รายการอ้างอิง

ภาษาไทย

ไปรมา พจนพิมล. การศึกษาแบบมอนติคาร์โล: การเปรียบเทียบอำนาจของการทดสอบของที-เทส,วิลค็อกซอน เทส,เทอรี่-โฮพพ์ติง นอร์มอล สกอร์เทส และแวน เดอแวร์เดน นอร์มอล-สกอร์เทส ภายใต้ลักษณะการแจกแจงของประชากร 3 แบบ วิทยานิพนธ์ปริญญามหาบัณฑิต จุฬาลงกรณ์มหาวิทยาลัย, 2526.

พิชิต พิทักษ์เทพสมบัติ. มาใช้ Yule's Q กันเถอะ. วารสารสถิติ 10 (พฤศจิกายน 2526) : 12-24.

สุวัฒนา สุวรรณเขตนิคม. แบบการวิจัยเชิงทดลอง. ข่าวสารวิจัยการศึกษา 7 (สิงหาคม-กันยายน 2527) : 3-14.

อุทุมพร ทองอุไทย. แผนวิเคราะห์ข้อมูลพฤติกรรมศาสตร์. กรุงเทพ : โรงพิมพ์เจริญผล, 2523.

ภาษาอังกฤษ

Adams,E.W., Fagot, R.F, and Robinson,R.E. A theory of appropriate statistics. Psychometrika 30 (1965): 99-127,cited by Knapp,T.R. Treating ordinal scales as interval scales: An attempt to resolve the controversy. Nursing Research 39 (1990): 121-123.

Bhattacharyya,G.K. and Johnson, Richard.A. Statistical concepts and methods. New York: John Wiley & Sons, 1977.

Blair, R.C.,Higgins, J.J. and Smitley, W.D.S On the relative power of the U and t-test. British Journal of Mathematical and Statistical Psychology 33(1980): 114-120, cited by Blair, R.C. and Higgins,J.J. A comparison of the power of

Wilcoxon's rank-sum statistic to that of student's t statistic under various nonnormal distributions. Journal of Educational Statistics 5 (Winter 1980) : 312.

_____. A comparison of the power of Wilcoxon's rank-sum statistic to that of student's t statistic under various nonnormal distributions. Journal of Educational Statistics 5 (Winter 1980): 309-335.

Boneau, C.A. A comparison of the power of the U and t-test. Psychological Review 69(1962) : 246-256, cited by Blair, R.C. and Higgins, J.J. A comparison of the power of Wilcoxon's rank-sum statistic to that of student's t statistic under various nonnormal distributions. Journal of Educational Statistics 5(Winter 1980): 312.

Christensen, Larry B. Experimental methodology. Allyn and Bacon, 1988.

Cochran, W.G.Some consequences when the assumptions for the analysis of variance are not satisfied. Biometrics 3 (1947) : 22-38, cited by Ramsey, Philip H. Exact Type I Error rates for robustness of student's t test with unequal variance. Journal of Educational Statistics 5 (Winter 1980) :337-349.

Cooper,R.A. and weekes, A.J. Data, models and statistical analysis. Oxford Allan, 1983.

Derek Srisukho. Monte Carlo study of the power of H-test compared of F-test when population distributions are different in form. Ph.D. dissertation, University of California, 1974.

Dixon, W.J. and Massey,F.J. Introduction to statistical analysis. New York: Mc Graw-Hill Book Co., 1969.

_____. Power under normality of several nonparametics tests. Annals of Mathematical Statistics 25 (1954): 610-614.

Gardner, P.L. Scales and statistics. Review of educational research 45 (1975): 43-57.

Hodges, J.L. and Lehmann, E.L. The efficiency of some nonparametric competitors of the t-test. Annals of Mathematical Statistics 27 (1956): 324-336. cited by Blair, R.C. and Higgins, J.J. A comparison of the power of Wilcoxon's rank-sum statistic that of student's t statistic unde various nonnormal distributions. Journal of Educational Statistics 5 (Winter 1980) : 311.

_____. Rank methods for combination of independent experiments in analysis of variance. Annals of Mathematical Statistics 33 (1962): 482-497.

Knapp, T.R. Treating ordinal scales as interval scales: An attempt to resolve the controversy. Nursing Research 39 (1990): 121-123.

