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ภาษาไทย

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ภาคผนวก

โปรแกรม A ใช้หาค่า Mean Square Error ในกรณีความคลาดเคลื่อนลุ่ม มีการแจกแจงปกติและกลุ่มตัวแปรอิสระเป็นข้อมูลเชิงปริมาณ

โปรแกรม B ใช้หาค่า Mean Square Error ในกรณีความคลาดเคลื่อนลุ่ม มีการแจกแจงปกติและกลุ่มตัวแปรอิสระเป็นข้อมูลเชิงคุณภาพ

โปรแกรม D ใช้หาค่า Mean Square Error ในกรณีความคลาดเคลื่อนลุ่ม มีการแจกแจงปกติและกลุ่มตัวแปรอิสระเป็นข้อมูลเชิงคุณภาพ และปริมาณ

โปรแกรม AO ใช้หาค่า Mean Square Error ในกรณีความคลาดเคลื่อน ลุ่มมีการแจกแจงปกติปลอมปนเนื่องจากเล่กลและกลุ่มตัวแปร อิสระเป็นข้อมูลเชิงปริมาณ

โปรแกรม BO ใช้หาค่า Mean Square Error ในกรณีความคลาดเคลื่อนลุ่ม มีการแจกแจงปกติปลอมปนเนื่องจากเล่กลและกลุ่มตัวแปรอิสระ เป็นข้อมูลเชิงคุณภาพ

โปรแกรม ABO ใช้หาค่า Mean Square Error ในกรณีความคลาดเคลื่อนลุ่ม มีการแจกแจงปกติปลอมปนเนื่องจากเล่กลและกลุ่มตัวแปรอิสระ เป็นข้อมูลเชิงคุณภาพและปริมาณ

โปรแกรม C ใช้หาค่า Mean Square Error ในกรณีความคลาดเคลื่อนลุ่ม มีการแจกแจงแบบไม่ล่มมาตรและกลุ่มตัวแปรอิสระเป็นข้อมูล เชิงปริมาณ

โปรแกรม C_1 ใช้หาค่า Mean Square Error ในกรณีความคลาดเคลื่อนลุ่ม มีการแจกแจงแบบไม่ล่มมาตรและกลุ่มหาตัวแปรอิสระ เป็นข้อมูลเชิงคุณภาพ

โปรแกรม C_2 ใช้หาค่า Mean Square Error ในกรณีความคลาดเคลื่อนลุ่ม มีการแจกแจงแบบไม่ล่มมาตรและกลุ่มของตัวแปรอิสระเป็นข้อมูล เชิงคุณภาพและปริมาณ

```
C*********************MAINPROGRAM*************************************
      DIMENSION X1(10,500),XP(10,500),YHATP(500),YRESP(500),
     1YCENP(500),XSP(500),EP(500),XSP1(10,500),Y(500),
     2XBARP(10),SP(10,10),AP(10,10),RP(10,10),DP(10),YHAT(100),A1(100),
     3YRES(100),YCEN(100),STDD(10),XS(100),XS1(100),SERP(10),A2(100),
     5RS11(100),RS2(100),RS21(100),XBAR(10),S(10,10),STDDP(10),
     6SME1(100),SME11(100),SME2(100),SME21(100),X2(10,100),
     7A(10,10),R(10,10),B1(10),B(10),SER(10),RS1(100),
     8A11(100),LA(100),MA(100),LB(100),MB(100)
      COMMON IA
      OPEN (UNIT=6,FILE='A.REP',STATUS='NEW')
C*************************************************************************
      N1 = 50
      NP = 500
      WRITE(6,1)NP
    1 FORMAT(/,2X,'NP=',I5)
      MP = 4
      EX = 0
      STD = 1
      EX1 = 0
      STD1 = .5
      DO 1000 J=1,NP
      DO 1000 I=1,MP
      IA = 65539
 3000 CALL NORM (EX,STD,Y2)
 1000 X1(I,J) = Y2
      DO 45 I=1,NP
      CALL NORM(EX1,STD1,Y1)
   45 EP(I) = Y1
      B1(1) = 1
      B1(2) = 1
      B1(3) = 1
      B1(4) = 1
      B1(5) = 1
      B1(6) = 1
      B1(7) = 1
      DO 7 I=1,MP
    7 B1(I) = B1(I)
      AA1 = 2.5
      WRITE (6,4)AA1,EX1,STD1
    4 FORMAT(//,2X,'AA1=',F6.2,//,2X,'EX1=',F5.2,//,2X,'STD1=',F5.2)
      WRITE (6,5) B1(1),B1(2),B1(3),B1(4),B1(5),B1(6),B1(7)
    5 FORMAT(///,2X,'B1(1)='F5.2,2X,'B1(2)=',F5.2,2X,'B1(3)=',F5.2,2X,
     1'B1(4)=',F5.2,2X,'B1(5)=',F5.2,2X,'B1(6)=',F5.2,2X,'B1(7)=',
     2F5.2)
      DO 50 J=1,NP
      Y(J) = 0
      DO 55 I=1,MP
   55 Y(J) = Y(J) +B1(I)*X1(I,J)
   50 Y(J) = Y(J) + EP(J) + AA1
      M = MP+1
      DO 60 J=1,NP
      DO 65 I=2,M
   65 XP(I,J) = X1(I-1,J)
   60 XP (1,J) = Y(J)
      CALL MEAN (M,NP,XP,XBARP)
      CALL COVAR (M,NP,XP,XBARP,SP)
      CALL CORR(M,NP,SP,RP)
      DO 124 I=1,MP
      DO 124 J=1,MP
  124 AP(I,J) = SP(I+1,J+1)
```

```
      CALL DET (AP,A2,MP)
      CALL MINV(A2,MP,D,LA,MA)
      DET1 = D
      IF (DET1) 3001,3000,3001
 3001 CALL INVS (MP,NP,AP)
      DO 129 I=1,MP
      BP(I) = 0
      DO 129 J=1,MP
  129 BP(I) = BP(I)+SP(1,J+1)*AP(J,I)
      WRITE(6,4000) (BP(I),I=1,MP)
 4000 FORMAT (///,2X,10F10.4)
      AA = 0
      DO 132 I=1,MP
  132 AA = AA + XBARP(I+1) * BP(I)
      AA = XBARP(1) - AA
      SSEP = 0
      DO 134 I= 1,NP
      YHATP(I) = 0
      DO 135 J = 2,M
  135 YHATP(I) = YHATP(I) + BP(J-1)*XP(J,I)
      YHATP(I) = YHATP(I) + AA
      YRESP(I) = XP(1,I) - YHATP(I)
  134 SSEP = SSEP + YRESP(I) * YRESP(I)
      SEEP = SQRT (SSEP/(NP-M))
      R2P = (SP(1,1)-SSEP)/SP(1,1)
      R21P = 1-((1-R2P)*(NP-1)/(NP-M))
      F = (R2P/MP)/((1-R2P)/(NP-M))
      DO 142 I=1,M
  142 SERP(I) = SEEP *SQRT(AP(I,I))
      CALL MED (NP,YRESP,C,XSP1)
      YAP = C
      YMEDP = YAP*YAP
      DO 146 I=1,NP
  146 YCENP(I) = XP(1,I)-XBARP(1)
      CALL MED (NP,YCENP,C,XSP)
      YBP = C
      YMDCP = YBP *YBP
      R1P = (YMDCP - YMEDP)/YMDCP
      R11P = 1-((1-R1P)*(NP-1)/(NP-M))
      WRITE (6,149) R1P,R11P,R2P,R21P,F
  149 FORMAT (//,2X,'R1P=',F5.4,2X,'R11P=',F5.4,2X,'R2P=',F5.4,
     12X,'R21P=',F5.4,2X,'F=',F15.4)
      DO 151 I=1,M
      SP(I,I) = SQRT (SP(I,I)/(NP-1))
  151 STDDP(I) = SP(I,I)
      SMSE1 = 0
      SMSE11 = 0
      SMSE2 = 0
      SMSE21 = 0
      IK  = 100
      DO 2000 IS=1,IK
      CALL SAMP (M,NP,XP,X2,N,N1)
      CALL MEAN(M,N,X2,XBAR)
      M1= M-1
      CALL COVAR (M,N,X2,XBAR,S)
      DO 164 I=1,M1
      DO 164 J=1,M1
  164 A(I,J) = S(I+1,J+1)
      CALL DET(A,A11,M1)
      CALL MINV(A11,M1,D2,LB,MB)
      IF (D2) 2003,2000,2003
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```
2003  CALL INVS (M1,N,A)
      DO 169 I=1,M1
      B(I) = 0
      DO 169 J=1,M1
  169 B(I) = B(I)+S(1,J+1)*A(J,I)
      AA = 0
      DO 172 I=1,M1
  172 AA = AA + XBAR(I+1) * B(I)
      AA = XBAR(1) - AA
      SSE = 0
      DO 174 I= 1,N
      YHAT(I) = 0
      DO 175 J = 2,M
  175 YHAT(I) = YHAT(I) + B(J-1)*X2(J,I)
      YHAT(I)= YHAT(I) + AA
      YRES(I) = X2(1,I) - YHAT(I)
  174 SSE = SSE + YRES(I) * YRES(I)
      SEE = SQRT (SSE/(N-M))
      R2 = (S(1,1)-SSE)/S(1,1)
      RS2(IS) = R2
      R21 = 1-((1-R2)*(N-1)/(N-M))
      RS21(IS) = R21

      F = (R2/M1)/((1-R2)/(N-M))
      DO 182 I=1,M
  182 SER(I) = SEE *SQRT(A(I,I))
      CALL MED (N,YRES,C,XS1)
      YA = C
      YMED = YA*YA
      DO 186 I=1,N
  186 YCEN(I) = X2(1,I)-XBAR(1)
      CALL MED (N,YCEN,C,XS)
      YB = C
      YMDC = YB *YB
      R1 = (YMDC - YMED)/YMDC
      RS1(IS) = R1
      R11 = 1-((1-R1)*(N-1)/(N-M))
      RS11(IS) = R11
      DO 191 I=1,M
      S(I,I) = SQRT (S(I,I)/(N-1))
  191 STDD(I) = S(I,I)
      SME1(IS) = RS1(IS) - R1P
      SME11(IS) = RS11(IS) - R11P
      SME2(IS) = RS2(IS) - R2P
      SME21(IS) = RS21(IS) - R21P
      SMSE1 =SMSE1+ SME1(IS) * SME1(IS)
      SMSE11 =SMSE11+SME11(IS)*SME11(IS)
      SMSE2 =SMSE2+ SME2(IS)*SME2(IS)
      SMSE21 =SMSE21 + SME21(IS) * SME21(IS)
2000  CONTINUE
      SMSE1 = SMSE1/IK
      SMSE11 = SMSE11/IK
      SMSE2 = SMSE2/IK
      SMSE21 = SMSE21/IK
      WRITE (6,2001)
2001  FORMAT (//,2X,'COMPARISION OF COEFFICIENT OF DETERMINATION')
      WRITE (6,2002) SMSE1,SMSE11,SMSE2,SMSE21
2002  FORMAT (//,2X,4F20.4)
      WRITE (6,2500)IK,N
2500  FORMAT(//,'IK=',I5,2X,'N=',I5)
      WRITE(6,2502) (RS1(I),RS11(I),RS2(I),RS21(I),I=1,IK)
2502  FORMAT(2X,4F10.6)
      CLOSE (6)
      STOP
      END
```

```
C**********************MAINPROGRAM*****************************************
      DIMENSION X1(10,500),XP(10,500),YHATP(500),YRESP(500),
     1YCENP(500),XSP(500),EP(500),XSP1(10,500),Y(500),RR(400),
     2XBARP(10),SP(10,10),AP(10,10),RP(10,10),BP(10),YHAT(100),A1(100),
     3YRES(100),YCEN(100),STDD(10),XS(100),XS1(100),SERP(10),A2(100),
     5RS11(100),RS2(100),RSP1(100),XBAR(10),S(10,10),STDDP(10),
     6SME1(100),SME11(100),SME2(100),SME21(100),X2(10,100),
     7A(10,10),P(10,10),B1(10),B(10),SER(10),RS1(100),
     8A11(100),LA(100),MA(100),LB(100),MB(100),X21(1000),X22(1000),
     9X23(1000),LS(1000),MS(1000),X24(1000),XE(100,100),
     *XA(10,100),HAT(100),TAU(100),TAUR(100),YRESP(100),YRES1(100)
      COMMON IA
      OPEN (UNIT=6,FILE='B.REP',STATUS='NEW')
C*****************************************************************************
      IA = 65539
      NP = 500
      N1 = 100
      IAA = 100
      PI = 0.5
      MP = 3
      EX =0
      STD = 1
      STD1 = 1
      WRITE(6,1)NP,MP
    1 FORMAT(/,2X,'NP=',I5,2X,'MP=',I3)
 3000 DO 1200 J=1,NP
      DO 1200 I=1,MP
      CALL RANDU(IA,IX,Y3)
      IF(Y3.GT.PI) GO TO 1300
      X1(I,J) = 0
      GO TO 1200
 1300 X1(I,J) = 1
 1200 CONTINUE
      DO 45 I=1,NP
      CALL NORM (EX,STD1,Y1)
   45 EP(I) = Y1
      DO 7 I=1,MP
    7 B1(I) = 1
      AA1 = 2.5
      WRITE (6,4)AA1,STD1
    4 FORMAT(//,2X,'AA1=',F6.2,2X,'STD1=',F5.3)
      WRITE (6,5) (B1(I),I=1,7)
    5 FORMAT(///,2X,'B1(1)=',F5.2,2X,'B1(2)=',F5.2,2X,'B1(3)=',F5.2,2X,
