รายการอ้างอิง

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ภาคผนวก

ภาคผนวก ก

โปรแกรมสำหรับการคำนวณหาค่าวิกฤตของตัวสถิติทดสอบ AD^C และ CVM^C ที่ใช้ในการทดสอบเทียบความกลมกลืนสำหรับการแจกแจงแกมมากรณีที่ข้อมูลถูกตัดปลายประเภทที่ 2 โดยกำหนดพารามิเตอร์ตามตารางที่ 3.1

```
!******************* PROGRAM FOR COMPUTE CRITICAL VALUE **********************
      COMMON/SEED/IX/SAMPLE/N,R
      REAL AD(50000),W(50000),TEMP(3),X(100),FF(100)
      REAL ADD,CVM,ALP,LAM
      REAL V1,V2,V3,V4,V5,V6,PAD(3),PW(3)
      REAL*8 F
      OPEN(5,FILE='C:\CT.XLS')
      IX = 65539
      NMAX = 50000
      N = 10
      R = 9
      ALP = 16
      LAM = 1
      A = SQRT(2*ALP-1)
      B = (2*ALP)-(ALOG(4.0))+(1/A)
!****************** FIND CRITICAL VALUE ********************
      DO 102 II=1,NMAX
      WRITE(*,*) II
      DO 103 I=1,N
      IF(ALP.LT.1.0) THEN
            X(I) = GAMMA1(IX,ALP,LAM)
            ELSE IF(ALP.EQ.1.0) THEN
                  X(I) = GAMMA2(IX,LAM)
                  ELSE
                        X(I) = GAMMA3(IX,A,B,ALP,LAM)
      ENDIF
103   CONTINUE
      CALL SORT(X,N)
      DO 112 I=1,N
                  B=X(I)
            CALL CDF(B,ALP,LAM,F)
                  FF(I)=F
```

```
112     CONTINUE
                CALL CAL1(FF,ADD)
                CALL CAL2(FF,CVM)
                        AD(II)  = ADD
                        W(II)   = CVM
102     CONTINUE
                CALL SORT(AD,NMAX)
                CALL SORT(W,NMAX)
!*****************       COMPUTER PERCENTILE       ******************
        P1 = 0.85
        DO 12 J=1,2
                P1 = P1+0.05
                P2 = (NMAX+1)*P1
                P3 = (NMAX+1)*P1-P2
                PAD(J) = (1-P3)*AD(P2)+P3*AD(P2+1)
                PW(J) = (1-P3)*W(P2)+P3*W(P2+1)
12      CONTINUE
                P1 = P1+0.04
                P2 = (NMAX+1)*P1
                P3 = (NMAX+1)*P1-P2
                PAD(J) = (1-P3)*AD(P2)+P3*AD(P2+1)
                PW(J) = (1-P3)*W(P2)+P3*W(P2+1)
        V1 =    PAD(1)
        V2 =    PAD(2)
        V3 =    PAD(3)
        V4 =    PW(1)
        V5 =    PW(2)
        V6 =    PW(3)
        TEMP(1) = 0.10
        TEMP(2) = 0.05
        TEMP(3) = 0.01
        WRITE(5,*)'  N=',N,'  R=',R
        WRITE(5,*)' CRITICAL VALUE '
        WRITE(5,*)'LEVEL AD CVM '
        WRITE(5,51)TEMP(1),V1,V4
        WRITE(5,51)TEMP(2),V2,V5
```

```
      WRITE(5,51)TEMP(3),V3,V6
51    FORMAT(3X,F4.2,3(7X,F5.3))
      STOP
      END
!****************** ANDERSON-DARLING STATISTICS ***************************
      SUBROUTINE CAL1(FF,ADD)