Levin, J. Elementary statistics in social research. New York: Harper & Row, 1983.

Marascuilo, L.A. and Mc Sweeney, M. Nonparametric and distribution-free methods for the social sciences. California: Brooks/Cole Comp., 1977.

Neave, H.R. and Granger, C.W.J. A Monte Carlo study comparing various two-sample tests for differences in mean. Technometrics 10 (1968): 509-522, cited by Blair, R.C. and Higgins, J.J. A comparison of the power of Wilcoxon's rank-sum statistic to that of student's t statistic under various nonnormal distributions. Journal of Educational Statistics 5 (Winter 1980) : 311-312.

Neymen, J. First course in probability and statistics. New York: Henry Holt, 1950, cited by Derek Srisukho. Monte Carlo study of the power of H-test compared of F-test when population distributions are different in form. Ph.D. dissertation, University of California, 1974.

Ramsey, Philip H. Exact Type I Error rates for robustness of student's t test with unequal variance. Journal of Educational Statistics 5 (Winter 1980): 337-349.

Rosenberger, J.L. and Gasko,M. Comparing location estimators: Trimmed means, medians and trimean. In D.C. Hoaglin, F. Mosteller,and J.W. Tukey (eds.) Understanding robust and exploratory data analysis, pp. 211-246. New York: John Wiley & Sons, 1983.

Senders, V.L. Measurement and statistics. New York: Oxford University Press, 1958.

Sheridan, Charles.L. Methods in experimental psychology Holt, Rinchart and Winston, 1979.

Siegel, S. Non-parametric statistics for the behavioral sciences. New York: Mc Graw-Hill, 1956.

Stigler, S.M. The asymptotic distribution of the trimmed mean. The Annals of Statistics 1 (1973) : 1973.

Tukey, J.W. The future of data analysis. Annals of Mathematical Statistics 33 (1962) : 1-67.

Wiersma, W. Research methods in education an introduction. New York: J.B.Lippincott Company, 1969.