     1'B1(4)=',F5.2,2X,'B1(5)=',F5.2,2X,'B1(6)=',F5.2,2X,'B1(7)=',
     2F5.2)
      DO 50 J=1,NP
      Y(J) = 0
      DO 55 I=1,MP
   55 Y(J) = Y(J) +B1(I)*X1(I,J)
   50 Y(J) = Y(J) + EP(J) + AA1
      M = MP+1
      DO 60 J=1,NP
      DO 65 I=2,M
   65 XP(I,J) = X1(I-1,J)
   60 XP (1,J) = Y(J)
      CALL MEAN (M,NP,XP,XBARP)
      CALL COVAR (M,NP,XP,XBARP,SP)
      CALL CORR(M,NP,SP,RP)
      DO 124 I=1,MP
      DO 124 J=1,MP
  124 AP(I,J) = SP(I+1,J+1)
```

```
      CALL DET (AP,A2,MP,MP)
      CALL MINV(A2,MP,D,LA,MA)
      DET1 = D
      IF (DET1) 3001,3000,3001
 3001 CALL INVS (MP,NP,AP)
      DO 129 I=1,MP
      BP(I) = 0
      DO 129 J=1,MP
  129 BP(I) = BP(I)+SP(I,J+1)*AP(J,I)
      WRITE(6,4000) (BP(I),I=1,MP)
 4000 FORMAT (///,2X,10F10.4)
      AA = 0
      DO 132 I=1,MP
  132 AA = AA + XBARP(I+1) * BP(I)
      AA = XBARP(1) - AA
      SSEP = 0
      DO 134 I= 1,NP
      YHATP(I) = 0
      DO 135 J = 2,M
  135 YHATP(I) = YHATP(I) + BP(J-1)*XP(J,I)
      YHATP(I) = YHATP(I) + AA
      YRESP(I) = XP(1,I) - YHATP(I)
  134 SSEP = SSEP + YRESP(I) * YRESP(I)
      SEEP = SQRT (SSEP/(NP-M))
      R2P = (SP(1,1)-SSEP)/SP(1,1)
      R21P = 1-((1-R2P)*(NP-1)/(NP-M))
      F = (R2P/MP)/((1-R2P)/(NP-M))
      DO 142 I=1,M
  142 SERP(I) = SEEP *SQRT(AP(I,I))
      CALL MED (NP,YRESP,C,XSP1)
      YAP = C
      YMEDP = YAP*YAP
      DO 146 I=1,NP
  146 YCENP(I) = XP(1,I)-XBARP(1)
       CALL MED (NP,YCENP,C,XSP)
      YBP = C
      YMDCP = YBP *YBP
      R1P = (YMDCP - YMEDP)/YMDCP
      R11P = 1-((1-R1P)*(NP-1)/(NP-M))
      WRITE (6,149) R1P,R11P,R2P,R21P,F
  149 FORMAT (//,2X,'R1P=',F5.4,2X,'R11P=',F5.4,2X,'R2P=',F5.4,
     12X,'R21P=',F5.4,2X,'F=',F15.4)
      DO 151 I=1,M
      SP(I,I) = SQRT (SP(I,I)/(NP-1))
  151 STDDP(I) = SP(I,I)
      IK = 0
      SMSE1 = 0
      SMSE11 = 0
      SMSE2 = 0
      SMSE21 = 0
      IBB = 0
 2000 CALL SAMP (M,NP,XP,X2,N,N1)
      IBB = IBB+1
      DO 800 J=1,N
      DO 800 I=2,M
      XA(I,J) = X2(I,J)
  800 CONTINUE
      DO 950 J=1,N
  950 XA(1,J) = 1
      CALL DETT (XA,X21,M,N)
      CALL TRANS(X21,X22,N,M)
```

```
      CALL GMPRD(X22,X21,X23,M,N,M)
      CALL MINV(X23,M,DS,LS,MS)
      IF(DS)501,500,501
  500 GO TO 200
  501 CALL MEAN(M,N,X2,XBAR)
      M1= M-1
      CALL COVAR (M,N,X2,XBAR,S)
      DO 164 I=1,M1
      DO 164 J=1,M1
  164 A(I,J) = S(I+1,J+1)
      CALL INVS (M1,N,A)
      DO 169 I=1,M1
      B(I) = 0
      DO 169 J=1,M1
  169 B(I) = B(I)+S(1,J+1)*A(J,I)
      AA = 0
      DO 172 I=1,M1
  172 AA = AA + XBAR(I+1) * B(I)
      AA = XBAR(1) - AA
      SSE = 0
      DO 174 I= 1,N
      YHAT(I) = 0
      DO 175 J = 2,M
  175 YHAT(I) = YHAT(I) + B(J-1)*X2(J,I)
      YHAT(I)= YHAT(I) + AA
      YRES(I) = X2(1,I) - YHAT(I)
  174 SSE = SSE + YRES(I) * YRES(I)
      SEE = SQRT (SSE/(N-M))
      R2 = (S(1,1)-SSE)/S(1,1)
      R21 = 1-((1-R2)*(N-1)/(N-M))
      F = (R2/M1)/((1-R2)/(N-M))
      DO 182 I=1,M
  182 SER(I) = SEE *SQRT(A(I,I))
  201 CALL MED (N,YRES,C,XS1)
      YA = C
      YMED = YA*YA
      DO 186 I=1,N
  186 YCEN(I) = X2(1,I)-XBAR(1)
      CALL MED (N,YCEN,C,XS)
      YB = C
      YMDC = YB *YB
      R1 = (YMDC - YMED)/YMDC
      R11 = 1-((1-R1)*(N-1)/(N-M))
      DO 191 I=1,M
      S(I,I) = SQRT (S(I,I)/(N-1))
  191 STDD(I) = S(I,I)
      IK = IK+1
      RS1(IK) = R1
      RS11(IK) = R11
      RS2(IK) = R2
      RS21(IK) = R21
      SME1(IK) = RS1(IK) - R1P
      SME11(IK) = RS11(IK) - R11P
      SME2(IK) = RS2(IK) - R2P
      SME21(IK) = RS21(IK) - R21P
      SMSE1 = SMSE1+SME1(IK) * SME1(IK)
      SMSE11 = SMSE11+SME11(IK)*SME11(IK)
      SMSE2 = SMSE2+SME2(IK)*SME2(IK)
      SMSE21 = SMSE21+ SME21(IK) * SME21(IK)
  200 IF (IK-IAA)2000,2001,2001
 2001 SMSE1  = SMSE1/IK
```

```
      SMSE11 = SMSE11/IK
      SMSE2  = SMSE2/IK
      SMSE21 = SMSE21/IK
      WRITE (6,2003)
2003  FORMAT (//,2X,'COMPARISION OF COEFFICIENT OF DETERMINATION')
      WRITE (6,2002) SMSE1,SMSE11,SMSE2,SMSE21
2002  FORMAT (//,2X,4F20.4)
      WRITE (6,2500)IK,N,IBB
2500  FORMAT(//,'IK=',I5,2X,'N=',I5,2X,'IBB=',I5)
      DO 9005 I=1,IAA
9005  WRITE (6,9006) RS1(I),RS11(I),RS2(I),RS21(I)
9006  FORMAT (4(F10.6),1X)
      CLOSE (6)
      STOP
      END
```

```
C*********************MAINPROGRAM*****************************************
      DIMENSION X1(10,500),XP(10,500),YHATP(500),YRESP(500),
     1YCENP(500),XSP(500),EP(500),XSP1(10,500),Y(500),RR(400),
     2XBARP(10),SP(10,10),AP(10,10),RP(10,10),BP(10),YHAT(100),A1(100),
     3YRES(100),YCEN(100),STDD(10),XS(100),XS1(100),SERP(10),A2(100),
     5RS11(100),RS2(100),RS21(100),XBAR(10),S(10,10),STDDP(10),
     6SME1(100),SME11(100),SME2(100),SME21(100),X2(10,100),
     7A(10,10),R(10,10),B1(10),B(10),SER(10),RS1(100),
     8A11(100),LA(100),MA(100),LB(100),MB(100),X21(1000),X22(1000),
     9X23(1000),LS(1000),MS(1000),X24(1000),XE(100,100),
     *XA(10,100),HAT(100),TAU(100),TAUR(100),YRESR(100),YRES1(100)
      COMMON IA
      OPEN (UNIT=6,FILE='D.REP',STATUS='NEW')
C*****************************************************************************
      IA = 65539
      NP = 500
      N1 = 50
      IAA = 100
      PI = 0.5
      MP = 2
      EX =0
      STD = .5
      WRITE(6,1)NP,MP
    1 FORMAT(/,2X,'NP=',I5,2X,'MP=',I3)
 3000 DO 1000 J=1,NP
      DO 1000 I=2,MP
      CALL NORM (EX,STD,Y2)
 1000 X1(I,J) = Y2
      DO 1200 J=1,NP
      CALL RANDU(IA,IX,Y3)
      IF(Y3.GT.PI) GO TO 1300
      X1(1,J) = 0
      GO TO 1200
 1300 X1(1,J) = 1
 1200 CONTINUE
      DO 45 I=1,NP
      CALL NORM (EX,STD,Y1)
   45 EP(I) = Y1
      DO 7 I=1,MP
    7 B1(I) = 1
      AA1 = 2.5
      WRITE (6,4)AA1,STD
    4 FORMAT(//,2X,'AA1=',F6.2,2X,'STD=',F5.3)
      WRITE (6,5) (B1(I),I=1,7)
    5 FORMAT(///,2X,'B1(1)='F5.2,2X,'B1(2)=',F5.2,2X,'B1(3)=',F5.2,2X,
     1'B1(4)=',F5.2,2X,'B1(5)=',F5.2,2X,'B1(6)=',F5.2,2X,'B1(7)=',
     2F5.2)
      DO 50 J=1,NP
      Y(J) = 0
      DO 55 I=1,MP
   55 Y(J) = Y(J) +B1(I)*X1(I,J)
   50 Y(J) = Y(J) + EP(J) + AA1
      M = MP+1
      DO 60 J=1,NP
      DO 65 I=2,M
   65 XP(I,J) = X1(I-1,J)
   60 XP (1,J) = Y(J)
      CALL MEAN (M,NP,XP,XBARP)
      CALL COVAR (M,NP,XP,XBARP,SP)
      CALL CORR(M,NP,SP,RP)
      DO 124 I=1,MP
```

```
      DO 124 J=1,MP
  124 AP(I,J) = SP(I+1,J+1)
      CALL DET (AP,A2,MP,MP)
      CALL MINV(A2,MP,D,LA,MA)
      DET1 = D
      IF (DET1) 3001,3000,3001
 3001 CALL INVS (MP,NP,AP)
      DO 129 I=1,MP
      BP(I) = 0
      DO 129 J=1,MP
  129 BP(I) = BP(I)+SP(1,J+1)*AP(J,I)
      WRITE(6,4000) (BP(I),I=1,MP)
 4000 FORMAT (///,2X,10F10.4)
      AA = 0
      DO 132 I=1,MP
  132 AA = AA + XBARP(I+1) * BP(I)
      AA = XBARP(1) - AA
      SSEP = 0
      DO 134 I= 1,NP
      YHATP(I) = 0
      DO 135 J = 2,M
  135 YHATP(I) = YHATP(I) + BP(J-1)*XP(J,I)
      YHATP(I) = YHATP(I) + AA
      YRESP(I) = XP(1,I) - YHATP(I)
  134 SSEP = SSEP + YRESP(I) * YRESP(I)
      SEEP = SQRT (SSEP/(NP-M))
      R2P = (SP(1,1)-SSEP)/SP(1,1)
      R21P = 1-((1-R2P)*(NP-1)/(NP-M))
      F = (R2P/MP)/((1-R2P)/(NP-M))
      DO 142 I=1,M
  142 SERP(I) = SEEP *SQRT(AP(I,I))
      CALL MED (NP,YRESP,C,XSP1)
      YAP = C
      YMEDP = YAP*YAP
      DO 146 I=1,NP
  146 YCENP(I) = XP(1,I)-XBARP(1)
       CALL MED (NP,YCENP,C,XSP)
      YBP = C
      YMDCP = YBP *YBP
      R1P = (YMDCP - YMEDP)/YMDCP
      R11P = 1-((1-R1P)*(NP-1)/(NP-M))
      WRITE (6,149) R1P,R11P,R2P,R21P,F
  149 FORMAT (//,2X,'R1P=',F5.4,2X,'R11P=',F5.4,2X,'R2P=',F5.4,
     12X,'R21P=',F5.4,2X,'F=',F15.4)
      DO 151 I=1,M
      SP(I,I) = SQRT (SP(I,I)/(NP-1))
  151 STDDP(I) = SP(I,I)
      IK = 0
      SMSE1 = 0
      SMSE11 = 0
      SMSE2 = 0
      SMSE21 = 0
      IBB = 0
 2000 CALL SAMP (M,NP,XP,X2,N,N1)
      IBB = IBB+1
      DO 800 J=1,N
      DO 800 I=2,M
      XA(I,J) = X2(I,J)
  800 CONTINUE
      DO 950 J=1,N
  950 XA(1,J) = 1
```

```
      CALL DETT (XA,X21,M,N)
      CALL TRANS(X21,X22,N,M)
      CALL GMPRD(X22,X21,X23,M,N,M)
      CALL MINV(X23,M,DS,LS,MS)
      IF(DS)501,500,501
  500 GO TO 200
  501 CALL MEAN(M,N,X2,XBAR)
      M1= M-1
      CALL COVAR (M,N,X2,XBAR,S)
      DO 164 I=1,M1
      DO 164 J=1,M1
  164 A(I,J) = S(I+1,J+1)
      CALL INVS (M1,N,A)
      DO 169 I=1,M1
      B(I) = 0
      DO 169 J=1,M1
  169 B(I) = B(I)+S(1,J+1)*A(J,I)
      AA = 0
