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ภาคผนวก

```
10 REM main program
20 DIM Y(10,20),A(10),AA(10),YBAR(10),YBBAR(10),NN(10)
40 INPUT "number of population = ";K
50 INPUT "sample size =";N
60 F01 = 9.196
70 F05 = 4.428
80 C05 = 5.049
90 C01 = 8.356
100 CT05 = 9.075
110 CT01 = 12.939
120 E05 = .04
130 E01 = .67
140 L05 = 8.1635
150 L01 = 12.6565
160 Z05 = 1.645
170 Z01 = 2.325
180 T05 = 1.672
190 T01 = 2.388
200 EX = 100
205 STD = 100
210 NK = N*K
220 FOR  W = 1 TO 1000
225 REM ************************************
230 REM generate data from subroutine normal
240 REM ************************************
250 FOR P=1 TO K
255 EX = EX + 100
260 FOR R=1 TO N
270 GOSUB 55000
275 Y(P,R) = X
280 NEXT R
290 NEXT P
295 REM ************************************
300 REM compute f-test
303 REM ************************************
305 GOSUB 54800
310 GOSUB 2500
320 REM count the number of reject
330 IF FF >= F01 THEN REJEF = REJEF + 1
340 IF FF >= F05 THEN REJEF5 = REJEF5 + 1
427 REM ****************************************************
430 REM compute likelihood ratio test case simple order know
        variance (increasing)
435 REM ****************************************************
440 GOSUB 2800
450 REM count the number of reject
460 IF CHI > C01 THEN REJC01 = REJC01 + 1  ELSE GOTO 480
480 IF CHI > C05 THEN REJC05 = REJC05 + 1
487 REM ****************************************************
490 REM compute likelihood ratio test case simple order know
        variance (decreasing)
493 REM ****************************************************
495 GOSUB 930
500 GOSUB 3000
510 IF CHI > C01  THEN REC01 = REC01 + 1 ELSE GOTO 520
520 IF CHI > C05 THEN REC05 = REC05 + 1 ELSE GOTO 530
```

```
527 REM ***********************************************************
530 REM compute likelihood ratio test case simple tree order know
        variance (increasing)
535 REM ***********************************************************
540 GOSUB 930
550 GOSUB 3060
555 IF AB = 1 THEN GOTO 556 ELSE GOTO 560
556 ABORD1 = ABORD1 + 1
560 IF CHI > CT01 THEN REJ01 = REJ01 + 1
570 IF CHI > CT05 THEN REJ05 = REJ05 + 1
577 REM ***********************************************************
580 REM compute likelihood ratio test case simple tree order known
        variance (decreasing)
583 REM ***********************************************************
585 GOSUB 930
590 GOSUB 3120
600 IF CHI > C01 THEN REJC101 = REJC101 + 1
610 IF CHI > C05 THEN REJC105 = REJC105 + 1
617 REM ***********************************************************
620 REM compute likelihood ratio test case simple order unknown
        variance (increasing)
623 REM ***********************************************************
625 GOSUB 930
630 GOSUB 3180
640 IF E>E01 THEN REJE01 = REJE01 + 1
650 IF E>E05 THEN REJE05 = REJE05 + 1
657 REM ***********************************************************
660 REM compute likelihood ratio test case simple order unknown
        variance (decreasing)
663 REM ***********************************************************
665 GOSUB 930
670 GOSUB 3400
680 IF E>E01 THEN RECE01 = RECE01 + 1
690 IF E>E05 THEN RECE05 = RECE05 + 1
697 REM ***********************************************************
700 REM compute likelihood ratio test case simple tree order
        unknown variance(increasing)
703 REM ***********************************************************
705 GOSUB 930
710 GOSUB 3450
712 IF AB = 1 THEN GOTO 713 ELSE GOTO 715
713 ABORD2 = ABORD2 + 1
715 GOSUB 970
720 IF L>L01 THEN REJE101 = REJE101 + 1
730 IF L>L05 THEN REJE105 = REJE105 + 1
737 REM ***********************************************************
740 REM compute likelihood ratio test case simple tree order
        unknown variance (decreasing)
743 REM ***********************************************************
745 GOSUB 930
750 GOSUB 3500
752 GOSUB 970
753 IF L>L01 THEN REJE201 = REJE201 + 1
755 IF L>L05 THEN REJE205 = REJE205 + 1
```

```
757 REM ************************************************************
760 REM compute tests based on scores case simple order known variance
765 REM ************************************************************
770 GOSUB 3600
780 IF Z>Z01 THEN REJETZ01 = REJETZ01 + 1
790 IF Z>Z05 THEN REJETZ05 = REJETZ05 + 1
797 REM ************************************************************
800 REM compute tests based on scores case simple order unknown variance
805 REM ************************************************************
810 GOSUB 3900
820 IF TPI>T01 THEN REJETT01 = REJETT01 + 1
830 IF TPI>T05 THEN REJETT05 = REJETT05 + 1
837 REM ************************************************************
840 REM compute tests based on scores case simple tree order known variance
845 REM ************************************************************
850 GOSUB 4100
860 IF Z>Z01 THEN REJEZ01 = REJEZ01 + 1
870 IF Z>Z05 THEN REJEZ05 = REJEZ05 + 1
877 REM ************************************************************
880 REM compute tests based on scores case simple tree order unknown variance
885 REM ************************************************************
890 GOSUB 4150
900 IF TPI>T01 THEN REJET01 = REJET01 + 1
910 IF TPI>T05 THEN REJET05 = REJET05 + 1
913 NEXT W
914 LPRINT "k = ";K:LPRINT:LPRINT "n= ";N
915 LPRINT "f-test   reject01="REJEF;"reject05=";REJEF5
916 LPRINT " chi-squre case simple order know variance reject01="
    REJC01;"reject05=";REJC05
917 LPRINT "chi-squre case simple order know variance  rejcct01="
    REC01;"reject05=";REC05
918 LPRINT "chi-squre case simple tree order know variance rejcct01="
    REJ01;"reject05=";REJ05:LPRINT " abord = ";ABORD1
919 LPRINT "chi-squre case simple tree order know variance rejcct01="
    REJC101;"reject05=";REJC105
920 LPRINT "chi-square case simple order unknow variace reject01="
    REJE01;"reject05=";REJE05
921 LPRINT "chi-squre case simple order unknow variance  rejcct01="
    RECE01;"reject05=";RECE05
922 LPRINT "chi-squre case simple tree order unknow variance rejcct01="
    REJE101;"reject05=";REJE105:LPRINT "abord = ";ABORD2
923 LPRINT "chi-squre case simple tree order unknow variance rejcct01="
    REJE201;"reject05=";REJE205
924 LPRINT "tests based on scores case simple order know variance
    rejcct01="REJETZ01;"reject05=";REJETZ05
925 LPRINT "tests based on scores case simple order unknow variance
    rejcct01="REJETT01;"reject05=";REJETT05
926 LPRINT "tests based on scores case simple tree order know variance
    rejcct01="REJEZ01;"reject05=";REJEZ05
927 LPRINT "tests based on scores case simple tree order unknow variance rejcct0
1="REJET01;"reject05=";REJET05
928 END
929 REM ************************************************************
930 FOR M = 1 TO K
940 YBBAR(M) = 0
945 NN(M) = 0
950 NEXT M
960 RETURN
```

```
962 REM ************************************************************
964 REM comput statistic case simple tree order unknown variance
966 REM ************************************************************
970 L = (NK - K) * E / (1 - E)
990 RETURN
2490 REM *****************
2500 REM subroutine f-test
2505 REM *****************
2510 GMEAN = 0
2520 COR = 0
2530 SSTO = 0
2540 SSTR = 0
2550 SSE = 0
2560 DFTR = 0
2570 DFTO = 0
2580 DFER = 0
2590 ASTR = 0
2600 ASE = 0
