SPEC. SIZE OF CONTIGENCY TABLE          -----*
C
41      RS1 = R - 1
42      CS1 = C - 1
43      XRANGE = (XMAX - XMIN)/FLOAT(R)
44      YRANGE = (YMAX - YMIN)/FLOAT(C)
45      DO 10 I = 1,RS1
46      10 CLASSX(I) = XMIN + XRANGE * FLOAT(I)
47      DO 20 I = 1,CS1
48      20 CLASSY(I) = YMIN + YRANGE * FLOAT(I)
C
C
C          *-----          CONTIGENCY TABLE          -----*
C
C      ** CLEAR TABLE **
49      KK = R+1
50      KK1 = C+1
51      DO 30 NROW = 1, KK
52      30 NCOL = 1, KK1
53      30 F(NROW,NCOL) = 0.0
C
C      ** COUNT FREQUENCY **
54      DO 40 NO = 1,N
55          KK = R
56          KK1 = C
57          DO 45 NROW = 1,RS1
58              IF ( X(NO) .GT. CLASSX(NROW) ) GOTO 45
59              KK = NROW
60              GOTO 55
61      45 CONTINUE
62      55 DO 60 NCOL = 1,CS1
63          IF ( Y(NO) .GT. CLASSY(NCOL) ) GOTO 60

```

```

64          KK1 = NCOL
65          GOTO 65
66 60      CONTINUE
67 65      F(KK, KK1) = F(KK, KK1) + 1
68 40      CONTINUE
C
C      *----- SUM FREQUENCY IN EACH ROW OR COL -----*
C
69      GT = 0.0
70      DO 70 NROW = 1, R
71      DO 70 NCOL = 1, C
72          FIJ = F(NROW, NCOL)
73          F(R+1, NCOL) = F(R+1, NCOL) + FIJ
74          F(NROW, C+1) = F(NROW, C+1) + FIJ
75 70      GT = GT + FIJ
76      F(R+1, C+1) = GT
C
C      *----- PRINT CONTINGENCY TABLE -----*
C
77      KK = R+1
78      KK1 = C+1
C      DO 80 NROW = 1, KK
C 80      WRITE(6, 99) (F(NROW, NCOL), NCOL = 1, K<1)
79 99      FORMAT(/(4X, 10F8.3))
C
C      *----- COMPUTE CHI-SQUARE -----*
C
80      X2 = 0.0
81      DO 90 NROW = 1, R
82      DO 90 NCOL = 1, C
83          E = F(R+1, NCOL) * F(NROW, C+1) / GT
84 90      X2 = X2 + (F(NROW, NCOL) - E)**2 / E
C      WRITE(6, 1000) X2
85 1000    FORMAT(10X, 'CHI-SQUARE IS ', F7.3)
C
C      *----- COMPUTE 6 STATISTIC VALUE -----*
C
86      XMINRC = RS1
87      IF (RS1 .GT. CS1) XMINRC = CS1
89      TEMPR = R
90      TEMPC = C
91      TEMPN = N
C      INITIAL VALUE AND COMPUTE FOR STAT NO 5 AND 6
92      FR = 0.
93      FC = 0.
94      SFMAXC = 0.
95      SFMAXR = 0.
96      SQC = 0.
97      SQR = 0.
98      SC = 0.0
99      SR = 0.0
100     DO 490 NROW = 1, R
101     IF (FR .LT. F(NROW, C+1)) FR = F(NROW, C+1)

```



```

103      SQR = SQR + F(NROW,C+1)**2
104      SQFC(NROW) = 0.
105  490    FMAXC(NROW) = 0.
106      DO 495 NCOL = 1,C
107      IF (FC .LT. F(R+1,NCOL)) FC = F(R+1,NCOL)
108      SQC = SQC + F(R+1,NCOL)**2
109      SQFR(NCOL) = 0.
110  495    FMAXR(NCOL) = 0.
111  C      **** FIND MAX FREQUENCY ****
112      DO 500 NROW = 1,R
113      DO 500 NCOL = 1,C
114          FIJ = F(NROW,NCOL)
115          IF(FMAXR(NCOL) .LT. FIJ) FMAXR(NCOL) = FIJ
116          IF(FMAXC(NROW) .LT. FIJ) FMAXC(NROW) = FIJ
117          SQFC(NROW) = SQFC(NROW) + FIJ**2
118          SQFR(NCOL) = SQFR(NCOL) + FIJ**2
119
120  500    CONTINUE
121      DO 510 NROW = 1,R
122          SFMAXC = SFMAXC + FMAXC(NROW)
123  510    SC = SC + SQFC(NROW)/F(NROW,C+1)
124      DO 520 NCOL = 1,C
125          SFMAXR = SFMAXR + FMAXR(NCOL)
126  520    SR = SR + SQFR(NCOL)/F(R+1,NCOL)
127
128  C      *----- STAT NO. 1  P H I - S Q U A R E -----8
129  C
130  C      PHI = SQRT(X2/TEMPN)
131      CORR = SQRT(XMINRC)
132      PHI = PHI / CORR
133
134  C      *----- STAT NO. 2  P E A R S O N 'S CONTINGENCY COEFF. --
135  C
136  C      C2 = SQRT(X2/(X2+TEMPN))
137      CORR = SQRT( XMINRC / (XMINRC + 1.))
138      C2 = C2 / CORR
139
140  C      *----- STAT NO. 3  T S C H U P R O W 'S CONTINGENCY COEFF.
141  C
142  C      A = 1.0 / SQRT( (TEMPR - 1.)*(TEMPC - 1.))
143      T = SQRT(X2 / TEMPN * A)
144      CORR = SQRT ( XMINRC*A)
145      T = T / CORR
146      T = PHI
147
148  C      *----- STAT NO. 4  C R A M E R 'S CONTINGENCY COEFF. ----*
149  C
150  C      V = SQRT( X2 / (TEMPN * XMINRC))
151      CORR = 1.0
152      V = PHI
153
154  C      *----- STAT NO. 5  G U T T M A N 'S COEFF. OF OPTIMAL PREDIC
155  C      *** CLEAR FMAXR,C FOR GET MAX VALUE OF FREQ.

```

```

136      A = SFMAXR + SFMAXC
137      B = FR + FC
138      C1 = 2.0 * TEMPN - B
139      RAMDA = SORT(ABS((A-B)/C1))
C      WRITE(6,99) FMAXC,FC
C      WRITE(6,99) FMAXR,FR
C
C      *----- STAT NO. 6  G O O D M A N   A N D   D R U S K A L -----*
C
140      A = 2.0*TEMPN - (SQR+SQC)/TEMPN
141      GOOD = ((SR - SQR/TEMPN) + (SC - SQC/TEMPN))/A
142      GOOD = SORT(ABS(GOOD))
C      WRITE(6,99) SQFC,SQC
C      WRITE(6,99) SQFR,SQR
C
C      *----- COMPUTE MEAN-SQUARE -----*
C
143      XMEAN1 = XMEAN1 + (PHI - RHO)**2
144      XMEAN2 = XMEAN2 + (C2 - RHO)**2
145      XMEAN3 = XMEAN3 + (T - RHO)**2
146      XMEAN4 = XMEAN4 + (V - RHO)**2
147      XMEAN5 = XMEAN5 + (RAMDA - RHO)**2
148      XMEAN6 = XMEAN6 + (GOOD - RHO)**2
C      WRITE(6,98) PHI,C2,T,V,RAMDA,GOOD
149      98  FORMAT(10X,'STAT VALUE = ',6F12.5)
150      100  CONTINUE
151      A = 1.0/FLOAT(ROUND)
152      XMEAN1 = XMEAN1 * A
153      XMEAN2 = XMEAN2 * A
154      XMEAN3 = XMEAN3 * A
155      XMEAN4 = XMEAN4 * A
156      XMEAN5 = XMEAN5 * A
157      XMEAN6 = XMEAN6 * A
158      WRITE(6,109) XMEAN1,XMEAN2,XMEAN3,XMEAN4,XMEAN5,XMEAN6
159      109  FORMAT(////10X,'** MEAN SQUARE ** = ',6F10.3)
160      5000 CONTINUE
161      STOP
162      END

```

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

## ภาคผนวก ข

แสดงการจำลองข้อมูลให้มีการแจกแจงแบบปกติสองตัวแปรโดยมีสัมประสิทธิ์สหสัมพันธ์เท่ากับ 0.1 ขนาดตัวอย่างจำนวน 50 แล้วนำมาใส่ตารางการแจกแจงขนาด 2x2 พร้อมทั้งคำนวณค่าไคสแควร์ และตัวสถิติที่ใช้วัดความสัมพันธ์ทั้ง 6 ตัว และคำนวณหาความคลาดเคลื่อนกำลังสองเฉลี่ย ของข้อมูลที่จำลองทั้งสิ้น 30 รอบ

A COMPARE OF MEASURING CORRELATION STATISTIC  
IN CONTINGENCY TABLE

RHO = 0.10  
SAMPLE 50 NO.  
