

บรรณานุกรม

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ภาคผนวก

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

ภาวณวมก

๑. แสดงโปรแกรมคอมพิวเตอร์สำหรับการคำนวณค่าประมาณแนวเรียนซ์ คอมโปเนนท์

โดยวิธี Iterative MINQUE ในกรณีทีค่าประมาณเป็นลบได้

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DIMENSION V1(16,16),V2(16,16),V3(16,16),Y(16,1),
3YT(1,16),A(16,16),AA(16,16),B(16,16),BI(16,16),
3AI(16,16),MAX(16,3),MAXT(3,16),XVX(3,3),
7VX(16,3),XV(3,16),AB(16,3),VV(16,16),MAQ(16,16)
8,QV1(16,16),QV2(16,16),QV3(16,16),A11(16,16),
9A12(16,16),A13(16,16),A21(16,16),A22(16,16),
5A23(16,16),A31(16,16),A32(16,16),A33(16,16),
7QY(16,1),V1Y(16,1),V2Y(16,1),V3Y(16,1),C(3,1),
8BJ(3,3),BS(3,3),BSI(3,3),BBI(3,3),BB(3,3)
9,CHEK(3,3),BC(3,1),IL(16),JL(16),IA(15),
5JA(15),IS(14),JS(14),IC(13),JC(13),ID(12),
6JD(12),IH(11),JH(11),IF(10),JF(10),IQ(9),
5JQ(9),IX(8),JX(8),IY(7),JY(7),IZ(6),
4JZ(6),IXX(3),JXX(3),IYY(2),JYY(2),
3IZZ(1),JZZ(1)
C ESTIMATING VARIANCE COMPONENT BY ITERATIVE
C MINQUE METHODS
C THIS PROGRAM IS USED WITH SUBPROGRAM
C PRINTED BELOW INCLUDING SUBPROGRAM
C MINV WHICH CAN BE FOUND IN THE IBM
C PROGRAMMER'S MANUAL
C MATRIX V1 CAME FROM MATRIX u(1)
C MULTIPLY u'(1) DO LIKE THIS FOR
C V2 AND V3
REAL MAX,MAXT,MAQ,IN,IM,IK
READ(1,1) ((V1(I,J),J=1,16),I=1,16)
READ(1,1) ((V2(I,J),J=1,16),I=1,16)
READ(1,1) ((V3(I,J),J=1,16),I=1,16)
READ(1,1) (Y(I,1),I=1,16)
1 FORMAT(16F3.0)
DO 2 I=1,16
2 YT(1,I)=Y(I,1)
IK=1.0
IM=2.0
IN=3.0
3 DO 4 I=1,16
DO 4 J=1,16
4 A(I,J)=IK*V1(I,J)+IM*V2(I,J)+IN*V3(I,J)
N=16
IB=1

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JB=1
M=16
EPS=1.0E-7
DO 5 I=1,16
DO 5 J=1,16
5 AA(I,J)=A(I,J)
CALL MFGR(A,M,N,EPS,IRANK,IROW,ICOL)
IF(N-IRANK) 6,39,6
6 K=N-IRANK
DO 11 I=1,N
DO 11 J=1,N
IF(K-J) 7,11,11
7 IF(K-I) 8,11,11
8 B(IB,JB)=AA(I,J)
IF(JB-IRANK) 10,9,9
9 IB=IB+1
JB=1
GOTO 11
10 JB=JB+1
11 CONTINUE
IF(IRANK-15) 13,12,13
12 CALL MINV(B,IRANK,D,IA,JA)
GOTO 31
13 IF(IRANK-14) 15,14,15
14 CALL MINV(B,IRANK,D,IS,JS)
GOTO 31
15 IF(IRANK-13) 17,16,17
16 CALL MINV(B,IRANK,D,IC,JC)
GOTO 31
17 IF(IRANK-12) 19,18,19
18 CALL MINV(B,IRANK,D,ID,JD)
GOTO 31
19 IF(IRANK-11) 21,20,21
20 CALL MINV(B,IRANK,D,IH,JH)
GOTO 31
21 IF(IRANK-10) 23,22,23
22 CALL MINV(B,IRANK,D,IF,JF)
GOTO 31
23 IF(IRANK-9) 25,24,25
24 CALL MINV(B,IRANK,D,IQ,JQ)
GOTO 31
25 IF(IRANK-8) 27,26,27
26 CALL MINV(B,IRANK,D,IX,JX)
GOTO 31
27 IF(IRANK-7) 29,28,29
28 CALL MINV(B,IRANK,D,IY,JY)
GOTO 31
29 IF(IRANK-6) 31,30,31
30 CALL MINV(B,IRANK,D,IZ,JZ)