2610 FF = 0
2620 REM goto subroutine mean
2640 GMEAN = TOTAL /NK
2650 COR = TOTAL^2/NK
2670 SSTO = TTAL - COR
2680 SSTR = SAI- COR
2690 SSE = SSTO - SSTR
2700 DFTR = K - 1
2710 DFTO = NK - 1
2720 DFER = K*(N-1)
2730 ASTR = SSTR/DFTR
2740 ASE = SSE/DFER
2750 FF = ASTR/ASE
2760 RETURN
2795 REM ********************************
2800 REM subroutine likelihood ratio test
2810 REM case simple order(increasing)
2815 REM ********************************
2820 REM goto subroutine estimate mue case (increasing)
2825 GOSUB 10000
2832 IF L = K OR L = 1 THEN GOTO 2838 ELSE GOTO 2833
2833 GOSUB 40000
2834 GOSUB 2838
2835 RETURN
2837 REM ***********************************
2838 REM compute chi-squre-bar know variance
2839 REM ***********************************
2841 NNEW = 0
2842 NNEW = 0
2843 YBNEW = 0
2844 YNEW = 0
2846 BB = 0
2850 FOR S = 1 TO L
2860 NNEW = NNEW + NN(S)
2870 YNEW = YNEW + (NN(S)* YBBAR(S))
2880 NEXT S
2890 YBNEW = YNEW/NNEW
2900 FOR S = 1 TO L
2910 BB = BB +(NN(S) * ( YBBAR(S) - YBNEW)^2)
2920 NEXT S
2930 CHI = BB/STD^2
2940 RETURN
```

```
2950 REM ********************************
3000 REM subroutine likelihood ratio
3010 REM case simple order (decreasing)
3015 REM ********************************
3020 REM goto subroutine estimate mue case (decreasing)
3025 GOSUB 20000
3032 IF L = K OR L = 1 THEN GOTO 3040 ELSE GOTO 3033
3033 GOSUB 30000
3040 GOSUB 2838
3050 RETURN
3055 REM ***********************************
3060 REM subroutine likelihood ratio test
3070 REM case simple tree order (increasing)
3075 REM ***********************************
3080 REM goto subroutine estimate mue case inceasing
3090 GOSUB 13000
3091 IF AB = 1 GOTO 3110
3092 L = K
3100 GOSUB 2838
3110 RETURN
3115 REM ************************************************************************
3120 REM subroutine likelihood ratio test case simple tree order known variance
     (decreasing)
3125 REM ************************************************************************
3130 REM go to subroutine estimate mue case decreasing
3140 GOSUB 23000
3145 L = K
3150 GOSUB 2838
3160 RETURN
3170 REM ************************************************************************
3180 REM subroutine likelihood ratio test case simple order unknown variance
     (increasing)
3185 REM ************************************************************************
3190 REM go to subroutine estimate mue case increasing
3200 GOSUB 10000
3204 IF L = 6 OR L = 1 THEN GOTO 3210 ELSE GOTO 3205
3205 GOSUB 40000
3210 GOSUB 3300
3220 RETURN
3290 REM ********************************
3300 REM compute E-bar (unknown variance)
3303 REM ********************************
3305 V = 0
3310 COR = TOTAL^2 /NK
3320 SSTO = TTAL - COR
3330 GMEAN = TOTAL / NK
3340 FOR I = 1 TO L
3350 V = V + (NN(I) * ( ( YBBAR(I) - GMEAN) ^ 2))
3360 NEXT I
3370 E = V /SSTO
3380 RETURN
```

```
3390 REM ************************************************************************
3400 REM subroutine likelihood ratio test case simple order unknown variance
       (decreasing)
3405 REM ************************************************************************
3410 REM go to subroutine estimate mue case decreasing
3420 GOSUB 20000
3424 IF L = K OR L = 1 THEN GOTO 3430 ELSE GOTO 3425
3425 GOSUB 40000
3430 GOSUB 3300
3440 RETURN
3445 REM ************************************************************************
3450 REM subroutine likelihood ratio test case simple tree order unknown varianc
       e (increasing)
3455 REM ************************************************************************
3460 GOSUB 13000
3461 IF AB = 1 GOTO 3480
3462 L = K
3470 GOSUB 3300
3480 RETURN
3490 REM ************************************************************************
3500 REM subroutine likelihood ratio test case simple tree order unknown varianc
       e (decreasing)
3505 REM ************************************************************************
3510 GOSUB 23000
3515 L = K
3520 GOSUB 3300
3530 RETURN
3550 REM ************************************************************
3600 REM subroutine based on scores case simple order known variance
3605 REM ************************************************************
3610 GOSUB 3700
3620 RETURN
3690 REM ***************************
3700 REM compute t (known variance)
3705 REM ***************************
3710 GOSUB 54800
3720 GOSUB 53000
3730 GOSUB 52000
3740 T = A/(B*STD)
3750 Z = (T - D)/(E^(1/2))
3760 RETURN
3890 REM ************************************************************
3900 REM subroutine based on scores case simple order unknown variance
3905 REM ************************************************************
3910 GOSUB 4000
3920 RETURN
3950 REM *********************************
4000 REM compute t-pi (unknown variance)
4005 REM *********************************
4010 GOSUB 54800
4020 GOSUB 53000
4030 GOSUB 52000
4040 COR = TOTAL ^ 2 / NK
4045 SSTO = TTAL - COR
4050 SSTR = SAI - COR
4055 SSE = SSTO - SSTR
4060 DFER = K *(N - 1)
4070 ASE = (SSE /DFER)^(.5)
4080 TPI = (( N^(1/2) * A ))/ (B * ASE)
4090 RETURN
```

```
4095 REM ************************************************************************
4100 REM subroutine based on scores case simple tree order known variance
4105 REM ************************************************************************
4110 GOSUB 54800
4120 GOSUB 54000
4130 GOSUB 52000
4135 T = A/(B*STD)
4137 Z = (T - D)/(E^(1/2))
4140 RETURN
4145 REM ************************************************************************
4150 REM subroutine based on scores case simple tree order unknown variance
4155 REM ************************************************************************
4160 GOSUB 54800
4170 GOSUB 54000
4180 GOSUB 52000
4181 COR = TOTAL ^ 2 / NK
4182 SSTO = TTAL - COR
4183 SSTR = SAI - COR
4184 SSE = SSTO - SSTR
4185 DFER = K *(N - 1)
4186 ASE = (SSE /DFER)^(.5)
4187 TPI = (( N^(1/2) * A ))/ (B * ASE)
4190 RETURN
9990 REM ************************************************
10000 REM program estimate mue case simple order(increasing)
10005 REM ************************************************
10010 GOSUB 54800
10020 IF YBAR(1)<= YBAR(2) THEN GOTO 11710 ELSE GOTO 10030
10030 YBBAR(1) = (YBAR(1) + YBAR(2))/2
10040 IF YBBAR(1)<= YBAR(3) THEN GOTO 11150 ELSE GOTO 10050
10050 YBBAR(1) = (YBAR(1) + YBAR(2) +YBAR(3))/3
10060 IF YBBAR(1)<= YBAR(4) THEN GOTO 10800 ELSE GOTO 10070
10070 YBBAR(1) = (YBAR(1) + YBAR(2) +YBAR(3)+ YBAR(4))/4
10080 IF YBBAR(1)<= YBAR(5) THEN GOTO 10610 ELSE GOTO 10090
10090 YBBAR(1) = (YBAR(1) + YBAR(2) +YBAR(3)+ YBAR(4)+ YBAR(5))/5
10115 NN(1) = K * N
10120 L = 1
10130 RETURN
10610 L = 2
10620 NN(1) = 4*N
10640 YBBAR(2) = YBAR(5)
10750 RETURN
10800 L = 1
10810 NN(1) = 3*N
10820 IF YBAR(4)<= YBAR(5) THEN GOTO 11000 ELSE GOTO 10830
10830 YBBAR(2) = (YBAR(4) + YBAR(5))/2
10910 L = 2
10920 NN(2) = 2*N
10925 RETURN
11000 L = 3
11010 NN(2) = N
11020 NN(3) = N
11030 YBBAR(2) = YBAR(4)
11040 YBBAR(3) = YBAR(5)
11075 RETURN
11150 L = 1
11160 NN(1) = 2*N
```

```
11170 IF YBAR(3)<= YBAR(4) THEN GOTO 11400 ELSE GOTO 11180
11180 YBBAR(2) = (YBAR(3) + YBAR(4))/2
11190 IF YBBAR(2)<= YBAR(5) THEN GOTO 11300 ELSE GOTO 11200
11200 YBBAR(2) = (YBAR(3) + YBAR(4) +YBAR(5))/3
11230 L = 2
11240 NN(2) = 3*N
11250 RETURN
11300 L = 3
11310 NN(2) = 2*N