      COMMON/SAMPLE/N,R
      REAL FF(1000),ADD,A1,A2,A3,P,BB,CC
      A1 = (R**2)*(ALOG(FF(R)))
      A2 = ((FLOAT(N)-R)**2)*(ALOG(1-FF(R)))
      A3 = FF(R)
      P = 0.
      DO 444 I = 1,R
            BB = ALOG(FF(I))
            CC = ALOG(1-FF(I))
            P = P +(2*FLOAT(I)-1)*BB+(2*FLOAT(N)-2*FLOAT(I)+1)*CC
444   CONTINUE
            ADD = -(P/FLOAT(N))+(A1/FLOAT(N))-(A2/FLOAT(N))-(FLOAT(N)*A3)
      RETURN
      END
!************************** CRAMER-VON MISES STATISTICS **********************
      SUBROUTINE CAL2(FF,CVM)
      DIMENSION FF(1000)
      COMMON/SAMPLE/N,R
      REAL CVM,SUM,C1,C2
      C1 = (R)/(12*((FLOAT(N))**2))
      C2 = (FLOAT(N)/3)*((R/FLOAT(N))-FF(R))**3
      SUM = 0.
      DO 405 I = 1,R
            SUM = SUM+(FF(I)-(FLOAT(I)-0.5)/FLOAT(N))**2
405   CONTINUE
            CVM = SUM+C1-C2
      RETURN
      END
```

```
!************************** GEN GAMMA DIST ************************
!!      GAMMA DIST FOR ALP LT 1
        FUNCTION GAMMA1(IX,ALP,LAM)
        DOUBLE PRECISION IY
        REAL ALP,LAM,GAMMA1,XX
        CALL URAND(IX,IY,RD)
        RO = RD
        V = -ALOG(RO)
        BET = 1.0-ALP
        W = BETA1(IX,ALP,BET)
        XX = V*W/LAM
        GAMMA1 = XX
        RETURN
        END
!!      GAMMA DIST FOR ALP EQ 1
        FUNCTION GAMMA2(IX,LAM)
        DOUBLE PRECISION IY
        REAL LAM,GAMMA2,XX
        CALL URAND(IX,IY,RD)
        RO = RD
        XX = -ALOG(RO)/LAM
        GAMMA2 = XX
        RETURN
        END

!!      GAMMA DIST FOR ALP GT 1
        FUNCTION GAMMA3(IX,AO,BO,ALP,LAM)
        DOUBLE PRECISION IY
        REAL ALP,LAM,GAMMA3,XX
20      CALL URAND(IX,IY,RD)
        R1 = RD
        CALL URAND(IX,IY,RD)
        R2 = RD
        Y = ALP*((R1/(1.0-R1))**AO)
        W = BO-ALOG(R1*R1*R2)
        IF(Y.GT.W) GOTO 20
```

```
      XX = Y/LAM
      GAMMA3 = XX
      RETURN
      END

!!    BETA DISTRIBUTION
      FUNCTION BETA1(IX,ALP,BET)
      DOUBLE PRECISION IY
      REAL ALP,BET
7     CALL URAND(IX,IY,RD)
      R1 = RD
      CALL URAND(IX,IY,RD)
      R2 = RD
      Y1 = R1**(1/ALP)
      Y2 = R2**(1/BET)
      IF(Y1+Y2.GT.1.0) GOTO 7
      BETA1 = Y1/(Y1+Y2)
      RETURN
      END
!********************** FIND F(X) FOR GAMMA DIST ********************
!!    FIND CUM PROB FOR GAMMA DIST
      SUBROUTINE CDF(B,ALP,LAM,F)[1]
      REAL LAM
      REAL*8   F,FB,FX,PDF
      N = 12
      N1 = N - 1
      H = B/N
      FB = PDF(B,ALP,LAM)
      XIO = FB
      XI1 = 0.0
      XI2 = 0.0
      DO 55 I = 1, N1
            X = I*H
            FX = PDF(X,ALP,LAM)
```