ภาคผนวก

```
C*************************************************************************
C************************  MAIN PROGRAM  *********************************
C*************************************************************************
      DIMENSION A(100),B(100),P(100),Q(100),R(100),X(100),Y(100),Z(100)
      DO 2000 KKK=1,9
      IX=65539
      Y2=0.
      CH05=5.99
      CH01=9.21
      IRM05=0
      IRM01=0
      IRT05=0
      IRT01=0
      IRW05=0
      IRW01=0
      SD=10.
      IT=4000
      DO 1000 II=1,IT
      NC=5
      N1=1
```

```
      NN1=NC
      N2=NN1+N1
      NN2=2*NN1
      N3=NN2+N1
      NN3=3*NN1
      N4=NN3+N1
      NN4=4*NN1
      N5=NN4+N1
      NN5=5*NN1
      N6=NN5+N1
      NN6=6*NN1
C*************************     FIRST POPULATION     ********************
      EX=500
      DO 1 I=N1,NN1
      X(I)=0
      IF(Y2.NE.0) GOTO 100
      CALL NORMAL(EX,SD,Y1,Y2,IX,IY,RNN)
      GOTO 101
100   Y1=Y2
      Y2=0.
101   X(I)=Y1
1     CONTINUE
C*************************     SECOND POPULATION     ********************
      EX=500
      DO 2 I=N2,NN2
```

```
      X(I)=0
      IF(Y2.NE.0) GOTO 200
      CALL NORMAL(EX,SD,Y1,Y2,IX,IY,RNN)
      GOTO 201
200   Y1=Y2
      Y2=0.
201   X(I)=Y1
2     CONTINUE
C*************************      THIRD  POPULATION      ******************
      EX=500
      DO 3 I=N3,NN3
      X(I)=0
      IF(Y2.NE.0) GOTO 300
      CALL NORMAL(EX,SD,Y1,Y2,IX,IY,RNN)
      GOTO 301
300   Y1=Y2
      Y2=0.
301   X(I)=Y1
3     CONTINUE
      GO TO(7,8,9,10,11,12,13,14,15),KKK
C***************   WHEN  BETA  IS  0.4  SIGMA   *************************
7     EX=504
      BETA=0.4
      GO TO 350
C***************   WHEN  BETA  IS  0.5  SIGMA   *************************
```

```
8       EX=505
        BETA=0.5
        GO TO 350
C***************   WHEN  BETA  IS  0.6  SIGMA   ************************
9       EX=506
        BETA=0.6
        GO TO 350
C***************   WHEN  BETA  IS  0.7  SIGMA   ************************
10      EX=507
        BETA=0.7
        GO TO 350
C***************   WHEN  BETA  IS  0.8  SIGMA   ************************
11      EX=508
        BETA=0.8
        GO TO 350
C***************   WHEN  BETA  IS  0.9  SIGMA   ************************
12      EX=509
        BETA=0.9
        GO TO 350
C***************   WHEN  BETA  IS  1.0  SIGMA   ************************
13      EX=510
        BETA=1.0
        GO TO 350
C***************   WHEN  BETA  IS  1.1  SIGMA   ************************
11      EX=511
```

```
      BETA=1.1
      GO TO 350
C**************   WHEN  BETA  IS  1.2  SIGMA  ************************
15    EX=512
      BETA=1.2
      GO TO 350
C************************      FORTH   POPULATION     ******************
350   DO 4 I=N4,NN4
      X(I)=0
      IF(Y2.NE.0) GOTO 400
      CALL NORMAL(EX,SD,Y1,Y2,IX,IY,RNN)
      GOTO 401
400   Y1=Y2
      Y2=0.
401   X(I)=Y1
4     CONTINUE
C************************       FIFTH    POPULATION     ***************
      DO 5 I=N5,NN5
      X(I)=0
      IF(Y2.NE.0) GOTO 500
      CALL NORMAL(EX,SD,Y1,Y2,IX,IY,RNN)