11320 NN(3) = N
11330 YBBAR(3) = YBAR(5)
11355 RETURN
11400 L = 2
11410 NN(2) = N
11420 YBBAR(2) = YBAR(3)
11430 IF YBAR(4)<= YBAR(5) THEN GOTO 11560 ELSE GOTO 11440
11440 YBBAR(3) = (YBAR(4) + YBAR(5))/2
11470 L = 3
11480 NN(3) = 2*N
11490 RETURN
11560 L = 4
11570 NN(3) = N
11580 NN(4) = N
11590 YBBAR(3) = YBAR(4)
11600 YBBAR(4) = YBAR(5)
11630 RETURN
11710 L = 1
11720 NN(1) = N
11730 YBBAR(1) = YBAR(1)
11740 IF YBAR(2)<= YBAR(3) THEN GOTO 12260 ELSE GOTO 11750
11750 YBBAR(2) = (YBAR(2) + YBAR(3))/2
11760 IF YBBAR(2)<= YBAR(4) THEN GOTO 12010 ELSE GOTO 11770
11770 YBBAR(2) = (YBAR(2) + YBAR(3) +YBAR(4))/3
11780 IF YBBAR(2)>= YBAR(5) THEN GOTO 11900 ELSE GOTO 11790
11790 YBBAR(2) = (YBAR(2) + YBAR(3) +YBAR(4)+ YBAR(5))/4
11820 L = 2
11830 NN(2) = 4*N
11840 RETURN
11900 L = 3
11910 NN(2) = 3*N
11920 NN(3) = N
11970 YBBAR(3) = YBAR(5)
12005 RETURN
12010 L = 2
12020 NN(2) = 2*N
12030 IF YBAR(4)<= YBAR(5) THEN GOTO 12140 ELSE GOTO 12040
12040 YBBAR(3) = (YBAR(4) + YBAR(5))/2
12070 L = 3
12080 NN(3) = 2*N
12090 RETURN
12140 L = 4
12150 NN(3) = N
12160 NN(4) = N
12170 YBBAR(3) = YBAR(4)
12180 YBBAR(4) = YBAR(5)
12205 RETURN
```

```
12260 L = 2
12270 NN(2) = N
12275 YBBAR(2) = YBAR(2)
12280 IF YBAR(3)<= YBAR(4) THEN GOTO 12510 ELSE GOTO 12290
12290 YBBAR(3) = (YBAR(3) + YBAR(4))/2
12300 IF YBBAR(3)<= YBAR(5) THEN GOTO 12400 ELSE GOTO 12310
12310 YBBAR(3) = (YBAR(3) + YBAR(4) +YBAR(5))/3
12340 L = 3
12350 NN(3) = 3*N
12355 RETURN
12400 L = 4
12410 NN(3) = 2*N
12420 NN(4) = N
12430 YBBAR(4) = YBAR(5)
12440 RETURN
12510 L = 3
12520 NN(3) = N
12530 YBBAR(3) = YBAR(3)
12540 IF YBAR(4)<= YBAR(5) THEN GOTO 12630 ELSE GOTO 12550
12550 YBBAR(4) = (YBAR(4) + YBAR(5))/2
12580 L = 4
12590 NN(4) = 2 * N
12595 RETURN
12630 L = 5
12640 NN(4) = N
12650 NN(5) = N
12660 YBBAR(4) = YBAR(4)
12670 YBBAR(5) = YBAR(5)
12750 RETURN
12990 REM ************************************************
13000 REM compute mue case simple tree order ( increasing)
13005 REM ************************************************
13010 GOSUB 54800
13020 IF YBAR(1) <= YBAR(2) AND YBAR(1) <= YBAR(3) AND YBAR(1) <= YBAR(4) AND
YBAR(1) <= YBAR(5) THEN GOTO  13030 ELSE GOTO  13130
13030 FOR R = 1 TO K
13040 YBBAR(R) = YBAR(R)
13050 NN(R) = N
13060 NEXT R
13070 L = K
13080 RETURN
13130 REM sort incressing
13140 U = K-1
13150 F = 0
13160 FOR J= 2 TO U
13170 IF YBAR(J) <= YBAR(J+1) THEN 13220
13180 T = YBAR(J)
13190 YBAR(J) = YBAR(J+1)
13200 YBAR(J+1) = T
13210 F = 1
13220 IF F = 1 THEN 13150
13230 NEXT J
13232 FOR Z = 1 TO K
13234 NEXT Z
13240 J = 2
13250 FOR L = 2 TO J
13260 B = B + (N* YBAR(L))
13265 Q = Q + N
13270 NEXT L
```

```
13290 A = (N * YBAR(1) + B) /(Q + N)
13300 IF A < YBAR(J+1) THEN GOTO 13330 ELSE GOTO 13305
13305 IF J + 1 = K THEN GOTO 13395 ELSE GOTO 13310
13310 J = J+1
13315 B = 0
13317 Q = 0
13320 GOTO 13250
13330 FOR M = 1 TO J
13340 YBBAR(M) = A
13345 NN(M) = N
13350 NEXT M
13360 P = K - J + 1
13370 FOR S = P TO K
13380 YBBAR(S) = YBAR(S)
13385 NN(S) = N
13390 NEXT S
13395 IF A > YBAR(J+1) THEN AB = 1 ELSE AB = 0
13400 RETURN
19990 REM ************************************************
20000 REM program estimate mue case simple order(decreasing)
20005 REM ************************************************
20010 GOSUB 54800
20020 IF YBAR(1)>= YBAR(2) THEN GOTO 21710 ELSE GOTO 20030
20030 YBBAR(1) = (YBAR(1) + YBAR(2))/2
20040 IF YBBAR(1)>= YBAR(3) THEN GOTO 21150 ELSE GOTO 20050
20050 YBBAR(1) = (YBAR(1) + YBAR(2) +YBAR(3))/3
20060 IF YBBAR(1)>= YBAR(4) THEN GOTO 20800 ELSE GOTO 20070
20070 YBBAR(1) = (YBAR(1) + YBAR(2) +YBAR(3)+ YBAR(4))/4
20080 IF YBBAR(1)>= YBAR(5) THEN GOTO 20610 ELSE GOTO 20090
20090 YBBAR(1) = (YBAR(1) + YBAR(2) +YBAR(3)+ YBAR(4)+ YBAR(5))/5
20115 NN(1) = K * N
20120 L = 1
20130 RETURN
20610 L = 2
20620 NN(1) = 4*N
20640 YBBAR(2) = YBAR(5)
20680 NN(2) = N
20800 L = 1
20810 NN(1) = 3*N
20820 IF YBAR(4)>= YBAR(5) THEN GOTO 21000 ELSE GOTO 20830
20830 YBBAR(2) = (YBAR(4) + YBAR(5))/2
20910 L = 2
20920 NN(2) = 2*N
20925 RETURN
21000 L = 3
21010 NN(2) = N
21020 NN(3) = N
21030 YBBAR(2) = YBAR(4)
21040 YBBAR(3) = YBAR(5)
21075 RETURN
21150 L = 1
21160 NN(1) = 2*N
21170 IF YBAR(3)>= YBAR(4) THEN GOTO 21400 ELSE GOTO 21180
21180 YBBAR(2) = (YBAR(3) + YBAR(4))/2
21190 IF YBBAR(2)>= YBAR(5) THEN GOTO 21300 ELSE GOTO 21200
21200 YBBAR(2) = (YBAR(3) + YBAR(4) +YBAR(5))/3
21230 L = 2
21240 NN(2) = 3*N
21250 RETURN
```

```
21290 NN(3) = N
21300 L = 3
21310 NN(2) = 2*N
21320 NN(3) = N
21330 YBBAR(3) = YBAR(5)
21355 RETURN
21400 L = 2
21410 NN(2) = N
21420 YBBAR(2) = YBAR(3)
21430 IF YBAR(4)>= YBAR(5) THEN GOTO 21560 ELSE GOTO 21440
21440 YBBAR(3) = (YBAR(4) + YBAR(5))/2
21470 L = 3
21480 NN(3) = 2*N
21490 RETURN
21560 L = 4
21570 NN(3) = N
21580 NN(4) = N
21590 YBBAR(3) = YBAR(4)
21600 YBBAR(4) = YBAR(5)
21630 RETURN
21710 L = 1
21720 NN(1) = N
21730 YBBAR(1) = YBAR(1)
21740 IF YBAR(2)>= YBAR(3) THEN GOTO 22260 ELSE GOTO 21750
21750 YBBAR(2) = (YBAR(2) + YBAR(3))/2
21760 IF YBBAR(2)>= YBAR(4) THEN GOTO 22010 ELSE GOTO 21770
21770 YBBAR(2) = (YBAR(2) + YBAR(3) +YBAR(4))/3
21780 IF YBBAR(2)>= YBAR(5) THEN GOTO 21900 ELSE GOTO 21790
21790 YBBAR(2) = (YBAR(2) + YBAR(3) +YBAR(4)+ YBAR(5))/4
21820 L = 2
21830 NN(2) = 4*N
21840 RETURN
21900 L = 3
21910 NN(2) = 3*N
21920 NN(3) = N
21955 RETURN
22010 L = 2
22020 NN(2) = 2*N
22030 IF YBAR(4)>= YBAR(5) THEN GOTO 22140 ELSE GOTO 22040
22040 YBBAR(3) = (YBAR(4) + YBAR(5))/2
22070 L = 3
22080 NN(3) = 2*N
22090 RETURN
22140 L = 4
22150 NN(3) = N
22160 NN(4) = N
22170 YBBAR(3) = YBAR(4)
22180 YBBAR(4) = YBAR(5)
22205 RETURN
22260 L = 2
22270 NN(2) = N
22275 YBBAR(2) = YBAR(2)
22280 IF YBAR(3)>= YBAR(4) THEN GOTO 22510 ELSE GOTO 22290
22290 YBBAR(3) = (YBAR(3) + YBAR(4))/2
22300 IF YBBAR(3)>= YBAR(5) THEN GOTO 22400 ELSE GOTO 22310
22310 YBBAR(3) = (YBAR(3) + YBAR(4) +YBAR(5))/3
22340 L = 3
22350 NN(3) = 3*N
22355 RETURN
```

```
22400 L = 4
22410 NN(3) = 2*N
22420 NN(4) = N
22430 YBBAR(4) = YBAR(5)
22440 RETURN
22510 L = 3
22520 NN(3) = N
22530 YBBAR(3) = YBAR(3)
22540 IF YBAR(4)>= YBAR(5) THEN GOTO 22630 ELSE GOTO 22550
22550 YBBAR(4) = (YBAR(4) + YBAR(5))/2
22580 L = 4
22590 NN(4) = 2 * N
22595 RETURN
22630 L = 5
22640 NN(4) = N
22650 NN(5) = N
22660 YBBAR(4) = YBAR(4)
22670 YBBAR(5) = YBAR(5)
22695 RETURN
22990 REM ***********************************************
23000 REM compute mue case simple tree order (decreasing)
23005 REM ***********************************************
23010 GOSUB 54800
23020 IF YBAR(1) >= YBAR(2) AND YBAR(1) >= YBAR(3) AND YBAR(1) >= YBAR(4) AND
YBAR(1) >= YBAR(5) THEN GOTO  23030 ELSE GOTO  23130
23030 FOR R = 1 TO K
23040 YBBAR (R) = YBAR(R)
23050 NN(R) = N
23060 NEXT R
23070 L = K
23080 RETURN
23130 REM sort decreasing
23140 U = K-1
23150 F = 0
23160 FOR J= 2 TO U
23170 IF YBAR(J) >= YBAR(J+1) THEN 23220
23180 T = YBAR(J)
23190 YBAR(J) = YBAR(J+1)
23200 YBAR(J+1) = T
23210 F = 1
23220 IF F = 1 THEN 23150
23230 NEXT J
23235 YBBAR(1) = (YBAR(1)+YBAR(2))/2
23240 YBBAR(2) = (YBAR(1)+YBAR(2))/2
23242 NN(1) = N
23244 NN(2) = N
23370 FOR S = 3 TO K
23380 YBBAR(S) = YBAR(S)
23385 NN(S) = N
23390 NEXT S
23400 RETURN
29990 REM ****************************
30000 REM check 2nd roops(decreasing)
30010 REM ****************************