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```
31 DO 32 I=1,IRANK
    DO 32 J=1,IRANK
32 BI(I,J)=B(I,J)
    IB=1
    JB=1
    DO 38 I=1,M
    DO 38 J=1,M
    IF(K-J) 33,37,37
33 IF(K-I) 34,37,37
34 AI(I,J)=BI(IB,JB)
    IF(JB-IRANK) 36,35,35
35 IB=IB+1
    JB=1
    GOTO 38
36 JB=JB+1
    GOTO 38
37 AI(I,J)=0.0
38 CONTINUE
    GOTO 42
39 DO 40 I=1,16
    DO 40 J=1,16
40 B(I,J)=AA(I,J)
    CALL MINV(B,IRANK,D,IL,JL)
    DO 41 I=1,N
    DO 41 J=1,N
41 AI(I,J)=B(I,J)
42 DO 50 I=1,3
    DO 50 J=1,16
    IF(I-2) 43,44,47
43 MAXT(I,J)=1.0
    GOTO 50
44 IF(J.LT.6) GOTO 45
    IF(J.LT.12) GOTO 46
    MAXT(I,J)=-1.0
    GOTO 50
45 MAXT(I,J)=1.0
    GOTO 50
46 MAXT(I,J)=0.0
    GOTO 50
47 IF(J.LT.6) GOTO 48
    IF(J.LT.12) GOTO 49
    MAXT(I,J)=-1.0
    GOTO 50
48 MAXT(I,J)=0.0
    GOTO 50
49 MAXT(I,J)=1.0
50 CONTINUE
    DO 51 I=1,3
    DO 51 J=1,16
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51  MAX(J,I)=MAXT(I,J)
    NN=3
    CALL GMPRD(AI,MAX,VX,N,M,NN)
    CALL GMPRD(MAXT,AI,XV,NN,M,M)
    CALL GMPRD(XV,MAX,XVX,NN,M,NN)
    CALL MINV(XVX,NN,D,IXX,JXX)
    CALL GMPRD(VX,XVX,AB,N,NN,NN)
    CALL GMPRD(AB,XV,VV,N,NN,N)
    DO 52 I=1,16
    DO 52 J=1,16
52  MAQ(I,J)=AI(I,J)-VV(I,J)
    L=16
    CALL GMPRD(MAQ,V1,QV1,N,M,L)
    CALL GMPRD(MAQ,V2,QV2,N,M,L)
    CALL GMPRD(MAQ,V3,QV3,N,M,L)
    CALL GMPRD(QV1,QV1,A11,N,M,L)
    CALL GMPRD(QV1,QV2,A12,N,M,L)
    CALL GMPRD(QV1,QV3,A13,N,M,L)
    CALL GMPRD(QV2,QV1,A21,N,M,L)
    CALL GMPRD(QV2,QV2,A22,N,M,L)
    CALL GMPRD(QV2,AV3,A23,N,M,L)
    CALL GMPRD(QV3,AV1,A31,N,M,L)
    CALL GMPRD(QV3,QV2,A32,N,M,L)
    CALL GMPRD(QV3,QV3,A33,N,M,L)
    CALL TRAC(A11,T11)
    B(1,1)=T11
    CALL TRAC(A12,T12)
    B(1,2)=T12
    CALL TRAC(A13,T13)
    B(1,3)=T13
    CALL TRAC(A21,T21)
    B(2,1)=T21
    CALL TRAC(A22,T22)
    B(2,2)=T22
    CALL TRAC(A23,T23)
    B(2,3)=T23
    CALL TRAC(A31,T31)
    B(3,1)=T31
    CALL TRAC(A32,T32)
    B(3,2)=T32
    CALL TRAC(A33,T33)
    B(3,3)=T33
    CALL MVEC1(MAQ,Y,N,QY)
    CALL MVEC1(QV1,QY,N,V1Y)
    CALL MVEC1(QV2,QY,N,V2Y)
    CALL MVEC1(QV3,QY,N,V3Y)
    C(1,1)=0.0
    C(2,1)=0.0
    C(3,1)=0.0
    DO 53 I=1,16
    CI=YT(1,I)*V1Y(I,1)

```

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53 C(1,1)=C(1,1)+CI
DO 54 I=1,16
CI=YT(1,I)*V2Y(I,1)
54 C(2,1)=C(2,1)+CI
DO 55 I=1,16
CI=YT(1,I)*V3Y(I,1)
55 C(3,1)=C(3,1)+CI
N=3
L=3
M=3
IB=1
JB=1
DO 56 I=1,N
DO 56 J=1,N
56 BJ(I,J)=B(I,J)
IRANK=3
DO 57 I=1,N
DO 57 J=1,N
57 BS(I,J)=BJ(I,J)
CALL MINV(BS,IRANK,D,IXX,JXX)
DO 58 I=1,3
DO 58 J=1,3
58 BBI(I,J)=BS(I,J)
DO 60 I=1,3
DO 60 J=1,3
60 BB(I,J)=BBI(I,J)
CALL GMPRD(BJ,BBI,CHEK,N,M,L)
KK=1
CALL GMPRD(BB,C,BC,N,N,KK)
CU=0.05
CUT1=IK-BC(1,1)
CUT2=IM-BC(2,1)
CUT3=IN-BC(3,1)
CUT5=0.0
IF(CUT1-CUT5) 61,62,62
61 CUT1=CUT1*(-1)
62 IF(CUT2-CUT5) 63,64,64
63 CUT2=CUT2*(-1)
64 IF(CUT3-CUT5) 65,66,66
65 CUT3=CUT3*(-1)
66 IF(CUT1-CU) 67,67,69
67 IF(CUT2-CU) 68,68,69
68 IF(CUT3-CU) 70,70,69
69 IK=BC(1,1)
IM=BC(2,1)
IN=BC(3,1)
WAITE(3,71) IK,IM,IN
GOTO 3