      GOTO 501
500   Y1=Y2
      Y2=0.
501   X(I)=Y1
```

```
5     CONTINUE
C************************      SIXTH     POPULATION     ****************
      DO 6 I=N6,NN6
      X(I)=0
      IF(Y2.NE.0) GOTO 600
      CALL NORMAL(EX,SD,Y1,Y2,IX,IY,RNN)
      GOTO 601
600   Y1=Y2
      Y2=0.
601   X(I)=Y1
6     CONTINUE
C*********************   SORT   DATA   ***********************************
      DO 20 I=N1,NN3
20    A(I)=X(I)
      KK=NN3-1
      DO 30 K=1,KK
      L=NN3-K
      DO 30 I=N1,L
      IF(X(I)-X(I+1)) 30,30,25
25    S=X(I)
      X(I)=X(I+1)
      X(I+1)=S
30    CONTINUE
      DO 35 J=N4,NN6
35    B(J)=X(J)
```

```
      KK=NN6-1
      DO 45 K=1,KK
      L=NN6-K
      DO 45 J=N4,L
      IF(X(J)-X(J+1)) 45,45,40
40    S=X(J)
      X(J)=X(J+1)
      X(J+1)=S
45    CONTINUE
C*********************   FIND MEDIAN   ************************************
      IF(NN3/2*2.EQ.NN3) THEN
      I=NN3/2
      J=NN3+1
      XMED1=(X(I)+X(I+1))/2
      XMED2=(X(J)+X(J+1))/2
      ELSE
      I=NN3/2
      J=NN3+1
      XMED1=X(I+1)
      XMED2=X(J+1)
      END IF
C*********************   FIND TRIMMED MEAN   ******************************
      IF(NN3/4*4.EQ.NN3) THEN
      M=NN3/4
      N=3*NN3/4
```

```
      XQT1=X(M)
      XQT3=X(N)
      ELSE
      M=NN3/4+1
      N=3*NN3/4+1
      XQT1=X(M)
      XQT3=X(N)
      END IF
      NTRIM1=0.0
      SUMT1=0.0
      DO 145 I=N1,NN3
      IF(X(I).GT.XQT1.AND.X(I).LT.XQT3) THEN
      NTRIM1=NTRIM1+1
      SUMT1=SUMT1+X(I)
      END IF
145   CONTINUE
      TRIM1=SUMT1/NTRIM1
      IF((NN6-NN3)/4*4.EQ.(NN6-NN3)) THEN
      M=NN3+(NN6-NN3)/4
      N=NN3+(3*(NN6-NN3)/4)
      XQT11=X(M)
      XQT33=X(N)
      ELSE
      M=(NN3+(NN6-NN3)/4)+1
      N=(NN3+(3*(NN6-NN3)/4))+1
```

```
      XQT11=X(M)
      XQT33=X(N)
      END IF
      NTRIM2=0.0
      SUMT2=0.0
      DO 165 J=N4,NN6
      IF(X(J).GT.XQT11.AND.X(J).LT.XQT33) THEN
      NTRIM2=NTRIM2+1
      SUMT2=SUMT2+X(J)
      END IF
165   CONTINUE
      TRIM2=SUMT2/NTRIM2
C*********************   FIND WINSORIZED MEAN   ***************************
      N11=0.0
      N12=0.0
      N13=0.0
      SUM1=0.0
      SUM2=0.0
      SUM3=0.0
      DO 255 I=N1,NN3
      IF(X(I).LE.XQT1) THEN
         X(I)=XQT1
         N11=N11+1
         SUM1=SUM1+X(I)
      ELSE   IF(X(I).GE.XQT3) THEN
```

```
                X(I)=XQT3
                N12=N12+1
                SUM2=SUM2+X(I)
              ELSE
                X(I)=X(I)
                N13=N13+1
                SUM3=SUM3+X(I)
        END IF
255     CONTINUE
        SUMW1=SUM1+SUM2+SUM3
        WINS01=SUMW1/NN3
        N21=0.0
        N22=0.0
        N23=0.0
        SUM11=0.0
        SUM22=0.0
        SUM33=0.0
        DO 275 J=N4,NN6
        IF(X(J).LE.XQT11) THEN
          X(J)=XQT11
          N21=N21+1.0
          SUM11=SUM11+X(J)
        ELSE   IF(X(J).GE.XQT33) THEN
                 X(J)=XQT33
                 N22=N22+1.0
```

```
                SUM22=SUM22+X(J)
              ELSE
                X(J)=X(J)
                N23=N23+1.0
                SUM33=SUM33+X(J)
      END IF