30020 IF YBBAR(1) >= YBBAR(2) THEN GOTO 31710 ELSE GOTO 30030
30030 YBBAR(1) = (NN(1)*YBBAR(1) + NN(2)*YBBAR(2))/(NN(1) +NN(2))
30035 IF YBBAR(3) = 0 THEN GOTO 30036 ELSE GOTO 30040
30036 L = 1
30037 NN(1) = NN(1) + NN(2)
30038 RETURN
```

```
30040 IF YBBAR(1)>= YBBAR(3) THEN GOTO 31150 ELSE GOTO 30050
30050 YBBAR(1) = ((NN(1) + NN(2))*YBBAR(1) +NN(3)*YBBAR(3))/(NN(1) +NN(2) +NN(3)
)
30052 IF YBBAR(4) = 0 THEN GOTO 30054 ELSE GOTO 30060
30054 L = 1
30056 NN(1) = NN(1) + NN(2) + NN(3)
30058 RETURN
30060 IF YBBAR(1)>= YBBAR(4) THEN GOTO 30080 ELSE GOTO 30070
30070 YBBAR(1) = ((NN(1)+ NN(2) +NN(3))*YBBAR(1)+ NN(4)*YBBAR(4))/(NN(1) + NN(2)
 + NN(3) + NN(4))
30072 IF YBBAR(5) = 0 THEN GOTO 30074 ELSE GOTO 30080
30074 L = 1
30076 NN(1) = NN(1) + NN(2) + NN(3) + NN(4)
30078 RETURN
30080 IF YBBAR(1)>= YBBAR(5) THEN GOTO 30600 ELSE GOTO 30090
30090 YBBAR(1) = ((NN(1) + NN(2) +NN(3)+ NN(4))*YBBAR(4)+ NN(5)*YBBAR(5))/(NN(1)
 + NN(2) + NN(3) + NN(4) + NN(5))
30120 L = 1
30130 NN(1) = NN(1) + NN(2) + NN(3) + NN(4) + NN(5)
30410 RETURN
30600 L = 2
30610 NN(1) = NN(1) + NN(2) + NN(3) + NN(4)
30620 NN(2) = NN(5)
30630 YBBAR(2) = YBBAR(5)
30635 RETURN
30800 L = 1
30810 NN(1) = NN(1) + NN(2) + NN(3)
30812 IF YBBAR(5) = 0 THEN GOTO 30814 ELSE GOTO 30820
30814 L = 2
30816 NN(2) = NN(4)
30818 RETURN
30820 IF YBBAR(4)>= YBBAR(5) THEN GOTO 31000 ELSE GOTO 30830
30830 YBBAR(2) = (NN(4)*YBBAR(4) + NN(5)*YBBAR(5))/(NN(4) +NN(5))
30840 L = 2
30850 NN(2) = NN(4) + NN(5)
30860 RETURN
31000 L = 3
31010 NN(2) = NN(4)
31020 YBBAR(2) = YBBAR(4)
31030 NN(3) = NN(5)
31040 YBBAR(3) = YBBAR(5)
31050 RETURN
31150 L = 1
31160 NN(1) = NN(1) + NN(2)
31170 IF YBBAR(4) = 0 THEN GOTO 31175 ELSE GOTO 31190
31175 L = 2
31180 NN(2) = NN(3)
31185 RETURN
31190 IF YBBBR(3)>= YBBAR(4) THEN GOTO 31400 ELSE GOTO 31191
31191 YBBAR(3) = (NN(3)*YBBAR(3) + NN(4)*YBBAR(4))/(NN(3) + NN(4))
31192 IF YBBAR(5) = 0 THEN GOTO 31193 ELSE GOTO 31196
31193 L = 2
31194 NN(2) = NN(3) + NN(4)
31195 RETURN
31196 IF YBBBR(3)>= YBBAR(5) THEN GOTO 31300 ELSE GOTO 31197
31197 YBBAR(3) = (NN(3)*YBBAR(3) + NN(4)*YBBAR(4) + NN(5)*YBBAR(5))/(NN(3) + NN(
4) +NN(5))
31200 L = 2
31210 NN(2) = NN(3) + NN(4) + NN(5)
31220 RETURN
```

```
31300 L = 3
31310 NN(2) = NN(3) + NN(4)
31320 NN(3) = NN(5)
31330 RETURN
31400 L = 2
31410 NN(2) = NN(3)
31420 YBBAR(2) = YBBAR(3)
31422 IF YBBAR(5) = 0 THEN GOTO 31424 ELSE GOTO 31430
31424 L = 3
31426 NN(3) =  NN(4)
31428 RETURN
31430 IF YBBAR(4)>= YBBAR(5) THEN GOTO 31560 ELSE GOTO 31440
31440 YBBAR(3) = (NN(4)*YBBAR(4) + NN(5)*YBBAR(5))/(NN(4) +NN(5))
31450 L =3
31460 NN(3) = NN(4) + NN(5)
31470 RETURN
31560 L = 4
31570 NN(3) = NN(4)
31580 YBBAR(3) = YBBAR(4)
31590 NN(4) = NN(5)
31600 YBBAR(4) = YBBAR(5)
31610 RETURN
31710 L = 1
31720 NN(1) = NN(1)
31730 YBBAR(1) = YBBAR(1)
31732 IF YBBAR(3) = 0 THEN GOTO 31733 ELSE GOTO 31740
31733 L = 2
31734 YBBAR(2) = YBBAR(2)
31735 NN(2) = NN(2)
31736 RETURN
31740 IF YBBAR(2)>= YBBAR(3) THEN GOTO 32260 ELSE GOTO 31750
31750 YBBAR(2) = (NN(2)*YBBAR(2) + NN(3)*YBBAR(3))/(NN(2) +NN(3))
31752 IF YBBAR(4) = 0 THEN GOTO 31754 ELSE GOTO 31760
31754 L = 2
31756 NN(2) = NN(2) + NN(3)
31758 RETURN
31760 IF YBBAR(2)>= YBBAR(4) THEN GOTO 42010 ELSE GOTO 41770
31770 YBBAR(2) = ((NN(2) + NN(3))*YBBAR(2) +NN(4)*YBBAR(4))/(NN(2) +NN(3) +NN(4)
)
31772 IF YBBAR(5) = 0 THEN GOTO 31774 ELSE GOTO 31780
31774 L = 2
31776 NN(2) = NN(2) + NN(3) + NN(4)
31778 RETURN
31780 IF YBBAR(2)>= YBBAR(5) THEN GOTO 31900 ELSE GOTO 31790
31790 YBBAR(2) = ((NN(2) + NN(3) +NN(4))*YBBAR(2)+ NN(5)*YBBAR(5))/(NN(2) + NN(3
) + NN(4) + NN(5))
31800 L =2
31810 NN(2) = NN(2) + NN(3) + NN(4) + NN(5)
31820 RETURN
31900 L =3
31910 NN(2) = NN(2) + NN(3) + NN(4)
31920 NN(3) = NN(5)
31930 YBBAR(3) = YBBAR(5)
31940 RETURN
```

```
32010 L = 2
32020 NN(2) = NN(2) + NN(3)
32022 IF YBBAR(5) = 0 THEN GOTO 32024 ELSE GOTO 32030
32024 L = 3
32026 NN(2) = NN(2) + NN(3)
32027 NN(3) = NN(4)
32028 RETURN
32030 IF YBBAR(4)>= YBBAR(5) THEN GOTO 32140 ELSE GOTO 32040
32040 YBBAR(3) = (NN(4)*YBBAR(4) + NN(5)*YBBAR(5))/(NN(4) +NN(5))
32050 L =3
32060 NN(3) = NN(4) + NN(5)
32065 RETURN
32140 L =4
32150 NN(3) = NN(4)
32160 NN(4) = NN(5)
32170 YBBAR(3) = YBBAR(4)
32180 YBBAR(4) = YBBAR(5)
32190 RETURN
32260 L = 2
32270 NN(2) = NN(2)
32275 YBBAR(2) = YBBAR(2)
32276 IF YBBAR(4) = 0 THEN GOTO 32277 ELSE GOTO 32280
32277 L = 3
32278 NN(3) = NN(3)
32279 RETURN
32280 IF YBBAR(3)>= YBBAR(4) THEN GOTO 32510 ELSE GOTO 32290
32290 YBBAR(3) = (NN(3)*YBBAR(3) + NN(4)*YBBAR(4))/(NN(3) +NN(4))
32292 IF YBBAR(5) = 0 THEN GOTO 32294 ELSE GOTO 32300
32294 L = 3
32296 NN(3) = NN(3) + NN(4)
32298 RETURN
32300 IF YBBAR(3)>= YBBAR(5) THEN GOTO 32400 ELSE GOTO 32310
32310 YBBAR(3) = ((NN(3) + NN(4))*YBBAR(3) +NN(5)*YBBAR(5))/(NN(3) +NN(4) +NN(5)
)
32320 L =3
32330 NN(3) = NN(3)+ NN(4) + NN(5)
32335 RETURN
32400 L =4
32410 NN(3) = NN(3)+ NN(4)
32420 NN(4) = NN(5)
32430 YBBAR(4) = YBBAR(5)
32440 RETURN
32510 L = 3
32520 NN(3) = NN(3)
32530 YBBAR(3) = YBBAR(3)
32532 IF YBBAR(5) = 0 THEN GOTO 32534 ELSE GOTO 32540
32534 L = 4
32536 NN(4) = NN(4)
32538 RETURN
32540 IF YBBAR(4)>= YBBAR(5) THEN GOTO 42630 ELSE GOTO 42550
32550 YBBAR(4) = (NN(4)*YBBAR(4) + NN(5)*YBBAR(5))/(NN(4) +NN(5))
32560 L =4
32570 NN(4) = NN(4)+ NN(5)
32580 RETURN
32630 L = 5
32640 NN(4) = NN(4)
32650 NN(5) = NN(5)
32660 YBBAR(4) = YBBAR(4)
32670 YBBAR(5) = YBBAR(5)
32680 RETURN
```

```
39990 REM ***************************
40000 REM check 2nd roops(incressing)
40010 REM ***************************
40020 IF YBBBR(1)<= YBBAR(2) THEN GOTO 41710 ELSE GOTO 40030
40030 YBBAR(1) = (NN(1)*YBBAR(1) + NN(2)*YBBAR(2))/(NN(1) +NN(2))
40035 IF YBBAR(3) = 0 THEN GOTO 40036 ELSE GOTO 40040
40036 L = 1
40037 NN(1) = NN(1) + NN(2)
40038 RETURN
40040 IF YBBAR(1)<= YBBAR(3) THEN GOTO 41150 ELSE GOTO 40050
40050 YBBAR(1) = ((NN(1) + NN(2))*YBBAR(1) +NN(3)*YBBAR(3))/(NN(1) +NN(2) +NN(3)
)
40052 IF YBBAR(4) = 0 THEN GOTO 40054 ELSE GOTO 40060
40054 L = 1
40056 NN(1) = NN(1) + NN(2) + NN(3) + NN(4)
40058 RETURN
40060 IF YBBAR(1)<= YBBAR(4) THEN GOTO 40800 ELSE GOTO 40070
40070 YBBAR(1) = ((NN(1)+ NN(2) +NN(3))*YBBAR(1)+ NN(4)*YBBAR(4))/(NN(1) + NN(2)
 + NN(3) + NN(4))
40072 IF YBBAR(5) = 0 THEN GOTO 40074 ELSE GOTO 40080
40074 L = 1
40076 NN(1) = NN(1) + NN(2) + NN(3) + NN(4)
40078 RETURN
40080 IF YBBAR(1)<= YBBAR(5) THEN GOTO 40600 ELSE GOTO 40090
40090 YBBAR(1) = ((NN(1) + NN(2) +NN(3)+ NN(4))*YBBAR(4)+ NN(5)*YBBAR(5))/(NN(1)
 + NN(2) + NN(3) + NN(4) + NN(5))
40120 L = 1
40130 NN(1) = NN(1) + NN(2) + NN(3) + NN(4) + NN(5)
40410 RETURN
40600 L = 2
40610 NN(1) = NN(1) + NN(2) + NN(3) + NN(4)
40620 NN(2) = NN(5)
40630 YBBAR(2) = YBBAR(5)
40635 RETURN
40800 L = 1
40810 NN(1) = NN(1) + NN(2) + NN(3)
40812 IF YBBAR(5) = 0 THEN GOTO 40814 ELSE GOTO 40820
40814 L = 2
40816 NN(2) = NN(4)
40818 RETURN
40820 IF YBBAR(4)<= YBBAR(5) THEN GOTO 41000 ELSE GOTO 40830
40830 YBBAR(2) = (NN(4)*YBBAR(4) + NN(5)*YBBAR(5))/(NN(4) +NN(5))
40840 L = 2
40850 NN(2) = NN(4) + NN(5)
40860 RETURN
41000 L = 3
41010 NN(2) = NN(4)
41020 YBBAR(2) = YBBAR(4)
41030 NN(3) = NN(5)
41040 YBBAR(3) = YBBAR(5)
41050 RETURN
41150 L = 1
41160 NN(1) = NN(1) + NN(2)
41170 IF YBBAR(4) = 0 THEN GOTO 41175 ELSE GOTO 41190
41175 L = 2
41180 NN(2) = NN(3)
41185 RETURN
```