```



```
70 WRITE(3,71) IK,IM,IN  
71 FORMAT(10X,3(F12.4,3X))  
STOP  
END
```



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```
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
```

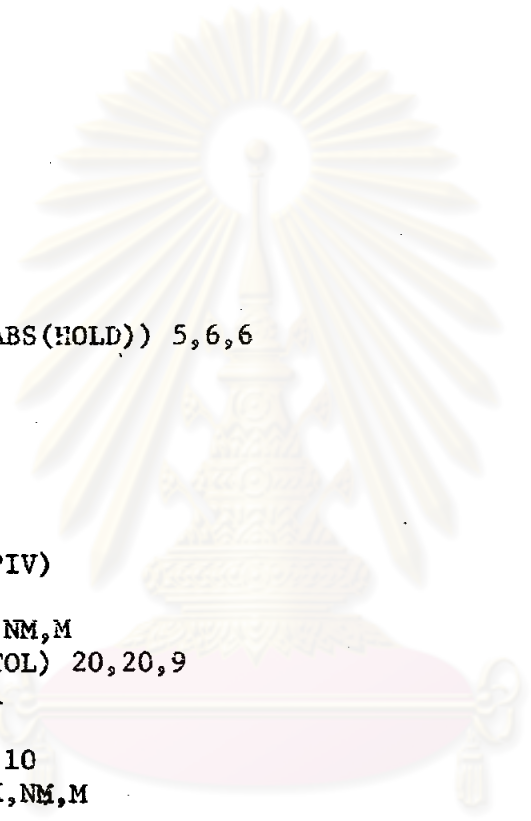
```
SUBROUTINE TRAC(A,SUM)
DIMENSION A(16,16)
SUM=0.0
DO 10 I=1,16
DO 10 J=1,16
IF(I-J) 10,20,10
20 SUM=A(I,J)+SUM
10 CONTINUE
RETURN
END
```

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```

SUBROUTINE MFGR (A,M,N, EPS, IRANK, IROW, ICOL)
DIMENSION A(1), IROW(1), ICOL(1)
IF(M) 2,2,1
1 IF(N) 2,2,4
2 IRANK=-1
3 RETURN
4 IRANK=0
PIV=0
JJ=0
DO 6 J=1,N
ICOL(J) =J
DO 6 I=1,M
JJ=JJ+1
HOLD=A(JJ)
IF(ABS(PIV)-ABS(HOLD)) 5,6,6
5 PIV=HOLD
IR=1
IC=J
6 CONTINUE
DO 7 I=i,M
7 IROW(I)=I
TOL=ABS(EPS*PIV)
NM=N*M
DO 19 NCOL=M,NM,M
8 IF(ABS(PIV)-TOL) 20,20,9
9 IRANK=IRANK+1
JJ=IR-IRANK
IF(JJ) 12,12,10
10 DO 11 J=IRANK,NM,M
I=J+JJ
SAVE=A(J)
A(J)=A(I)
11 A(I)=SAVE
JJ=IROW(IR)
IROW(IR)=IROW(IRANK)
IROW(IRANK)=JJ
12 JJ=(IC-IRANK)*M
IF(JJ) 15,15,13
13 KK=NCOL
DO 14 J=1,M
I=KK+JJ
SAVE=A(KK)
A(KK)=A(I)
KK=KK-1
14 A(I)=SAVE
JJ=ICOL(IC)
ICOL(IC)=ICOL(IRANK)
ICOL(IRANK)=JJ

```



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 ภาควิชาคณิตศาสตร์
 มหาวิทยาลัย

```
15  KK=IRANK+1
    MM=IRANK-M
    LL=NCOL+MM
    IF(MM) 16,25,25
16  JJ=LL
    SAVE=PIV
    PIV=0.
    DO 19 J=KK,M
    JJ=JJ+1
    HOLD=A(JJ)/SAVE
    A(JJ)=HOLD
    L=J-IRANK
    IF(IRANK-N) 17,19,19
17  II=JJ
    DO 19 I=KK,N
    II=II+M
    MM=II-L
    A(II)=A(II)-HOLD*A(MM)
    IF(ABS(A(II))-ABS(PIV)) 19,19,18
18  PIV=A(II)
    IR=J
    IC=I
19  CONTINUE
20  IF(IRANK-1) 3,25,21
21  IR=LL
    DO 24 J=2, IRANK
    II=J-1
    IR=IR-M
    JJ=LL
    DO 23 I=KK,M
    HOLD=0.
    JJ=JJ+1
    MM=JJ
    IC=IR
    DO 22 L=1, II
    HOLD=HOLD+A(MM)*A(IC)
    IC=IC-1
22  MM=MM-M
23  A(MM)=A(MM)-HOLD
24  CONTINUE
25  IF(N-IRANK) 3,3,26
26  IR=LL
    KK=LL+M
    DO 30 J=1, IRANK
    DO 29 I=KK,NM,M
    JJ=IR
    LL=I
    HOLD=0.
    II=J
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```
27 II=II-1
   IF(II) 29,29,28
28 HOLD=HOLD-A(JJ)*A(LL)
   JJ=JJ-M
   LL=LL-1
   GOTO 27
29 A(LL)=(HOLD-A(LL))/A(JJ)
30 IR=IR-1
   RETURN
   END
```