275   CONTINUE
      SUMW2=SUM11+SUM22+SUM33
      WINSO2=SUMW2/(NN6-NN3)
C*************************************************************************
C**** ALIGNMENT DATA WITH MEDIAN,TRIMMED MEAN AND WINSORIZED MEAN ***
C*************************************************************************
      DO 50 I=N1,NN3
50    Y(I)=A(I)-XMED1
      DO 51 J=N4,NN6
51    Y(J)=B(J)-XMED2
      DO 170 I=N1,NN3
170   P(I)=A(I)-TRIM1
      DO 171 J=N4,NN6
171   P(J)=B(J)-TRIM2
      DO 280 I=N1,NN3
280   Q(I)=A(I)-WINSO1
      DO 281 J=N4,NN6
281   Q(J)=B(J)-WINSO2
C*************************************************************************
```

```
C***   RANK DATA AND COMPUTE HODGES-LEHMANN WITH MEDIAN   ***C
C*****************************************************************C
      DO 60 K=N1,NN6
      Z(K)=Y(K)
60    CONTINUE
      DO 70 K=N1,NN6
      SMALL=0.0
      EQUAL=0.0
      DO 67 L=N1,NN6
      IF(Z(L)-Y(K)) 65,66,67
65    SMALL=SMALL+1.0
      GO TO 67
66    EQUAL=EQUAL+1.0
67    CONTINUE
      IF(EQUAL.EQ.0.0) GO TO 68
      R(K)=SMALL+(EQUAL+1.0)*0.5
      GO TO 70
68    R(K)=SMALL+1.0
70    CONTINUE
      SUMRTO=0.0
      DO 80 K=N1,NN6
      SUMRTO=SUMRTO+R(K)
80    CONTINUE
      RTOBAR=SUMRTO/NN6
      SUMB1=0.0
```

```
      DO 85 K=N1,NN3
      SUMB1=SUMB1+R(K)
85    CONTINUE
      RB1BAR=SUMB1/NN3
      SUMB2=0.0
      DO 90 K=N4,NN6
      SUMB2=SUMB2+R(K)
90    CONTINUE
      RB2BAR=SUMB2/NN3
      SUMT11=0.0
      DO 95 K=N1,NN1
      SUMT11=SUMT11+R(K)
95    CONTINUE
      SUMT12=0.0
      DO 96 K=N4,NN4
      SUMT12=SUMT12+R(K)
96    CONTINUE
      SUMT1=SUMT11+SUMT12
      RT1BAR=SUMT1/NN2
      SUMT21=0.0
      DO 110 K=N2,NN2
      SUMT21=SUMT21+R(K)
110   CONTINUE
      SUMT22=0.0
      DO 111 K=N5,NN5
```

```
      SUMT22=SUMT22+R(K)
111   CONTINUE
      SUMT2=SUMT21+SUMT22
      RT2BAR=SUMT2/NN2
      SUMT31=0.0
      DO 115 K=N3,NN3
      SUMT31=SUMT31+R(K)
115   CONTINUE
      SUMT32=0.0
      DO 116 K=N6,NN6
      SUMT32=SUMT32+R(K)
116   CONTINUE
      SUMT3=SUMT31+SUMT32
      RT3BAR=SUMT3/NN2
      SSUMB1=0.0
      DO 120 K=N1,NN3
120   SSUMB1=SSUMB1+R(K)**2
      VARB1=(SSUMB1/NN3)-(RB1BAR**2)
      SSUMB2=0.0
      DO 125 K=N4,NN6
125   SSUMB2=SSUMB2+R(K)**2
      VARB2=(SSUMB2/NN3)-(RB2BAR**2)
      VARBAR=(VARB1+VARB2)/2
      W1=(RT1BAR-RT0BAR)**2
      W2=(RT2BAR-RT0BAR)**2
```

```
      W3=(RT3BAR-RT0BAR)**2
      WMED=((NN3-1)*(W1+W2+W3))/(NN3*(VARBAR/NN2))
C*************************************************************************
C***   RANK DATA AND COMPUTE HODGES-LEHMANN WITH TRIMMED MEAN   ********
C*************************************************************************
      DO 180 K=N1,NN6
      Z(K)=P(K)
180   CONTINUE
      DO 185 K=N1,NN6
      SMALL=0.0
      EQUAL=0.0
      DO 183 L=N1,NN6
      IF(Z(L)-P(K)) 181,182,183
181   SMALL=SMALL+1.0
      GO TO 183
182   EQUAL=EQUAL+1.0
183   CONTINUE
      IF(EQUAL.EQ.0.0) GO TO 184
      R(K)=SMALL+(EQUAL+1.0)*0.5
      GO TO 185
184   R(K)=SMALL+1.0
185   CONTINUE
      SUMRT0=0.0
      DO 190 K=N1,NN6