      DO 172 I=1,M1
  172 AA = AA + XBAR(I+1) * B(I)
      AA = XBAR(1) - AA
      SSE = 0
      DO 174 I= 1,N
      YHAT(I) = 0
      DO 175 J = 2,M
  175 YHAT(I) = YHAT(I) + B(J-1)*X2(J,I)
      YHAT(I)= YHAT(I) + AA
      YRES(I) = X2(1,I) - YHAT(I)
  174 SSE = SSE + YRES(I) * YRES(I)
      SEE = SQRT (SSE/(N-M))
      R2 = (S(1,1)-SSE)/S(1,1)
      R21 = 1-((1-R2)*(N-1)/(N-M))
      F = (R2/M1)/((1-R2)/(N-M))
      DO 182 I=1,M
  182 SER(I) = SEE *SQRT(A(I,I))
  201 CALL MED (N,YRES,C,XS1)
      YA = C
      YMED = YA*YA
      DO 186 I=1,N
  186 YCEN(I) = X2(1,I)-XBAR(1)
      CALL MED (N,YCEN,C,XS)
      YB = C
      YMDC = YB *YB
      R1 = (YMDC - YMED)/YMDC
      R11 = 1-((1-R1)*(N-1)/(N-M))
      DO 191 I=1,M
      S(I,I) = SQRT (S(I,I)/(N-1))
  191 STDD(I) = S(I,I)
      IK = IK+1
      RS1(IK) = R1
      RS11(IK) = R11
      RS2(IK) = R2
      RS21(IK) = R21
      SME1(IK) = RS1(IK) - R1P
      SME11(IK) = RS11(IK) - R11P
      SME2(IK) = RS2(IK) - R2P
      SME21(IK) = RS21(IK) - R21P
      SMSE1 = SMSE1+SME1(IK) * SME1(IK)
      SMSE11 = SMSE11+SME11(IK)*SME11(IK)
      SMSE2 = SMSE2+SME2(IK)*SME2(IK)
      SMSE21 = SMSE21+ SME21(IK) * SME21(IK)
```

```
 200  IF (IK-IAA)2000,2001,2001
2001  SMSE1  = SMSE1/IK
      SMSE11 = SMSE11/IK
      SMSE2  = SMSE2/IK
      SMSE21 = SMSE21/IK
      WRITE (6,2003)
2003  FORMAT (//,2X,'COMPARISION OF COEFFICIENT OF DETERMINATION')
      WRITE (6,2002) SMSE1,SMSE11,SMSE2,SMSE21
2002  FORMAT (//,2X,4F20.4)
      WRITE (6,2500)IK,N,IBB
2500  FORMAT(//,'IK=',I5,2X,'N=',I5,2X,'IBB=',I5)
      DO 9005 I=1,IAA
9005  WRITE (6,9006) RS1(I),RS11(I),RS2(I),RS21(I)
9006  FORMAT (4(F10.6),1X)
      CLOSE (6)
      STOP
      END
```

```
C**********MAINPROGRAM**********
      DIMENSION X1(10,500),XP(10,500),YHATP(500),YRESP(500),
     1YCENP(500),XSP(500),EP(500),XSP1(10,500),Y(500),
     2XBARP(10),SP(10,10),AP(10,10),RP(10,10),BP(10),YHAT(100),A1(100),
     3YRES(100),YCEN(100),STDD(10),XS(100),XS1(100),SERP(10),A2(100),
     5RS1(100),RS2(100),RS21(100),XBAR(10),S(10,10),STDDP(10),
     6SME1(100),SME11(100),SME2(100),SME21(100),X2(10,100),
     7A(10,10),R(10,10),B1(10),B(10),SER(10),RS1(100),
     8A11(100),LA(100),MA(100),LB(100),MB(100)
      COMMON IA
      OPEN (UNIT=6,FILE='C.REP',STATUS='NEW')
C**********
      IA = 65539
      IK = 100
      NP =  500
      N1 =  100
      ALPHA3 = .5
      ALPHA4 = 3
      RL1 = -0.6390
      RL2 = 0.2006
      RL3 = 0.0630
      RL4 = 0.2307
      MP = 2
      EX = 0
      STD = 1
      EX1 = 0
      STD1 = 1
      WRITE(6,1)NP,MP
    1 FORMAT(/,2X,'NP=',I5,2X,'MP=',I5)
      WRITE(6,13)ALPHA3,ALPHA4,RL1,RL2,RL3,RL4
   13 FORMAT(2X,'ALPHA3=',F10.7,1X,'ALPHA4=',F10.7,1X,'RL1=',F10.7,
     11X,'RL2=',F10.7,1X,'RL3=',F10.7,1X,'RL4=',F10.7)
 3000 DO 1000 J=1,NP
      DO 1000 I=1,MP
      CALL NORM (EX,STD,Y2)
 1000 X1(I,J) = Y2
      DO 45 I=1,NP
      CALL SKEW(RL1,RL2,RL3,RL4,EX1,STD1,Y1)
   45 EP(I) = Y1
      DO 7 I=1,MP
    7 B1(I) = 1
      AA1 = 2.5
      WRITE (6,4)AA1,EX1,STD1
    4 FORMAT(//,2X,'AA1=',F6.2,//,2X,'EX1=',F5.2,//,2X,'STD1=',F5.2)
      WRITE (6,5) B1(1),B1(2),B1(3),B1(4),B1(5),B1(6),B1(7)
    5 FORMAT(///,2X,'B1(1)='F5.2,2X,'B1(2)=',F5.2,2X,'B1(3)=',F5.2,2X,
     1'B1(4)=',F5.2,2X,'B1(5)=',F5.2,2X,'B1(6)=',F5.2,2X,'B1(7)=',
     2F5.2)
      DO 50 J=1,NP
      Y(J) = 0
      DO 55 I=1,MP
   55 Y(J) = Y(J) +B1(I)*X1(I,J)
   50 Y(J) = Y(J) + EP(J) + AA1
      M = MP+1
      DO 60 J=1,NP
      DO 65 I=2,M
   65 XP(I,J) = X1(I-1,J)
   60 XP (1,J) = Y(J)
      CALL MEAN (M,NP,XP,XBARP)
      CALL COVAR (M,NP,XP,XBARP,SP)
      CALL CORR(M,NP,SP,RP)
```

```
      DO 124 I=1,MP
      DO 124 J=1,MP
  124 AP(I,J) = SP(I+1,J+1)
      CALL DET (AP,A2,MP)
      CALL MINV(A2,MP,D,LA,MA)
      DET1 = D
      IF (DET1) 3001,3000,3001
 3001 CALL INVS (MP,NP,AP)
      DO 129 I=1,MP
      BP(I) = 0
      DO 129 J=1,MP
  129 BP(I) = BP(I)+SP(1,J+1)*AP(J,I)
      WRITE(6,4000) (BP(I),I=1,MP)
 4000 FORMAT (///,2X,10F10.4)
      AA = 0
      DO 132 I=1,MP
  132 AA = AA + XBARP(I+1) * BP(I)
      AA = XBARP(1) - AA
      SSEP = 0
      DO 134 I= 1,NP
      YHATP(I) = 0
      DO 135 J = 2,M
  135 YHATP(I) = YHATP(I) + BP(J-1)*XP(J,I)
      YHATP(I) = YHATP(I) + AA
      YRESP(I) = XP(1,I) - YHATP(I)
  134 SSEP = SSEP + YRESP(I) * YRESP(I)
      SEEP = SQRT (SSEP/(NP-M))
      R2P = (SP(1,1)-SSEP)/SP(1,1)
      R21P = 1-((1-R2P)*(NP-1)/(NP-M))
      F = (R2P/MP)/((1-R2P)/(NP-M))
      DO 142 I=1,M
  142 SERP(I) = SEEP *SQRT(AP(I,I))
      CALL MED (NP,YRESP,C,XSP1)
      YAP = C
      YMEDP = YAP*YAP
      DO 146 I=1,NP
  146 YCENP(I) = XP(1,I)-XBARP(1)
       CALL MED (NP,YCENP,C,XSP)
      YBP = C
      YMDCP = YBP *YBP
      R1P = (YMDCP - YMEDP)/YMDCP
      R11P = 1-((1-R1P)*(NP-1)/(NP-M))
      WRITE (6,149) R1P,R11P,R2P,R21P,F
  149 FORMAT (//,2X,'R1P=',F5.4,2X,'R11P=',F5.4,2X,'R2P=',F5.4,
     12X,'R21P=',F5.4,2X,'F=',F15.4)
      DO 151 I=1,M
      SP(I,I) = SQRT (SP(I,I)/(NP-1))
  151 STDDP(I) = SP(I,I)
      SMSE1 = 0
      SMSE11 = 0
      SMSE2 = 0
      SMSE21 = 0
      DO 2000 IS=1,IK
      CALL SAMP (M,NP,XP,X2,N,N1)
      CALL MEAN(M,N,X2,XBAR)
      M1= M-1
      CALL COVAR (M,N,X2,XBAR,S)
      DO 164 I=1,M1
      DO 164 J=1,M1
  164 A(I,J) = S(I+1,J+1)
      CALL DET(A,A11,M1)
```

```
      CALL MINV(A11,M1,D2,LB,MB)
      IF (D2) 2003,2000,2003
 2003 CALL INVS (M1,N,A)                                          120
      DO 169 I=1,M1
      B(I) = 0
      DO 169 J=1,M1
  169 B(I) = B(I)+S(1,J+1)*A(J,I)
      AA = 0
      DO 172 I=1,M1
  172 AA = AA + XBAR(I+1) * B(I)
      AA = XBAR(1) - AA
      SSE = 0
      DO 174 I= 1,N
      YHAT(I) = 0
      DO 175 J = 2,M
  175 YHAT(I) = YHAT(I) + B(J-1)*X2(J,I)
      YHAT(I)= YHAT(I) + AA
      YRES(I) = X2(1,I) - YHAT(I)
  174 SSE = SSE + YRES(I) * YRES(I)
      SEE = SQRT (SSE/(N-M))
      R2 = (S(1,1)-SSE)/S(1,1)
      RS2(IS) = R2
      R21 = 1-((1-R2)*(N-1)/(N-M))
      RS21(IS) = R21
      F = (R2/M1)/((1-R2)/(N-M))
      DO 182 I=1,M
  182 SER(I) = SEE *SQRT(A(I,I))
      CALL MED (N,YRES,C,XS1)
      YA = C
      YMED = YA*YA
      DO 186 I=1,N
  186 YCEN(I) = X2(1,I)-XBAR(1)
       CALL MED (N,YCEN,C,XS)
      YB = C
      YMDC = YB *YB
      R1 = (YMDC - YMED)/YMDC
      RS1(IS) = R1
      R11 = 1-((1-R1)*(N-1)/(N-M))
      RS11(IS) = R11
      DO 191 I=1,M
      S(I,I) = SQRT (S(I,I)/(N-1))
  191 STDD(I) = S(I,I)
      SME1(IS) = RS1(IS) - R1P
      SME11(IS) = RS11(IS) - R11P
      SME2(IS) = RS2(IS) - R2P
      SME21(IS) = RS21(IS) - R21P
      SMSE1 =SMSE1+ SME1(IS) * SME1(IS)
      SMSE11 =SMSE11+SME11(IS)*SME11(IS)
      SMSE2 =SMSE2+ SME2(IS)*SME2(IS)
      SMSE21 =SMSE21 + SME21(IS) * SME21(IS)
 2000 CONTINUE
      SMSE1 = SMSE1/IK
      SMSE11 = SMSE11/IK
      SMSE2 = SMSE2/IK
      SMSE21 = SMSE21/IK
      WRITE (6,2001)
 2001 FORMAT (//,2X,'COMPARISION OF COEFFICIENT OF DETERMINATION')
      WRITE (6,2002) SMSE1,SMSE11,SMSE2,SMSE21
 2002 FORMAT (//,2X,4F20.4)
      WRITE (6,2500)IK,N1
 2500 FORMAT(2X,'IK=',I5,2X,'N=',I5)
```

```
      DO 2501 I=1,IK
2501  WRITE(6,2502) RS1(I),RS11(I),PS2(I),RS21(I)
2502  FORMAT(2X,4F17.7)
      CLOSE (6)
      STOP
      END
```

```
C*********************MAINPROGRAM*************************************
      DIMENSION X1(10,500),XP(10,500),YHATP(500),YRESP(500),
     1YCENP(500),XSP(500),EP(500),XSP1(10,500),Y(500),
     2XBARP(10),SP(10,10),AP(10,10),RP(10,10),BP(10),YHAT(100),A1(100),
     3YRES(100),YCEN(100),STDD(10),XS(100),XS1(100),SERP(10),A2(100),
     5RS11(100),RS2(100),RS21(100),XBAR(10),S(10,10),STDDP(10),
     6SME1(100),SME11(100),SME2(100),SME21(100),X2(10,100),
     7A(10,10),R(10,10),B1(10),B(10),SER(10),RS1(100),
     8A11(100),LA(100),MA(100),LB(100),MB(100)
      COMMON IA
      OPEN (UNIT=6,FILE='C1.REP',STATUS='NEW')
C*************************************************************************
      IA = 65539
      IK = 100
      NP =  500
      N1 =  100
      PI =  0.5
      ALPHA3 = .75
      ALPHA4 = 3
      RL1 = -1.0970
      RL2 = 0.2003
      RL3 = 0.0183
      RL4 = 0.3119
      MP = 4
      EX = 0
      STD = 1
      EX1 = 0
      STD1 = 1
      WRITE(6,1)NP,MP,PI
    1 FORMAT(/,2X,'NP=',I5,2X,'MP=',I5,2X,'PI=',F10.5)