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[1] เขียนโดย รศ. ร.อ.มานพ วราภักดิ์

```
            K = I/2.0
            IF((I - 2*K) .EQ. 0) THEN
                  XI2 = XI2 + FX
            ELSE
                  XI1 = XI1 + FX
            END IF
55      CONTINUE
            F = H*(XIO + 2*XI2 + 4*XI1)/3.0
      IF(F .GT. 1.0 .OR. F .LT. 0.0) THEN
      PRINT*,' '
      PRINT*, 'THE INPUT DATA MAY BE INVALID. PLEASE RE-ENTER THE ','INPUT DATA.'
      STOP
      ENDIF
      RETURN
      END
!!    FIND PROB FOR GAMMA DIST
      FUNCTION PDF(XO,ALP,LAM)
      REAL LAM
      REAL*8  GAM,PD,PDF,LAMXO
      IF(ALP .EQ. 1.0) THEN
            PD = 1.0
            GO TO 10
      END IF
      IF(ALP .LT. 1.0) THEN
            ALP1 = ALP + 1.0
            PD = (XO**(ALP - 1.0))*ALP/GAM(ALP1)
            GO TO 10
      END IF
      IF(ALP .GT. 1.0 .AND. ALP .LT. 2.0) THEN
            PD = (XO**(ALP - 1.0))/GAM(ALP)
            GO TO 10
      END IF
      K = ALP
      AK = ALP - K + 1.0
      K1 = K - 1
      PD = 1.0
```

```
      DO 50 I = 1,K1
      PD = PD*XO/(ALP - I)
50    CONTINUE
      PD = PD*(XO**(AK-1.0))/GAM(AK)
10    LAMXO = LAM*XO
      PDF = (LAM**ALP)*PD/DEXP(LAMXO)
      RETURN
      END
      FUNCTION GAM(X)
      REAL*8  A,B,GAM,XX
      XX = -1.0*X
      A = (X**(X-0.5))*DEXP(XX)*2.506628
      B = 1.0 + (1.0/(12.0*X)) + (1.0/(288.0*X*X))- (139.0/(51840.0*(X**3.0))) -
          (571.0/(2488320.0*(X**4.0)))
      GAM = A*B
      RETURN
      END
!********************* RANDOM NUMBER **********************
      SUBROUTINE URAND(IX,IY,RD)
      REAL RD
      DOUBLE PRECISION IY
      IY=IX*16807
      IF(IY.LT.0) IY=1+(IY+2147483647)
      RD=IY
      RD=RD/2147483647
      IX=IY
      RETURN
      END
!******************* SORT *******************
      SUBROUTINE SORT(Y,NUM)
      DIMENSION Y(50000)
      JUMP = NUM
10    JUMP = JUMP/2
      IF (JUMP.EQ.0) GOTO 99
      J2 = NUM-JUMP
      DO 20 J=1,J2
```

```
                I = J
30              J3 = I+JUMP
        IF(Y(I).LE.Y(J3)) GOTO 20
                CALL SWAP(Y(I),Y(J3))
                I = I-JUMP
                IF (I.GT.0) GOTO 30
20      CONTINUE
        GOTO 10
99      RETURN
        END
!******************** SWAP ********************
        SUBROUTINE SWAP(A,B)
                HOLD = A
                A = B
                B = HOLD
        RETURN
        END
```