      SUMRT0=SUMRT0+R(K)
```

```
190   CONTINUE
      RTOBAR=SUMRTO/NN6
      SUMB1=0.0
      DO 195 K=N1,NN3
      SUMB1=SUMB1+R(K)
195   CONTINUE
      RB1BAR=SUMB1/NN3
      SUMB2=0.0
      DO 205 K=N4,NN6
      SUMB2=SUMB2+R(K)
205   CONTINUE
      RB2BAR=SUMB2/NN3
      SUMT11=0.0
      DO 210 K=N1,NN1
      SUMT11=SUMT11+R(K)
210   CONTINUE
      SUMT12=0.0
      DO 211 K=N4,NN4
      SUMT12=SUMT12+R(K)
211   CONTINUE
      SUMT1=SUMT11+SUMT12
      RT1BAR=SUMT1/NN2
      SUMT21=0.0
      DO 220 K=N2,NN2
      SUMT21=SUMT21+R(K)
```

```
220   CONTINUE
      SUMT22=0.0
      DO 221 K=N5,NN5
      SUMT22=SUMT22+R(K)
221   CONTINUE
      SUMT2=SUMT21+SUMT22
      RT2BAR=SUMT2/NN2
      SUMT31=0.0
      DO 225 K=N3,NN3
      SUMT31=SUMT31+R(K)
225   CONTINUE
      SUMT32=0.0
      DO 226 K=N6,NN6
      SUMT32=SUMT32+R(K)
226   CONTINUE
      SUMT3=SUMT31+SUMT32
      RT3BAR=SUMT3/NN2
      SSUMB1=0.0
      DO 230 K=N1,NN3
230   SSUMB1=SSUMB1+R(K)**2
      VARB1=(SSUMB1/NN3)-(RB1BAR**2)
      SSUMB2=0.0
      DO 235 K=N4,NN6
235   SSUMB2=SSUMB2+R(K)**2
      VARB2=(SSUMB2/NN3)-(RB2BAR**2)
```

```
      VARBAR=(VARB1+VARB2)/2
      W1=(RT1BAR-RT0BAR)**2
      W2=(RT2BAR-RT0BAR)**2
      W3=(RT3BAR-RT0BAR)**2
      WTRIM=((NN3-1)*(W1+W2+W3))/((NN3)*(VARBAR/NN2))
C*************************************************************************
C***   RANK DATA AND COMPUTE HODGES-LEHMANN WITH WINSORIZED MEAN   *****
C*************************************************************************
      DO 285 K=N1,NN6
      Z(K)=Q(K)
285   CONTINUE
      DO 290 K=N1,NN6
      SMALL=0.0
      EQUAL=0.0
      DO 288 L=N1,NN6
      IF(Z(L)-Q(K)) 286,287,288
286   SMALL=SMALL+1.0
      GO TO 288
287   EQUAL=EQUAL+1.0
288   CONTINUE
      IF(EQUAL.EQ.0.0) GO TO 289
      R(K)=SMALL+(EQUAL+1.0)*0.5
      GO TO 290
289   R(K)=SMALL+1.0
290   CONTINUE
```

```
      SUMRTO=0.0
      DO 310 K=N1,NN6
      SUMRTO=SUMRTO+R(K)
310   CONTINUE
      RTOBAR=SUMRTO/NN6
      SUMB1=0.0
      DO 315 K=N1,NN3
      SUMB1=SUMB1+R(K)
315   CONTINUE
      RB1BAR=SUMB1/NN3
      SUMB2=0.0
      DO 320 K=N4,NN6
      SUMB2=SUMB2+R(K)
320   CONTINUE
      RB2BAR=SUMB2/NN3
      SUMT11=0.0
      DO 325 K=N1,NN1
      SUMT11=SUMT11+R(K)
325   CONTINUE
      SUMT12=0.0
      DO 326 K=N4,NN4
      SUMT12=SUMT12+R(K)
326   CONTINUE
      SUMT1=SUMT11+SUMT12
      RT1BAR=SUMT1/NN2
```

```
      SUMT21=0.0
      DO 330 K=N2,NN2
      SUMT21=SUMT21+R(K)
330   CONTINUE
      SUMT22=0.0
      DO 331 K=N5,NN5
      SUMT22=SUMT22+R(K)
331   CONTINUE
      SUMT2=SUMT21+SUMT22
      RT2BAR=SUMT2/NN2
      SUMT31=0.0
      DO 335 K=N3,NN3
      SUMT31=SUMT31+R(K)
335   CONTINUE
      SUMT32=0.0
      DO 336 K=N6,NN6
      SUMT32=SUMT32+R(K)
336   CONTINUE
      SUMT3=SUMT31+SUMT32
      RT3BAR=SUMT3/NN2
      SSUMB1=0.0
      DO 340 K=N1,NN3
340   SSUMB1=SSUMB1+R(K)**2
      VARB1=(SSUMB1/(NN3))-(RB1BAR**2)
      SSUMB2=0.0
```

```
      DO 345 K=N4,NN6
345   SSUMB2=SSUMB2+R(K)**2
      VARB2=(SSUMB2/(NN3))-(RB2BAR**2)
      VARBAR=(VARB1+VARB2)/2
      W1=(RT1BAR-RT0BAR)**2