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```
SUBROUTINE MVEC1(TR,SS,N,COM)
DIMENSION TR(16,16),SS(16,1),COM(16,1),A(16,16)
DO 5 I=1,N
5 COM(I,1)=0.0
DO 10 J=1,N
DO 10 J=1,N
A(I,J)=TR(I,J)*SS(J,1)
10 COM(I,1)=A(I,J)+COM(I,1)
RETURN
END
```



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1472.4675	17.9209	80.4011
1461.2375	26.7545	78.9138
1464.0344	26.9526	78.8440
1464.3098	26.9570	78.8422
1464.1460	26.9575	78.8428
1464.3069	26.9579	78.8426
1464.1987	26.9573	78.8424
1464.4341	26.9568	78.8426
1464.3088	26.9573	78.8425
1464.4116	26.9577	78.8428
1464.2964	26.9568	78.8425
1464.2964	26.9568	78.8425



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๒. แสดงโปรแกรมคอมพิวเตอร์สำหรับการคำนวณค่าประมาณแนวเรขาคณิต คอมโปเนนท์

โดยวิธี ML

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DIMENSION V1(16,16),V3(16,16),V4(3,16),A(16,16),
1AA(16,16),AI(16,16),X(16,3),Y(16,1),XT(3,16),VEC(3,3),
2AV1(16,16),V11(16,16),TR(3,3),AV2(16,16),V12(16,16),AV3(16,16),
3V13(16,16),V1V(16,16),V3V(16,16),XX(16,1),YX(16,1),YXT(1,16),
4L1(1,16),V2(16,16),L2(1,16),L3(1,16),SS(3,1),COM(3,1),
5B(16,16),BS(2,2),V21(16,16),V22(16,16),V23(16,16),V31(16,16),
6V32(16,16),V33(16,16),XVY(3,1),V2V(16,16),IL(16),JL(16),
7IXX(3),JXX(3),IYY(2),JYY(2),ALFA(3,1),BSI(2,2),
8AIB(16,16),VECA(3,3),CAT(3,3),AS(2,2)
C ESTIMATING VARIANCE COMPONENTS BY ML METHOD
C THIS PROGRAM IS USED WITH SUBPROGRAM PRINTED
C BELOW INCLUDING SUBPROGRAM MINV WHICH CAN BE
C FOUND IN THE IBM PROGRAMMER'S MANUAL
C INPUT DATA IS MATRIX V1, V2, V3 WHICH  $V1=u'(1) \times u(1)$ 
C  $V2=u'(12) \times u(2)$ ,  $V3=u'(3) \times u(3)$ 
C OUTPUT IS ESTIMATION OF VARIANCE COMPONENTS FOR EACH ITERATION
REAL L1, L2, L3
READ(1,1) ((V1(I,J), J=1,16), I=1,16)
READ(1,1) ((V2(I,J), J=1,16), I=1,16)
READ(1,1) ((V3(I,J), J=1,16), I=1,16)
READ(1,1) ((XT(I,J), J=1,16), I=1,3)
READ(1,1) (Y(I,1), I=1,16)
1 FORMAT(16F3.0)
VR1=1.0
VR2=2.0
VR3=3.0
ICOUN=3
N2=2
KEEP=0
EPS=1.0E-7
2 DO 3 I=1,16
DO 3 J=1,16
3 A(I,J)=VR1*V1(I,J)+VR2*V2(I,J)+VR3*V3(I,J)
M=16
N=16
L=N
DO 4 I=1,16
DO 4 J=1,16
4 AA(I,J)=A(I,J)
CALL MFGR(A,M,N,EPS,IRANK,IRGW,ICOL)
IF(N-IRANK) 47,6,47
6 DO 7 I=1,N
DO 7 J=1,N

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7  B(I,J)=AA(I,J)