โปรแกรมสำหรับการคำนวณค่าความน่าจะเป็นของความคลาดเคลื่อนประเภทที่ 1 และอำนาจการทดสอบของตัวสถิติทดสอบทั้ง 3 ตัว

```
!***************PROGRAM  FOR TYPE I  ERROR AND POWER OF THE TEST ******************
      COMMON/SEED/IX/SAMPLE/N,R
      REAL X(70),FF(70),VAL(3,4),ROUNDKS(3),ROUNDAD(3),ROUNDW(3)
      REAL TEMP(3),W(1000),KS(1000),AD(1000)
      REAL DD,ADD,CVM,ALP,LAM ,ALP2,LAM2,KO
      REAL*8 F
!     REAL LOGNORM,MEAN,SD
      IX = 65539
      MAX = 1000
      N = 10
      R = 9
!!    FOR GAMMA IN H0
      ALP  = 16
      LAM = 1
!!    FOR GAMMA IN H1
      ALP2  = 17.4
      LAM2 = 1
!!    FOR CHISQUARE
      DG = 19
!!    FOR WEIBULL
      ALPHA = 2.02
      BETA =  18
!!    FOR LOGNORMAL
      MEAN =  2.8
      SD =  0.16
!!    CHECK FOR DEGREES OF FREEDOM
      ND = DG/2
      DIFF = DG-ND*2
      IF(DIFF.EQ.0.0) THEN
            KO = DG/2.
      ELSE
            KO = (DG-1)/2.0
      END IF
```

```
      A = SQRT(2*ALP2-1)
      B = (2*ALP2)-(ALOG(4.0))+(1/A)

      OPEN(5,FILE='C:\POWER.XLS')

!****************** FILL CRITICAL VALUE ********************
!!    CT FOR KS 0.10,0.05,0.01
            VAL(1,1)=     0.3661
            VAL(2,1)=     0.4066
            VAL(3,1)=     0.4858
!!    CT FOR AD 0.10,0.05,0.01
            VAL(1,2)=     1.67
            VAL(2,2)=     2.19
            VAL(3,2)=     3.51
!!    CT FOR CVM 0.10,0.05,0.01
            VAL(1,3)=     0.29
            VAL(2,3)=     0.39
            VAL(3,3)=     0.62
!*************************************************************
      DO 120 I=1,3
            ROUNDKS(I) = 0.
            ROUNDAD(I) = 0.
            ROUNDW(I) = 0.
120   CONTINUE
!***************************** START *************************
      DO 141 II=1,MAX
      WRITE(*,*) II
      DO 101 I=1,N
      IF(ALP2.LT.1.0) THEN
            X(I) = GAMMA1(IX,ALP2,LAM2)
            ELSE  IF(ALP2.EQ.1.0) THEN
                  X(I) = GAMMA2(IX,LAM2)
                ELSE
                  X(I) = GAMMA3(IX,A,B,ALP2,LAM2)
      ENDIF
```

```
!       X(I) = WEI(ALPHA,BETA)
!       X(I) = LOGNORM(MEAN,SD)
!       X(I) = CHI(KO,DIFF)
101     CONTINUE
        CALL SORT(X,N)
        DO 115 K=1,N
                        B=X(K)
                        CALL CDF(B,ALP,LAM,F)
                                FF(K) = F
115     CONTINUE
                CALL CAL1(FF,DD)
                CALL CAL2(FF,ADD)
                CALL CAL3(FF,CVM)
                        KS(II) = DD
                        AD(II) = ADD
                        W(II) = CVM
        DO 104 I=1,3
                IF(KS(II).GT.VAL(I,1)) ROUNDKS(I) = ROUNDKS(I)+1
                IF(AD(II).GT.VAL(I,2)) ROUNDAD(I) = ROUNDAD(I)+1