GENERATE 30 ROUNDS  
TABLE SIZE 2 X 2

SAMPLE ROUND : 1									
X	Y	X	Y	X	Y	X	Y	X	Y
-1.906	-0.379	1.543	1.069	0.489	1.298	0.649	1.000	1.081	1.101
1.306	0.606	-1.565	-2.559	0.295	-1.165	-0.449	0.954	-0.164	-0.406
1.868	-0.135	0.585	0.106	0.262	0.487	-0.361	0.654	-0.954	1.558
1.529	-0.279	-0.029	-0.990	0.224	-0.856	-0.774	0.593	0.133	-0.745
1.437	0.413	-1.901	0.068	0.667	-1.082	0.405	-0.012	0.417	-0.073
2.771	1.775	-0.375	0.271	-0.647	-0.487	1.668	-0.349	0.748	0.310
-0.641	0.134	-0.014	0.004	0.949	0.788	0.537	0.886	-1.873	0.456
0.310	-0.843	1.018	-0.734	0.648	0.750	-0.814	-1.291	0.334	0.834
-0.368	-0.529	0.587	0.232	-1.205	-0.373	-0.935	-0.155	0.550	1.415
0.863	0.760	-0.790	-0.413	-0.488	0.355	-0.472	-0.668	-2.017	-1.615

## CONTINGENCY TABLE

		COLUMN 1	COLUMN 2	TOTAL
		-2.559 TO -0.392	-0.392 TO 1.775	
ROW 1	-2.017 TO 0.377	I 13.	I 15.	I 28.
ROW 2	0.377 TO 2.771	I 2.	I 20.	I 22.
TOTAL		I 15.	I 35.	I 50.

CHI-SQUARE IS 6.497  
PHI COEFFICIENT : 0.36048  
PEARSON'S CONTINGENCY COEFFICIENT : 0.47959  
TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.36048  
CRAMER'S CONTINGENCY COEFFICIENT : 0.36048  
GUTTMAN'S COEFFICIENT : 0.36761  
GOODMAN AND KRUSKAL'S TAU : 0.40444

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTIGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 2

X	Y	X	Y	X	Y	X	Y	X	Y
-0.309	0.638	-0.318	0.057	1.325	0.297	2.454	-1.481	-0.506	-0.148
1.582	0.031	-0.301	-0.659	-0.214	-0.902	-1.122	-0.623	-0.778	0.555
-0.593	0.555	-0.515	-0.535	0.100	1.561	-1.392	-1.865	-0.793	0.464
-0.940	0.746	-0.582	0.193	-0.252	-0.381	0.857	-1.121	0.017	1.482
-2.910	-0.591	0.650	-1.279	0.116	0.979	1.866	0.016	0.373	0.068
-0.677	0.101	-0.261	-1.285	-0.886	0.159	-0.473	0.333	-1.227	-0.038
0.487	-1.236	0.268	1.153	-1.192	0.762	1.008	-0.616	-0.885	1.429
-1.163	0.739	-0.527	-0.377	0.037	-0.358	-0.617	0.752	0.329	-0.151
-1.218	0.753	-0.132	1.019	1.048	0.322	1.250	-0.491	-1.008	1.526
-1.493	1.209	-1.133	0.247	1.109	2.043	0.361	0.109	-1.037	-0.598

CONTIGENCY TABLE  
 -----

		COLUMN 1		COLUMN 2		TOTAL
		-1.865 TO 0.089		0.089 TO 2.043		
ROW 1	-2.910 TO -0.228	I 12.	I	17.	I	29.
ROW 2	-0.228 TO 2.454	I 12.	I	9.	I	21.
	TOTAL	I 24.	I	26.	I	50.

CHI-SQUARE IS 0.663  
 PHI COEFFICIENT : 0.11517  
 PEARSON'S CONTIGENCY COEFFICIENT : 0.16181  
 TSCHUPROW'S CONTIGENCY COEFFICIENT : 0.11517  
 CRAMER'S CONTIGENCY COEFFICIENT : 0.11517  
 GUTTMAN'S COEFFICIENT : 0.25820  
 GOODMAN AND KRUSKAL'S TAU : 0.15573

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 3

X	Y	X	Y	X	Y	X	Y	X	Y
-2.401	-1.355	1.414	0.020	0.145	0.340	-0.756	0.256	0.001	-1.588
-0.327	0.538	-1.396	0.388	0.357	-0.223	0.831	0.649	-0.607	-1.642
0.996	-0.084	0.311	1.628	-0.152	0.986	1.082	-0.117	0.577	-0.625
1.112	-1.072	-1.192	0.228	-0.752	-1.026	-1.395	-0.975	1.770	0.416
-0.530	0.177	0.399	0.641	0.340	1.512	0.291	-0.192	0.591	-0.653
0.042	-1.151	-0.963	0.326	0.684	1.366	-1.071	-0.961	0.686	-0.798
-1.044	-0.991	-0.044	-0.300	1.243	-0.437	-0.162	-0.158	0.353	-1.287
0.115	-1.125	-0.711	0.725	1.006	-1.483	0.488	0.292	-0.831	-0.431
-0.174	-1.145	-1.302	0.032	-0.383	-0.076	0.126	-0.023	-0.389	1.223
0.422	0.546	0.998	-0.938	-1.006	-0.418	1.403	-0.219	-0.315	-1.207

CONTINGENCY TABLE  
 -----

		COLUMN 1	COLUMN 2	TOTAL
		-1.642 TO -0.007	-0.007 TO 1.628	
ROW 1	-2.401 TO -0.316	I 9.	I 9.	I 18.
ROW 2	-0.316 TO 1.770	I 21.	I 11.	I 32.
	TOTAL	I 30.	I 20.	I 50.

CHI-SQUARE IS 0.611  
 PHI COEFFICIENT : 0.11057  
 PEARSON'S CONTINGENCY COEFFICIENT : 0.15542  
 TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.11057  
 CRAMER'S CONTINGENCY COEFFICIENT : 0.11057  
 GUTTMAN'S COEFFICIENT : 0.00000  
 GOODMAN AND KRUSKAL'S TAU : 0.15309

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 4

X	Y	X	Y	X	Y	X	Y	X	Y
-1.110	1.243	-0.220	0.659	-1.041	-0.492	-0.004	-0.514	-0.451	0.261
-1.508	-1.287	1.037	0.914	-0.138	0.867	0.234	0.948	2.138	-0.698
0.394	-1.068	0.790	0.483	0.203	0.378	-1.274	1.110	-0.211	1.429
-0.711	0.354	-0.286	-2.287	1.263	0.347	-0.021	0.158	-0.133	0.318
0.024	0.176	0.758	0.972	-0.277	-1.391	-0.968	0.406	1.390	0.960
0.219	0.184	-1.223	0.371	0.290	0.355	-0.928	-0.277	1.652	-0.938
1.900	0.581	1.150	0.297	1.326	-1.582	0.067	-0.024	-1.150	-0.161
0.121	0.463	2.411	-0.411	0.470	0.324	-0.616	-0.250	0.708	1.586
-2.416	0.902	0.869	-0.209	-1.739	-1.571	0.422	-0.184	1.103	0.931
2.273	1.346	-0.763	-0.132	1.768	-0.235	1.227	-0.372	1.689	-1.397

CONTINGENCY TABLE  
 -----

	COLUMN 1	COLUMN 2	TOTAL
	-2.287 TO -0.351	-0.351 TO 1.586	
ROW 1 -2.416 TO -0.002	I 6.	I 16.	I 22.
ROW 2 -0.002 TO 2.411	I 7.	I 21.	I 28.
TOTAL	I 13.	I 37.	I 50.