      WRITE(6,13)ALPHA3,ALPHA4,RL1,RL2,RL3,RL4
   13 FORMAT(2X,'ALPHA3=',F10.7,1X,'ALPHA4=',F10.7,1X,'RL1=',F10.7,
     11X,'RL2=',F10.7,1X,'RL3=',F10.7,1X,'RL4=',F10.7)
 3000 DO 1000 J=1,NP
      DO 1000 I=1,MP
      CALL RANDU(IA,IX,Y2)
      IF (Y2.GT.PI) GO TO 1200
      X1(I,J) = 0
      GO TO 1000
 1200 X1(I,J) = 1
 1000 CONTINUE
      DO 45 I=1,NP
      CALL SNEW(RL1,RL2,RL3,RL4,EX1,STD1,Y1)
   45 EP(I) = Y1
      DO 7 I=1,MP
    7 B1(I) = 1
      AA1 = 2.5
      WRITE (6,4)AA1,EX1,STD1
    4 FORMAT(//,2X,'AA1=',F6.2,//,2X,'EX1=',F5.2,//,2X,'STD1=',F5.2)
      WRITE (6,5) B1(1),B1(2),B1(3),B1(4),B1(5),B1(6),B1(7)
    5 FORMAT(///,2X,'B1(1)='F5.2,2X,'B1(2)=',F5.2,2X,'B1(3)=',F5.2,2X,
     1'B1(4)=',F5.2,2X,'B1(5)=',F5.2,2X,'B1(6)=',F5.2,2X,'B1(7)=',
     2F5.2)
      DO 50 J=1,NP
      Y(J) = 0
      DO 55 I=1,MP
   55 Y(J) = Y(J) +B1(I)*X1(I,J)
   50 Y(J) = Y(J) + EP(J) + AA1
      M = MP+1
      DO 60 J=1,NP
      DO 65 I=2,M
```

```
 65   XP(I,J) = X1(I-1,J)
 60   XP (1,J) = Y(J)
      CALL MEAN (M,NP,XP,XBARP)
      CALL COVAR (M,NP,XP,XBARP,SP)
      CALL CORR(M,NP,SP,RP)
      DO 124 I=1,MP
      DO 124 J=1,MP
 124  AP(I,J) = SP(I+1,J+1)
      CALL DET (AP,A2,MP)
      CALL MINV(A2,MP,D,_A,MA)
      DET1 = D
      IF (DET1) 3001,3000,3001
3001  CALL INVS (MP,NP,AP)
      DO 129 I=1,MP
      BP(I) = 0
      DO 129 J=1,MP
 129  BP(I) = BP(I)+SP(1,J+1)*AP(J,I)
      WRITE(6,4000) (BP(I),I=1,MP)
4000  FORMAT (///,2X,10F10.4)
      AA = 0
      DO 132 I=1,MP
 132  AA = AA + XBARP(I+1) * BP(I)
      AA = XBARP(1) - AA
      SSEP = 0
      DO 134 I= 1,NP
      YHATP(I) = 0
      DO 135 J = 2,M
 135  YHATP(I) = YHATP(I) + BP(J-1)*XP(J,I)
      YHATP(I) = YHATP(I) + AA
      YRESP(I) = XP(1,I) - YHATP(I)
 134  SSEP = SSEP + YRESP(I) * YRESP(I)
      SEEP = SQRT (SSEP/(NP-M))
      R2P = (SP(1,1)-SSEP)/SP(1,1)
      R21P = 1-((1-R2P)*(NP-1)/(NP-M))
      F = (R2P/MP)/((1-R2P)/(NP-M))
      DO 142 I=1,M
 142  SERP(I) = SEEP *SQRT(AP(I,I))
      CALL MED (NP,YRESP,C,XSP1)
      YAP = C
      YMEDP = YAP*YAP
      DO 146 I=1,NP
 146  YCENP(I) = XP(1,I)-XBARP(I)
       CALL MED (NP,YCENP,C,XSP)
      YBP = C
      YMDCP = YBP *YBP
      R1P = (YMDCP - YMEDP)/YMDCP
      R11P = 1-((1-R1P)*(NP-1)/(NP-M))
      WRITE (6,149) R1P,R11P,R2P,R21P,F
 149  FORMAT (//,2X,'R1P=',F5.4,2X,'R11P=',F5.4,2X,'R2P=',F5.4,
     12X,'R21P=',F5.4,2X,'F=',F15.4)
      DO 151 I=1,M
      SP(I,I) = SQRT (SP(I,I)/(NP-1))
 151  STDDP(I) = SP(I,I)
      SMSE1 = 0
      SMSE11 = 0
      SMSE2 = 0
      SMSE21 = 0
      DO 2000 IS=1,IK
      CALL SAMP (M,NP,XP,X2,N,N1)
      CALL MEAN(M,N,X2,XBAR)
      M1= M-1
```

```
      CALL COVAR (M,N,X2,XBAR,S)
      DO 164 I=1,M1
      DO 164 J=1,M1
  164 A(I,J) = S(I+1,J+1)
      CALL DET(A,A11,M1)
      CALL MINV(A11,M1,D2,LB,MB)
      IF (D2) 2003,2000,2003
 2003 CALL INVS (M1,N,A)
      DO 169 I=1,M1
      B(I) = 0
      DO 169 J=1,M1
  169 B(I) = B(I)+S(1,J+1)*A(J,I)
      AA = 0
      DO 172 I=1,M1
  172 AA = AA + XBAR(I+1) * B(I)
      AA = XBAR(1) - AA
      SSE = 0
      DO 174 I= 1,N
      YHAT(I) = 0
      DO 175 J = 2,M
  175 YHAT(I) = YHAT(I) + B(J-1)*X2(J,I)
      YHAT(I)= YHAT(I) + AA
      YRES(I) = X2(1,I) - YHAT(I)
  174 SSE = SSE + YRES(I) * YRES(I)
      SEE = SQRT (SSE/(N-M))
      R2 = (S(1,1)-SSE)/S(1,1)
      RS2(IS) = R2
      R21 = 1-((1-R2)*(N-1)/(N-M))
      RS21(IS) = R21
      F = (R2/M1)/((1-R2)/(N-M))
      DO 182 I=1,M
  182 SER(I) = SEE *SQRT(A(I,I))
      CALL MED (N,YRES,C,XS1)
      YA = C
      YMED = YA*YA
      DO 186 I=1,N
  186 YCEN(I) = X2(1,I)-XBAR(1)
       CALL MED (N,YCEN,C,XS)
      YB = C
      YMDC = YB *YB
      R1 = (YMDC - YMED)/YMDC
      RS1(IS) = R1
      R11 = 1-((1-R1)*(N-1)/(N-M))
      RS11(IS) = R11
      DO 191 I=1,M
      S(I,I) = SQRT (S(I,I)/(N-1))
  191 STDD(I) = S(I,I)
      SME1(IS) = RS1(IS) - R1P
      SME11(IS) = RS11(IS) - R11P
      SME2(IS) = RS2(IS) - R2P
      SME21(IS) = RS21(IS) - R21P
      SMSE1 =SMSE1+ SME1(IS) * SME1(IS)
      SMSE11 =SMSE11+SME11(IS)*SME11(IS)
      SMSE2 =SMSE2+ SME2(IS)*SME2(IS)
      SMSE21 =SMSE21 + SME21(IS) * SME21(IS)
 2000 CONTINUE
      SMSE1 = SMSE1/IK
      SMSE11 = SMSE11/IK
      SMSE2 = SMSE2/IK
      SMSE21 = SMSE21/IK
      WRITE (6,2001)
```

```
2001  FORMAT (//,2X,'COMPARISION OF COEFFICIENT OF DETERMINATION')
      WRITE (6,2002) SMSE1,SMSE11,SMSE2,SMSE21
2002  FORMAT (//,2X,4F20.4)
      WRITE (6,2500)IK,N1
2500  FORMAT(2X,'IK=',I5,2X,'N=',I5)
      DO 2501 I=1,IK
2501  WRITE(6,2502) RS1(I),RS11(I),RS2(I),RS21(I)
2502  FORMAT(2X,4F17.7)
      CLOSE (6)
      STOP
      END
```

```
C*********************MAINPROGRAM*************************************
      DIMENSION X1(10,500),XP(10,500),YHATP(500),YRESP(500),
     1YCENP(500),XSP(500),EP(500),XSP1(10,500),Y(500),
     2XBARP(10),SP(10,10),AP(10,10),RP(10,10),BP(10),YHAT(100),A1(100),
     3YRES(100),YCEN(100),STDD(10),XS(100),XS1(100),SERP(10),A2(100),
     5RS11(100),RS2(100),RS21(100),XBAR(10),S(10,10),STDDP(10),
     6SME1(100),SME11(100),SME2(100),SME21(100),X2(10,100),
     7A(10,10),R(10,10),B1(10),B(10),SEP(10),RS1(100),
     8A11(100),LA(100),MA(100),LB(100),MB(100)
      COMMON IA
      OPEN (UNIT=6,FILE='C2.REP',STATUS='NEW')
C***********************************************************************
      IA = 65539
      IK = 100
      NP =  500
      N1 =  100
      PI =  0.5
      ALPHA3 = .75
      ALPHA4 = 3
      RL1 = -1.0970
      RL2 = 0.2003
      RL3 = 0.0183
      RL4 = 0.3119
      MP = 2
      EX1 = 0
      STD1 = 1
      WRITE(6,1)NP,MP,PI
    1 FORMAT(/,2X,'NP=',I5,2X,'MP=',I5,2X,'PI=',F10.5)
      WRITE(6,13)ALPHA3,ALPHA4,RL1,RL2,RL3,RL4
   13 FORMAT(2X,'ALPHA3=',F10.7,1X,'ALPHA4=',F10.7,1X,'RL1=',F10.7,
     11X,'RL2=',F10.7,1X,'RL3=',F10.7,1X,'RL4=',F10.7)
 3000 DO 1000 J=1,NP
      DO 1000 I=2,MP
      CALL NORM(EX1,STD1,Y2)
      X1(I,J) = Y2
 1000 CONTINUE
      DO 1300 J=1,NP
      CALL RANDU(IA,IX,Y3)
      IF (Y3.GT.PI) GO TO 1200
      X1(1,J) = 0
      GO TO 1300
 1200 X1(1,J) = 1
 1300 CONTINUE
      DO 45 I=1,NP
      CALL SKEW(RL1,RL2,RL3,RL4,EX1,STD1,Y1)
   45 EP(I) = Y1
      DO 7 I=1,MP
    7 B1(I) = 1
      AA1 = 2.5
      WRITE (6,4)AA1,EX1,STD1
    4 FORMAT(//,2X,'AA1=',F6.2,//,2X,'EX1=',F5.2,//,2X,'STD1=',F5.2)
      WRITE (6,5) B1(1),B1(2),B1(3),B1(4),B1(5),B1(6),B1(7)
    5 FORMAT(///,2X,'B1(1)='F5.2,2X,'B1(2)=',F5.2,2X,'B1(3)=',F5.2,2X,
     1'B1(4)=',F5.2,2X,'B1(5)=',F5.2,2X,'B1(6)=',F5.2,2X,'B1(7)=',
     2F5.2)
      DO 50 J=1,NP
      Y(J) = 0
      DO 55 I=1,MP
   55 Y(J) = Y(J) +B1(I)*X1(I,J)
   50 Y(J) = Y(J) + EP(J) + AA1
      M = MP+1
```

```
      DO 60 J=1,NP
      DO 65 I=2,M
   65 XP(I,J) = X1(I-1,J)
   60 XP (1,J) = Y(J)
      CALL MEAN (M,NP,XP,XBARP)
      CALL COVAR (M,NP,XP,XBARP,SP)
      CALL CORR(M,NP,SP,RP)
      DO 124 I=1,MP
      DO 124 J=1,MP
  124 AP(I,J) = SP(I+1,J+1)
      CALL DET (AP,A2,MP)
      CALL MINV(A2,MP,D,LA,MA)
      DET1 = D
      IF (DET1) 3001,3000,3001
 3001 CALL INVS (MP,NP,AP)
      DO 129 I=1,MP
      BP(I) = 0
      DO 129 J=1,MP
  129 BP(I) = BP(I)+SP(1,J+1)*AP(J,I)
      WRITE(6,4000) (BP(I),I=1,MP)
 4000 FORMAT (///,2X,10F10.4)
      AA = 0
      DO 132 I=1,MP
  132 AA = AA + XBARP(I+1) * BP(I)
      AA = XBARP(1) - AA
      SSEP = 0
      DO 134 I= 1,NP
      YHATP(I) = 0
      DO 135 J = 2,M
  135 YHATP(I) = YHATP(I) + BP(J-1)*XP(J,I)
      YHATP(I) = YHATP(I) + AA
      YRESP(I) = XP(1,I) - YHATP(I)
  134 SSEP = SSEP + YRESP(I) * YRESP(I)
      SEEP = SQRT (SSEP/(NP-M))
      R2P = (SP(1,1)-SSEP)/SP(1,1)
      R21P = 1-((1-R2P)*(NP-1)/(NP-M))
      F = (R2P/MP)/((1-R2P)/(NP-M))
      DO 142 I=1,M
  142 SERP(I) = SEEP *SQRT(AP(I,I))
      CALL MED (NP,YRESP,C,XSP1)
      YAP = C
      YMEDP = YAP*YAP
      DO 146 I=1,NP
  146 YCENP(I) = XP(1,I)-XBARP(I)
      CALL MED (NP,YCENP,C,XSP)
      YBP = C
      YMDCP = YBP *YBP
      R1P = (YMDCP - YMEDP)/YMDCP
      R11P = 1-((1-R1P)*(NP-1)/(NP-M))
      WRITE (6,149) R1P,R11P,R2P,R21P,F
  149 FORMAT (//,2X,'R1P=',F5.4,2X,'R11P=',F5.4,2X,'R2P=',F5.4,
     12X,'R21P=',F5.4,2X,'F=',F15.4)
      DO 151 I=1,M
      SP(I,I) = SQRT (SP(I,I)/(NP-1))
  151 STDDP(I) = SP(I,I)
      SMSE1 = 0
      SMSE11 = 0
      SMSE2 = 0