                IF(W(II).GT.VAL(I,3)) ROUNDW(I) = ROUNDW(I)+1
104     CONTINUE
141     CONTINUE
        TEMP(1) = 0.10
        TEMP(2) = 0.05
        TEMP(3) = 0.01
        WRITE(5,*)'                     POWER OF THE TEST                       '
        WRITE(5,*)'LEVEL                KS      AD      CVM     '
        DO 160 K=1,3
        WRITE(5,241)TEMP(K),ROUNDKS(K)/MAX,ROUNDAD(K)/MAX,ROUNDW(K)/MAX
241     FORMAT(3X,F4.2,3(7X,F10.3))
160     CONTINUE
        STOP
        END
```

```
!********************* KOLMOGOROV-SMIRNOV STATISTICS *********************
      SUBROUTINE CAL1(FF,DD)
      COMMON/SAMPLE/N,R
      REAL DP(1000),DN(1000),FF(1000)
      REAL DD,T1,T2
      DO 505 I=1,R
            DP(I) = FLOAT(I)/FLOAT(N)-FF(I)
            DN(I) = FF(I)-(FLOAT(I)-1.)/FLOAT(N)
505   CONTINUE
      T1 = XMAX(DP)
      T2 = XMAX(DN)
      IF(T1.GT.T2) THEN
            DD = T1
      ELSE
            DD = T2
      END IF
      RETURN
      END
!******************* ANDERSON-DARLING STATISTICS ****************************
      SUBROUTINE CAL2(FF,ADD)
      COMMON/SAMPLE/N,R
      REAL FF(1000),ADD,A1,A2,A3,P,BB,CC
!!!   FINDING ANDERSON-DARING STATISTICS
      A1 = (R**2)*(ALOG(FF(R)))
      A2 = ((FLOAT(N)-R)**2)*(ALOG(1-FF(R)))
      A3 = FF(R)
      P = 0.
      DO 444 I = 1,R
            BB = ALOG(FF(I))
            CC = ALOG(1-FF(I))
            P = P +(2*FLOAT(I)-1)*BB+(2*FLOAT(N)-2*FLOAT(I)+1)*CC
444   CONTINUE
            ADD = -(P/FLOAT(N))+(A1/FLOAT(N))-(A2/FLOAT(N))-(FLOAT(N)*A3)
      RETURN
      END
```

```
!************************** CRAMER-VON MISES STATISTICS **********************
      SUBROUTINE CAL3(FF,CVM)
      DIMENSION FF(1000)
      COMMON/SAMPLE/N,R
      REAL CVM,SUM,C1,C2
      C1 = (R)/(12*((FLOAT(N))**2))
      C2 = (FLOAT(N)/3)*((R/FLOAT(N))-FF(R))**3
      SUM = 0.
      DO 405 I = 1,R
            SUM = SUM+(FF(I)-(FLOAT(I)-0.5)/FLOAT(N))**2
405   CONTINUE
            CVM = SUM+C1-C2
      RETURN
      END
!************************** GEN GAMMA DIST ************************
!!    GAMMA DIST FOR ALP LT 1
      FUNCTION GAMMA1(IX,ALP,LAM)
      DOUBLE PRECISION IY,XX
      REAL ALP,LAM,GAMMA1
      CALL URAND(IX,IY,RD)
      RO = RD
      V = -ALOG(RO)
      BET = 1.0-ALP
      W = BETA1(IX,ALP,BET)
      XX = V*W/LAM
      GAMMA1 = XX
      RETURN
      END
!!    GAMMA DIST FOR ALP EQ 1
      FUNCTION GAMMA2(IX,LAM)
      DOUBLE PRECISION IY,XX
      REAL LAM,GAMMA2
      CALL URAND(IX,IY,RD)
      RO = RD
      XX = -ALOG(RO)/LAM
      GAMMA2 = XX
```

```
      RETURN
      END
!!    GAMMA DIST FOR ALP GT 1
      FUNCTION GAMMA3(IX,AO,BO,ALP,LAM)