      W2=(RT2BAR-RT0BAR)**2
      W3=(RT3BAR-RT0BAR)**2
      WWIN=((NN3-1)*(W1+W2+W3))/((NN3)*(VARBAR/NN2))
C*************************************************************************
C*********************    COUNT   NUMBER   OF   SIGNIFICANT   ********
C*************************************************************************
      IF(WMED.GE.CH05)   IRM05=IRM05+1
      IF(WMED.GE.CH01)   IRM01=IRM01+1
      IF(WTRIM.GE.CH05)  IRT05=IRT05+1
      IF(WTRIM.GE.CH01)  IRT01=IRT01+1
      IF(WWIN.GE.CH05)   IRW05=IRW05+1
      IF(WWIN.GE.CH01)   IRW01=IRW01+1
1000  CONTINUE
C*************************************************************************
C*************   COMPUTE   ACTUAL   TYPE   I   ERROR   *****************
C*************************************************************************
      XIT=IT
      SIGM5=IRM05/XIT
      SIGM1=IRM01/XIT
      SIGT5=IRT05/XIT
```

```
      SIGT1=IRTO1/XIT
      SIGW5=IRWO5/XIT
      SIGW1=IRWO1/XIT
C*************************************************************************
C*********  TEST SIGNIFICANT AT P=.05 ****************************
C*************************************************************************
      NMED5=XIT-IRM05
      NTRI5=XIT-IRTO5
      NWIN5=XIT-IRWO5
      XTO5=IRM05+IRTO5+IRWO5
      XTOTAL=3*XIT
      REO5=(XTO5/XTOTAL)*XIT
      EXO5=XIT-REO5
      IF(EXO5.LE.5) GO TO 99
      CHIO5=(IRM05**2+IRTO5**2+IRWO5**2)/REO5+(NMED5**2+NTRI5**2+
     *NWIN5**2)/EXO5-XTOTAL
C====== COMPARISION ALIGNMENT WITH MEDIAN AND TRIMMED MEAN ======
      TMO5=(SIGM5*(1-SIGM5)/XIT)+(SIGT5*(1-SIGT5)/XIT)
      ZTMO5=(SIGM5-SIGT5)/SQRT(TMO5)
C==== COMPARISION ALIGNMENT WITH MEDIAN AND WINSORIZED MEAN ======
      WMO5=(SIGM5*(1-SIGM5)/XIT)+(SIGW5*(1-SIGW5)/XIT)
      ZWMO5=(SIGM5-SIGW5)/SQRT(WMO5)
C==== COMPARISION ALIGNMENT WITH TRIMMED MEAN AND WINSORIZED MEAN ===
      TWO5=(SIGT5*(1-SIGT5)/XIT)+(SIGW5*(1-SIGW5)/XIT)
      ZTWO5=(SIGT5-SIGW5)/SQRT(TWO5)
```

```
C*************************************************************************
C*********   TEST   SIGNIFICANT   AT   P=.01   **************************
C*************************************************************************
99     NMED1=XIT-IRM01
       NTRI1=XIT-IRT01
       NWIN1=XIT-IRW01
       XT01=IRM01+IRT01+IRW01
       RE01=(XT01/XTOTAL)*XIT
       EX01=XIT-RE01
       IF(EX01.LE.5) GO TO 999
       CHI01=(IRM01**2+IRT01**2+IRW01**2)/RE01+(NMED1**2+NTRI1**2+
      *NWIN1**2)/EX01-XTOTAL
C======= COMPARISION  ALIGNMENT  WITH  MEDIAN  AND  TRIMMED  MEAN ======
       TM01=(SIGM1*(1-SIGM1)/XIT)+(SIGT1*(1-SIGT1)/XIT)
       ZTM01=(SIGM1-SIGT1)/SQRT(TM01)
C===== COMPARISION  ALIGNMENT  WITH  MEDIAN  AND  WINSORIZED  MEAN =====
       WM01=(SIGM1*(1-SIGM1)/XIT)+(SIGW1*(1-SIGW1)/XIT)
       ZWM01=(SIGM1-SIGW1)/SQRT(WM01)
C===== COMPARISION ALIGNMENT WITH TRIMMED MEAN AND WINSORIZED MEAN =====
       TW01=(SIGT1*(1-SIGT1)/XIT)+(SIGW1*(1-SIGW1)/XIT)
       ZTW01=(SIGT1-SIGW1)/SQRT(TW01)
C*************************************************************************
C***********   PRINT     TOTAL     RESULT   **************************