      SMSE21 = 0
      DO 2000 IS=1,IK
      CALL SAMP (M,NP,XP,X2,N,N1)
```

```
      CALL MEAN(M,N,X2,XBAR)
      M1= M-1
      CALL COVAR (M,N,X2,XBAR,S)
      DO 164 I=1,M1
      DO 164 J=1,M1
  164 A(I,J) = S(I+1,J+1)
      CALL DET(A,A11,M1)
      CALL MINV(A11,M1,D2,LB,MB)
      IF (D2) 2003,2000,2003
 2003 CALL INVS (M1,N,A)
      DO 169 I=1,M1
      B(I) = 0
      DO 169 J=1,M1
  169 B(I) = B(I)+S(1,J+1)*A(J,I)
      AA = 0
      DO 172 I=1,M1
  172 AA = AA + XBAR(I+1) * B(I)
      AA = XBAR(1) - AA
      SSE = 0
      DO 174 I= 1,N
      YHAT(I) = 0
      DO 175 J = 2,M
  175 YHAT(I) = YHAT(I) + B(J-1)*X2(J,I)
      YHAT(I)= YHAT(I) + AA
      YRES(I) = X2(1,I) - YHAT(I)
  174 SSE = SSE + YRES(I) * YRES(I)
      SEE = SQRT (SSE/(N-M))
      R2 = (S(1,1)-SSE)/S(1,1)
      RS2(IS) = R2
      R21 = 1-((1-R2)*(N-1)/(N-M))
      RS21(IS) = R21
      F = (R2/M1)/((1-R2)/(N-M))
      DO 182 I=1,M
  182 SER(I) = SEE *SQRT(A(I,I))
      CALL MED (N,YRES,C,XS1)
      YA = C
      YMED = YA*YA
      DO 186 I=1,N
  186 YCEN(I) = X2(1,I)-XBAR(1)
      CALL MED (N,YCEN,C,XS)
      YB = C
      YMDC = YB *YB
      R1 = (YMDC - YMED)/YMDC
      RS1(IS) = R1
      R11 = 1-((1-R1)*(N-1)/(N-M))
      RS11(IS) = R11
      DO 191 I=1,M
      S(I,I) = SQRT (S(I,I)/(N-1))
  191 STDD(I) = S(I,I)
      SME1(IS) = RS1(IS) - R1P
      SME11(IS) = RS11(IS) - R11P
      SME2(IS) = RS2(IS) - R2P
      SME21(IS) = RS21(IS) - R21P
      SMSE1 =SMSE1+ SME1(IS) * SME1(IS)
      SMSE11 =SMSE11+SME11(IS)*SME11(IS)
      SMSE2 =SMSE2+ SME2(IS)*SME2(IS)
      SMSE21 =SMSE21 + SME21(IS) * SME21(IS)
 2000 CONTINUE
      SMSE1 = SMSE1/IK
      SMSE11 = SMSE11/IK
      SMSE2 = SMSE2/IK
```

```
      SMSE21 = SMSE21/IK
      WRITE (6,2001)
2001  FORMAT (//,2X,'COMPARISION OF COEFFICIENT OF DETERMINATION')
      WRITE (6,2002) SMSE1,SMSE11,SMSE2,SMSE21
2002  FORMAT (//,2X,4F20.4)
      WRITE (6,2500)IK,N1
2500  FORMAT(2X,'IK=',I5,2X,'N=',I5)
      DO 2501 I=1,IK
2501  WRITE(6,2502) RS1(I),RS11(I),RS2(I),RS21(I)
2502  FORMAT(2X,4F17.7)
      CLOSE (6)
      STOP
      END
```

```
C*********************MAINPROGRAM*****************************************
      DIMENSION X1(10,500),XP(10,500),YHATP(500),YRESP(500),
     1YCENP(500),XSP(500),EP(500),XSP1(10,500),Y(500),
     2XBARP(10),SP(10,10),AP(10,10),RP(10,10),BP(10),YHAT(100),A1(100),
     3YRES(100),YCEN(100),STDD(10),XS(100),XS1(100),SERP(10),A2(100),
     5RS11(100),RS2(100),RS21(100),XBAR(10),S(10,10),STDDP(10),
     6SME1(100),SME11(100),SME2(100),SME21(100),X2(10,100),
     7A(10,10),R(10,10),B1(10),B(10),SER(10),RS1(100),
     8A11(100),LA(100),MA(100),LB(100),MB(100),X21(1000),X22(1000),
     9X23(1000),LS(1000),MS(1000),X24(1000),XF(10000),XE(100,100),
     *XA(10,100),HAT(100),TAU(100),TAUR(100),YRESR(100),YRES1(100)
      COMMON IA
      OPEN (UNIT=6,FILE='AO.REP',STATUS='NEW')
C*****************************************************************************
      IA = 65539
      NP = 500
      N1 =  100
      IAA = 50
      MP = 4
      EX =0
      STD = 1
      SIGMA = 1
      C1 = 10
      P1 = .01
      TA = 3.4
      WRITE(6,1)NP,MP
    1 FORMAT(/,2X,'NP=',I5,2X,'MP=',I4)
 3000 DO 1000 J=1,NP
      DO 1000 I=1,MP
      CALL NORM (EX,STD,Y2)
 1000 X1(I,J) = Y2
      DO 45 I=1,NP
      CALL SCALE (C1,P1,SIGMA,Y1)
   45 EP(I) = Y1
      DO 7 I=1,MP
    7 B1(I) = 1
      AA1 = 2.5
      WRITE (6,4)AA1,C1,P1
    4 FORMAT(//,2X,'AA1=',F6.2,//,2X,'C1=',F10.2,//,2X,'P1=',F5.2)
      WRITE (6,5) B1(1),B1(2),B1(3),B1(4),B1(5),B1(6),B1(7)
    5 FORMAT(///,2X,'B1(1)='F5.2,2X,'B1(2)=',F5.2,2X,'B1(3)=',F5.2,2X,
     1'B1(4)=',F5.2,2X,'B1(5)=',F5.2,2X,'B1(6)=',F5.2,2X,'B1(7)=',
     2F5.2)
      DO 50 J=1,NP
      Y(J) = 0
      DO 55 I=1,MP
   55 Y(J) = Y(J) +B1(I)*X1(I,J)
   50 Y(J) = Y(J) + EP(J) + AA1
      M = MP+1
      DO 60 J=1,NP
      DO 65 I=2,M
   65 XP(I,J) = X1(I-1,J)
   60 XP (1,J) = Y(J)
      CALL MEAN (M,NP,XP,XBARP)
      CALL COVAR (M,NP,XP,XBARP,SP)
      CALL CORR(M,NP,SP,RP)
      DO 124 I=1,MP
      DO 124 J=1,MP
  124 AP(I,J) = SP(I+1,J+1)
      CALL DET (AP,A2,MP,MP)
      CALL MINV(A2,MP,D,LA,MA)
```

```
      DET1 = D
      IF (DET1) 3001,3000,3001
 3001 CALL INVS (MP,NP,AP)
      DO 129 I=1,MP                                                    131
      BP(I) = 0
      DO 129 J=1,MP
  129 BP(I) = BP(I)+SP(1,J+1)*AP(J,I)
      WRITE(6,4000) (BP(I),I=1,MP)
 4000 FORMAT (///,2X,10F10.4)
      AA = 0
      DO 132 I=1,MP
  132 AA = AA + XBARP(I+1) * BP(I)
      AA = XBARP(1) - AA
      SSEP = 0
      DO 134 I= 1,NP
      YHATP(I) = 0
      DO 135 J = 2,M
  135 YHATP(I) = YHATP(I) + BP(J-1)*XP(J,I)
      YHATP(I) = YHATP(I) + AA
      YRESP(I) = XP(1,I) - YHATP(I)
  134 SSEP = SSEP + YRESP(I) * YRESP(I)
      SEEP = SQRT (SSEP/(NP-M))
      R2P = (SP(1,1)-SSEP)/SP(1,1)
      R21P = 1-((1-R2P)*(NP-1)/(NP-M))
      F = (R2P/MP)/((1-R2P)/(NP-M))
      DO 142 I=1,M
  142 SERP(I) = SEEP *SQRT(AP(I,I))
      CALL MED (NP,YRESP,C,XSP1)
      YAP = C
      YMEDP = YAP*YAP
      DO 146 I=1,NP
  146 YCENP(I) = XP(1,I)-XBARP(1)
      CALL MED (NP,YCENP,C,XSP)
      YBP = C
      YMDCP = YBP *YBP
      R1P = (YMDCP - YMEDP)/YMDCP
      R11P = 1-((1-R1P)*(NP-1)/(NP-M))
      WRITE (6,149) R1P,R11P,R2P,R21P,F
  149 FORMAT (//,2X,'R1P=',F5.4,2X,'R11P=',F5.4,2X,'R2P=',F5.4,
     12X,'R21P=',F5.4,2X,'F=',F15.4)
      DO 151 I=1,M
      SP(I,I) = SQRT (SP(I,I)/(NP-1))
  151 STDDP(I) = SP(I,I)
      IK = 0
      SMSE1 = 0
      SMSE11 = 0
      SMSE2 = 0
      SMSE21 = 0
      IBB = 0
 2000 CALL SAMP (M,NP,XP,X2,N,N1)
      IBB = IBB+1
      DO 800 J=1,N
      DO 800 I=2,M
      XA(I,J) = X2(I,J)
  800 CONTINUE
      DO 950 J=1,N
  950 XA(1,J) = 1
      CALL DETT (XA,X21,M,N)
      CALL TRANS(X21,X22,N,M)
      CALL GMPRD(X22,X21,X23,M,N,M)
      CALL MINV(X23,M,DS,LS,MS)
```

```
      IF(DS)501,500,501
  500 GO TO 200
  501 CALL GMPRD(X21,X23,X24,N,M,M)
      CALL GMPRD(X24,X22,XF,N,M,N)
      IB = 0
      DO 700 I=1,N
      DO 701 J=1,N
      IB = IB+1
  701 XE(I,J) = XF(IB)
  700 CONTINUE
      DO 400 J = 1,N
      DO 400 I = 1,N
      IF (I-J) 400,401,400
  401 HAT(I) = XE(I,J)
  400 CONTINUE
      CALL MEAN(M,N,X2,XBAR)
      M1= M-1
      CALL COVAR (M,N,X2,XBAR,S)
      DO 164 I=1,M1
      DO 164 J=1,M1
  164 A(I,J) = S(I+1,J+1)
      CALL INVS (M1,N,A)
      DO 169 I=1,M1
      B(I) = 0
      DO 169 J=1,M1
  169 B(I) = B(I)+S(1,J+1)*A(J,I)
      AA = 0
      DO 172 I=1,M1
  172 AA = AA + XBAR(I+1) * B(I)
      AA = XBAR(1) - AA
      SSE = 0
      DO 174 I= 1,N
      YHAT(I) = 0
      DO 175 J = 2,M
  175 YHAT(I) = YHAT(I) + B(J-1)*X2(J,I)
      YHAT(I)= YHAT(I) + AA
      YRES(I) = X2(1,I) - YHAT(I)
  174 SSE = SSE + YRES(I) * YRES(I)
      SEE = SQRT (SSE/(N-M))
      R2 = (S(1,1)-SSE)/S(1,1)
      R21 = 1-((1-R2)*(N-1)/(N-M))
      F = (R2/M1)/((1-R2)/(N-M))
      DO 182 I=1,M
  182 SER(I) = SEE *SQRT(A(I,I))
      CALL OUT (YRES,SEE,HAT,TAU,N)
      CALL MAXA(TAU,TAUR,N)
      T = TAUR(N)
       PRINT *,'T',T
      DO 600 I=1,N
      IF (T-TAU(I))600,601,600
  600 CONTINUE
  601 I1 = I
      DO 350 J1 = 1,N
  350 YRES1(J1) = ABS(YRES(J1))
      CALL MAXA(YRES1,YRESR,N)
      T2 = YRESR(N)
      DO 300 J = 1,N
      IF (T2-YRES1(J))300,301,300
  300 CONTINUE
  301 I2 = J
      IF(I2-I1)200,202,200
```

```
  202 IF (T- TA)200,200,201
  201 CALL MED (N,YRES,C,XS1)
      YA = C
      YMED = YA*YA
      DO 186 I=1,N
  186 YCEN(I) = X2(1,I)-XBAR(1)
      CALL MED(N,YCEN,C,XS)
      YB = C
      YMDC = YB *YB
      R1 = (YMDC - YMED)/YMDC
      R11 = 1-((1-R1)*(N-1)/(N-M))
      DO 191 I=1,M
      S(I,I) = SQRT (S(I,I)/(N-1))
 *191 STDD(I) = S(I,I)
      IK = IK+1
      RS1(IK) = R1
      RS11(IK) = R11
      RS2(IK) = R2
      RS21(IK) = R21
      SME1(IK) = RS1(IK) - R1P
      SME11(IK) = RS11(IK) - R11P
      SME2(IK) = RS2(IK) - R2P
      SME21(IK) = RS21(IK) - R21P
      SMSE1 = SMSE1+SME1(IK) * SME1(IK)
      SMSE11 = SMSE11+SME11(IK)*SME11(IK)
      SMSE2 = SMSE2+SME2(IK)*SME2(IK)
      SMSE21 = SMSE21+ SME21(IK) * SME21(IK)
  200 IF (IK-IAA)2000,2001,2001
 2001 SMSE1  = SMSE1/IK
      SMSE11 = SMSE11/IK
      SMSE2  = SMSE2/IK
      SMSE21 = SMSE21/IK
      WRITE (6,2003)
 2003 FORMAT (//,2X,'COMPARISION OF COEFFICIENT OF DETERMINATION')