      DOUBLE PRECISION IY
      REAL ALP,LAM,GAMMA3,XX
20    CALL URAND(IX,IY,RD)
      R1 = RD
      CALL URAND(IX,IY,RD)
      R2 = RD
      Y = ALP*((R1/(1.0-R1))**AO)
      W = BO-ALOG(R1*R1*R2)
      IF(Y.GT.W) GOTO 20
      XX = Y/LAM
      GAMMA3 = XX
      RETURN
      END
!!    BETA DISTRIBUTION
      FUNCTION BETA1(IX,ALP,BET)
      DOUBLE PRECISION IY
      REAL ALP,BET
7     CALL URAND(IX,IY,RD)
      R1 = RD
      CALL URAND(IX,IY,RD)
      R2 = RD
      Y1 = R1**(1/ALP)
      Y2 = R2**(1/BET)
      IF(Y1+Y2.GT.1.0) GOTO 7
      BETA1 = Y1/(Y1+Y2)
      RETURN
      END
!************************** GEN WEIBULL DIST ************************
!!    WEIBULL DIST
      FUNCTION WEI(ALPHA,BETA)
      COMMON/SEED/IX
      DOUBLE PRECISION IY
```

```
      REAL ALPHA,BETA,WEI
      CALL URAND(IX,IY,RD)
      R = RD
      WEI = BETA*((-ALOG(1.0-R))**(1.0/ALPHA))
      RETURN
      END
!************************** GEN LOGNORMAL DIST ************************
!!    LOGNORMAL DIST
      FUNCTION NORM(MEAN,SD)
      COMMON/SEED/IX
      REAL NORM,V1,V2,Z1,SD,MEAN
      DOUBLE PRECISION IY
44    CALL URAND(IX,IY,RD)
            R1 = RD
      CALL URAND(IX,IY,RD)
            R2 = RD
      V1 = (2*R1)-1
      V2 = (2*R2)-1
      S = (V1*V1)+(V2*V2)
      IF(S.GT.1.0) GOTO 44
      Z1 = V1*SQRT(-2*ALOG(S)/S)
      NORM = MEAN+(Z1*SD)
45    RETURN
      END
      FUNCTION LOGNORM(MEAN,SD)
      REAL XI,NORM,MEAN,SD,LOGNORM
      XI = NORM(MEAN,SD)
      LOGNORM = EXP(XI)
      RETURN
      END
!************************** GEN CHI-SQUARE DIST ************************
      FUNCTION CHI(KO,DIFF)
      COMMON/SEED/IX
      REAL RD,KO,P,CHI
      DOUBLE PRECISION IY
      P = 1.0
```

```
      DO 51 I=1,KO
      CALL URAND(IX,IY,RD)
            R = RD
            P = R*P
51    CONTINUE
      P = (-2.0)*ALOG(P)
      IF(DIFF.GT.0.0) THEN
            Z = ZNORM(IX)
            CHI = Z*Z+P
      ELSE
            CHI = P
      END IF
      RETURN
      END
      FUNCTION ZNORM(IX)
      DOUBLE PRECISION IY
      REAL ZNORM,RD
52    CALL URAND(IX,IY,RD)
            R1 = RD
      CALL URAND(IX,IY,RD)
            R2 = RD
            V1 = 2*R1-1
            V2 = 2*R2-1
            S = (V1*V1)+(V2*V2)
      IF(S.GT.1.0) GOTO 52
            ZNORM = V1*SQRT(-2*ALOG(S)/S)
      RETURN
      END
!********************** FIND F(X) FOR GAMMA DIST ********************
!!    FIND CUM PROB FOR GAMMA DIST
      SUBROUTINE CDF(B,ALP,LAM,F)
      REAL LAM
      REAL*8    F,FB,FX,PDF
      N = 12
      N1 = N - 1
      H = B/N
```

```
      FB = PDF(B,ALP,LAM)
      XIO = FB
      XI1 = 0.0
      XI2 = 0.0
      DO 55 I = 1, N1