C*************************************************************************
999    WRITE(6,700) KKK
```

```
700   FORMAT(/20X,'==================  PROGRAM',I3,'================')
      WRITE(6,701) NC,BETA
701   FORMAT(/5X,'SAMPLE SIZE IN EACH CELL  =',I3//5X,'BETA  =',F5.2)
      WRITE(6,702)
702   FORMAT(/5X,'ALPHA  =  .01')
      WRITE(6,703)
703   FORMAT(//40X,'MEDIAN',7X,'TRIMMED',7X,'WINSORIZED')
      WRITE(6,704) IRM01,IRT01,IRW01,SIGM1,SIGT1,SIGW1,CHI01
704   FORMAT(//20X,'REJECT AT P .01',5X,I5,10X,I5,10X,I5,
     *       //20X,'SIGNIFICANT P .01',F10.5,3X,F10.5,5X,F10.5,
     *       //20X,'CHISQUARE',5X,F15.5)
      IF(CHI01.LE.5.99) GO TO 710
      WRITE(6,705)
705   FORMAT(/5X,'Z-TEST')
      WRITE(6,706) ZTM01,ZWM01,ZTW01
706   FORMAT(//20X,'MED-TRIMMED',9X,F15.5,
     *       //20X,'MED-WINSORIZED',6X,F15.5,
     *       //20X,'TRIMMED-WINSORIZED',2X,F15.5)
710   WRITE(6,711)
711   FORMAT(/5X,'ALPHA  = .05')
      WRITE(6,712)
712   FORMAT(//40X,'MEDIAN',7X,'TRIMMED',7X,'WINSORIZED')
      WRITE(6,713) IRM05,IRT05,IRW05,SIGM5,SIGT5,SIGW5,CHI05
713   FORMAT(//20X,'REJECT AT P .05',5X,I5,10X,I5,10X,I5,
     *       //20X,'SIGNIFICANT P .05',F10.5,3X,F10.5,5X,F10.5,
```

```
     *       //20X,'CHISQUARE',5X,F15.5)
      IF(CHI05.LE.5.99) GO TO 720
      WRITE(6,714)
714   FORMAT(/5X,'Z-TEST')
      WRITE(6,715) ZTM05,ZWM05,ZTW05
715   FORMAT(//20X,'MED-TRIMMED',9X,F15.5,
     *       //20X,'MED-WINSORIZED',6X,F15.5,
     *       //20X,'TRIMMED-WINSORIZED',2X,F15.5)
720   WRITE(6,721) KKK
721   FORMAT(//20X,'***************  END PROGRAM',I3,' ****************')
2000  CONTINUE
      STOP
      END
C*************************************************************************
C**********************    SUBROUTINE NORMAL     **************************
C*************************************************************************
      SUBROUTINE NORMAL(EX,SD,Y1,Y2,IX,IY,RNN)
 1    CALL RANDOM(IX,IY,RNN)
      V1=2.* RNN-1.
      CALL RANDOM(IX,IY,RNN)
      V2=2.*RNN-1.
      S=V1*V1+V2*V2
      IF(S.GE.1)GOTO 1
      RNN1=V1*SQRT((-2.*ALOG(S))/S)
      RNN2=V2*SQRT((-2.*ALOG(S))/S)
```

```
      Y1=EX+RNN1*SD
      Y2=EX+RNN2*SD
      RETURN
      END
C*************************************************************************
C**********************      SUBROUTINE RANDOM      **********************
C*************************************************************************
      SUBROUTINE RANDOM(IX,IY,RNN)
      IY=IX*65539
      IF(IY) 33,44,44
   33 IY=IY+2147483647+1
   44 RNN=IY
      RNN=RNN*.4656613E-9
      IX=IY
      RETURN
      END
```

ประวัติผู้เขียน

นางสาวพัชรา ชุมสาย ณ อยุธยา เกิดวันที่ 2 พฤษภาคม 2504 ที่อำเภอเมือง จังหวัดสมุทรสาคร สำเร็จการศึกษาปริญญาตรีครุศาสตรบัณฑิต วิชาเอกคณิตศาสตร์จากวิทยาลัยครูสวนสุนันทา เมื่อปีการศึกษา 2526 เข้าศึกษาต่อในหลักสูตรปริญญาครุศาสตรมหาบัณฑิต สาขาวิชาสถิติการศึกษา ภาควิชาวิจัยการศึกษา บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย เมื่อปีการศึกษา 2532 ปัจจุบันรับราชการที่โรงเรียนแวงน้อยศึกษา อำเภอแวงน้อย จังหวัดขอนแก่น