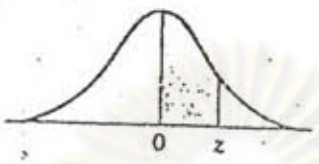
```
41190 IF YBBBR(3)<= YBBAR(4) THEN GOTO 41400 ELSE GOTO 41191
41191 YBBAR(3) = (NN(3)*YBBAR(3) + NN(4)*YBBAR(4))/(NN(3) + NN(4))
41192 IF YBBAR(5) = 0 THEN GOTO 41193 ELSE GOTO 41196
41193 L = 2
41194 NN(2) = NN(3) + NN(4)
41195 RETURN
41196 IF YBBBR(3)<= YBBAR(5) THEN GOTO 41300 ELSE GOTO 41197
41197 YBBAR(3) = (NN(3)*YBBAR(3) + NN(4)*YBBAR(4) + NN(5)*YBBAR(5))/(NN(3) + NN(
4) +NN(5))
41200 L = 2
41210 NN(2) = NN(3) + NN(4) + NN(5)
41220 RETURN
41300 L = 3
41310 NN(2) = NN(3) + NN(4)
41320 NN(3) = NN(5)
41330 RETURN
41400 L = 2
41410 NN(2) = NN(3)
41420 YBBAR(2) = YBBAR(3)
41422 IF YBBAR(5) = 0 THEN GOTO 41424 ELSE GOTO 41430
41424 L = 3
41426 NN(3) =  NN(4)
41428 RETURN
41430 IF YBBAR(4)<= YBBAR(5) THEN GOTO 41560 ELSE GOTO 41440
41440 YBBAR(3) = (NN(4)*YBBAR(4) + NN(5)*YBBAR(5))/(NN(4) +NN(5))
41450 L =3
41460 NN(3) = NN(4) + NN(5)
41470 RETURN
41560 L = 4
41570 NN(3) = NN(4)
41580 YBBAR(3) = YBBAR(4)
41590 NN(4) = NN(5)
41600 YBBAR(4) = YBBAR(5)
41610 RETURN
41710 L = 1
41720 NN(1) = NN(1)
41730 YBBAR(1) = YBBAR(1)
41732 IF YBBAR(3) = 0 THEN GOTO 41734 ELSE GOTO 41740
41734 L = 2
41735 NN(2) = NN(2)
41736 RETURN
41740 IF YBBAR(2)<= YBBAR(3) THEN GOTO 42260 ELSE GOTO 41750
41750 YBBAR(2) = (NN(2)*YBBAR(2) + NN(3)*YBBAR(3))/(NN(2) +NN(3))
41752 IF YBBAR(4) = 0 THEN GOTO 41754 ELSE GOTO 41760
41754 L = 2
41756 NN(2) = NN(2) + NN(3)
41758 RETURN
41760 IF YBBAR(2)<= YBBAR(4) THEN GOTO 42010 ELSE GOTO 41770
41770 YBBAR(2) = ((NN(2) + NN(3))*YBBAR(2) +NN(4)*YBBAR(4))/(NN(2) +NN(3) +NN(4)
)
41772 IF YBBAR(5) = 0 THEN GOTO 41774 ELSE GOTO 41780
41774 L = 2
41776 NN(2) = NN(2) + NN(3) + NN(4)
41778 RETURN
```

```
41780 IF YBBAR(2)<= YBBAR(5) THEN GOTO 41900 ELSE GOTO 41790
41790 YBBAR(2) = ((NN(2) + NN(3) +NN(4))*YBBAR(2)+ NN(5)*YBBAR(5))/(NN(2) + NN(3
) + NN(4) + NN(5))
41800 L =2
41810 NN(2) = NN(2) + NN(3) + NN(4) + NN(5)
41820 RETURN
41900 L =3
41910 NN(2) = NN(2) + NN(3) + NN(4)
41920 NN(3) = NN(5)
41930 YBBAR(3) = YBBAR(5)
41940 RETURN
42010 L = 2
42020 NN(2) = NN(2) + NN(3)
42022 IF YBBAR(5) = 0 THEN GOTO 42024 ELSE GOTO 42030
42024 L = 3
42026 NN(2) = NN(2) + NN(3)
42027 NN(3) = NN(4)
42028 RETURN
42030 IF YBBAR(4)<= YBBAR(5) THEN GOTO 42140 ELSE GOTO 42040
42040 YBBAR(3) = (NN(4)*YBBAR(4) + NN(5)*YBBAR(5))/(NN(4) +NN(5))
42050 L =3
42060 NN(3) = NN(4) + NN(5)
42065 RETURN
42140 L =4
42150 NN(3) = NN(4)
42160 NN(4) = NN(5)
42170 YBBAR(3) = YBBAR(4)
42180 YBBAR(4) = YBBAR(5)
42190 RETURN
42260 L = 2
42270 NN(2) = NN(2)
42275 YBBAR(2) = YBBAR(2)
42276 IF YBBAR(4) = 0 THEN GOTO 42277 ELSE GOTO 42280
42277 L = 3
42278 NN(3) = NN(3)
42279 RETURN
42280 IF YBBAR(3)<= YBBAR(4) THEN GOTO 42510 ELSE GOTO 42290
42290 YBBAR(3) = (NN(3)*YBBAR(3) + NN(4)*YBBAR(4))/(NN(3) +NN(4))
42292 IF YBBAR(5) = 0 THEN GOTO 42294 ELSE GOTO 42300
42294 L = 3
42296 NN(3) = NN(3) + NN(4)
42298 RETURN
42300 IF YBBAR(3)<= YBBAR(5) THEN GOTO 42400 ELSE GOTO 42310
42310 YBBAR(3) = ((NN(3) + NN(4))*YBBAR(3) +NN(5)*YBBAR(5))/(NN(3) +NN(4) +NN(5)
)
42320 L =3
42330 NN(3) = NN(3)+ NN(4) + NN(5)
42335 RETURN
42400 L =4
42410 NN(3) = NN(3)+ NN(4)
42420 NN(4) = NN(5)
42430 YBBAR(4) = YBBAR(5)
42440 RETURN
42510 L = 3
42520 NN(3) = NN(3)
42530 YBBAR(3) = YBBAR(3)
42532 IF YBBAR(5) = 0 THEN GOTO 42534 ELSE GOTO 42540
42534 L = 4
42536 NN(4) = NN(4)
42538 RETURN
```

```
42540 IF YBBAR(4)<= YBBAR(5) THEN GOTO 42630 ELSE GOTO 42550
42550 YBBAR(4) = (NN(4)*YBBAR(4) + NN(5)*YBBAR(5))/(NN(4) +NN(5))
42560 L =4
42570 NN(4) = NN(4)+ NN(5)
42580 RETURN
42630 L = 5
42640 NN(4) = NN(4)
42650 NN(5) = NN(5)
42660 YBBAR(4) = YBBAR(4)
42670 YBBAR(5) = YBBAR(5)
42680 RETURN
49990 REM ******************************
52000 REM compute mean T and variance T
52001 REM ******************************
52002 A = 0
52004 B = 0
52006 D = 0
52008 E = 0
52010 FOR I = 1 TO K
52020 A = A + ( C(I) * N * YBAR(I) )
52030 B = B +  (C(I) ^ 2) * N
52040 D = D + ( C(I) * YBAR(I) )
52050 E = E + ( C(I) ^ 2)
52060 NEXT I
52062 B = B^(.5)
52064 E = E * (STD^2)
52070 RETURN
53000 REM compute c case simple order
53010 FOR I = 1 TO K
53020 C(I) = ((I -1) * (1 - (I -1)/K))^(1/2) - (I*(1 - (I/K)))^(1/2)
53030 NEXT I
53040 RETURN
53990 REM ********************************
54000 REM compute c case simple tree order
54010 REM ********************************
54020 FOR I = 2 TO K
54030 C(I) = - ((K - 1)/K)^ (1/2)
54040 NEXT I
54050 RETURN
```

```
54790 REM **************
54800 REM subrotine mean
54805 REM **************
54810 SAI = 0
54820 TTAL = 0
54830 TOTAL = 0
54840 FOR M = 1 TO K
54850 A(M) = 0
54860 AA(M) = 0
54870 YBAR(M) = 0
54880 NEXT M
54881 FOR Q = 1 TO K
54882  FOR V = 1 TO N
54885 NEXT V
54886 NEXT Q
54890 FOR Q = 1 TO K
54900  FOR V = 1 TO N
54910  A(Q) = A(Q) + Y(Q,V)
54920 AA(Q) = AA(Q) + Y(Q,V)^2
54930 NEXT V
54940 NEXT Q
54950 FOR Q = 1 TO K
54955 SAI = SAI + A(Q)^2/N
54960 YBAR(Q) = A(Q)/N
54970 TOTAL = TOTAL + A(Q)
54980 TTAL = TTAL + AA(Q)
54990 NEXT Q
54995 RETURN
54999 REM ******************
55000 REM subroutine normal
55005 REM ******************
55010 B = 0!
55020 FOR J=1 TO 12
55030 R1 = RND
55040 B = B + R1
55065 NEXT J
55070 X = EX+ (B - 6) * STD
55080 RETURN
```