            X = I*H
            FX = PDF(X,ALP,LAM)
            K = I/2.0
            IF((I - 2*K) .EQ. 0) THEN
                  XI2 = XI2 + FX
            ELSE
                  XI1 = XI1 + FX
            END IF
55    CONTINUE
            F = H*(XIO + 2*XI2 + 4*XI1)/3.0
      IF(F .GT. 1.0 .OR. F .LT. 0.0) THEN
      PRINT*, ' '
      PRINT*, 'THE INPUT DATA MAY BE INVALID. PLEASE RE-ENTER THE ','INPUT DATA.'
      STOP
      ENDIF
      RETURN
      END
!!    FIND PROB FOR GAMMA DIST
      FUNCTION PDF(XO,ALP,LAM)
      REAL LAM
      REAL*8  GAM,PD,PDF,LAMXO
      IF(ALP .EQ. 1.0) THEN
            PD = 1.0
            GO TO 10
      END IF
      IF(ALP .LT. 1.0) THEN
            ALP1 = ALP + 1.0
            PD = (XO**(ALP - 1.0))*ALP/GAM(ALP1)
            GO TO 10
      END IF
      IF(ALP .GT. 1.0 .AND. ALP .LT. 2.0) THEN
```

```
                PD = (XO**(ALP - 1.0))/GAM(ALP)
                GO TO 10
        END IF
        K = ALP
        AK = ALP - K + 1.0
        K1 = K - 1
        PD = 1.0
        DO 50 I = 1,K1
        PD = PD*XO/(ALP - I)
50      CONTINUE
        PD = PD*(XO**(AK-1.0))/GAM(AK)
10      LAMXO = LAM*XO
        PDF = (LAM**ALP)*PD/DEXP(LAMXO)
        RETURN
        END
        FUNCTION GAM(X)
        REAL*8  A,B,GAM,XX
        XX = -1.0*X
        A = (X**(X-0.5))*DEXP(XX)*2.506628
        B = 1.0 + (1.0/(12.0*X)) + (1.0/(288.0*X*X))- (139.0/(51840.0*(X**3.0))) -
           (571.0/(2488320.0*(X**4.0)))
        GAM = A*B
        RETURN
        END
!*************************** FIND MAX ******************************
        FUNCTION XMAX(T)
        DIMENSION T(1000)
        COMMON/SAMPLE/N,R
        XMAX = T(1)
        DO 95 I=2,N
95              IF(XMAX.LT.T(I)) XMAX = T(I)
        RETURN
        END
!*************************** RANDOM NUMBER ** ************************
        SUBROUTINE URAND(IX,IY,RD)
        REAL RD
```

```
      DOUBLE PRECISION IY
      IY=IX*16807
      IF(IY.LT.0) IY=1+(IY+2147483647)
      RD=IY
      RD=RD/2147483647
      IX=IY
      RETURN
      END
!************************ SORT ****************************
      SUBROUTINE SORT(Y,NUM)
      DIMENSION Y(50000)
      JUMP = NUM
10    JUMP = JUMP/2
      IF (JUMP.EQ.0) GOTO 99
      J2 = NUM-JUMP
      DO 20 J=1,J2
            I = J
30          J3 = I+JUMP
      IF(Y(I).LE.Y(J3)) GOTO 20
            CALL SWAP(Y(I),Y(J3))
            I = I-JUMP
            IF (I.GT.0) GOTO 30
20    CONTINUE
      GOTO 10
99    RETURN
      END
!************************ SWAP ****************************
      SUBROUTINE SWAP(A,B)
            HOLD = A
            A = B
            B = HOLD
      RETURN
      END
```