CHI-SQUARE IS 0.020

PHI COEFFICIENT	:	0.02021
PEARSON'S CONTINGENCY COEFFICIENT	:	0.02857
TSCHUPROW'S CONTINGENCY COEFFICIENT	:	0.02021
CRAMER'S CONTINGENCY COEFFICIENT	:	0.02021
GUTTMAN'S COEFFICIENT	:	0.00000
GOODMAN AND KRUSKAL'S TAU	:	0.02572

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 5

X	Y	X	Y	X	Y	X	Y	X	Y
-0.928	0.392	-0.744	-1.719	0.212	0.338	0.125	-0.494	0.522	0.905
-0.608	0.374	-1.684	-1.758	0.589	0.260	-2.655	0.419	0.685	0.307
0.798	-0.032	0.088	0.448	-0.700	0.539	-1.357	0.996	-0.085	-0.100
-2.369	-0.145	1.144	1.370	0.773	-0.408	-1.075	-0.510	-0.775	-1.034
-0.365	0.233	0.583	0.804	0.086	1.087	0.878	-0.747	1.530	0.423
0.581	2.276	-1.344	-1.622	0.598	0.402	1.588	0.055	-1.726	0.161
-1.108	-0.119	-2.608	0.207	0.567	-0.164	-1.829	-0.729	2.052	0.879
0.269	0.446	0.223	1.564	0.780	-1.953	-0.606	-0.365	1.236	0.204
-1.684	-1.318	-1.392	-0.894	-0.823	1.087	-1.698	0.160	-0.398	-0.741
1.162	0.794	-1.344	1.113	-0.527	0.004	-0.160	0.516	0.952	1.749

CONTINGENCY TABLE  
 -----

	COLUMN 1 -1.953 TO 0.161	COLUMN 2 0.161 TO 2.276	TOTAL
ROW 1 -2.655 TO -0.301	I 15.	I 9.	I 24.
ROW 2 -0.301 TO 2.052	I 8.	I 18.	I 26.
TOTAL	I 23.	I 27.	I 50.

CHI-SQUARE IS 3.862  
 PHI COEFFICIENT : 0.27791  
 PEARSON'S CONTINGENCY COEFFICIENT : 0.37868  
 TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.27791  
 CRAMER'S CONTINGENCY COEFFICIENT : 0.27791  
 GUTTMAN'S COEFFICIENT : 0.52592  
 GOODMAN AND KRUSKAL'S TAU : 0.31807

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 6

X	Y	X	Y	X	Y	X	Y	X	Y
0.092	0.071	0.758	-1.776	-2.213	-1.022	0.484	0.611	-0.259	-0.291
-0.836	1.369	-0.798	0.826	-0.733	-1.292	-1.140	-1.706	0.700	0.969
-0.158	1.290	-1.192	1.547	-1.291	-1.925	0.373	-2.596	0.464	1.075
1.614	-0.192	0.545	-0.691	-0.810	0.606	-0.173	0.687	1.195	1.184
-0.375	0.660	0.161	-0.184	1.689	0.136	0.058	-1.653	-0.793	0.595
-1.708	0.388	1.807	-0.372	0.710	-0.113	-1.450	1.163	0.592	-0.080
0.939	-0.132	0.659	0.962	-1.089	-0.364	-0.932	-0.513	0.842	-0.328
-1.587	-1.182	0.547	-0.843	-0.273	0.568	0.276	0.540	-1.520	1.253
-0.283	0.479	-2.421	-0.437	-2.003	-0.008	0.368	0.637	-0.321	2.070
-0.370	-0.955	-1.236	1.124	0.585	-0.012	-0.310	1.998	-0.111	-0.707

CONTINGENCY TABLE

	COLUMN 1 -2.596 TO -0.263	COLUMN 2 -0.263 TO 2.070	TOTAL
ROW 1 -2.421 TO -0.307	I 9.	I 13.	I 22.
ROW 2 -0.307 TO 1.807	I 9.	I 19.	I 28.
TOTAL	I 18.	I 32.	I 50.

CHI-SQUARE IS 0.119

PHI COEFFICIENT	:	0.04869
PEARSON'S CONTINGENCY COEFFICIENT	:	0.06877
TSCHUPROW'S CONTINGENCY COEFFICIENT	:	0.04869
CRAMER'S CONTINGENCY COEFFICIENT	:	0.04869
GUTTMAN'S COEFFICIENT	:	0.00000
GOODMAN AND KRUSKAL'S TAU	:	0.09066





-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 7

X	Y	X	Y	X	Y	X	Y	X	Y
-0.567	0.261	1.638	-0.064	-1.992	0.221	0.363	-0.603	-0.536	0.995
-0.965	-0.580	-0.110	-0.613	-0.940	-0.958	-0.087	0.049	0.284	-3.415
0.596	0.149	-1.012	0.400	0.439	2.010	0.893	-0.677	0.382	-0.321
-0.845	-0.723	-1.200	2.308	0.369	0.005	0.506	0.226	0.568	0.631
-0.248	-1.932	1.221	0.260	1.227	0.953	0.236	1.062	0.055	0.542
-0.044	0.117	-0.199	0.722	-0.835	-1.436	-0.534	2.373	1.083	0.409
-0.513	-1.004	0.365	0.285	0.742	1.484	1.108	-0.822	-0.457	0.809
-1.157	-2.348	-0.359	-0.926	-0.461	0.735	0.226	1.343	-0.394	0.996
-1.078	0.028	0.886	-1.053	-2.206	-0.639	1.662	0.153	1.343	-1.713
0.654	0.710	0.506	-0.198	0.020	0.477	-1.341	-0.373	-0.647	-0.508

CONTINGENCY TABLE  
 -----

	COLUMN 1	COLUMN 2	TOTAL
	-3.415 TO -0.521	-0.521 TO 2.373	
ROW 1	-2.206 TO -0.272	I 8. I 12. I	20.
ROW 2	-0.272 TO 1.662	I 8. I 22. I	30.
TOTAL	I 16. I	I 34. I	50.

CHI-SQUARE IS 0.463  
 PHI COEFFICIENT : 0.09627  
 PEARSON'S CONTINGENCY COEFFICIENT : 0.13552  
 TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.09627  
 CRAMER'S CONTINGENCY COEFFICIENT : 0.09627  
 GUTTMAN'S COEFFICIENT : 0.00000  
 GOODMAN AND KRUSKAL'S TAU : 0.14003

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 8

X	Y	X	Y	X	Y	X	Y	X	Y
-0.382	-1.063	0.686	0.462	0.631	1.673	-0.510	-0.097	-1.612	-0.784
0.670	-0.308	-0.985	0.250	1.572	0.386	1.076	0.200	0.978	0.141
0.570	0.643	0.108	0.773	0.937	-1.636	0.618	-1.391	0.053	-0.026
1.605	-0.891	-0.770	0.928	1.599	2.144	-0.779	0.043	0.571	0.202
2.214	0.693	-0.072	0.281	0.834	0.759	-0.485	0.704	0.145	-0.199
0.613	1.365	-1.352	1.135	0.943	-0.745	-1.718	0.899	1.662	1.098
0.421	-1.406	-0.636	0.663	0.881	0.565	-1.918	-0.139	-1.088	1.002
-1.715	-0.311	1.202	0.248	-1.119	0.428	0.878	0.710	0.215	-0.049
0.502	-0.790	0.068	0.292	1.077	0.808	1.660	-0.511	-0.961	-1.395
-0.351	0.133	-0.734	-2.078	2.130	-0.370	1.070	1.974	-0.367	0.035

CONTINGENCY TABLE  
 -----

	COLUMN 1 -2.078 TO 0.033	COLUMN 2 0.033 TO 2.144	TOTAL
ROW 1 -1.918 TO 0.148	I 9.	I 14.	I 23.
ROW 2 0.148 TO 2.214	I 10.	I 17.	I 27.
TOTAL	I 19.	I 31.	I 50.

CHI-SQUARE IS 0.020  
 PHI COEFFICIENT : 0.01984  
 PEARSON'S CONTINGENCY COEFFICIENT : 0.02805  
 TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.01984  
 CRAMER'S CONTINGENCY COEFFICIENT : 0.01984  
 GUTTMAN'S COEFFICIENT : 0.00000  
 GOODMAN AND KRUSKAL'S TAU : 0.02150

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 9

X	Y	X	Y	X	Y	X	Y	X	Y
1.204	1.217	-1.869	-1.583	-0.146	0.817	-0.972	0.778	0.648	-0.246
1.171	1.360	-1.352	-0.429	-2.158	-0.740	-0.644	-2.678	-1.241	0.627
0.710	-0.311	0.081	-0.255	1.086	1.893	0.402	-1.456	0.297	-0.266
-1.245	-0.571	-2.404	-0.658	0.608	-0.083	0.669	0.164	-2.130	1.579
-0.357	0.328	-0.115	-0.791	-0.918	-0.159	0.435	-0.584	-0.014	-0.216
0.740	1.032	-1.206	0.220	-0.543	1.078	0.381	2.493	2.682	-0.254
1.063	-2.423	1.945	-1.805	-0.412	1.002	1.217	-0.737	-0.853	-0.670
-0.094	0.795	0.364	0.196	-0.145	-0.679	-0.697	1.263	-0.653	0.408
-1.534	0.280	-1.897	0.251	0.790	-0.546	-0.722	-1.192	0.653	1.565
0.468	-0.101	0.866	0.725	0.705	0.955	1.681	-0.818	-0.542	-1.107

CONTINGENCY TABLE  
 -----

	COLUMN 1	COLUMN 2	TOTAL
	-2.678 TO -0.092	-0.092 TO 2.493	
ROW 1	-2.404 TO 0.139	I 14. I 13.	I 27.