Table 2 Normal Curve Areas



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4799	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990

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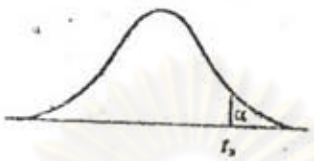
Source : "Mathematical Statistics with Applications" Mendenhall / Scheaffer, 1973. p.A30.

Table 2 Critical Values of t



d.f.	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.355
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.787
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
inf.	1.282	1.645	1.960	2.326	2.576

TABLE 1: Critical values for L_{01}^{*} with $w = n_0/n_1 = 1, \infty$.

ν	α	w	$k = 2$	3	4	5	6	7	8	9	10
2	.05	1	14.380	18.683	22.155	25.211	27.985	30.520	32.843	35.037	37.216
		∞	11.432	11.793	11.342	10.698	10.048	9.475	8.935	8.477	8.091
	.01	1	71.260	86.889	98.000	107.290	114.959	122.224	130.450	134.986	141.885
		∞	55.637	50.493	43.558	36.610	31.577	27.240	24.247	21.529	19.552
4	.05	1	7.940	10.815	13.391	15.831	18.136	20.375	22.508	24.592	26.628
		∞	6.893	8.210	9.004	9.473	14.957	9.884	9.957	9.966	9.932
	.01	1	21.445	27.496	32.900	38.017	42.838	47.216	51.710	55.791	60.000
		∞	18.753	20.969	21.924	22.093	21.924	21.445	20.969	20.375	19.810
6	.05	1	6.576	8.985	11.212	13.349	15.406	17.410	19.338	21.273	23.155
		∞	5.839	7.213	8.188	8.914	9.476	9.898	10.221	10.470	10.671
	.01	1	14.899	19.178	22.986	40.656	30.364	33.894	37.259	40.548	43.751
		∞	13.443	15.637	17.095	18.096	18.671	19.073	19.284	19.391	19.391
8	.05	1	6.003	8.191	10.223	12.202	14.112	15.974	17.798	19.605	21.390
		∞	5.385	6.733	7.770	8.601	9.282	9.849	10.307	10.705	11.029
	.01	1	12.481	16.024	19.304	22.453	25.431	28.413	31.389	34.216	37.020
		∞	11.503	13.558	15.075	16.235	17.126	17.765	18.255	18.684	19.036
10	.05	1	5.681	7.746	9.673	11.533	13.354	15.132	16.802	18.684	20.294
		∞	5.126	6.464	7.519	8.399	9.150	9.786	10.338	10.825	11.245
	.01	1	11.290	14.378	17.382	20.120	22.819	25.549	28.212	30.800	33.215
		∞	10.479	12.457	13.923	15.157	16.123	16.947	17.678	18.209	18.686
12	.05	1	5.472	7.458	9.314	11.099	12.850	14.566	16.249	17.933	19.571
		∞	4.961	6.284	7.352	8.260	9.049	9.739	10.351	10.892	11.383
	.01	1	10.586	13.494	16.182	18.722	21.213	23.725	26.156	28.554	30.965
		∞	9.826	11.720	13.178	14.484	15.491	16.376	17.119	17.828	18.418
14	.05	1	5.334	7.254	9.068	10.801	12.500	14.163	15.806	17.439	19.050
		∞	4.850	6.155	7.238	8.159	8.973	9.697	10.348	10.933	11.464
	.01	1	10.055	12.974	15.375	17.789	20.130	22.477	24.749	27.080	29.317
		∞	9.423	11.239	12.748	14.000	15.022	15.991	16.762	17.574	18.147
16	.05	1	5.229	7.108	8.879	10.574	12.249	13.873	15.477	17.065	18.655
		∞	4.766	6.066	7.141	8.075	8.918	9.662	10.342	10.959	11.534
	.01	1	9.719	12.344	14.799	17.099	19.390	21.576	23.771	26.006	28.162
		∞	9.130	10.859	12.344	13.575	14.681	15.627	16.507	17.299	17.992
18	.05	1	5.157	7.000	8.734	10.400	12.045	13.646	15.229	16.796	18.334
		∞	4.707	5.994	7.077	8.015	8.870	9.633	10.333	10.981	11.576
	.01	1	9.468	12.020	14.339	16.582	18.787	20.969	23.049	25.165	27.181
		∞	8.870	10.621	12.070	13.348	14.450	15.389	16.325	17.108	17.857
20	.05	1	5.091	6.911	8.625	10.276	11.878	13.462	15.026	16.556	18.088
		∞	4.652	5.934	7.020	7.968	8.827	9.608	10.331	10.993	11.606
	.01	1	9.257	11.701	14.019	16.186	18.351	20.396	22.490	24.524	26.544
		∞	8.682	10.432	11.852	13.085	14.247	15.186	16.121	16.969	17.715
30	.05	1	4.908	6.657	8.295	9.872	11.402	12.906	14.392	15.865	17.326
		∞	4.507	5.761	6.846	7.807	8.705	9.526	10.290	11.017	11.696
	.01	1	8.690	10.961	13.023	15.045	16.970	18.916	20.778	22.604	24.417
		∞	8.207	9.846	11.237	12.433	13.573	14.583	15.579	16.476	17.259
50	.05	1	4.777	6.459	8.032	9.545	11.028	12.469	13.898	15.308	16.702
		∞	4.395	5.630	6.709	7.683	8.589	9.493	10.255	11.013	11.75
	.01	1	8.248	10.379	12.290	14.160	15.980	17.723	19.473	21.114	22.83
		∞	7.824	9.397	10.739	11.912	13.052	14.078	15.053	15.980	16.88

Table 2. *Critical values of the* $\bar{E}^2_{k+1}$ *statistic for* $n_1 = \ldots = n_k = n$ *and* $w = n_0/n = 1, \infty$

ν	α	w \ k	2	3	4	5	6	7	8	9	10
2	0·05	1	0·811	0·773	0·728	0·683	0·642	0·605	0·572	0·542	0·515
		∞	0·784	0·725	0·667	0·614	0·567	0·527	0·492	0·462	0·435
	0·01	1	0·953	0·929	0·895	0·858	0 819	0·782	0·747	0·714	0·683
		∞	0·943	0·905	0·859	0·810	0·763	0·720	0·680	0·644	0·611
4	0·05	1	0·590	0·590	0·574	0·553	0·530	0·508	0·487	0·467	0·448
		∞	0·563	0·546	0·520	0·492	0·465	0·440	0·417	0·396	0·377
	0·01	1	0·800	0·787	0·764	0·738	0·710	0·683	0·657	0·632	0·609
		∞	0·782	0·756	0·723	0·688	0·655	0·623	0·594	0·567	0·542
6	0·05	1	0·455	0·472	0·471	0·462	0·450	0·437	0·423	0·410	0·397
		∞	0·432	0·435	0·424	0·409	0·393	0·376	0·361	0·346	0·332
	0·01	1	0·665	0·667	0·657	0·641	0·623	0·603	0·584	0·566	0·548
		∞	0·647	0·637	0·617	0·594	0·570	0·547	0·525	0·505	0·485
8	0·05	1	0·369	0·392	0·398	0·397	0·391	0·383	0·374	0·365	0·355
		∞	0·350	0·360	0·357	0·349	0·339	0·329	0·318	0·307	0·297
	0·01	1	0·563	0·575	0·573	0·564	0·552	0·539	0·525	0·511	0·498
		∞	0·546	0·546	0·535	0·520	0·504	0·487	0·470	0·454	0·439
10	0·05	1	0·310	0·335	0·345	0·347	0·345	0·341	0·335	0·329	0·322
		∞	0·293	0·307	0·308	0·305	0·299	0·292	0·284	0·276	0·269
	0·01	1	0·486	0·503	0·506	0·503	0·496	0·487	0·477	0·466	0·455
		∞	0·471	0·477	0·472	0·462	0·450	0·438	0·426	0·413	0·401
12	0·05	1	0·267	0·292	0·304	0·308	0·309	0·307	0·303	0·299	0·294
		∞	0·252	0·267	0·271	0·270	0·267	0·262	0·257	0·251	0·245
	0·01	1	0·427	0·447	0·453	0·453	0·449	0·443	0·436	0·428	0·420
		∞	0·413	0·422	·421	0·415	0·407	0·398	0·388	0·379	0·369
14	0·05	1	0·235	0·259	0·271	0·277	0·279	0·279	0·277	0·274	0·271
		∞	0·221	0·236	0·242	0·243	0·241	0·238	0·234	0·230	0·225
	0·01	1	0·381	0·401	0·410	0·412	0·410	0·406	0·401	0·395	0·389
		∞	0·368	0·379	0·380	0·377	0·371	0·364	0·357	0·349	0·341
16	0·05	1	0·209	0·233	0·245	0·252	0·255	0·256	0·255	0·253	0·251
		∞	0·197	0·212	0·218	0·220	0·220	0·218	0·215	0·212	0·208
	0·01	1	0·343	0·364	0·374	0·377	0·377	0·375	0·372	0·367	0·362
		∞	0·331	0·343	0·346	0·345	0·341	0·336	0·330	0·324	0·318
18	0·05	1	0·189	0·211	0·224	0·231	0·234	0·236	0·236	0·235	0·233
		∞	0·178	0·192	0·199	0·202	0·202	0·201	0·199	0·197	0·194
	0·01	1	0·312	0·333	0·343	0·348	0·349	0·349	0·346	0·343	0·339
		∞	0·301	0·314	0·318	0·318	0·315	0·312	0·307	0·302	0·297
20	0·05	1	0·172	0·193	0·205	0·213	0·217	0·219	0·220	0·219	0·218
		∞	0·162	0·176	0·183	0·186	0·187	0·186	0·185	0·183	0·181
	0·01	1	0·286	0·307	0·318	0·323	0·325	0·325	0·324	0·322	0·319
		∞	0·276	0·289	0·294	0·295	0·293	0·291	0·287	0·283	0·279
30	0·05	1	0·119	0·135	0·146	0·153	0·158	0·161	0·163	0·165	0·166
		∞	0·111	0·123	0·130	0·133	0·136	0·137	0·137	0·137	0·137
	0·01	1	0·202	0·220	0·231	0·237	0·241	0·244	0·245	0·245	0·245
		∞	0·194	0·206	0·213	0·216	0·217	0·217	0·216	0·215	0·213
50	0·05	1	0·073	0·085	0·093	0·098	0·102	0·105	0·108	0·110	0·111
		∞	0·069	0·077	0·082	0·085	0·088	0·089	0·090	0·091	0·092
	0·01	1	0·127	0·140	0·149	0·155	0·159	0·162	0·164	0·166	0·167
		∞	0·122	0·131	0·137	0·140	0·142	0·144	0·145	0·145	0·146
∞	0·05	1	0·000	0·000	0·000	0·000	0·000	0·000	0·000	0·000	0·000
		∞	0·000	0·000	0·000	0·000	0·000	0·000	0·000	0·000	0·000
	0·01	1	0·000	0·000	0·000	0·000	0·000	0·000	0·000	0·000	0·000
		∞	0·000	0·000	0·000	0·000	0·000	0·000	0·000	0·000	0·000