      WRITE (6,2002) SMSE1,SMSE11,SMSE2,SMSE21
 2002 FORMAT (//,2X,4F20.4)
      WRITE (6,2500)IK,N,IBB,AA
 2500 FORMAT(//,'IK=',I5,2X,'N=',I5,2X,'IBB=',I5,2X,'AA=',F8.4)
      DO 2502 I=1,IAA
 2502 WRITE(6,2504) (RS1(I),RS11(I),RS2(I),RS21(I))
 2504 FORMAT(2X,4F10.6)
      CLOSE (6)
      STOP
      END
```

```
C*********************MAINPROGRAM*****************************************
      DIMENSION X1(7,500),XP(7,500),YHATP(500),YRESP(500),
     1YCENP(500),XSP(500),EP(500),XSP1(7,500),Y(500),
     2XBARP(7),SP(7,7),AP(7,7),RP(7,7),BP(7),YHAT(100),A1(100),
     3YRES(100),YCEN(100),STDD(7),XS(100),XS1(100),SERP(7),A2(100),
     5RS11(100),RS2(100),RS21(100),XBAR(7),S(7,7),STDDP(7),
     6SME1(100),SME11(100),SME2(100),SME21(100),X2(7,100),
     7A(7,7),R(7,7),B1(7),B(7),SER(7),RS1(100),
     8A11(100),LA(100),MA(100),LB(100),MB(100),X21(1000),X22(1000),
     9X23(1000),LS(1000),MS(1000),X24(1000),XF(10000),XE(100,100),
     *XA(7,100),HAT(100),TAU(100),TAUR(100),YRESR(100),YRES1(100)
      COMMON IA
      OPEN (UNIT=6,FILE='BO.REP',STATUS='NEW')
C*****************************************************************************
      IA = 65539
      NP = 500
      N1 = 100
      IAA = 50
      MP = 3
      EX =0
      STD = 1
      SIGMA = 1
      C1 = 10
      P1 = .01
      TA = 3.4
      PI = 0.5
      WRITE(6,1)NP,MP
    1 FORMAT(/,2X,'NP=',I5,2X,'MP=',I4)
C3000  DO 1000 J=1,NP
C     DO 1000 I=1,MP
C      CALL NORM (EX,STD,Y2)
C1000  X1(I,J) = Y2
3000  DO 1200 J=1,NP
      DO 1200 I=1,MP
      CALL RANDU(IA,IX,Y3)
      IF(Y3.GT.PI) GO TO 1300
      X1(I,J) = 0
      GO TO 1200
1300  X1(I,J) = 1
1200  CONTINUE
      DO 45 I=1,NP
      CALL SCALE (C1,P1,SIGMA,Y1)
   45 EP(I) = Y1
      DO 7 I=1,MP
    7 B1(I) = 1
      AA1 = 2.5
      WRITE (6,4)AA1,C1,P1
    4 FORMAT(//,2X,'AA1=',F6.2,//,2X,'C1=',F10.2,//,2X,'P1=',F5.2)
      WRITE (6,5) B1(1),B1(2),B1(3),B1(4),B1(5),B1(6),B1(7)
    5 FORMAT(///,2X,'B1(1)='F5.2,2X,'B1(2)=',F5.2,2X,'B1(3)=',F5.2,2X,
     1'B1(4)=',F5.2,2X,'B1(5)=',F5.2,2X,'B1(6)=',F5.2,2X,'B1(7)=',
     2F5.2)
      DO 50 J=1,NP
      Y(J) = 0
      DO 55 I=1,MP
   55 Y(J) = Y(J) +B1(I)*X1(I,J)
   50 Y(J) = Y(J) + EP(J) + AA1
      M = MP+1
      DO 60 J=1,NP
      DO 65 I=2,M
   65 XP(I,J) = X1(I-1,J)
```

```
      DO 800 I=2,M
      XA(I,J) = X2(I,J)
800   CONTINUE
      DO 950 J=1,N
950   XA(1,J) = 1
      CALL DETT (XA,X21,M,N)
      CALL TRANS(X21,X22,N,M)
      CALL GMPRD(X22,X21,X23,M,N,M)
      CALL MINV(X23,M,DS,LS,MS)
      IF(DS)501,500,501
 500  GO TO 200
 501  CALL GMPRD(X21,X23,X24,N,M,M)
      CALL GMPRD(X24,X22,XF,N,M,N)
      IB = 0
      DO 700 I=1,N
      DO 701 J=1,N
      IB = IB+1
 701  XE(I,J) = XF(IB)
 700  CONTINUE
      DO 400 J = 1,N
      DO 400 I = 1,N
      IF (I-J) 400,401,400
 401  HAT(I) = XE(I,J)
 400  CONTINUE
      CALL MEAN(M,N,X2,XBAR)
      M1= M-1
      CALL COVAR (M,N,X2,XBAR,S)
      DO 164 I=1,M1
      DO 164 J=1,M1
 164  A(I,J) = S(I+1,J+1)
      CALL INVS (M1,N,A)
      DO 169 I=1,M1
      B(I) = 0
      DO 169 J=1,M1
 169  B(I) = B(I)+S(1,J+1)*A(J,I)
      AA = 0
      DO 172 I=1,M1
 172  AA = AA + XBAR(I+1) * B(I)
      AA = XBAR(1) - AA
      SSE = 0
      DO 174 I= 1,N
      YHAT(I) = 0
      DO 175 J = 2,M
 175  YHAT(I) = YHAT(I) + B(J-1)*X2(J,I)
      YHAT(I)= YHAT(I) + AA
      YRES(I) = X2(1,I) - YHAT(I)
 174  SSE = SSE + YRES(I) * YRES(I)
      SEE = SQRT (SSE/(N-M))
      R2 = (S(1,1)-SSE)/S(1,1)
      R21 = 1-((1-R2)*(N-1)/(N-M))
      F = (R2/M1)/((1-R2)/(N-M))
      DO 182 I=1,M
 182  SER(I) = SEE *SQRT(A(I,I))
      CALL OUT (YRES,SEE,HAT,TAU,N)
      CALL MAXA(TAU,TAUR,N)
      T = TAUR(N)
       PRINT *,'T',T
      DO 600 I=1,N
      IF (T-TAU(I))600,601,600
 600  CONTINUE
 601  I1 = I
```

```
   60  XP (1,J) = Y(J)
       CALL MEAN (M,NP,XP,XBARP)
       CALL COVAR (M,NP,XP,XBARP,SP)
       CALL CORR(M,NP,SP,RP)
       DO 124 I=1,MP
       DO 124 J=1,MP
  124  AP(I,J) = SP(I+1,J+1)
       CALL DET (AP,A2,MP,MP)
       CALL MINV(A2,MP,D,LA,MA)
       DET1 = D
       IF (DET1) 3001,3000,3001
 3001  CALL INVS (MP,NP,AP)
       DO 129 I=1,MP
       BP(I) = 0
       DO 129 J=1,MP
  129  BP(I) = BP(I)+SP(1,J+1)*AP(J,I)
       WRITE(6,4000) (BP(I),I=1,MP)
 4000  FORMAT (///,2X,10F10.4)
       AA = 0
       DO 132 I=1,MP
  132  AA = AA + XBARP(I+1) * BP(I)
       AA = XBARP(1) - AA
       SSEP = 0
       DO 134 I= 1,NP
       YHATP(I) = 0
       DO 135 J = 2,M
  135  YHATP(I) = YHATP(I) + BP(J-1)*XP(J,I)
       YHATP(I) = YHATP(I) + AA
       YRESP(I) = XP(1,I) - YHATP(I)
  134  SSEP = SSEP + YRESP(I) * YRESP(I)
       SEEP = SQRT (SSEP/(NP-M))
       R2P = (SP(1,1)-SSEP)/SP(1,1)
       R21P = 1-((1-R2P)*(NP-1)/(NP-M))
       F = (R2P/MP)/((1-R2P)/(NP-M))
       DO 142 I=1,M
  142  SERP(I) = SEEP *SQRT(AP(I,I))
       CALL MED (NP,YRESP,C,XSP1)
       YAP = C
       YMEDP = YAP*YAP
       DO 146 I=1,NP
  146  YCENP(I) = XP(1,I)-XBARP(1)
       CALL MED (NP,YCENP,C,XSP)
       YBP = C
       YMDCP = YBP *YBP
       R1P = (YMDCP - YMEDP)/YMDCP
       R11P = 1-((1-R1P)*(NP-1)/(NP-M))
       WRITE (6,149) R1P,R11P,R2P,R21P,F
  149  FORMAT (//,2X,'R1P=',F5.4,2X,'R11P=',F5.4,2X,'R2P=',F5.4,
      12X,'R21P=',F5.4,2X,'F=',F15.4)
       DO 151 I=1,M
       SP(I,I) = SQRT (SP(I,I)/(NP-1))
  151  STDDP(I) = SP(I,I)
       IK = 0
       SMSE1 = 0
       SMSE11 = 0
       SMSE2 = 0
       SMSE21 = 0
       IBB = 0
 2000  CALL SAMP (M,NP,XP,X2,N,N1)
       IBB = IBB+1
       DO 800 J=1,N
```

```
      DO 350 J1 = 1,N
  350 YRES1(J1) = ABS(YRES(J1))
      CALL MAXA(YRES1,YRESR,N)
      T2 = YRESR(N)
      DO 300 J = 1,N
      IF (T2-YRES1(J))300,301,300
  300 CONTINUE
  301 I2 = J
      IF(I2-I1)200,202,200
  202 IF (T- TA)200,200,201
  201 CALL MED (N,YRES,C,XS1)
      YA = C
      YMED = YA*YA
      DO 186 I=1,N
  186 YCEN(I) = X2(1,I)-XBAR(1)
      CALL MED(N,YCEN,C,XS)
      YB = C
      YMDC = YB *YB
      R1 = (YMDC - YMED)/YMDC
      R11 = 1-((1-R1)*(N-1)/(N-M))
      DO 191 I=1,M
      S(I,I) = SQRT (S(I,I)/(N-1))
  191 STDD(I) = S(I,I)
      IK = IK+1
      RS1(IK) = R1
      RS11(IK) = R11
      RS2(IK) = R2
      RS21(IK) = R21
      SME1(IK) = RS1(IK) - R1P
      SME11(IK) = RS11(IK) - R11P
      SME2(IK) = RS2(IK) - R2P
      SME21(IK) = RS21(IK) - R21P
      SMSE1 = SMSE1+SME1(IK) * SME1(IK)
      SMSE11 = SMSE11+SME11(IK)*SME11(IK)
      SMSE2 = SMSE2+SME2(IK)*SME2(IK)
      SMSE21 = SMSE21+ SME21(IK) * SME21(IK)
  200 IF (IK-IAA)2000,2001,2001
 2001 SMSE1  = SMSE1/IK
      SMSE11 = SMSE11/IK
      SMSE2  = SMSE2/IK
      SMSE21 = SMSE21/IK
      WRITE (6,2003)
 2003 FORMAT (//,2X,'COMPARISION OF COEFFICIENT OF DETERMINATION')
      WRITE (6,2002) SMSE1,SMSE11,SMSE2,SMSE21
 2002 FORMAT (//,2X,4F20.4)
      WRITE (6,2500)IK,N,IBB,AA
 2500 FORMAT(//,'IK=',I5,2X,'N=',I5,2X,'IBB=',I5,2X,'AA=',F8.4)
      DO 2502 I=1,IAA
 2502 WRITE(6,2504) (RS1(I),RS11(I),RS2(I),RS21(I))
 2504 FORMAT(2X,4F10.6)
      CLOSE (6)
      STOP
      END
```

```
**********MAINPROGRAM**********
      DIMENSION X1(7,500),XP(7,500),YHATP(500),YRESP(500),
     1YCENP(500),XSP(500),EP(500),XSP1(7,500),Y(500),
     2XBARP(7),SP(7,7),AP(7,7),RP(7,7),BP(7),YHAT(100),A1(100),
     3YRES(100),YCEN(100),STDD(7),XS(100),XS1(100),SERP(7),A2(100),
     5RS11(100),RS2(100),RS21(100),XBAR(7),S(7,7),STDDP(7),
     6SME1(100),SME11(100),SME2(100),SME21(100),X2(7,100),
     7A(7,7),R(7,7),B1(7),B(7),SER(7),RS1(100),
     8A11(100),LA(100),MA(100),LB(100),MB(100),X21(1000),X22(1000),
     9X23(1000),LS(1000),MS(1000),X24(1000),XF(10000),XE(100,100),
     *XA(7,100),HAT(100),TAU(100),TAUR(100),YRESR(100),YRES1(100)
      COMMON IA
      OPEN (UNIT=6,FILE='ABO.REP',STATUS='NEW')
C*************************************************************************
      IA = 65539
      NP = 500
      N1 = 100
      IAA = 50
      MP =  3
      EX =0
      STD = 1
      SIGMA = 1
      C1 = 5
      P1 = .01
      TA = 3.4
      PI = 0.5
      WRITE(6,1)NP,MP
    1 FORMAT(/,2X,'NP=',I5,2X,'MP=',I4)
 3000 DO 1000 J=1,NP
      DO 1000 I=2,MP
      CALL NORM (EX,STD,Y2)
 1000 X1(I,J) = Y2
      DO 1200 J=1,NP
      CALL RANDU(IA,IX,Y3)
      IF(Y3.GT.PI) GO TO 1300
      X1(1,J) = 0
      GO TO 1200