ROW 2	0.139 TO 2.682	I 12. I 11.	I 23.
TOTAL	I 26.	I 24.	I 50.

CHI-SQUARE IS 0.068  
 PHI COEFFICIENT : 0.03695  
 PEARSON'S CONTINGENCY COEFFICIENT : 0.05222  
 TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.03695  
 CRAMER'S CONTINGENCY COEFFICIENT : 0.03695  
 GUTTMAN'S COEFFICIENT : 0.00000  
 GOODMAN AND KRUSKAL'S TAU : 0.00323

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 10

X	Y	X	Y	X	Y	X	Y	X	Y
-0.212	0.259	-0.364	-1.628	0.310	0.599	-0.418	1.048	0.813	1.499
0.079	1.294	0.297	0.854	-0.653	-0.368	0.200	0.224	-1.957	0.249
0.399	0.452	-0.739	-0.944	0.207	-0.224	-0.466	-0.298	0.375	0.992
-2.169	-0.448	2.092	-1.578	0.560	1.128	-1.018	-0.004	-0.434	-0.038
0.111	-0.298	0.131	-0.665	-0.021	1.453	-0.027	0.217	1.523	-0.502
1.252	1.472	0.122	-1.295	-0.439	-1.241	-0.413	1.247	-0.068	-0.936
-1.830	-0.778	-0.164	1.095	1.559	-0.162	1.179	-0.540	1.880	0.428
0.307	-0.404	-0.303	-0.396	0.001	0.055	2.011	0.040	0.482	0.564
-0.740	1.202	0.405	-0.859	0.320	0.853	0.867	1.446	2.504	0.016
0.400	0.384	-0.436	0.787	0.973	-1.407	-0.311	0.178	-1.007	0.582

CONTINGENCY TABLE  
 -----

	COLUMN 1	COLUMN 2	TOTAL
	-1.628 TO -0.064	-0.064 TO 1.499	
ROW 1	-2.169 TO 0.168	I 12. I 15. I	27.
ROW 2	0.168 TO 2.504	I 8. I 15. I	23.
TOTAL	I 20. I	30. I	50.

CHI-SQUARE IS 0.164  
 PHI COEFFICIENT : 0.05734  
 PEARSON'S CONTINGENCY COEFFICIENT : 0.08096  
 TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.05734  
 CRAMER'S CONTINGENCY COEFFICIENT : 0.05734  
 GUTTMAN'S COEFFICIENT : 0.00000  
 GOODMAN AND KRUSKAL'S TAU : 0.09829

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTIGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 11

X	Y	X	Y	X	Y	X	Y	X	Y
-0.497	1.444	0.305	-0.698	0.071	0.757	0.191	1.015	1.893	-0.353
1.371	1.220	-1.091	0.415	-0.997	0.072	-0.507	0.273	-0.319	1.294
1.460	-0.189	-0.563	-1.963	-0.940	-0.333	0.741	1.449	-1.018	2.181
1.500	-1.225	-0.648	0.310	-0.941	-0.471	-1.267	-0.570	1.200	0.774
0.127	-1.169	1.143	0.543	0.971	0.669	0.545	-0.856	0.142	-0.283
-0.499	2.135	0.953	-0.412	1.543	0.933	-1.844	1.483	0.641	1.356
-0.062	0.423	0.202	-2.333	-1.074	2.249	-0.930	0.027	1.183	0.649
0.529	-0.421	0.211	-0.564	0.297	0.076	-1.054	0.817	-1.468	-1.807
1.767	-2.371	0.829	-2.447	0.485	-0.204	1.219	0.064	1.353	1.213
0.173	-0.244	0.058	0.128	-1.402	0.095	-0.274	-2.041	1.839	1.446

CONTIGENCY TABLE  
 -----

	COLUMN 1	COLUMN 2	TOTAL
	-2.447 TO -0.099	-0.099 TO 2.249	
ROW 1	-1.844 TO 0.025	I 6. I 14. I	20. I
ROW 2	0.025 TO 1.893	I 15. I 15. I	30. I
TOTAL	I 21. I	29. I	50. I

CHI-SQUARE IS 1.235  
 PHI COEFFICIENT : 0.15716  
 PEARSON'S CONTIGENCY COEFFICIENT : 0.21956  
 TSCHUPROW'S CONTIGENCY COEFFICIENT : 0.15716  
 CRAMER'S CONTIGENCY COEFFICIENT : 0.15716  
 GUTTMAN'S COEFFICIENT : 0.00000  
 GOODMAN AND KRUSKAL'S TAU : 0.19852

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 12

X	Y	X	Y	X	Y	X	Y	X	Y
-1.078	-0.913	-0.323	0.067	0.645	-1.177	0.332	-2.520	0.335	1.110
-1.537	0.257	0.867	-1.861	-0.837	-0.466	-1.445	-0.214	-1.036	0.951
2.150	1.689	-0.163	-0.814	-1.160	0.747	-1.811	-2.248	0.252	0.722
0.864	-1.343	1.448	-2.813	1.144	0.995	-1.070	-0.770	1.750	0.268
0.636	-0.392	-0.162	-0.186	-1.057	-0.093	0.004	-0.823	-0.337	1.502
0.279	0.663	0.048	0.374	0.133	0.194	0.786	0.244	-0.526	1.136
0.003	0.041	-0.355	0.468	1.263	0.666	-1.569	-0.772	0.566	0.709
-0.951	-0.567	-0.649	-0.259	-0.842	-0.003	0.494	1.889	-1.149	-0.487
0.309	0.116	-0.338	-0.853	0.546	-0.690	-0.440	0.143	0.395	-0.439
-2.047	0.344	0.480	-1.447	0.684	1.656	-1.135	-0.873	-0.963	-0.009

CONTINGENCY TABLE  
 -----

	COLUMN 1	COLUMN 2	TOTAL
	-2.813 TO -0.462	-0.462 TO 1.889	
ROW 1	-2.047 TO 0.051	I 11. I 17.	I 28.
ROW 2	0.051 TO 2.150	I 7. I 15.	I 22.
TOTAL	I 18.	I 32.	I 50.

CHI-SQUARE IS 0.062

PHI COEFFICIENT	:	0.03525
PEARSON'S CONTINGENCY COEFFICIENT	:	0.04983
TSCHUPROW'S CONTINGENCY COEFFICIENT	:	0.03525
CRAMER'S CONTINGENCY COEFFICIENT	:	0.03525
GUTTMAN'S COEFFICIENT	:	0.00000
GOODMAN AND KRUSKAL'S TAU	:	0.07723

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 13

X	Y	X	Y	X	Y	X	Y	X	Y
2.052	-0.571	0.730	1.298	-1.021	0.267	-1.078	-0.438	0.021	2.043
1.206	0.595	-1.007	0.950	-1.384	1.031	0.145	0.635	0.620	0.775
1.166	-0.456	0.126	-1.487	1.182	0.686	0.480	0.379	0.756	1.676
-0.538	1.442	1.889	-0.284	0.293	-1.256	1.020	0.840	-1.370	-1.043
-0.976	0.021	-0.433	-0.814	-1.785	-1.217	0.638	-0.798	-1.655	-0.179
-0.189	1.243	-0.399	0.343	-1.506	-0.629	1.610	1.912	0.532	0.270
1.435	3.288	0.206	0.149	-0.424	0.028	0.237	0.480	1.973	-0.384
-0.218	0.820	0.002	1.546	-0.564	-0.681	1.476	1.425	-0.770	-1.517
0.645	1.896	-0.366	-0.692	1.199	1.013	0.556	2.176	2.263	-1.202
0.341	-0.214	0.401	-0.567	1.770	-1.350	-0.386	0.318	-1.936	1.777

CONTINGENCY TABLE  
 -----

		COLUMN 1		COLUMN 2		TOTAL	
		-1.517 TO 0.885		0.885 TO 3.288			
ROW 1	-1.936 TO 0.164	I	17.	I	7.	I	24.
ROW 2	0.164 TO 2.263	I	18.	I	8.	I	26.
	TOTAL	I	35.	I	15.	I	50.