Interpolate linearly in $w^{-\frac{1}{2}}$ for intermediate values of w and linearly in $(\nu+k+1)^{-1}$ for intermediate values of ν.

Table A.3 Critical Values of the $\overline{\chi}_k^2$ Statistic for Testing Against the Simple Order Alternative, Equal Weights

k	3	4	5	6	7	8	9	10	11	12
0.1	2.580	3.187	3.636	3.994	4.289	4.542	4.761	4.956	5.130	5.288
0.05	3.820	4.528	5.049	5.460	5.800	6.088	6.339	6.560	6.758	6.937
0.025	5.098	5.891	6.471	6.928	7.304	7.624	7.901	8.145	8.363	8.561
0.01	6.822	7.709	8.356	8.865	9.284	9.639	9.946	10.216	10.458	10.676
0.005	8.146	9.092	9.784	10.327	10.774	11.153	11.480	11.767	12.025	12.257

Significance level = α.

Table A.4 Critical Values of the $\overline{E}_k^2$ Statistic for Testing Against the Simple Order Alternative, Equal Weights (i.e. Constant Error Variance and Equal Sample Sizes)

n	α	k = 3	4	5	6
2	0.05	0.687	0.590	0.518	0.461
	0.01	0.878	0.787	0.708	0.641
3	0.05	0.455	0.392	0.345	0.308
	0.01	0.665	0.575	0.506	0.453
4	0.05	0.337	0.292	0.258	0.231
	0.01	0.522	0.447	0.391	0.348
5	0.05	0.267	0.233	0.206	0.184
	0.01	0.427	0.364	0.318	0.282
6	0.05	0.221	0.193	0.170	0.153
	0.01	0.361	0.307	0.268	0.237
7	0.05	0.189	0.165	0.146	0.131
	0.01	0.312	0.265	0.231	0.205
8	0.05	0.164	0.144	0.128	0.115
	0.01	0.287	0.223	0.203	0.180
10	0.05	0.131	0.113	0.102	0.092
	0.01	0.222	0.188	0.164	0.145
16	0.05	0.081	0.071	0.064	0.057
	0.01	0.140	0.119	0.103	0.091

Significance level = α. Common sample size = n.

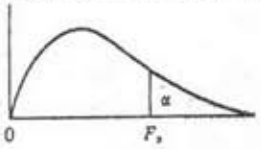
Table A.5 The Probabilities P(l, k) for Equal Weights (Testing Against the Simple Order Alternative)

l	k = 2	3	4	5	6	7	8	9	10	11	12
1	0.50000	0.33333	0.25000	0.20000	0.16667	0.14286	0.12500	0.11111	0.10000	0.09091	0.08333
2	0.50000	0.50000	0.45833	0.41667	0.38056	0.35000	0.32411	0.30198	0.28290	0.26627	0.25166
3		0.16667	0.25000	0.29167	0.31250	0.32222	0.32569	0.32552	0.32316	0.31950	0.31507
4			0.04167	0.08333	0.11806	0.14583	0.16788	0.18542	0.19943	0.21068	0.21974
5				0.00833	0.02083	0.03472	0.04861	0.06186	0.07422	0.08560	0.09602
6					0.00139	0.00417	0.00799	0.01250	0.01744	0.02260	0.02785
7						0.00020	0.00069	0.00150	0.00260	0.00395	0.00551
8							0.00002	0.00010	0.00024	0.00045	0.00075
9								0.00000	0.00001	0.00003	0.00007
10									0.00000	0.00000	0.00000
11										0.00000	0.00000
12											0.00000

Table A.6 The Probabilities P(l, k) for Equal Weights (Testing Against the Simple Tree Alternative)

l	k = 2	3	4	5	6	7	8	9	10	11	12
1	0.50000	0.16667	0.04387	0.00978	0.00192	0.00034	0.00006	0.00001	0.00000	0.00000	0.00000
2	0.50000	0.50000	0.25000	0.08774	0.02446	0.00577	0.00119	0.00022	0.00004	0.00001	0.00000
3		0.33333	0.45613	0.29021	0.12373	0.04060	0.01101	0.00258	0.00053	0.00010	0.00002
4			0.25000	0.41226	0.30857	0.15185	0.05650	0.01714	0.00443	0.00101	0.00021
5				0.20000	0.37434	0.31620	0.17352	0.07139	0.02374	0.00669	0.00164
6					0.16667	0.34238	0.31731	0.19018	0.08499	0.03054	0.00925
7						0.14286	0.31541	0.31492	0.20299	0.09725	0.03734
8							0.12500	0.29246	0.31054	0.21282	0.10824
9								0.11111	0.27274	0.30505	0.22035
10									0.10000	0.23563	0.29898
11										0.09091	0.24064
12											0.08333

Table 5 Percentage Points of the F Distribution



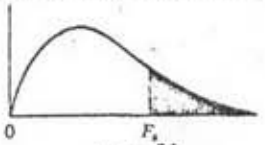
$\alpha = .05$

Degrees of Freedom

ν_2 \ ν_1	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	∞	ν_2
1	161.4	199.5	215.7	224.6	230.2	234.0	236.8	238.9	240.5	241.9	243.9	245.9	248.0	249.1	250.1	251.1	252.2	253.3	254.3	1
2	18.51	19.00	19.16	19.25	19.30	19.33	19.35	19.37	19.38	19.40	19.41	19.43	19.45	19.45	19.46	19.47	19.48	19.49	19.50	2
3	10.13	9.55	9.28	9.12	9.01	8.94	8.89	8.85	8.81	8.79	8.74	8.70	8.66	8.64	8.62	8.59	8.57	8.55	8.53	3
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.91	5.86	5.80	5.77	5.75	5.72	5.69	5.66	5.63	4
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.77	4.74	4.68	4.62	4.56	4.53	4.50	4.46	4.43	4.40	4.36	5
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.00	3.94	3.87	3.84	3.81	3.77	3.74	3.70	3.67	6
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.64	3.57	3.51	3.44	3.41	3.38	3.34	3.30	3.27	3.23	7
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.35	3.28	3.22	3.15	3.12	3.08	3.04	3.01	2.97	2.93	8
9	5.12	4.26	3.86	3.63	3.48	3.37	3.29	3.23	3.18	3.14	3.07	3.01	2.94	2.90	2.86	2.83	2.79	2.75	2.71	9
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.98	2.91	2.85	2.77	2.74	2.70	2.66	2.62	2.58	2.54	10
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.85	2.79	2.72	2.65	2.61	2.57	2.53	2.49	2.45	2.40	11
12	4.75	3.89	3.49	3.26	3.11	3.00	2.91	2.85	2.80	2.75	2.69	2.62	2.54	2.51	2.47	2.43	2.38	2.34	2.30	12
13	4.67	3.81	3.41	3.18	3.03	2.92	2.83	2.77	2.71	2.67	2.60	2.53	2.46	2.42	2.38	2.34	2.30	2.25	2.21	13
14	4.60	3.74	3.34	3.11	2.96	2.85	2.76	2.70	2.65	2.60	2.53	2.46	2.39	2.35	2.31	2.27	2.22	2.18	2.13	14
15	4.54	3.68	3.29	3.06	2.90	2.79	2.71	2.64	2.59	2.54	2.48	2.40	2.33	2.29	2.25	2.20	2.16	2.11	2.07	15
16	4.49	3.63	3.24	3.01	2.85	2.74	2.66	2.59	2.54	2.49	2.42	2.35	2.28	2.24	2.19	2.15	2.11	2.06	2.01	16
17	4.45	3.59	3.20	2.96	2.81	2.70	2.61	2.55	2.49	2.45	2.38	2.31	2.23	2.19	2.15	2.10	2.06	2.01	1.96	17
18	4.41	3.55	3.16	2.93	2.77	2.66	2.58	2.51	2.46	2.41	2.34	2.27	2.19	2.15	2.11	2.06	2.02	1.97	1.92	18
19	4.38	3.52	3.13	2.90	2.74	2.63	2.54	2.48	2.42	2.38	2.31	2.23	2.16	2.11	2.07	2.03	1.98	1.93	1.88	19
20	4.35	3.49	3.10	2.87	2.71	2.60	2.51	2.45	2.39	2.35	2.28	2.20	2.12	2.08	2.04	1.99	1.95	1.90	1.84	20
21	4.32	3.47	3.07	2.84	2.68	2.57	2.49	2.42	2.37	2.32	2.25	2.18	2.10	2.05	2.01	1.96	1.92	1.87	1.81	21
22	4.30	3.44	3.05	2.82	2.66	2.55	2.46	2.40	2.34	2.30	2.23	2.15	2.07	2.03	1.98	1.94	1.89	1.84	1.78	22
23	4.28	3.42	3.03	2.80	2.64	2.53	2.44	2.37	2.32	2.27	2.20	2.13	2.05	2.01	1.96	1.91	1.86	1.81	1.76	23
24	4.26	3.40	3.01	2.78	2.62	2.51	2.42	2.36	2.30	2.25	2.18	2.11	2.03	1.98	1.94	1.89	1.84	1.79	1.73	24
25	4.24	3.39	2.99	2.76	2.60	2.49	2.40	2.34	2.28	2.24	2.16	2.09	2.01	1.96	1.92	1.87	1.82	1.77	1.71	25
26	4.23	3.37	2.98	2.74	2.59	2.47	2.39	2.32	2.27	2.22	2.15	2.07	1.99	1.95	1.90	1.85	1.80	1.75	1.69	26
27	4.21	3.35	2.96	2.73	2.57	2.46	2.37	2.31	2.25	2.20	2.13	2.06	1.97	1.93	1.88	1.84	1.79	1.73	1.67	27
28	4.20	3.34	2.95	2.71	2.56	2.45	2.36	2.29	2.24	2.19	2.12	2.04	1.96	1.91	1.87	1.82	1.77	1.71	1.65	28
29	4.18	3.33	2.93	2.70	2.55	2.43	2.35	2.28	2.22	2.18	2.10	2.03	1.94	1.90	1.85	1.81	1.75	1.70	1.64	29
30	4.17	3.32	2.92	2.69	2.53	2.42	2.33	2.27	2.21	2.16	2.09	2.01	1.93	1.89	1.84	1.79	1.74	1.68	1.62	30
40	4.08	3.23	2.84	2.61	2.45	2.34	2.25	2.18	2.12	2.08	2.00	1.92	1.84	1.79	1.74	1.69	1.64	1.58	1.51	40
60	4.00	3.15	2.76	2.53	2.37	2.25	2.17	2.10	2.04	1.99	1.92	1.84	1.75	1.70	1.65	1.59	1.53	1.47	1.39	60
120	3.92	3.07	2.68	2.45	2.29	2.17	2.09	2.02	1.96	1.91	1.83	1.75	1.66	1.61	1.55	1.50	1.43	1.35	1.25	120
∞	3.84	3.00	2.60	2.37	2.21	2.10	2.01	1.94	1.88	1.83	1.75	1.67	1.57	1.52	1.46	1.39	1.32	1.22	1.00	∞