 1300 X1(1,J) = 1
 1200 CONTINUE
      DO 45 I=1,NP
      CALL SCALE (C1,P1,SIGMA,Y1)
   45 EP(I) = Y1
      DO 7 I=1,MP
    7 B1(I) = 1
      AA1 = 2.5
      WRITE (6,4)AA1,C1,P1
    4 FORMAT(//,2X,'AA1=',F6.2,//,2X,'C1=',F10.2,//,2X,'P1=',F5.2)
      WRITE (6,5) B1(1),B1(2),B1(3),B1(4),B1(5),B1(6),B1(7)
    5 FORMAT(///,2X,'B1(1)='F5.2,2X,'B1(2)=',F5.2,2X,'B1(3)=',F5.2,2X,
     1'B1(4)=',F5.2,2X,'B1(5)=',F5.2,2X,'B1(6)=',F5.2,2X,'B1(7)=',
     2F5.2)
      DO 50 J=1,NP
      Y(J) = 0
      DO 55 I=1,MP
   55 Y(J) = Y(J) +B1(I)*X1(I,J)
   50 Y(J) = Y(J) + EP(J) + AA1
      M = MP+1
      DO 60 J=1,NP
      DO 65 I=2,M
   65 XP(I,J) = X1(I-1,J)
   60 XP (1,J) = Y(J)
```

```
      XA(I,J) = X2(I,J)
  800 CONTINUE
      DO 950 J=1,N
  950 XA(1,J) = 1
      CALL DETT (XA,X21,M,N)
      CALL TRANS(X21,X22,N,M)
      CALL GMPRD(X22,X21,X23,M,N,M)
      CALL MINV(X23,M,DS,LS,MS)
      IF(DS)501,500,501
  500 GO TO 200
  501 CALL GMPRD(X21,X23,X24,N,M,M)
      CALL GMPRD(X24,X22,XF,N,M,N)
      IB = 0
      DO 700 I=1,N
      DO 701 J=1,N
      IB = IB+1
  701 XE(I,J) = XF(IB)
  700 CONTINUE
      DO 400 J = 1,N
      DO 400 I = 1,N
      IF (I-J) 400,401,400
  401 HAT(I) = XE(I,J)
  400 CONTINUE
      CALL MEAN(M,N,X2,XBAR)
      M1= M-1
      CALL COVAR (M,N,X2,XBAR,S)
      DO 164 I=1,M1
      DO 164 J=1,M1
  164 A(I,J) = S(I+1,J+1)
      CALL INVS (M1,N,A)
      DO 169 I=1,M1
      B(I) = 0
      DO 169 J=1,M1
  169 B(I) = B(I)+S(1,J+1)*A(J,I)
      AA = 0
      DO 172 I=1,M1
  172 AA = AA + XBAR(I+1) * B(I)
      AA = XBAR(1) - AA
      SSE = 0
      DO 174 I= 1,N
      YHAT(I) = 0
      DO 175 J = 2,M
  175 YHAT(I) = YHAT(I) + B(J-1)*X2(J,I)
      YHAT(I)= YHAT(I) + AA
      YRES(I) = X2(1,I) - YHAT(I)
  174 SSE = SSE + YRES(I) * YRES(I)
      SEE = SQRT (SSE/(N-M))
      R2 = (S(1,1)-SSE)/S(1,1)
      R21 = 1-((1-R2)*(N-1)/(N-M))
      F = (R2/M1)/((1-R2)/(N-M))
      DO 182 I=1,M
  182 SER(I) = SEE *SQRT(A(I,I))
      CALL OUT (YRES,SEE,HAT,TAU,N)
      CALL MAXA(TAU,TAUR,N)
      T = TAUR(N)
       PRINT *,'T',T
      DO 600 I=1,N
      IF (T-TAU(I))600,601,600
  600 CONTINUE
  601 I1 = I
      DO 350 J1 = 1,N
```

```
      CALL MEAN (M,NP,XP,XBARP)
      CALL COVAR (M,NP,XP,XBARP,SP)
      CALL CORR(M,NP,SP,RP)
      DO 124 I=1,MP
      DO 124 J=1,MP
  124 AP(I,J) = SP(I+1,J+1)
      CALL DET (AP,A2,MP,MP)
      CALL MINV(A2,MP,D,LA,MA)
      DET1 = D
      IF (DET1) 3001,3000,3001
 3001 CALL INVS (MP,NP,AP)
      DO 129 I=1,MP
      BP(I) = 0
      DO 129 J=1,MP
  129 BP(I) = BP(I)+SP(1,J+1)*AP(J,I)
      WRITE(6,4000) (BP(I),I=1,MP)
 4000 FORMAT (///,2X,10F10.4)
      AA = 0
      DO 132 I=1,MP
  132 AA = AA + XBARP(I+1) * BP(I)
      AA = XBARP(1) - AA
      SSEP = 0
      DO 134 I= 1,NP
      YHATP(I) = 0
      DO 135 J = 2,M
  135 YHATP(I) = YHATP(I) + BP(J-1)*XP(J,I)
      YHATP(I) = YHATP(I) + AA
      YRESP(I) = XP(1,I) - YHATP(I)
  134 SSEP = SSEP + YRESP(I) * YRESP(I)
      SEEP = SQRT (SSEP/(NP-M))
      R2P = (SP(1,1)-SSEP)/SP(1,1)
      R21P = 1-((1-R2P)*(NP-1)/(NP-M))
      F = (R2P/MP)/((1-R2P)/(NP-M))
      DO 142 I=1,M
  142 SERP(I) = SEEP *SQRT(AP(I,I))
      CALL MED (NP,YRESP,C,XSP1)
      YAP = C
      YMEDP = YAP*YAP
      DO 146 I=1,NP
  146 YCENP(I) = XP(1,I)-XBARP(1)
      CALL MED (NP,YCENP,C,XSP)
      YBP = C
      YMDCP = YBP *YBP
      R1P = (YMDCP - YMEDP)/YMDCP
      R11P = 1-((1-R1P)*(NP-1)/(NP-M))
      WRITE (6,149) R1P,R11P,R2P,R21P,F
  149 FORMAT (//,2X,'R1P=',F5.4,2X,'R11P=',F5.4,2X,'R2P=',F5.4,
     12X,'R21P=',F5.4,2X,'F=',F15.4)
      DO 151 I=1,M
      SP(I,I) = SQRT (SP(I,I)/(NP-1))
  151 STDDP(I) = SP(I,I)
      IK = 0
      SMSE1 = 0
      SMSE11 = 0
      SMSE2 = 0
      SMSE21 = 0
      IBB = 0
 2000 CALL SAMP (M,NP,XP,X2,N,N1)
      IBB = IBB+1
      DO 800 J=1,N
      DO 800 I=2,M
```

```
  350 YRES1(J1) = ABS(YRES(J1))
      CALL MAXA(YRES1,YRESR,N)
      T2 = YRESR(N)
      DO 300 J = 1,N
      IF (T2-YRES1(J))300,301,300
  300 CONTINUE
  301 I2 = J
      IF(I2-I1)200,202,200
  202 IF (T- TA)200,200,201
  201 CALL MED (N,YRES,C,XS1)
      YA = C
      YMED = YA*YA
      DO 186 I=1,N
  186 YCEN(I) = X2(1,I)-XBAR(1)
      CALL MED(N,YCEN,C,XS)
      YB = C
      YMDC = YB *YB
      R1 = (YMDC - YMED)/YMDC
      R11 = 1-((1-R1)*(N-1)/(N-M))
      DO 191 I=1,M
      S(I,I) = SQRT (S(I,I)/(N-1))
  191 STDD(I) = S(I,I)
      IK = IK+1
      RS1(IK) = R1
      RS11(IK) = R11
      RS2(IK) = R2
      RS21(IK) = R21
      SME1(IK) = RS1(IK) - R1P
      SME11(IK) = RS11(IK) - R11P
      SME2(IK) = RS2(IK) - R2P
      SME21(IK) = RS21(IK) - R21P
      SMSE1 = SMSE1+SME1(IK) * SME1(IK)
      SMSE11 = SMSE11+SME11(IK)*SME11(IK)
      SMSE2 = SMSE2+SME2(IK)*SME2(IK)
      SMSE21 = SMSE21+ SME21(IK) * SME21(IK)
  200 IF (IK-IAA)2000,2001,2001
 2001 SMSE1  = SMSE1/IK
      SMSE11 = SMSE11/IK
      SMSE2  = SMSE2/IK
      SMSE21 = SMSE21/IK
      WRITE (6,2003)
 2003 FORMAT (//,2X,'COMPARISION OF COEFFICIENT OF DETERMINATION')
      WRITE (6,2002) SMSE1,SMSE11,SMSE2,SMSE21
 2002 FORMAT (//,2X,4F20.4)
      WRITE (6,2500)IK,N,IBB,AA
 2500 FORMAT(//,'IK=',I5,2X,'N=',I5,2X,'IBB=',I5,2X,'AA=',F8.4)
      DO 2502 I=1,IAA
 2502 WRITE(6,2504) (RS1(I),RS11(I),RS2(I),RS21(I))
 2504 FORMAT(2X,4F10.6)
      CLOSE (6)
      STOP
      END
```

```
C*************************************************************************
C**************          SUBROUTINE COVARIANCE      ********************
C*************************************************************************
      SUBROUTINE COVAR (M,N,X,XBAR,S)
      DIMENSION X(7,500),XBAR(7),S(7,7)
      DO 20 I=1,M
      DO 20 K=1,M
      SIK = 0
      DO 10 J=1,N
   10 SIK = SIK+(X(I,J)-XBAR(I))*(X(K,J)-XBAR(K))
      S(I,K) = SIK
   20 S(K,I) = SIK
      RETURN
      END
C*************************************************************************
C**********          NORMAL DISTRIBUTION          ********************
C*************************************************************************
      SUBROUTINE NORM (EX,STD,Y1)
      COMMON IA
      SINT = 2.2160359
      A1 = 0.8840704
      A2 = 0.9733110
      A3 = 0.9587208
      A4 = 0.9113128
      CALL RANDU (IA,IY,U)
      IF (U.LE.A1) GOTO 20
      IF (U.LE.A2) GOTO 4
    2 CALL RANDU (IA,IY,V1)
      CALL RANDU (IA,IY,W1)
      T = (SINT**2)/2-ALOG(W1)
      C1 = (V1**2)*T
      C2 = (SINT**2)/2
      IF (C1.GT.C2) GOTO 2
      IF (U..LE..9866555)X = (2*T)**0.5
      IF (U.GT..9866555)X = -(2*T)**0.5
      GOTO 25
    4 IF (U.LE.A3) GOTO 6
   12 CALL RANDU (IA,IY,V1)
      CALL RANDU (IA,IY,W1)
      CALL MXMN (V1,W1,RMAX,RMIN)
      Z = V1-W1
      T = SINT-.6308348*RMIN
      IF (RMAX.LE..7555915) GOTO 9
      RX = ABS(Z)*.0342405
      CALL F(T,SINT,FT)
      IF (RX.GT.FT) GOTO 12
      GOTO 9
    6 IF (U.LE.A4) GOTO 8
   10 CALL RANDU (IA,IY,V1)
      CALL RANDU (IA,IY,W1)
      CALL MXMN (V1,W1,RMAX,RMIN)
      Z = V1-W1
      T = .4797274 + 1.1054737*RMIN
      IF (RMAX.LE..8728350) GOTO 9
      RX = ABS(Z)*.0492645
      CALL F (T,SINT,FT)
      IF (RX.LE.FT) GOTO 9
      GOTO 10
```

```
    8 CALL RANDU (IA,IY,V1)
      CALL RANDU (IA,IY,W1)
      CALL MXMN (V1,W1,RMAX,RMIN)
      Z = V1-W1
      T = .4797274 - .5955071*RMIN
      IF (RMAX.LE..8055779) GOTO 9
      CALL F(T,SINT,FT)
      RX = .0533755*ABS(Z)
      IF (RX.LE.FT) GOTO 9
      GOTO 8
    9 IF (Z.LE.0) GOTO 15
      X = -T
      GOTO 25
   15 X = T
      GOTO 25
   20 CALL RANDU (IA,IY,V)
      X = SINT*((1.13113164)*U-1+V)
   25 Y1 = EX+STD*X
      RETURN
      END
C*************************************************************************
C***********                  SUBROUTINE MXMN                ***************
**************************************************************************
      SUBROUTINE MXMN (V1,W1,RMAX,RMIN)
      IF (W1.LE.V1) GOTO 6
      RMIN = V1
      RMAX = W1
      GOTO 2
    6 RMIN = W1
      RMAX = V1
    2 RETURN
      END
C*************************************************************************
C***********                  SUBROUTINE F                   ***************
C*************************************************************************
      SUBROUTINE F(T,SINT,FT)
      SINX = 0.39894280*EXP(-(T**2)/2.)