CHI-SQUARE IS 0.034  
 PHI COEFFICIENT : 0.02621  
 PEARSON'S CONTINGENCY COEFFICIENT : 0.03705  
 TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.02621  
 CRAMER'S CONTINGENCY COEFFICIENT : 0.02621  
 GUTTMAN'S COEFFICIENT : 0.00000  
 GOODMAN AND KRUSKAL'S TAU : 0.01747

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 14

X	Y	X	Y	X	Y	X	Y	X	Y
-0.660	-1.167	0.879	1.518	-1.544	-0.299	-0.689	0.344	1.274	-1.324
-1.109	0.815	0.546	-1.252	0.589	-0.501	-0.540	-0.586	-0.187	-1.185
-1.358	0.348	-1.593	0.268	0.156	-0.185	0.654	0.076	1.503	1.033
0.272	-1.191	-1.380	-0.461	1.420	0.504	-0.115	-0.487	1.693	0.026
-0.889	0.136	-0.879	0.677	-0.453	0.973	0.176	0.073	0.884	-0.324
-0.236	0.085	0.247	1.044	0.230	-0.219	-0.801	-2.183	0.356	0.301
-2.258	-0.069	-0.637	0.277	-0.686	0.190	0.906	-0.780	-0.210	-0.961
1.081	-0.693	-0.515	-0.210	-0.579	1.502	0.149	1.360	-0.105	-1.307
-0.029	-0.241	0.909	0.564	0.577	0.732	-1.690	2.052	-0.970	1.050
0.378	-1.223	0.832	-0.247	-1.165	3.050	-1.080	2.030	0.836	-0.691

CONTINGENCY TABLE  
 -----

	COLUMN 1	COLUMN 2	TOTAL
	-2.183 TO 0.433	0.433 TO 3.050	
ROW 1 -2.258 TO -0.283	I 13.	I 8.	I 21.
ROW 2 -0.283 TO 1.693	I 22.	I 7.	I 29.
TOTAL	I 35.	I 15.	I 50.

CHI-SQUARE IS 0.563  
 PHI COEFFICIENT : 0.10611  
 PEARSON'S CONTINGENCY COEFFICIENT : 0.14923  
 TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.10611  
 CRAMER'S CONTINGENCY COEFFICIENT : 0.10611  
 GUTTMAN'S COEFFICIENT : 0.16667  
 GOODMAN AND KRUSKAL'S TAU : 0.15032



-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 15

X	Y	X	Y	X	Y	X	Y	X	Y
-1.329	-0.178	0.977	2.019	-0.102	-1.121	1.290	-1.040	-0.148	1.150
-0.755	1.776	-0.778	1.403	0.749	-0.495	0.133	-0.038	0.146	-0.628
0.150	-0.883	0.219	1.921	1.272	1.043	2.188	-0.981	-0.061	0.831
0.710	0.223	-0.973	0.620	0.879	0.649	-0.152	-1.154	2.229	-0.729
0.155	0.992	1.727	-0.776	1.135	0.383	-0.217	1.434	-0.586	-1.716
0.240	0.644	0.057	2.215	-0.620	-0.764	0.563	0.468	1.924	0.868
-0.128	0.821	-1.971	0.220	-1.642	-1.306	1.289	0.721	-1.163	2.128
-1.264	-0.403	-0.441	0.237	-0.159	0.735	-0.789	0.524	0.511	-0.860
0.921	-0.567	0.090	0.547	1.252	0.148	2.360	-2.361	1.205	1.761
1.542	-0.507	-0.783	-1.433	-0.708	1.442	1.166	-1.027	-0.295	0.491

CONTINGENCY TABLE  
 -----

		COLUMN 1	COLUMN 2		TOTAL
		-2.361 TO -0.073	-0.073 TO	2.215	
ROW 1	-1.971 TO 0.194	I 10.	I 18.	I 28.	28.
ROW 2	0.194 TO 2.360	I 10.	I 12.	I 22.	22.
TOTAL		I 20.	I 30.	I 50.	50.

CHI-SQUARE IS 0.166  
 PHI COEFFICIENT : 0.05757  
 PEARSON'S CONTINGENCY COEFFICIENT : 0.08128  
 TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.05757  
 CRAMER'S CONTINGENCY COEFFICIENT : 0.05757  
 GUTTMAN'S COEFFICIENT : 0.00000  
 GOODMAN AND KRUSKAL'S TAU : 0.09869

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 16

X	Y	X	Y	X	Y	X	Y	X	Y
-0.636	1.513	0.314	-1.600	0.563	-0.366	0.087	0.492	-0.049	-1.004
0.433	-1.160	-0.846	-0.626	0.197	0.622	-0.764	-0.073	-0.341	0.658
-0.303	0.094	-0.459	0.218	0.476	-1.204	-1.001	-0.143	-1.051	-0.886
0.628	-0.088	-0.071	0.334	-0.540	-1.588	-1.332	-0.770	-1.035	0.631
-0.146	0.920	-0.950	-1.009	-0.388	0.151	0.061	1.317	0.507	0.711
-0.222	-0.310	0.539	-0.601	-0.578	-0.090	1.147	-0.234	0.650	-0.703
-1.793	-0.731	0.558	-0.867	-0.968	-2.058	-0.324	0.481	-1.627	-1.024
-1.025	-0.088	-0.581	-1.117	-1.138	0.342	0.796	-0.874	-0.819	1.089
-0.433	0.456	-0.784	-0.142	1.233	-1.070	0.685	-0.984	-0.268	-1.161
1.746	1.005	-1.559	-0.114	-0.006	0.689	1.173	-1.729	-1.539	0.875

CONTINGENCY TABLE  
 -----

	COLUMN 1	COLUMN 2	TOTAL
	-2.058 TO -0.272	-0.272 TO 1.513	

ROW 1	-1.793 TO -0.023	I	12.	I	19.	I	31.
ROW 2	-0.023 TO 1.746	I	11.	I	8.	I	19.
TOTAL		I	23.	I	27.	I	50.

CHI-SQUARE IS 1.059

PHI COEFFICIENT	:	0.14551
PEARSON'S CONTINGENCY COEFFICIENT	:	0.20363
TSCHUPROW'S CONTINGENCY COEFFICIENT	:	0.14551
CRAMER'S CONTINGENCY COEFFICIENT	:	0.14551
GUTTMAN'S COEFFICIENT	:	0.26726
GOODMAN AND KRUSKAL'S TAU	:	0.18684

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 17

X	Y	X	Y	X	Y	X	Y	X	Y
-0.821	0.317	-1.384	-0.325	-0.852	-1.591	0.367	-0.541	1.205	1.622
-0.941	-0.409	-1.086	0.905	-1.527	-0.280	-1.724	-0.172	-1.170	-0.427
-0.270	0.844	-0.213	0.253	0.151	0.518	-0.562	-0.841	-0.148	-0.822
2.315	-1.249	0.586	-0.281	0.389	0.669	-1.460	-1.051	0.067	0.470
0.340	0.127	-1.807	0.155	-0.950	-0.379	0.050	0.022	1.171	1.551
1.357	-0.155	-0.359	0.157	-1.729	0.873	-0.164	0.317	0.388	0.165
0.570	1.710	-0.261	0.422	0.093	0.415	0.795	-0.939	-1.905	-0.938
0.461	-0.853	-0.299	-0.733	-1.916	-0.550	-1.526	0.931	-1.554	0.713
-1.584	-0.534	0.765	0.574	-1.035	0.211	0.700	1.724	2.997	3.315
-0.655	-0.126	1.825	0.245	2.232	-0.426	1.201	0.267	0.332	-0.622

CONTINGENCY TABLE  
 -----

	COLUMN 1	COLUMN 2	TOTAL
	-1.591 TO 0.862	0.862 TO 3.315	
ROW 1 -1.916 TO 0.541	I 34.	I 3.	I 37.
ROW 2 0.541 TO 2.997	I 8.	I 5.	I 13.
TOTAL	I 42.	I 8.	I 50.

CHI-SQUARE IS 4.530  
 PHI COEFFICIENT : 0.30098  
 PEARSON'S CONTINGENCY COEFFICIENT : 0.40759  
 TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.30098  
 CRAMER'S CONTINGENCY COEFFICIENT : 0.30098  
 GUTTMAN'S COEFFICIENT : 0.30861  
 GOODMAN AND KRUSKAL'S TAU : 0.36317

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 18									
X	Y	X	Y	X	Y	X	Y	X	Y
0.313	-0.506	0.050	-0.182	-0.213	-0.410	0.232	-0.883	0.686	-0.287
0.161	0.950	-0.488	-0.998	-0.444	1.512	1.202	1.854	0.573	-0.332
1.133	0.205	-1.191	1.025	1.119	1.995	-0.705	-0.363	-0.590	-0.677
-0.500	0.178	-1.306	0.094	1.333	0.246	0.098	0.548	-0.863	1.093
0.186	-1.101	0.696	0.779	-0.042	1.200	0.228	0.422	0.852	-0.938
1.391	0.526	-0.255	0.989	1.280	-0.610	0.950	-0.252	0.427	-0.929
1.219	0.721	-0.199	0.119	0.738	0.118	-0.190	-0.517	2.136	-1.190
0.299	0.458	-0.526	0.231	-2.450	-1.540	-0.746	0.538	2.282	0.736
1.415	0.645	0.653	0.568	0.333	0.345	0.257	-0.210	0.820	-0.079
1.128	-0.085	0.128	0.327	0.733	0.643	0.946	-0.485	0.982	-1.424

CONTINGENCY TABLE  
 -----

	COLUMN 1	COLUMN 2	TOTAL
	-1.540 TO 0.228	0.228 TO 1.995	
ROW 1 -2.450 TO -0.084	9.	6.	15.