ภาคผนวก ข

ตารางที่ 1 *Significance points for* $D_{N:f}$

		Significance level (α)				
N	f	.15	.10	.05	.025	.01
10	1	.1728	.2057	.2589	.3085	.3690
	2	.2211	.2566	.3120	.3616	.4199
	3	.2556	.2865	.3410	.3887	.4436
	4	.2837	.3119	.3582	.4026	.4538
	5	.3045	.3311	.3725	.4105	.4567
	6	.3186	.3446	.3839	.4190	.4613
	7	.3283	.3538	.3933	.4284	.4700
	8	.3351	.3611	.4011	.4368	.4791
	9	.3400	.3661	.4066	.4428	.4858
	10	.3425	.3687	.4092	.4456	.4889
15	1	.1188	.1423	.1810	.2180	.2644
	3	.1799	.2065	.2503	.2899	.3372
	5	.2209	.2439	.2828	.3207	.3655
	7	.2480	.2702	.3051	.3371	.3762
	9	.2650	.2866	.3197	.3493	.3846
	11	.2745	.2960	.3292	.3590	.3945
	13	.2800	.3017	.3353	.3656	.4017
	15	.2823	.3040	.3376	.3679	.4042
20	2	.1190	.1400	.1740	.2058	.2451
	4	.1571	.1774	.2139	.2476	.2879
	6	.1856	.2052	.2384	.2710	.3105
	8	.2064	.2259	.2570	.2863	.3226
	10	.2214	.2407	.2707	.2978	.3305
	12	.2318	.2508	.2801	.3062	.3373
	14	.2384	.2572	.2863	.3125	.3437
	16	.2425	.2614	.2907	.3172	.3488
	18	.2450	.2639	.2933	.3198	.3516
	20	.2459	.2647	.2941	.3206	.3524
25	1	.0731	.0880	.1129	.1372	.1682
	3	.1131	.1318	.1621	.1903	.2249
	5	.1413	.1584	.1894	.2189	.2545
	7	.1626	.1798	.2088	.2375	.2729
	9	.1791	.1964	.2244	.2511	.2844
	11	.1919	.2093	.2366	.2618	.2925
	13	.2016	.2189	.2458	.2700	.2989
	15	.2087	.2259	.2524	.2760	.3043
	17	.2137	.2307	.2570	.2806	.3088
	19	.2169	.2339	.2603	.2841	.3125
	21	.2191	.2361	.2625	.2864	.3150
	23	.2203	.2373	.2637	.2876	.3163
	25	.2207	.2377	.2640	.2879	.3166

ที่มา: R. Dufour and U. R. Magg, "Distribution Results for Modified Kolmogorov-Smirnov Statistics for Truncated or Censored Samples," Technometrics, 20(1) :29-32,1978.

ตารางที่ 2 Quantiles of the Limiting Distribution of $\sqrt{n}D^{\alpha}_{n,p}$ [a]

p	.75	.90	.95	.975	.99
.1	0.4714	0.5985	0.6825	0.7589	0.8512
.2	0.6465	0.8155	0.9268	1.0282	1.1505
.3	0.7663	0.9597	1.0868	1.2024	1.3409
.4	0.8544	1.0616	1.1975	1.3209	1.4696
.5	0.9196	1.1334	1.2731	1.3997	1.5520
.6	0.9606	1.1813	1.3211	1.4476	1.5996
.7	0.9976	1.2094	1.3471	1.4717	1.6214
.8	1.0142	1.2216	1.3568	1.4794	1.6272
.9	1.0190	1.2238	1.3581	1.4802	1.6276
1.0	1.0192	1.2238	1.3581	1.4802	1.6277

[a]Adapted, with permission, from Koziol and Byar(1975)

ที่มา: Lawless, J. F., Statistical Models and Methods for Lifetime Data (New York : John Wiley and Sons, 1982), p. 437.

ประวัติผู้เขียนวิทยานิพนธ์

นางสาวธิวา กันยะมี เกิดเมื่อวันที่ 16 สิงหาคม พ.ศ. 2521 ที่จังหวัดแพร่ จบการศึกษาชั้นมัธยมศึกษาตอนปลายจากโรงเรียนนารีรัตน์จังหวัดแพร่ สำเร็จการศึกษาปริญญาวิทยาศาสตรบัณฑิต สาขาวิชาสถิติ จากคณะวิทยาศาสตร์ มหาวิทยาลัยเชียงใหม่ เมื่อปีการศึกษา 2543 และเข้าศึกษาต่อในหลักสูตรสถิติศาสตรมหาบัณฑิต สาขาวิชาสถิติ คณะพาณิชยศาสตร์และการบัญชี จุฬาลงกรณ์มหาวิทยาลัย เมื่อปีการศึกษา 2545