      FT = SINX - 1.8002519*(SINT-ABS(T))
      RETURN
      END
C*************************************************************************
C***********            SUBROUTINE RANDOM NUMBER     *************
**************************************************************************
      SUBROUTINE RANDU (IX,IY,RN)
      IY = IX*65539
      IF (IY) 3,4,4
    3 IY = IY + 2147483647 + 1
    4 RN = IY
      RN = RN*.4656613E-9
      IX = IY
      RETURN
      END
C*************************************************************************
C***********                  SUBROUTINE INVERSE             *************
C*************************************************************************
      SUBROUTINE INVS (M1,N,A)
      DIMENSION A(7,7)
      DO 20 K=1,M1
      A(K,K) = -1/A(K,K)
      DO 5 I=1,M1
      IF (I-K) 3,5,3
```

```
    3  A(I,K) = -A(I,K)*A(K,K)
    5  CONTINUE
       DO 10 I=1,M1
       DO 10 J=1,M1
       IF((I-K)*(J-K)) 9,10,9
    9  A(I,J) = A(I,J)-A(I,K)*A(K,J)
   10  CONTINUE
       DO 20 J=1,M1
       IF (J-K) 18,20,18
   18  A(K,J) = -A(K,J)*A(K,K)
   20  CONTINUE
       DO 25 I=1,M1
       DO 25 J=1,M1
   25  A(I,J) = -A(I,J)
       RETURN
       END
C*****************************************************************
C***************                SUBROUTINE CORRELATION   **************
C*****************************************************************
       SUBROUTINE CORR (M,N,S,R)
       DIMENSION S(7,7),R(7,7)
       R(1,1) = 1
       DO 10 J=2,M
       R(J,J) = 1
       J1 = J-1
       DO 10 I=1,J1
       R(I,J) = S(I,J)/SQRT(S(I,I)*S(J,J))
   10  R(J,I) = R(I,J)
       RETURN
       END
C*****************************************************************
C***************          SUBROUTINE MEDIAN          **************
C*****************************************************************
       SUBROUTINE MED (N,P,C,XSP)
       DIMENSION P(500),XSP(500)
       DO 25 IN =1,N
  25   XSP(IN) = ABS(P(IN))
       I1=N-1
       DO 10 I=1,I1
       I2 = N-I
       DO 10 J=1,I2
       IF( XSP(J).LE.XSP(J+1)) GO TO 10
       TEMP = XSP(J)
       XSP(J) = XSP(J+1)
       XSP(J+1) = TEMP
   10  CONTINUE
       K = N/2
       I3 = 2*K
       IF (N.EQ.I3) GO TO 20
       C = XSP(K+1)
       RETURN
   20  C = (XSP(K)+XSP(K+1))/2
       RETURN
       END
C*****************************************************************
C***********                SUBROUTINE SAMPLING            ************
C*****************************************************************
       SUBROUTINE SAMP (M,NP,XP,X,NUM,N1)
       DIMENSION X(7,100),Y(100),XP(7,500)
       COMMON IA
       N = N1
```

```
      NUM =0
      J = 0
      DO 10 JP=1,NP                                                    145
      A1 = N-NUM
      A2 = NP-JP+1
      AND =A1/A2
      CALL RANDU(IA,IY,RN)
      IF (RN.GT.AND)GO TO 10
      J = J+1
      NUM = NUM+1
      DO 85 I =1,M
   85 X(I,J) = XP(I,JP)
   10 CONTINUE
      RETURN
      END
C*******************************************************************************
C********************* SUBROUTINE MINV ******************************************
C*******************************************************************************
      SUBROUTINE MINV(A,N,D,L,M)
      DIMENSION A(1),L(1),M(1)
      D = 1.0
      NK = -N
      DO 80 K = 1,N
      NK = NK+N
      L(K) = K
      M(K) = K
      KK = NK+K
      BIGA = A(KK)
      DO 20 J = K,N
      IZ = N*(J-1)
      DO 20 I = K,N
      IJ = IZ+I
   10 IF (ABS(BIGA)-ABS(A(IJ))) 15,20,20
   15 BIGA = A(IJ)
      L(K) = I
      M(K) = J
   20 CONTINUE
      J = L(K)
      IF (J-K) 35,35,25
   25 KI = K-N
      DO 30 I=1,N
      KI = KI+N
      HOLD = -A(KI)
      JI = KI-K+J
      A(KI) = A(JI)
   30 A(JI) = HOLD
   35 I = M(K)
      IF (I-K) 45,45,38
   38 JP = N*(I-1)
      DO 40 J=1,N
      JK = NK+J
      JI = JP+J
      HOLD = -A(JK)
      A(JK) = A(JI)
   40 A(JI) = HOLD
   45 IF (BIGA) 48,46,48
   46 D = 0.0
      RETURN
   48 DO 55 I=1,N
      IF (I-K) 50,55,50
   50 IK = NK + I
```

```
      PPP = A(IK)/(-1*BIGA)
      A(IK) = PPP
   55 CONTINUE
      DO 65 I=1,N
      IK = NK+I
      HOLD = A(IK)
      IJ = I-N
      DO 65 J=1,N
      IJ = IJ+N
      IF (I-K) 60,65,60
   60 IF (J-K) 62,65,62
   62 KJ = IJ-I+K
      A(IJ) = HOLD * A(KJ) + A(IJ)
   65 CONTINUE
      KJ = K-N
      DO 75 J=1,N
      KJ = KJ+N
      IF (J-K) 70,75,70
   70 A(KJ) = A(KJ) / BIGA
   75 CONTINUE
      D = D*BIGA
      A(KK) = 1.0 / BIGA
   80 CONTINUE
      K = N
  100 K = (K-1)
      IF (K) 150,150,105
  105 I = L(K)
      IF (I-K) 120,120,108
  108 JQ = N*(K-1)
      JR = N*(I-1)
      DO 110 J=1,N
      JK = JQ+J
      HOLD = A(JK)
      JI = JR + J
      A(JK) = -A(JI)
  110 A(JI) = HOLD
  120 J = M(K)
      IF (J-K) 100,100,125
  125 KI = K-N
      DO 130 I=1,N
      KI = KI+N
      HOLD = A(KI)
      JI = KI -K + J
      A(KI) = -A(JI)
  130 A(JI) = HOLD
      GO TO 100
  150 RETURN
      END
C*******************************************************************************
C************************** SUBROUTINE DET *************************************
C*******************************************************************************
      SUBROUTINE DET(A1,A2,MP,N)
      DIMENSION A1(7,7), A2(100)
      NX = 0
      DO 400 I=1,MP
      DO 401 J=1,N
      NX =NX+1
      A2(NX) = A1(I,J)
  401 CONTINUE
  400 CONTINUE
      RETURN
```

```
      END
C*************************************************************************
C************************** SUBROUTINE SCALE *****************************
C*************************************************************************
      SUBROUTINE SCALE(C,P,SIGMA,Y3)
      COMMON IA
      CSIGMA = C*SIGMA
      CALL RANDU(IA,IY,RN)
      IF(RN-P)90,90,91
   90 CALL NORM(0,CSIGMA,Y3)
      GO TO 95
   91 CALL NORM(0,SIGMA,Y3)
   95 RETURN
      END
C*************************************************************************
C************************** SUBROUTINT GMPRD *****************************
C*************************************************************************
      SUBROUTINE GMPRD(A,B,R,N,M,L)
      DIMENSION A(1),B(1),R(1)
      IR = 0
      IK = -M
      DO 10 K=1,L
      IK = IK+M
      DO 10 J=1,N
      IR = IR+1
      JI = J-N
      IB = IK
      R(IR) = 0
      DO 10 I =1,M
      JI = JI+N
      IB = IB+1
   10 R(IR) = R(IR) + A(JI)*B(IB)
      RETURN
      END
C*************************************************************************
C********************** SUBROUTINE TRANSPOSE *****************************
C*************************************************************************
      SUBROUTINE TRANS(A,R,N,M)
      DIMENSION A(1),R(1)
      IR = 0
      DO 10 I=1,N
      IJ = I-N
      DO 10 J=1,M
      IJ = IJ+N
      IR = IR+1
   10 R(IR) = A(IJ)
      RETURN
      END
C*************************************************************************
C************************  SUBROUTINE OUT  *******************************
C*************************************************************************
      SUBROUTINE OUT(YRES,SEE,HAT,TAU,N)
      DIMENSION YRES(100),HAT(100),TAU(100)
      DO 10 I=1,N
      TAU(I) = SQRT(1/(1-HAT(I)))
      TAU(I) = (YRES(I)/SEE)*TAU(I)
   10 TAU(I) = ABS(TAU(I))
      RETURN
      END
C*************************************************************************
C*************************   SUBROUTINE DETT  ****************************
```

```
C*****************************************************************
      SUBROUTINE DETT(A1,A2,MP,N)
      DIMENSION A1(7,100),A2(500)
      NX = 0
      DO 20 I=1,MP
      DO 10 J=1,N
      NX = NX+1
      A2(NX) = A1(I,J)
   10 CONTINUE
   20 CONTINUE
      RETURN
      END
C*****************************************************************
C****************** SUBROUTINE MAXA ******************************
C*****************************************************************
      SUBROUTINE MAXA(TAU,TAUR,N)
      DIMENSION TAU(100),TAUR(100)
      DO 5 I=1,N
    5 TAUR(I) = TAU(I)
      I1 = N-1
      DO 10 I=1,I1
      I2 = N-I
      DO 10 J=1,I2
      IF(TAUR(J).LE.TAUR(J+1)) GO TO 10
      TEMP = TAUR(J)
      TAUR(J) = TAUR(J+1)
      TAUR(J+1) = TEMP
   10 CONTINUE
      RETURN
      END
C*****************************************************************
C*********************  SUBROUTINE SKEW ******************************
C*****************************************************************
      SUBROUTINE SKEW (RL1,RL2,RL3,RL4,EX,STD,X)
      COMMON IA
      CALL RANDU(IA,IY,RN)
      R1 = RL3*ALOG(RN)
      R2 = RL4*ALOG(1-RN)
      RX1 = EXP(R1)
      RX2 = EXP(R2)
       X1 = RL1 + (RX2-RX1)/RL2
       X  = EX + STD * X1
      RETURN
      END


C*****************************************************************
C******************      SUBROUTINE MEAN      ********************
C*****************************************************************
      SUBROUTINE MEAN (M,N,X,XBAR)
      DIMENSION X(10,1000),XBAR(10)
      DO 20 I=1,M
      SUM = 0
      DO 10 J =1,N
   10 SUM = SUM+X(I,J)
   20 XBAR(I) = SUM/N
      RETURN
      END
```

ประวัติผู้เขียน

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