ROW 2 -0.084 TO 2.282	18.	17.	35.
TOTAL	27.	23.	50.

CHI-SQUARE IS 0.061  
 PHI COEFFICIENT : 0.03503  
 PEARSON'S CONTINGENCY COEFFICIENT : 0.04951  
 TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.03503  
 CRAMER'S CONTINGENCY COEFFICIENT : 0.03503  
 GUTTMAN'S COEFFICIENT : 0.00000  
 GOODMAN AND KRUSKAL'S TAU : 0.07881

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 19

X	Y	X	Y	X	Y	X	Y	X	Y
1.399	-0.602	1.218	-0.553	-0.950	-0.717	0.223	0.414	-0.098	0.749
0.218	-0.584	-0.608	0.778	-2.141	-1.750	0.396	0.511	1.247	2.280
-0.772	-2.112	1.898	-1.264	-0.362	0.979	0.798	2.098	0.816	-0.074
0.348	-0.437	0.387	-0.921	1.393	0.498	0.415	0.681	0.216	-0.676
1.400	1.285	0.536	0.597	-0.719	-1.581	-0.490	-0.306	0.435	-0.951
-2.267	-0.260	0.674	0.565	0.238	0.757	0.249	0.754	1.494	1.151
0.850	-0.090	-0.592	0.107	0.601	0.490	-0.675	0.974	0.067	0.593
-0.972	-0.182	0.248	0.304	-0.265	-0.552	-0.416	0.882	0.105	0.869
-1.051	0.286	1.231	-0.211	-0.343	1.929	0.647	-2.030	-0.540	-0.647
-2.678	-0.261	0.546	0.908	-0.337	0.854	-1.459	-0.200	-0.486	-0.167

CONTINGENCY TABLE

	COLUMN 1	COLUMN 2	TOTAL
	-2.112 TO 0.084	0.084 TO 2.280	
ROW 1	-2.678 TO -0.390	I	11. I 5. I 16.
ROW 2	-0.390 TO 1.898	I	14. I 20. I 34.
TOTAL	I	I	25. I 25. I 50.

CHI-SQUARE IS 2.298  
 PHI COEFFICIENT : 0.21437  
 PEARSON'S CONTINGENCY COEFFICIENT : 0.29643  
 TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.21437  
 CRAMER'S CONTINGENCY COEFFICIENT : 0.21437  
 GUTTMAN'S COEFFICIENT : 0.38255  
 GOODMAN AND KRUSKAL'S TAU : 0.25725

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 20

X	Y	X	Y	X	Y	X	Y	X	Y
-0.493	0.662	0.159	0.752	-0.053	0.642	0.316	-0.295	0.799	-0.242
0.144	0.331	0.439	-0.800	0.236	-1.210	-0.321	0.839	1.626	1.667
1.772	0.260	1.782	0.705	0.406	-0.511	-0.388	-1.827	0.706	0.145
0.460	0.407	0.236	1.535	-0.890	-0.811	-1.003	-0.337	0.780	-0.277
-0.572	0.170	1.128	0.719	1.404	0.914	0.248	0.774	0.240	1.722
-0.327	1.052	0.685	-0.178	-1.627	0.906	-0.072	0.079	-0.245	-0.424
1.597	-1.511	0.663	0.058	0.753	-0.420	-0.620	-0.042	-0.102	1.100
0.625	-2.040	0.970	1.176	0.556	-0.706	-1.655	0.599	-0.233	-1.871
-1.162	-2.139	0.291	-0.839	-0.302	-1.111	-0.403	-0.894	1.614	-0.553
-1.408	0.436	0.713	0.253	0.622	0.329	-0.443	1.113	-0.531	2.409

CONTINGENCY TABLE  
 -----

		COLUMN 1	COLUMN 2	TOTAL
		-2.139 TO 0.135	0.135 TO 2.409	
ROW 1	-1.655 TO 0.063	I 10.	I 11.	I 21.
ROW 2	0.063 TO 1.782	I 14.	I 15.	I 29.
TOTAL		I 24.	I 26.	I 50.

CHI-SQUARE IS 0.058

PHI COEFFICIENT	:	0.03407
PEARSON'S CONTINGENCY COEFFICIENT	:	0.04815
TSCHUPROW'S CONTINGENCY COEFFICIENT	:	0.03407
CRAMER'S CONTINGENCY COEFFICIENT	:	0.03407
GUTTMAN'S COEFFICIENT	:	0.00000
GOODMAN AND KRUSKAL'S TAU	:	0.00649

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 21

X	Y	X	Y	X	Y	X	Y	X	Y
0.148	-0.772	-0.648	0.834	-1.075	0.632	-0.072	-2.300	-0.238	0.396
1.292	0.557	1.974	0.352	-1.023	0.022	-0.688	0.992	-1.048	-0.869
0.963	0.625	-0.376	0.604	-1.445	1.011	-2.161	0.472	-1.850	-0.181
-1.122	-0.968	1.250	1.662	-0.540	0.137	-0.207	0.682	-0.255	-1.527
0.154	-0.134	0.325	-0.848	-0.852	0.683	-0.767	-0.492	-0.974	-0.387
-1.061	-2.250	1.475	0.479	-0.649	-1.761	1.622	-0.081	-1.188	-1.349
0.031	-0.472	0.106	0.523	0.702	0.688	-1.549	0.097	0.074	-0.516
-0.495	0.072	-1.978	-1.253	1.364	-1.159	-0.139	0.303	-0.442	0.950
-0.559	0.276	-2.942	0.183	-0.350	2.144	1.271	0.158	-0.584	-0.590
-0.958	1.876	0.700	-1.700	1.653	0.264	0.005	-1.055	0.823	-0.328

CONTINGENCY TABLE  
 -----

	COLUMN 1	COLUMN 2	TOTAL
	-2.300 TO -0.078	-0.078 TO 2.144	
ROW 1	I 10.	I 13.	I 23.
ROW 2	I 13.	I 14.	I 27.
TOTAL	I 23.	I 27.	I 50.

CHI-SQUARE IS 0.002

PHI COEFFICIENT	:	0.00644
PEARSON'S CONTINGENCY COEFFICIENT	:	0.00911
TSCHUPROW'S CONTINGENCY COEFFICIENT	:	0.00644
GRAMER'S CONTINGENCY COEFFICIENT	:	0.00644
GUTTMAN'S COEFFICIENT	:	0.00000
GOODMAN AND KRUSKAL'S TAU	:	0.04670



A COMPARE OF MEASURING CORRELATION STATISTIC  
IN CONTINGENCY TABLE

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2

SAMPLE ROUND : 22

X	Y	X	Y	X	Y	X	Y	X	Y
-0.732	1.463	0.711	0.158	-1.135	0.281	-0.090	1.661	0.611	0.352
2.453	0.123	0.756	-1.447	-0.191	-0.380	-0.012	1.590	0.886	0.439
-0.566	0.732	0.029	-0.148	0.657	0.660	0.020	0.394	-0.342	-3.021
-1.922	1.493	0.875	-0.491	1.860	-1.916	-0.816	0.633	0.463	0.599
0.900	2.275	0.416	1.747	0.772	-1.329	-1.308	-1.307	0.990	1.157
1.696	-1.067	0.179	0.252	-0.727	-0.210	1.402	1.287	-1.294	-0.230
1.162	1.408	-0.286	1.038	1.395	0.733	-0.546	0.963	-0.521	0.353
0.522	-1.111	-1.773	0.348	0.950	0.106	-1.111	-0.912	1.206	-0.357
0.154	1.090	1.199	-1.126	1.148	0.408	0.273	0.548	0.435	1.423
0.211	-0.860	1.016	-1.550	-1.768	-1.944	1.329	0.708	0.993	-0.902

CONTINGENCY TABLE

	COLUMN 1 -3.021 TO -0.373	COLUMN 2 -0.373 TO 2.275	TOTAL
ROW 1 -1.922 TO 0.265	I 6.	I 17.	I 23.
ROW 2 0.265 TO 2.453	I 9.	I 18.	I 27.
TOTAL	I 15.	I 35.	I 50.