From "Tables of Percentage Points of the Inverted Beta (F) Distribution," *Biometrika*, Vol. 33 (1943), pp. 73–88, by Maxine Merrington and Catherine M. Thompson. Reproduced by permission of Professor E. S. Pearson.

Table 6 Percentage Points of the *F* Distribution



Degrees of Freedom $\alpha = .01$

ν_2 \ ν_1	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	∞	ν_2
1	4052	4999.5	5403	5625	5764	5859	5928	5982	6022	6056	6106	6157	6209	6235	6261	6287	6313	6339	6366	1
2	98.50	99.00	99.17	99.25	99.30	99.33	99.36	99.37	99.39	99.40	99.42	99.43	99.45	99.46	99.47	99.47	99.48	99.49	99.50	2
3	34.12	30.82	29.46	28.71	28.24	27.91	27.67	27.49	27.35	27.23	27.05	26.87	26.69	26.60	26.50	26.41	26.32	26.22	26.13	3
4	21.20	18.00	16.69	15.98	15.52	15.21	14.98	14.80	14.66	14.55	14.37	14.20	14.02	13.93	13.84	13.75	13.65	13.56	13.46	4
5	16.26	13.27	12.06	11.39	10.97	10.67	10.46	10.29	10.16	10.05	9.89	9.72	9.55	9.47	9.38	9.29	9.20	9.11	9.02	5
6	13.75	10.92	9.78	9.15	8.75	8.47	8.26	8.10	7.98	7.87	7.72	7.56	7.40	7.31	7.23	7.14	7.06	6.97	6.88	6
7	12.25	9.55	8.45	7.85	7.46	7.19	6.99	6.84	6.72	6.62	6.47	6.31	6.16	6.07	5.99	5.91	5.82	5.74	5.65	7
8	11.26	8.65	7.59	7.01	6.63	6.37	6.18	6.03	5.91	5.81	5.67	5.52	5.36	5.28	5.20	5.12	5.03	4.95	4.86	8
9	10.56	8.02	6.99	6.42	6.06	5.80	5.61	5.47	5.35	5.26	5.11	4.96	4.81	4.73	4.65	4.57	4.48	4.40	4.31	9
10	10.04	7.56	6.55	5.99	5.64	5.39	5.20	5.06	4.94	4.85	4.71	4.56	4.41	4.33	4.25	4.17	4.08	4.00	3.91	10
11	9.65	7.21	6.22	5.67	5.32	5.07	4.89	4.74	4.63	4.54	4.40	4.25	4.10	4.02	3.94	3.86	3.78	3.69	3.60	11
12	9.33	6.93	5.95	5.41	5.06	4.82	4.64	4.50	4.39	4.30	4.16	4.01	3.86	3.78	3.70	3.62	3.54	3.45	3.36	12
13	9.07	6.70	5.74	5.21	4.86	4.62	4.44	4.30	4.19	4.10	3.96	3.82	3.66	3.59	3.51	3.43	3.34	3.25	3.17	13
14	8.86	6.51	5.56	5.04	4.69	4.46	4.28	4.14	4.03	3.94	3.80	3.66	3.51	3.43	3.35	3.27	3.18	3.09	3.00	14
15	8.68	6.36	5.42	4.89	4.56	4.32	4.14	4.00	3.89	3.80	3.67	3.52	3.37	3.29	3.21	3.13	3.05	2.96	2.87	15
16	8.53	6.23	5.29	4.77	4.44	4.20	4.03	3.89	3.78	3.69	3.55	3.41	3.26	3.18	3.10	3.02	2.93	2.84	2.75	16
17	8.40	6.11	5.18	4.67	4.34	4.10	3.93	3.79	3.68	3.59	3.46	3.31	3.16	3.08	3.00	2.92	2.83	2.75	2.65	17
18	8.29	6.01	5.09	4.58	4.25	4.01	3.84	3.71	3.60	3.51	3.37	3.23	3.08	3.00	2.92	2.84	2.75	2.66	2.57	18
19	8.18	5.93	5.01	4.50	4.17	3.94	3.77	3.63	3.52	3.43	3.30	3.15	3.00	2.92	2.84	2.76	2.67	2.58	2.49	19
20	8.10	5.85	4.94	4.43	4.10	3.87	3.70	3.56	3.46	3.37	3.23	3.09	2.94	2.86	2.78	2.69	2.61	2.52	2.42	20
21	8.02	5.78	4.87	4.37	4.04	3.81	3.64	3.51	3.40	3.31	3.17	3.03	2.88	2.80	2.72	2.64	2.55	2.46	2.36	21
22	7.95	5.72	4.82	4.31	3.99	3.76	3.59	3.45	3.35	3.26	3.12	2.98	2.83	2.75	2.67	2.58	2.50	2.40	2.31	22
23	7.88	5.66	4.76	4.26	3.94	3.71	3.54	3.41	3.30	3.21	3.07	2.93	2.78	2.70	2.62	2.54	2.45	2.35	2.26	23
24	7.82	5.61	4.72	4.22	3.90	3.67	3.50	3.36	3.26	3.17	3.03	2.89	2.74	2.66	2.58	2.49	2.40	2.31	2.21	24
25	7.77	5.57	4.68	4.18	3.85	3.63	3.46	3.32	3.22	3.13	2.99	2.85	2.70	2.62	2.54	2.45	2.36	2.27	2.17	25
26	7.72	5.53	4.64	4.14	3.82	3.59	3.42	3.29	3.18	3.09	2.96	2.81	2.66	2.58	2.50	2.42	2.33	2.23	2.13	26
27	7.68	5.49	4.60	4.11	3.78	3.56	3.39	3.26	3.15	3.06	2.93	2.78	2.63	2.55	2.47	2.38	2.29	2.20	2.10	27
28	7.64	5.45	4.57	4.07	3.75	3.53	3.36	3.23	3.12	3.03	2.90	2.75	2.60	2.52	2.44	2.35	2.26	2.17	2.06	28
29	7.60	5.42	4.54	4.04	3.73	3.50	3.33	3.20	3.09	3.00	2.87	2.73	2.57	2.49	2.41	2.33	2.23	2.14	2.03	29
30	7.56	5.39	4.51	4.02	3.70	3.47	3.30	3.17	3.07	2.98	2.84	2.70	2.55	2.47	2.39	2.30	2.21	2.11	2.01	30
40	7.31	5.18	4.31	3.83	3.51	3.29	3.12	2.99	2.89	2.80	2.66	2.52	2.37	2.29	2.20	2.11	2.02	1.92	1.80	40
60	7.08	4.98	4.13	3.65	3.34	3.12	2.95	2.82	2.72	2.63	2.50	2.35	2.20	2.12	2.03	1.94	1.84	1.73	1.60	60
120	6.85	4.79	3.95	3.48	3.17	2.96	2.79	2.66	2.56	2.47	2.34	2.19	2.03	1.95	1.86	1.76	1.66	1.53	1.38	120
∞	6.63	4.61	3.78	3.32	3.02	2.80	2.64	2.51	2.41	2.32	2.18	2.04	1.88	1.79	1.70	1.59	1.47	1.32	1.00	∞

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ประวัติผู้เขียน

นางสาว ดารุณี หล่อมณีนพรัตน์ เกิดเมื่อวันที่ 10 กันยายน 2506 ที่กรุงเทพฯ ได้รับปริญญาวิทยาศาสตร์บัณฑิต(สถิติ) จากมหาวิทยาลัยเกษตรศาสตร์ เมื่อปีการศึกษา 2528 และเข้าศึกษาต่อในสาขาวิชาสถิติ ภาควิชาสถิติ บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย ปีการศึกษา 2529 ปัจจุบันทำงานตำแหน่ง นักสถิติ สังกัดฝ่ายวิศวกรรม บริษัท การบินไทย จำกัด