   CALL MINV(B,IRANK,D,IL, JL)
   DO 8 I=1,N
   DO 8 J=1,N
8  AI(I,J)=B(I,J)
   CALL GMPRD(AA,B,AIB,N,M,L)
   DO 9 I=1,3
   DO 9 J=1,16
9  X(J,I)=XT(I,J)
   NN=3
   NK=3
   KN=16
   MK=16
   DO 10 I=1,NK
   DO 10 J=1,KN
   V4(I,J)=0.0
   DO 10 K=1,MK
10 V4(I,J)=V4(I,J)+XT(I,K)*AI(K,J)
   CALL GMPRD(V4,X,VEC,NN,M,NN)
   DO 11 I=1,3
   DO 11 J=1,3
11 VECA(I,J)=VEC(I,J)
   CALL MINV(VEC,NN,D,IXX,JXX)
   CALL GMPRD(VEC,VECA,CAT,NN,NN,NN)
   LL=1
   CALL GMPRD(V4,Y,XVY,NN,M,LL)
   CALL GMPRD(VEC,XVY,ALFA,NN,NN,LL)
   CALL GMPRD(V1,AI,AV1,N,M,L)
   CALL GMPRD(V2,AI,AV2,N,M,L)
   CALL GMPRD(V3,AI,AV3,N,M,L)
   CALL GMPRD(AV1,AV1,V11,N,M,L)
   CALL GMPRD(AV1,AV2,V12,N,M,L)
   CALL GMPRD(AV1,AV3,V13,N,M,L)
   CALL GMPRD(AV2,AV1,V21,N,M,L)
   CALL GMPRD(AV2,AV2,V22,N,M,L)
   CALL GMPRD(AV2,AV3,V23,N,M,L)
   CALL GMPRD(AV3,AV1,V31,N,M,L)
   CALL GMPRD(AV3,AV2,V32,N,M,L)
   CALL GMPRD(AV3,AV3,V33,N,M,L)
   CALL TRAC(V11,A11)
   CALL TRAC(V12,A12)
   CALL TRAC(V13,A13)
   CALL TRAC(V21,A21)
   CALL TRAC(V22,A22)
   CALL TRAC(V23,A23)
   CALL TRAC(V31,A31)
   CALL TRAC(V32,A32)
   CALL TRAC(V33,A33)
   IF(KEEP-0) 15,13,15,

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```

13 TR(1,1)=A11
   TR(1,2)=A12
   TR(1,3)=A13
   TR(2,1)=A21
   TR(2,2)=A22
   TR(2,3)=A23
   TR(3,1)=A31
   TR(3,2)=A32
   TR(3,3)=A33
   GOTO 17
15 BS(1,1)=A11
   BS(1,2)=A13
   BS(2,1)=A31
   BS(2,2)=A33
   CALL MINV(BS,N2,D,IYY,JYY)
17 CALL GMPRD(AV1,AI,V1V,N,M,L)
   CALL GMPRD(AV2,AI,V2V,N,M,L)
   CALL GMPRD(AV3,AI,V3V,N,M,L)
   CALL GMPRD(X,ALFA,XX,M,NN,LL)
   DO 18 I=1,16
   YX(I,1)=Y(I,1)-XX(I,1)
18 YXT(1,1)=YX(I,1)
   CALL GMPRD(YXT,V1V,L1,LL,M,M)
   CALL GMPRD(YXT,V2V,L2,LL,M,M)
   CALL GMPRD(YXT,V3V,L3,LL,M,M)
   AS(1,1)=0.0
   AS(2,1)=0.0
   SS(1,1)=0.0
   SS(2,1)=0.0
   SS(3,1)=0.0
   IF(KEEP-0) 23,19,23
19 DO 20 J=1,16
   CI=L2(1,J)*YX(J,1)
20 SS(2,1)=SS(2,1)+CI
   DO 21 J=1,16
   CI=L1(1,J)*YX(J,1)
21 SS(1,1)=SS(1,1)+CI
   DO 22 J=1,16
   CI=L3(1,J)*YX(J,1)
22 SS(3,1)=SS(3,1)+CI
   GOTO 26
23 DO 24 J=1,16
   CI=L1(1,J)*YX(J,1)
24 AS(1,1)=AS(1,1)+CI
   DO 25 J=1,16
   CI=L3(1,J)*YX(J,1)
25 AS(2,1)=AS(2,1)+CI
26 IF(KEEP-0) 29,27,29
27 CALL MFGR(TR,NN,NN,EPS,IRANK,IROW,ICOL)