CHI-SQUARE IS 0.061  
 PHI COEFFICIENT : 0.03503  
 PEARSON'S CONTINGENCY COEFFICIENT : 0.04951  
 TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.03503  
 CRAMER'S CONTINGENCY COEFFICIENT : 0.03503  
 GUTTMAN'S COEFFICIENT : 0.00000  
 GOODMAN AND KRUSKAL'S TAU : 0.07881



-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 23

X	Y	X	Y	X	Y	X	Y	X	Y
0.249	-2.003	0.589	-0.933	1.091	0.894	-1.448	0.123	-0.394	-0.244
-0.147	0.229	1.981	-0.646	-1.103	1.704	0.844	0.552	-2.469	-1.907
1.257	-1.069	-0.964	-0.555	-0.279	0.591	1.131	-3.223	0.175	1.872
-2.025	1.090	-1.005	-1.212	0.162	-2.399	-0.006	0.475	-0.276	-0.041
1.424	1.023	-1.869	2.293	-0.028	-0.225	0.289	0.510	1.765	1.432
1.545	0.939	0.366	0.922	-0.320	-0.357	-0.223	-1.370	0.913	2.920
2.435	2.186	-1.098	0.327	0.216	-1.302	-0.258	1.009	1.435	1.235
-1.035	0.556	0.842	0.052	0.541	-0.183	-0.374	-0.580	-0.124	2.205
-0.588	1.105	-0.184	0.371	-0.736	0.086	1.643	1.177	-0.317	-0.120
1.076	0.418	-0.393	0.304	0.274	1.932	0.413	-0.134	-0.171	-1.107

CONTINGENCY TABLE  
 -----

	COLUMN 1	COLUMN 2	TOTAL
	-3.223 TO -0.151	-0.151 TO 2.920	
ROW 1	-2.469 TO -0.017	I 9. I 16. I	25.
ROW 2	-0.017 TO 2.435	I 8. I 17. I	25.
TOTAL	I 17. I	33. I	50.

CHI-SQUARE IS 0.000  
 PHI COEFFICIENT : 0.00000  
 PEARSON'S CONTINGENCY COEFFICIENT : 0.00000  
 TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.00000  
 CRAMER'S CONTINGENCY COEFFICIENT : 0.00000  
 GUTTMAN'S COEFFICIENT : 0.15430  
 GOODMAN AND KRUSKAL'S TAU : 0.04221

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTIGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 24

X	Y	X	Y	X	Y	X	Y	X	Y
0.914	1.229	-0.224	-0.221	-1.639	-0.621	-0.417	-0.485	1.442	-0.167
-0.843	0.472	0.284	-0.276	0.844	-0.271	-0.551	0.053	-0.574	-0.980
0.939	-0.983	1.122	-0.333	1.193	1.654	0.589	-0.713	-2.914	0.548
-0.077	0.656	0.931	0.212	-0.344	-0.136	-0.519	1.047	1.756	0.543
-0.078	-0.035	-1.368	-1.157	-0.118	1.316	1.129	-0.841	0.423	1.272
-0.472	0.288	1.047	-1.721	-0.451	-0.974	0.692	1.106	-0.651	-0.195
1.734	0.401	0.524	-0.120	1.987	-0.276	-0.895	-1.627	1.701	1.324
-0.438	0.659	0.565	-1.125	-0.198	-0.045	0.705	1.653	1.170	-0.791
-1.315	-0.089	1.449	0.455	-1.495	0.003	-1.142	2.226	-0.395	1.300
0.054	1.349	-0.142	0.465	-1.869	-1.297	-1.420	1.705	2.623	0.234

CONTIGENCY TABLE

	COLUMN 1 -1.721 TO 0.252	COLUMN 2 0.252 TO 2.226	TOTAL
ROW 1 -2.914 TO -0.145	I 14.	I 8.	I 22.
ROW 2 -0.145 TO 2.623	I 15.	I 13.	I 28.
TOTAL	I 29.	I 21.	I 50.

CHI-SQUARE IS 0.182  
 PHI COEFFICIENT : 0.06041  
 PEARSON'S CONTIGENCY COEFFICIENT : 0.08528  
 TSCHUPROW'S CONTIGENCY COEFFICIENT : 0.06041  
 CRAMER'S CONTIGENCY COEFFICIENT : 0.06041  
 GUTTMAN'S COEFFICIENT : 0.00000  
 GOODMAN AND KRUSKAL'S TAU : 0.10123

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 25

X	Y	X	Y	X	Y	X	Y	X	Y
0.521	-0.737	0.499	-0.879	0.871	-0.206	0.166	0.076	0.254	0.984
1.469	0.426	0.735	1.096	-0.310	-0.532	-0.187	0.363	0.548	0.961
0.429	0.992	-0.798	0.085	-1.043	-0.005	-1.754	-1.828	0.211	-0.359
-0.289	-1.075	-1.557	-1.405	0.068	0.950	0.340	-1.804	-0.776	0.648
-0.971	-0.145	-0.476	1.068	-0.928	-0.400	-1.250	-0.731	-1.528	-0.795
1.121	1.347	-0.333	-1.660	-0.705	0.741	-0.468	0.534	-0.633	0.624
-0.619	1.240	-1.132	0.768	-1.035	1.164	-2.231	-0.369	-0.528	-0.398
0.477	1.525	0.529	1.105	-1.164	0.988	1.198	0.650	1.129	-0.389
0.982	-0.333	-0.925	-0.247	-0.182	1.057	-1.168	-0.315	-0.918	0.341
0.995	0.538	0.588	1.479	-0.405	0.241	0.587	0.352	0.102	0.289

CONTINGENCY TABLE  
 -----

	COLUMN 1 -1.828 TO -0.152	COLUMN 2 -0.152 TO 1.525	TOTAL
ROW 1 -2.231 TO -0.381	I 9.	I 14.	I 23.
ROW 2 -0.381 TO 1.469	I 10.	I 17.	I 27.
TOTAL	I 19.	I 31.	I 50.

CHI-SQUARE IS 0.020  
 PHI COEFFICIENT : 0.01984  
 PEARSON'S CONTINGENCY COEFFICIENT : 0.02805  
 TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.01984  
 CRAMER'S CONTINGENCY COEFFICIENT : 0.01984  
 GUTTMAN'S COEFFICIENT : 0.00000  
 GOODMAN AND KRUSKAL'S TAU : 0.02150

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 26

X	Y	X	Y	X	Y	X	Y	X	Y
0.767	-0.214	-0.576	-0.232	0.255	-1.190	-1.095	-0.363	0.613	-0.880
1.328	1.436	0.842	-0.393	0.912	0.311	1.382	0.734	-0.686	0.549
2.108	-1.628	1.630	0.250	0.334	0.506	1.391	-0.220	-0.190	1.280
-0.433	-0.312	-0.275	-0.210	-1.435	0.105	-0.294	-1.406	0.231	-1.441
2.815	-0.958	-0.154	-0.678	0.553	0.766	1.130	-0.017	-0.140	0.405
0.240	-1.195	-1.890	0.045	-1.229	-0.986	-0.882	-0.136	-0.244	0.429
-1.866	-0.377	-0.337	-0.331	-1.153	0.360	0.401	0.298	0.383	-0.887
0.314	-0.009	-0.695	0.062	1.183	2.176	0.615	0.709	-1.770	-0.884
0.750	0.123	0.110	-1.218	-1.413	-0.953	-0.080	-0.929	0.439	0.399
-0.810	1.146	1.058	0.407	0.892	0.782	-1.369	-1.934	0.431	-0.599

CONTINGENCY TABLE  
 -----

	COLUMN 1	COLUMN 2	TOTAL
	-1.934 TO 0.121	0.121 TO 2.176	
ROW 1	-1.890 TO 0.462	I 24. I 9.	I 33.
ROW 2	0.462 TO 2.815	I 7. I 10.	I 17.
TOTAL	I 31.	I 19.	I 50.