```

```
CALL MINV(TR,IRANK,D,EXX,JXX)
CALL GMPRD(TR,SS,COM,IRANK,IRANK,LL)
GOTO 31
29 CALL GMPRD(BS,AS,BSI,N2,N2,LL)
   COM(1,1)=BSI(1,1)
   COM(2,1)=0.0
   COM(3,1)=BSI(2,1)
31 DO 34 I=1,NN
   IF(COM(I,1)-0) 32,34,34
32 COM(I,1)=0.0
   KEEP=I
34 CONTINUE
   WRITE(3,35) (COM(I,1), I=1,3)
35 FORMAT(5X,3(F12.4,3X))
   CU=0.05
   CUT1=VR1-COM(1,1)
   CUT2=VR2-COM(2,1)
   CUT3=VR3-COM(3,1)
   CUT5=0.0
   IF(CUT1-CUT5) 36,37,37
36 CUT1=-1 *CUT1
37 IF(CUT2-CUT5) 38,39,39
38 CUT2=-1 *CUT2
39 IF(CUT3-CUT5) 40,41,41
40 CUT3=-1 *CUT3
41 IF(CUT1-CU) 42,42,44
42 IF(CUT2-CU) 43,43,44
43 IF(CUT3-CU) 45,45,44
44 VR1=COM(1,1)
   VR2=COM(2,1)
   VR3=COM(3,1)
   GOTO 2
45 WRITE(3,46) (COM(I,1), I=1,3)
46 FORMAT(10X,'VARIANCE=',F9.5)
47 STOP
END
```

```
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
```

```
SUBROUTINE TRAC(A,SUM)
DIMENSION A(16,16)
SUM=0.0
DO 10 I=1,16
DO 10 J=1,16
IF(I-J) 10,20,10
20 SUM=A(I,J)+SUM
10 CONTINUE
RETURN
END
```

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```

SUBROUTINE MFGR (A,M,N,EPS,IRANK,IROW,ICOL)
DIMENSION A(1),IROW(1),ICOL(1)
IF(M) 2,2,1
1 IF(N) 2,2,4
2 IRANK=-1
3 RETURN
4 IRANK=0
PIV=0
JJ=0
DO 6 J=1,N
ICOL(J)=J
DO 6 I=1,M
JJ=JJ+1
HOLD=A(JJ)
IF(ABS(PIV)-ABS(HOLD)) 5,6,6
5 PIV=HOLD
IR=1
IC=J
6 CONTINUE
DO 7 I=1,M
7 IROW(I)=I
TOL=ABS(EPS*PIV)
NM=N*M
DO 19 NCOL=M,NM,M
8 IF(ABS(PIV)-TOL) 20,20,9
9 IRANK=IRANK+1
JJ=IR-IRANK
IF(JJ) 12,12,10
10 DO 11 J=IRANK,NM,M
I=J+JJ
SAVE=A(J)
A(J)=A(I)
11 A(I)=SAVE
JJ=IROW(IR)
IROW(IR)=IROW(IRANK)
IROW(IRANK)=JJ
12 JJ=(IC-IRANK)*M
IF(JJ) 15,15,13
13 KK=NCOL
DO 14 J=1,M
I=KK+JJ
SAVE=A(KK)
A(KK)=A(I)
KK=KK-1
14 A(I)=SAVE
JJ=ICOL(IC)
ICOL(IC)=ICOL(IRANK)
ICOL(IRANK)=JJ

```

```

15  KK=IRANK+1
    MM=IRANK-M
    LL=NCOL+MM
    IF(MM) 16,25,25
16  JJ=LL
    SAVE=PIV
    PIV=0.
    DO 19 J=KK,M
    JJ=JJ+1
    HOLD=A(JJ)/SAVE
    A(JJ)=HOLD
    L=J-IRANK
    IF(IRANK-N) 17,19,19
17  II=JJ
    DO 19 I=KK,N
    II=II+M
    MM=II-L
    A(II)=A(II)-HOLD*A(MM)
    IF(ABS(A(II))-ABS(PIV)) 19,19,18
18  PIV=A(II)
    IR=J
    IC=I
19  CONTINUE
20  IF(IRANK-1) 3,25,21
21  IR=LL
    DO 24 J=2, IRANK
    II=J-1
    IR=IR-M
    JJ=LL
    DO 23 I=KK,M
    HOLD=0.
    JJ=JJ+1
    MM=JJ
    IC=IR
    DO 22 L=1, II
    HOLD=HOLD+A(MM)*A(IC)
    IC=IC-1
22  MM=MM-M
23  A(MM)=A(MM)-HOLD
24  CONTINUE
25  IF(N-IRANK) 3,3,26
26  IR=LL
    KK=LL+M
    DO 30 J=1, IRANK
    DO 29 I=KK,NM,M
    JJ=IR
    LL=I
    HOLD=0.
    II=J

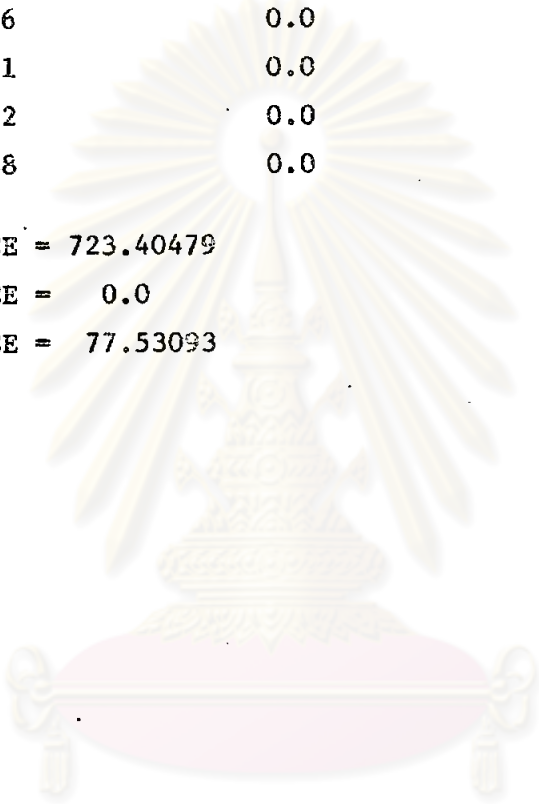
```

```
27 II=II-1
   IF(II) 29,29,28
28 HOLD=HOLD-A(JJ)*A(LL)
   JJ=JJ-M
   LL=LL-1
   GOTO 27
29 A(LL)=(HOLD-A(LL))/A(JJ)
30 IR=IR-1
   RETURN
   END
```



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283.4207	204.0866	83.493
0.0	0.1084	7426.9375
685.3782	0.0	97.9688
723.2336	0.0	77.5331
723.4951	0.0	77.5316
723.3652	0.0	77.5313
723.4048	0.0	77.5309
VARIANCE = 723.40479		
VARIANCE = 0.0		
VARIANCE = 77.53093		



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ประวัติผู้เขียน



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การศา

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