CHI-SQUARE IS 3.496

PHI COEFFICIENT	:	0.26443
PEARSON'S CONTINGENCY COEFFICIENT	:	0.36153
TSCHUPROW'S CONTINGENCY COEFFICIENT	:	0.26443
CRAMER'S CONTINGENCY COEFFICIENT	:	0.26443
GUTTMAN'S COEFFICIENT	:	0.33333
GOODMAN AND KRUSKAL'S TAU	:	0.30792

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 27

X	Y	X	Y	X	Y	X	Y	X	Y
0.785	-0.280	-0.347	0.500	0.583	0.744	-1.160	0.892	-0.473	0.776
0.712	1.049	-1.447	-2.157	-0.575	-0.963	1.040	0.601	-1.425	-0.726
-1.201	-1.920	-0.806	0.387	0.083	-0.700	0.752	1.282	-1.421	0.318
-1.845	-2.140	0.413	-1.127	-0.251	1.730	1.150	1.036	0.316	-0.300
-0.211	1.716	1.075	-0.441	1.770	-1.105	-1.316	0.117	-0.032	-1.315
0.238	-0.324	0.697	-0.971	1.268	-0.205	1.708	0.434	0.744	-0.172
1.189	-0.094	0.074	0.803	1.767	0.304	-1.898	-0.054	0.504	-0.606
0.111	-1.450	-0.098	-1.099	-0.179	1.163	-1.100	-0.360	0.387	-0.215
0.872	0.315	0.407	1.319	0.633	1.203	-2.090	-0.882	0.434	-0.223
-0.632	1.742	-0.037	1.651	0.687	1.212	-0.654	0.976	0.212	-1.812

CONTINGENCY TABLE  
 -----

		COLUMN 1		COLUMN 2		TOTAL	
		-2.157 TO -0.208		-0.208 TO 1.742			
ROW 1	-2.090 TO -0.160	I 7.	I	12.	I	19.	I
ROW 2	-0.160 TO 1.770	I 15.	I	16.	I	31.	I
	TOTAL	I 22.	I	28.	I	50.	I

CHI-SQUARE IS 0.255  
 PHI COEFFICIENT : 0.07139  
 PEARSON'S CONTINGENCY COEFFICIENT : 0.10070  
 TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.07139  
 CRAMER'S CONTINGENCY COEFFICIENT : 0.07139  
 GUTTMAN'S COEFFICIENT : 0.00000  
 GOODMAN AND KRUSKAL'S TAU : 0.11289

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 28

X	Y	X	Y	X	Y	X	Y	X	Y
0.147	0.446	-2.274	0.872	-0.634	-1.251	-1.552	0.538	-0.558	-1.459
1.035	1.173	0.252	-1.324	-0.418	-1.219	1.108	1.370	0.622	-1.988
-0.239	1.161	-1.876	-1.284	1.400	1.725	1.494	-0.265	-0.349	-0.949
0.579	1.377	-1.422	0.559	3.660	0.256	-0.319	0.912	-1.543	-1.667
-0.102	0.721	0.127	-0.247	1.607	-0.412	1.265	-2.116	-1.380	0.672
-0.097	0.007	0.188	1.154	1.511	0.654	1.000	-0.818	-0.004	-0.395
1.182	-2.138	1.703	1.305	-0.704	-0.413	0.414	-0.572	-0.655	-1.228
0.348	0.070	-0.233	-0.339	-0.836	-1.836	-0.562	0.014	0.955	-1.325
0.670	1.352	-0.746	-0.022	1.216	1.199	-0.970	0.037	-0.737	-0.457
-1.308	-2.411	-0.562	-0.554	1.083	-0.783	-0.197	0.762	-1.514	0.931

CONTINGENCY TABLE  
 -----

		COLUMN 1		COLUMN 2		TOTAL	
		-2.411 TO	-0.343	-0.343 TO	1.725		
ROW 1	-2.274 TO	0.693	I	16.	I	20.	I
ROW 2	0.693 TO	3.660	I	6.	I	8.	I
	TOTAL		I	22.	I	28.	I

CHI-SQUARE IS 0.047

PHI COEFFICIENT	:	0.03051
PEARSON'S CONTINGENCY COEFFICIENT	:	0.04313
TSCHUPROW'S CONTINGENCY COEFFICIENT	:	0.03051
CRAMER'S CONTINGENCY COEFFICIENT	:	0.03051
GUTTMAN'S COEFFICIENT	:	0.00000
GOODMAN AND KRUSKAL'S TAU	:	0.01435

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTIGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 29

X	Y	X	Y	X	Y	X	Y	X	Y
-0.139	0.937	-1.379	-0.274	-0.451	-0.109	-0.356	0.038	-1.755	-0.093
0.151	-0.187	-0.242	0.173	1.174	-0.331	0.344	-0.448	0.182	-0.692
-0.311	-0.323	0.082	0.404	-0.081	-1.119	-0.779	-1.357	0.598	-0.345
-0.622	-0.558	-1.273	-0.305	-0.224	-1.551	-2.256	-0.234	2.069	0.946
0.526	-0.980	-1.646	-0.246	1.385	1.166	1.163	2.112	0.073	-0.054
-1.535	0.304	0.778	0.925	-0.333	0.138	0.126	-0.601	0.615	0.531
0.181	2.585	-0.410	1.079	0.444	-1.022	-1.688	-0.829	-2.147	-0.961
0.939	-0.157	-0.217	1.180	0.064	-0.553	1.050	0.400	-2.279	0.690
-0.098	0.839	0.380	-1.796	0.030	0.551	-2.054	-1.666	0.559	-0.443
-0.234	1.844	2.052	0.450	-1.380	-0.676	-1.489	1.619	0.730	0.055

CONTIGENCY TABLE

	COLUMN 1 -1.796 TO 0.395	COLUMN 2 0.395 TO 2.585	TOTAL
ROW 1 -2.279 TO -0.105	I 18.	I 6.	I 24.
ROW 2 -0.105 TO 2.069	I 15.	I 11.	I 26.
TOTAL	I 33.	I 17.	I 50.

CHI-SQUARE IS 0.984  
 PHI COEFFICIENT : 0.14028  
 PEARSON'S CONTIGENCY COEFFICIENT : 0.19647  
 TSCHUPROW'S CONTIGENCY COEFFICIENT : 0.14028  
 CRAMER'S CONTIGENCY COEFFICIENT : 0.14028  
 GUTTMAN'S COEFFICIENT : 0.27050  
 GOODMAN AND KRUSKAL'S TAU : 0.18254

-----  
 A COMPARE OF MEASURING CORRELATION STATISTIC  
 IN CONTINGENCY TABLE  
 -----

RHO = 0.10  
 SAMPLE 50 NO.  
 GENERATE 30 ROUNDS  
 TABLE SIZE 2 X 2  
 -----

SAMPLE ROUND : 30

X	Y	X	Y	X	Y	X	Y	X	Y
0.374	-1.441	-0.248	-0.435	-0.484	-0.726	0.781	-0.067	0.252	0.512
-0.651	-0.265	0.332	-1.201	1.426	1.014	-0.054	0.296	0.420	0.019
0.717	0.799	0.173	-1.545	-0.288	0.061	0.971	-0.895	0.429	0.904
-0.470	1.843	1.808	2.152	1.010	0.859	2.225	2.010	1.005	-1.225
-1.507	-0.041	0.547	1.184	-0.137	1.138	-0.895	0.027	0.024	1.604
-0.413	-0.035	-0.899	1.481	-0.662	-1.429	0.659	-0.319	-0.860	-0.825
-0.303	0.662	2.212	0.808	0.656	2.306	0.213	0.789	1.409	0.281
0.236	-0.594	1.272	-0.211	1.813	-0.384	-0.006	-0.453	-0.085	-0.624
-1.235	-1.148	0.949	0.215	-2.789	2.252	-0.240	-0.046	1.394	-0.543
-0.371	0.680	2.817	-1.939	1.276	-0.317	0.416	0.864	0.859	-0.794

CONTINGENCY TABLE  
 -----

		COLUMN 1		COLUMN 2		TOTAL
		-1.939 TO 0.014	I	0.014 TO 2.817	I	
ROW 1	-2.789 TO 0.014	I	13.	I	7.	I 20.
ROW 2	0.014 TO 2.817	I	15.	I	15.	I 30.
TOTAL		I	28.	I	22.	I 50.

CHI-SQUARE IS 0.572  
 PHI COEFFICIENT : 0.10692  
 PEARSON'S CONTINGENCY COEFFICIENT : 0.15035  
 TSCHUPROW'S CONTINGENCY COEFFICIENT : 0.10692  
 CRAMER'S CONTINGENCY COEFFICIENT : 0.10692  
 GUTTMAN'S COEFFICIENT : 0.00000  
 GOODMAN AND KRUSKAL'S TAU : 0.14804

MEAN SQUARE \*\* = 0.009 0.018 0.009 0.009 0.024 0.012



## ประวัติผู้เขียน

นายประวิทย์ วชิระจงกล เกิดเมื่อวันที่ 20 กรกฎาคม 2500 สำเร็จการศึกษา  
วิทยาศาสตรบัณฑิต (สถิติ) จากมหาวิทยาลัยรามคำแหง ปีการศึกษา 2523 และเข้าศึกษาต่อ  
ในภาควิชาสถิติ บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย เมื่อปีการศึกษา 2525 ปัจจุบัน  
ทำงานในตำแหน่ง อาจารย์ประจำ คณะวิทยาศาสตร์ มหาวิทยาลัยหอการค้าไทย



ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย