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STATPAC REVISIONS FOR PDP-8/I AND TSS/8

DECUS Program Library Write-up

DECUS NO. 8-406

ABSTRACT

This package contains 11 programs from the original PDP-10 Dartmouth BASIC Statistical Package which have been revised for the PDP-8/I and TSS/8. The documentation consists of a description and listing of each of the programs.
10 ' BERKSHIRE COMMUNITY COLLEGE USER LIBRARY
20 ' MODIFIED VERSION OF DARTMOUTH COLLEGE STATISTICS PROGRAM
30 ' DARTMOUTH PROGRAM NAME: STAT01***
40 ' MODIFIED: JULY 2 1970
90 ' B.C.C. LIBRARY PROGRAM NAME: STAT01
110 ' DESCRIPTION--COMPUTES THE MEAN, VARIANCE, STANDARD DEVIATION, AND THE STANDARD ERROR OF THE MEAN FOR ONE OR MORE SETS OF DATA.
150 ' SOURCE--UNKNOWN
180 ' INSTRUCTIONS--THE DATA START IN LINE NUMBER 900 AND CONTINUE NOT PAST LINE 909. THE NUMBER 999999 MUST BE PLACED AT THE END OF THE LAST DATUM OF EACH SET. SAMPLE DATUM ARE IN LINE 900.
230 ' * * * * * * * * MAIN PROGRAM * * * * * * * *
260 READ X
270 IF X = 999999 THEN 320
280 LET S = S + X
290 LET S1 = S1 + X*X
300 LET N = N + 1
310 G0 TO 260
320 LET M = S/N
330 LET V = (N*S1 - S*S)/N/(N-1)
340 LET S3 = SQR(V)
350 LET S4 = SQR(V/N)
360 PRINT"NUMBER","SUM OF SQUARES","MEAN","VARIANCE" SUM-OF-SQUARES", "MEAN", "VARIANCE"
370 PRINT N, S, S1, M, V
380 PRINT
390 LET Q = S3/M
400 PRINT "STD. DEV.", "STD. ERROR OF THE MEAN", "COEFF. OF VARIATION"
410 PRINT S3, S4, "", Q
420 PRINT
430 PRINT
440 READ X
450 IF X = 999999 THEN 500
460 LET S=0
470 LET S1=0
480 LET N=0
490 G0 TO 280
500 ST0P
900 DATA 1,2,3,4,5,6,7,8,9,10,999999,4,3,9,15,21,6,999999
910 DATA 999999
920 END

READY
Berkshire Community College User Library

Modified version of Dartmouth College Statistics Program

Dartmouth Program Name: STATO2***

Modified: July 2 1970

BC Library Program Name: STATO2

Description--Computes the means, variances, and t-ratio for two groups of data, unpaired. This program assumes that the two groups have the same variance.

Source--Thomason E. Kurtz, Kiewit Computation Center

Instructions--Put data in Lines 900 through 998.

End the first series of data with 999999 and then type the second series, again ending with 999999.

Example data are in lines 900 and 910.

* * * * * * * MAIN PROGRAM * * * * * * * * * * *

DIM S(2), Z(2), N(2), M(2), V(2), D(2)

LET P = 1
LET S = 0
LET S2 = 0
LET N = 0
READ X

IF X = 999999 THEN 370
LET S = S + X
LET S2 = S2 + X**2
LET N = N + 1
G0 10 310
LET S(P) = S
LET Z(P) = S2
LET N(P) = N

IF P = 2 THEN 430
LET P = 2
G0 TO 280

REM Now we print the answers
PRINT "GROUP", "NUMBER", "MEAN", "VARIANCE", "STD. DEV."
PRINT
FOR I = 1 TO 2
LET M(1) = S(1)/N(1)
LET V(1) = (N(1)*Z(1) - S(1)*S(1))/N(1)/(N(1) - 1)
LET D(1) = SQRT(V(1))
PRINT I, N(1), M(1), V(1), D(1)
NEXT I

PRINT "MEAN DIFF.", "VAR. DIFF.", "STD. DEV. DIFF."
PRINT R, Q, W
PRINT
PRINT "T RATIO", R/W, "N", N(1)+N(2)-2; "DEGREES OF FREEDOM"
STOP

DATA 160, 160, 140, 190, 999999
DATA 117, 145, 147, 120, 150, 120, 999999
END

READY
MODIFIED VERSION OF DARTMOUTH COLLEGE STATISTICS PROGRAM

DARTMOUTH PROGRAM NAME: STAT03
MODIFIED: JULY 2, 1970

B.C.C. LIBRARY PROGRAM NAME: STAT03

DESCRIPTION—COMPUTES THE MEANS, VARIANCES, AND T-RATIO FOR TWO GROUPS OF UNPAIRED DATA. THIS PROGRAM ASSUMES THAT THE GROUPS MAY HAVE UNEQUAL VARIANCES.

SOURCE—THOMAS E. KURTZ, KIEWIT COMPUTATION CENTER

INSTRUCTIONS—PUT DATA IN LINE 900 AND FOLLOWING.
MAKE SURE THE DATA LINE NUMBERS DO NOT EXCEED 998.
END THE FIRST SERIES OF DATA WITH 999999 AND THEN TYPE IN THE SECOND SERIES, AGAIN ENDING WITH 999999.
SAMPLE DATA ARE IN LINES 900 AND 910.

* * * * * * * MAIN PROGRAM * * * * * * *

DIM S(2), Z(2), N(2), M(2), V(2), D(2)

LET P = 1
LET S = 0
LET S2 = 0
LET N = 0
READ X
IF X = 999999 THEN 370
LET S = S + X
LET S2 = S2 + X*X
LET N = N + 1
GO TO 310
LET S(P) = S
LET Z(P) = S2
LET N(P) = N
IF P = 2 THEN 430
LET P = 2
GO TO 280
REM NOW WE PRINT THE ANSWERS
PRINT "GROUP", "NUMBER", "MEAN", "VARIANCE", "STD. DEV."
PRINT FOR I = 1 TO 2
LET M(I) = S(I)/N(I)
LET V(I) = (N(I)*Z(I) - S(I)*S(I))/N(I)/(N(I) - 1)
LET D(I) = SQRT(V(I))
PRINT I, N(I), M(I), V(I), D(I)
NEXT I
LET Q = V(1) / N(1) + V(2) / N(2)
LET W = SQRT(Q)
LET R = M(1) - M(2)
LET K = V(1) / N(1) / Q
LET D = 1/(K*K/(N(1) - 1) + (1-K)*(1-K)/(N(2) - 1))
PRINT PRINT "MEAN DIFF.", "VAR. DIFF.", "STD. DEV. DIFF."
PRINT R, Q, W
PRINT "T RATIO", R/W, "ON", D; "DEGREES OF FREEDOM."
STOP
DATA 160, 160, 140, 140, 999999
DATA 117, 145, 147, 120, 150, 120, 999999
999 END

READY
BERKSHIRE COMMUNITY COLLEGE USER PROGRAM LIBRARY
MÖDIFIED VERSION OF DARTMOUTH COLLEGE STATISTICS PROGRAM
DARTMOUTH PROGRAM NAME: STAT04***
MÖDIFIED: JULY 2 1970

B.C.C. LIBRARY PROGRAM NAME: STAT04

DESCRIPTION--COMPUTES CHI SQUARE STATISTICS FOR 2 BY 2 CONTINGENCY TABLES.
SOURCE--THOMAS E. KURTZ, KIEWIT COMPUTATION CENTER

INSTRUCTIONS--DATA IS PUT IN LINE 900 AND FOLLOWING.
ENTER THE TABLES IN NORMAL ORDER WITH FOUR ENTRIES OF TABLE 1 FIRST, THEN THE 4 ENTRIES FOR TABLE 2, ETC.
DATA LINE NUMBERS SHOULD NOT EXCEED 998. SAMPLE DATA ARE IN LINE 900.

* * * * * * MAIN PROGRAM * * * * * * * * * *

PRINT "TABLE", "", "CHI SQUARE"
PRINT
READ A, B, C, D
LET N = A + B + C + D
LET E = A*D - B*C
LET E=ABS(E)
LET F = (E - N / 2)
LET G = N * F * F
LET R1 = A + B
LET R2 = N - R1
LET C1 = A + C
LET C2 = N - C1
LET X = G / R1 / R2 / C1 / C2
PRINT A, B
PRINT C, D, X
GO TO 270
DATA 6, 0, 2, 6, 6, 0, 1, 3
END

READY
BERKSHIRE COMMUNITY COLLEGE USER PROGRAM LIBRARY
MODIFIED VERSION OF DARTMOUTH COLLEGE STATISTICS PROGRAM
DARTMOUTH PROGRAM NAME: STAT08***
MODIFIED: JULY 2 1970

B.C.C. LIBRARY PROGRAM NAME: STAT08

DESCRIPTION--COMPARSES TWO GROUPS OF DATA USING THE MEDIAN TEST.
SOURCE--THOMAS E. KURTZ, KIEWIT COMPUTATION CENTER

INSTRUCTIONS--PUT DATA IN LINE 900 AND FOLLOWING.
The first datum is the number of entries in the first group, then enter the number of entries in the second group, then the first group itself is entered and then the second group. The program prints out the chi square statistic of a 2 by 2 table on 1 degree of freedom. Data should not exceed line 998. Sample data are in line 900.

* * * * * MAIN PROGRAM * * * * *

DIM A(100)
READ M, N
LET M1 = M + N
LET M2 = INT(M1/2)
FOR Z1 = 1 TO M1
READ A(Z1)
NEXT Z1
LET L = 1
LET U = M
GOSUB 630
LET L = M + 1
LET U = M1
GOSUB 630
LET X = 0
LET Y = 0
LET I = 1
LET J = M + 1
FOR K = 1 TO M2
IF A(I) < A(J) THEN 470
LET Y = Y + 1
LET J = J + 1
IF J <= M1 THEN 520
LET X = M2 - Y
GO TO 530
LET X = X + 1
LET I = I + 1
IF I <= M THEN 520
LET Y = M2 - X
GO TO 530
NEXT K
LET U = M - X
LET V = N - Y
LET Z = X*V - Y*U
LET T = M1*(ABS(Z) - M1/2) + 2
LET C2 = T / M / N / M2 / (M1 - M2)
PRINT "TWO SAMPLE MEDIAN TEST."
PRINT "GROUP 1 "; X; U
PRINT "GROUP 2 "; Y; V
PRINT "CHI-SQUARE = "; C2
STOP
FOR I = 1 TO U - L
640 LET X = A(L)
650 LET Q = L
660 FOR J = L + 1 TO U - I + 1
670 IF X >= A(J) THEN 700
680 LET X = A(J)
690 LET Q = J
700 NEXT J
705 LET J = U-I+1 'THIS STATEMENT PUT IN TSS/B BECAUSE OF BUG IN BASIC
710 IF J = Q THEN 740
720 LET A(Q) = A(J)
730 LET A(J) = X
740 NEXT I
750 RETURN
900 DATA 4, 6, 160, 160, 140, 190, 117, 145, 147, 120, 150, 120
999 END

READY
Berkshire Community College User Program Library

Modified version of Dartmouth College Statistics Program

Dartmouth Program Name: STAT9X***

Modified: July 2 1970

B.C.C. Library Program Name: STAT9X

Description -- Computes the slope and other statistics for a linear regression with several Y values for each X value.

Source -- Thomas E. Kurtz, KIENIT Computation Center

Instructions -- Put data starting in line 900. First data is K, the number of different X-values. Then for each of the K groups--enter the number in that group, then the common X-value, then the Y-values for that group. Sample data are in lines 900-950.

* * * * * * MAIN PROGRAM * * * * * * * *

READ K
FOR J = 1 TO K
LET N = N + NO
READ X
FOR I = 1 TO NO
READ Y
LET X1 = X1 + X
LET Y1 = Y1 + Y
LET X2 = X2 + X*X
LET Y2 = Y2 + Y*Y
LET Z = Z + X*Y
NEXT I
NEXT J
LET S1 = N*X2 - X1*X1
LET S2 = N*Z - X1*Y1
LET B = S2/S1
LET Y3 = Y1/N
LET X3 = X1/N
LET B1 = Y3 - B*X3
LET N1 = N - 1
LET N2 = N1 - 1
LET S3 = (Y2 - Y1*Y3 - B*S2/N)
LET S4 = S3/N2
PRINT "NUMBER = "; N, " SLOPE = "; B
PRINT "MEAN OF X = "; X1/N, " OF Y = "; Y1/N
PRINT "Y-INTERCEPT = "; B1
PRINT "SUM-OF-SQUARES"; "TOTAL", Y2
PRINT "", "MEAN "; Y3*Y1
PRINT "", "SLOPE "; B*S2/N
PRINT "", "RESIDUAL "; S3
PRINT "STANDARD DEVIATIONS"
PRINT "", "X ", SQR(S1/N/N1)
PRINT "", "Y ", SQR(Y2-Y1*Y3/N1)
PRINT "", "ERROR ", SQR(S4)
PRINT "", "Y-BAR ", SQR(S4/N)
PRINT "", "SLOPE ", SQR(S4/S1*N)
PRINT "", "Y-INTER "; SQR(S4*(1/N + X3*X3/S1*N))
PRINT "F-RATIO FOR SLOPE = "; B*S2/N/S4
STOP

DATA 5
DATA 3, 4, 6, 8, 7
DATA 2, 7, 1, 3
930 DATA 5, 6, 1, 2, 3, 4, 5
940 DATA 1, 1, 2
950 DATA 4, 5, 2, 4, 6, 3, 10
999 END

READY
10 ' BERKSHIRE COMMUNITY COLLEGE USER PROGRAM LIBRARY
20 ' MODIFIED VERSION OF DARTMOUTH COLLEGE STATISTICS PROGRAM
30 ' DARTMOUTH PROGRAM NAME: STAT11***
40 ' MODIFIED: JULY 2 1970
90 ' B.C.C. LIBRARY PROGRAM NAME: STAT11
110 ' DESCRIPTION--COMPUTES THE SPEARMAN RANK CORRELATION COEFFICIENT
130 ' FOR TWO SERIES OF DATA.
140 ' SOURCE--THOMAS E. KURTZ, KIEWIT COMPUTATION CENTER
160 ' INSTRUCTIONS--PUT DATA IN LINE 900 AND FOLLOWING.
180 ' ENTER DATA IN THE FOLLOWING ORDER: FIRST THE COMMON LENGTH
190 ' OF EACH SERIES, THEN THE ELEMENTS OF THE SERIES BY GROUPS
200 ' THAT IS X1,Y1,X2,Y2,...ETC.
210 ' SAMPLE DATA ARE IN LINE 900.
220 ' 240 ' ** ** ** ** ** MAIN PROGRAM ** ** ** ** ** **
250 ' 260 DIM A(100), B(100)
270 READ N
280 FOR I = 1 TO N
290   READ A(I), B(I)
300 NEXT I
310 FOR I = 1 TO N - 1
320   LET X = A(I)
330   LET Y = B(I)
340   LET Q = 1
350   FOR J = 2 TO N - I + 1
360     IF X >= A(J) THEN 400
370     LET X = A(J)
380     LET Y = B(J)
390     LET Q = J
400 NEXT J
410 LET J = N-I+1
411 IF Q=J THEN 460
420   LET A(Q) = A(J)
430   LET A(J) = X
440   LET B(Q) = B(J)
450   LET B(J) = Y
460 NEXT I
470 REM NOW WE REPLACE THE ELEMENT BY ITS AVERAGE RANK
480 FOR I = 1 TO N
490   LET X = A(I)
500   FOR J = I + 1 TO N
510     IF X <> A(J) THEN 540
520 NEXT J
530   LET J = N + 1
540   LET Z = (J + I - 1)/2
550   FOR K = I TO J - 1
560     LET A(K) = Z
570 NEXT K
580   LET I = J - 1
590 NEXT I
600 IF P = 1 THEN 690
610 REM NOW WE INTERCHANGE A AND B AND SORT AGAIN.
620 FOR I = 1 TO N
630 LET T = A(I)
640 LET A(I) = B(I)
650 LET B(I) = T
660 NEXT I
670 LET P = 1
680 G0 TO 310
690 REM NOW WE START COMPUTING THE CORRELATION COEFFICIENT.
700 FOR I = 1 TO N
710 LET S1 = S1 + A(I) * A(I)
720 LET S2 = S2 + B(I) * B(I)
730 LET S3 = S3 + A(I) * B(I)
740 NEXT I
750 LET S = N * N * (N+1) * (N+1) / 4
760 LET D1 = N * S1 - S
770 LET D2 = N * S2 - S
780 LET D = D1 * D2
790 IF D <> 0 THEN 820
800 LET R = 0
810 G0 TO 830
820 LET R = (N * S3 - S) / SQRT(D)
830 PRINT "SPEARMAN RANK CORRELATION COEFFICIENT"
840 PRINT " R = "; R
850 STOP
900 DATA 5, 480, 56, 500, 61, 520, 78, 540, 71, 56, 82
910 END

READY
REM DESCRIPTION-- MULTIPLE LINEAR REGRESSION ACCORDING TO EFRÖYSON'S ALGORITHM

REM SOURCE-- RALSTON AND WILF, "MATHEMATICAL METHODS FOR DIGITAL COMPUTERS", P. 191

REM PROGRAMMED BY THOMAS E. KURTZ, KIEWIT COMPUTATION CENTER

REM INSTRUCTIONS-- ENTER DATA STARTING IN LINE 1610.
REM BE SURE TO REMOVE SAMPLE DATA BEFORE RUNNING PROGRAM.

REM * * * * * * * * MAIN PROGRAM * * * * * * *

REM

DIM S(6, 6)
DIM A(20, 4)
DIM M(8), D(8), B(7), E(7)
READ N, P, M, F1, F2
LET T1 = 1E-6
LET N1 = N + P
LET N2 = N1 + N
LET K = 1
LET DI = M - 1
REM MAT READ A(M, N1)
FOR I9 = 1 TO M
    FOR I8 = 1 TO N1
        READ A(I9, I8)
    NEXT I8
    NEXT I9
FOR I = 1 TO M
    LET A(I, 0) = 1
NEXT I
PRINT "MEANS "
FOR I = 0 TO N1
    FOR J = 1 TO N1
        LET S = 0
        FOR L = 1 TO M
            LET S = S + A(L, I) * A(L, J)
        NEXT L
        LET S(I, J) = S
    NEXT J
    PRINT M(I)
NEXT I
PRINT
PRINT "STANDARD DEVIATIONS"
LET M1 = M * D1
FOR I = 1 TO N1

FOR J = 1 TO N1
LET S(I,J) = ( M*S(I,J) - S(0,I)*S(0,J) )/M1
NEXT J
LET D(I) = SQR( S(I,I) )
PRINT D(I),
NEXT I
PRINT
PRINT "CORRELATION COEFFICIENTS"
FOR I = 1 TO N2
FOR J = 1 TO N2
IF J > N1 THEN 740
LET S(I,J) = S(I,J) / D(I) / D(J)
LET S(J,I) = S(I,J)
G0 T0 300
IF I <> J - N1 THEN 780
LET S(I,J) = 1
LET S(J,I) = -1
G0 T0 300
LET S(I,J) = 0
LET S(J,I) = 0
NEXT J
NEXT I
FOR I = 1 TO N1
FOR J = 1 TO N1
PRINT S(I,J),
NEXT J
PRINT
NEXT I
PRINT
LET K1 = K + N
PRINT "DEPENDENT VARIABLE", K
FOR I = 1 TO N
LET B(I) = 0
NEXT I
LET S8 = D(K1) * SQR( S(K1,K1) / D1 )
LET V1 = 1E35
LET V2 = 0
LET N3 = 0
LET N4 = 0
FOR I = 1 TO N
IF ABS( S(I,I) ) <= T1 THEN 1140
LET V0 = S(I,K1) * S(K1,I) / S(I,I)
LET E9 = SGN(V0)+2
IF E9 = 1 THEN 1080
IF E9 = 2 THEN 1140
IF E9 = 3 THEN 1040
IF V0 <= V2 THEN 1140
LET V2 = V0
LET N4 = I
G0 T0 1140
LET I1 = I + N1
LET B(I) = S(I1,K1) * D(K1) / D(I)
LET E(I) = S8 / D(I) * SQR( S(I1,I1) )
IF ABS( V0 ) >= ABS( V1 ) THEN 1140
LET V1 = V0
LET N3 = I
NEXT I
LET S = 0
FOR I = 1 TO N
LET S = S + B(I) * M(I)
NEXT I
1190 LET B(0) = M(1) - S  
1200 PRINT "INDEX", "B", "STD. DEV.", "T-RATIO"  
1210 PRINT 0, B(0)  
1220 FOR I = 1 TO N  
1230 IF B(I) = 0 THEN 1250  
1240 PRINT I, B(I), E(I), B(I) / E(I)  
1250 NEXT I  
1260 PRINT "STANDARD ERROR OF Y", SB * SQR(M-1)  
1270 PRINT  
1280 LET F = ABS(V1) * D1 / S(K1,K1)  
1290 IF F < F2 THEN 1360  
1300 LET F = V2 * (D1 - 1) / (S(K1,K1) - V2)  
1310 IF F <= F1 THEN 1570  
1320 LET Q = N4  
1330 LET D1 = D1 - 1  
1340 PRINT "VARIABLE ENTERING", Q  
1350 G0 TO 1390  
1360 LET Q = N3  
1370 LET D1 = D1 + 1  
1380 PRINT "VARIABLE LEAVING", Q  
1390 PRINT "F-LEVEL", F  
1400 LET Y = 1 / S(Q,Q)  
1410 FOR J = 1 TO N2  
1420 LET S(Q,J) = S(Q,J) * Y  
1430 NEXT J  
1440 LET Y = -Y  
1450 FOR I = 1 TO N2  
1460 IF I = Q THEN 1540  
1470 LET X = -S(I,Q)  
1480 FOR J = 1 TO N2  
1490 IF J = Q THEN 1520  
1500 LET S(I,J) = S(I,J) + X * S(Q,J)  
1510 G0 TO 1530  
1520 LET S(I,J) = S(I,J) * Y  
1530 NEXT J  
1540 NEXT I  
1550 LET S(Q,Q) = -Y  
1560 G0T0 950  
1570 LET K = K + 1  
1580 IF K <= P THEN 900  
1590 PRINT "***** END OF PROBLEM *****"  
1600 STOP  
1610 DATA 3,1,9,2,5,2,5  
1620 DATA 24769,34181,35516,29566  
1630 DATA 34181,35516,29566,37009  
1640 DATA 35516,29566,37009,34542  
1650 DATA 29,566,37009,34542,41465  
1660 DATA 37009,34542,41465,49972  
1670 DATA 34542,41465,49972,53944  
1680 DATA 41465,49972,53944,47062  
1690 DATA 49972,53944,47062,47284  
1700 DATA 53944,47062,47284,57765  
1710 DATA 1,1,1,1  
1720 DATA 3,4  
1730 DATA 2,2,1,0  
1740 DATA 1,3,4  
1750 DATA 3,3,0,1  
1755 DATA 1,2,3,4  
1760 DATA 4,1,0,0  
1999 END

READY 14
MULTIPLE LINEAR REGRESSION - FANCY OUTPUT

DESCRIPTION - Computes one or more multiple linear regressions on a batch of data.

INSTRUCTION - Place data in line 1940 and following. First data is N (number of data sets or observations), then V (number of variables in data batch), then G (number of regressions to be performed). Then enter the data by the data set, that is enter first the values for all variables at observation 1, then the values for variables at observation 2, etc. Variables may be entered in any order, but the order must be the same for each data set. The position of a variable in entering the data is the index of the variables. Thus, if there are four variables entered in the order X, Y, Z, W, the index of Z is 3. Next, for each regression enter (in order) H (the number of the regression), then K (total number of independent variables in the regression), then P1 (enter 1 if you want the residuals printed out, otherwise enter 0), P2 (enter 1 if you want the residuals printed out, otherwise enter 0), and then enter the indexes of the independent variables followed by the index of the dependent variable. If N > 9 or V > 4, then the DIM statements in line 430 and 440 must be changed. Sample data are in lines 1940 through 1992. Be sure to remove the sample data before running the program.
BERKSHIRE COMMUNITY COLLEGE USER PROGRAM LIBRARY

MODIFIED VERSION OF DARTMOUTH COLLEGE STATISTICS PROGRAM

DARTMOUTH PROGRAM NAME: STAT21

MODIFIED: JULY 2 1970

B.C.C. LIBRARY PROGRAM NAME: STAT21

REM 5/27/70

REM DESCRIPTION--COMPUTES ONE OR MORE MULTIPLE LINEAR

REM REGRESSIONS ON A BATCH OF DATA.

REM

SOURCE--REVISED 11/16/67 BY PROF. GERALD CHILDS.

REM

REM INSTRUCTIONS--PLACE DATA IN LINE 1960 AND FOLLOWING.

REM FIRST DATA IS N (NUMBER OF DATA SETS OR OBSERVATIONS).

REM THEN V (NUMBER OF VARIABLES IN DATA BATCH), THEN G

REM (NUMBER OF REGRESSIONS TO BE PERFORMED), THEN ENTER THE

REM DATA BY THE DATA SET, THAT IS ENTER FIRST THE VALUES FOR

REM ALL VARIABLES AT OBSERVATION 1, THEN THE VALUES FOR THE

REM VARIABLES FOR OBSERVATION 2, ETC. VARIABLES MAY BE

REM ENTERED IN ANY ORDER, BUT THE ORDER MUST BE THE SAME FOR EACH

REM DATA SET. THE POSITION OF A VARIABLE IN ENTERING THE DATA IS

REM THE INDEX OF THE VARIABLE. THUS, IF THERE ARE 4 VARIABLES

REM ENTERED IN ORDER X, Y, Z, W THE INDEX OF Z IS 3. NEXT,

REM FOR EACH REGRESSION ENTER (IN ORDER) H (THE NUMBER OF THE

REM REGRESSION), THEN K (TOTAL NUMBER OF INDEPENDENT VARIABLES

REM ** ** ** ** ** ** ** MAIN PROGRAM ** ** ** ** ** ** ** **

REM X(4, 4), A(4, 4), D(9, 4), Y(4), M(4), S(4)

REM T(4), B(4), U(4, 4), R(4, 4), C(4, 4), O(9), E(4)

REM READ N, V, G

REM MAT READ D(N, V)

REM FOR I = 1 TO N

REM FOR J = 1 TO V

REM READ D(I, J)

REM NEXT J

REM NEXT I

REM FOR I=1 TO N

REM LET D(I, 0) = 1

REM NEXT I

REM READ H, K, P1, P2

REM LET M = K + 1

REM MAT READ E(M)

REM FOR Z = 1 TO M

REM READ E(Z)

REM NEXT Z

REM PRINT "**REGRESSION NUMBER"H";DEPENDENT VARIABLE IS"E(M)

REM PRINT

REM IF H>1 THEN 700

REM FOR I=0 TO V

REM FOR J=0 TO V

REM LET X=0

REM FOR L=1 TO N

REM LET X=X+D(L, I)*D(L, J)

REM NEXT L

REM LET X(I, J)=X

REM LET C(I, J)=X

REM NEXT J

REM LET T(I)=X(O, I)/X(O, O)

REM LET B(I)=O

REM IF I=0 THEN 690

REM LET B(I)=SQR(X(I, I)/(N-1)-X(O, I)*X(O, I)/(N*(N-1)))

REM NEXT I

REM PRINT "INDEX", "MEANS", "STANDARD DEVIATIONS"
FOR I=1 TO M
LET M(I)=X(E(I))
LET S(I)=B(E(I))
PRINT E(I), M(I), S(I)
NEXT I
PRINT
PRINT "CORRELATION COEFFICIENTS"
IF H>1 THEN 850
FOR I=1 TO V
FOR J=1 TO V
LET R(I,J)=(N*X(I,J)-X(O,I)*X(O,J))/(N*(N-1)*B(I)*B(J))
NEXT J
NEXT I
FOR I=1 TO M
FOR J=1 TO M
LET U(I,J)=R(E(I),E(J))
PRINT U(I,J),
NEXT J
NEXT I
PRINT
PRINT
NEXT I
PRINT
NEXT I
LET E(0)=0
FOR I=0 TO K
LET Y(I)=C(E(I),E(M))
FOR J=0 TO K
LET X(I,J)=C(E(I),E(J))
NEXT J
NEXT I
PRINT
FOR I=0 TO K
IF X(I,I)<1E-6 THEN 1840
LET Y(I)=Y(I)/X(I,I)
FOR J=0 TO K
LET A(I,J)=A(I,J)/X(I,I)
IF J=I THEN 1160
LET X(I,J)=X(I,J)/X(I,I)
NEXT J
NEXT I
LET X(I,I)=1
FOR L=0 TO K
IF L=I THEN 1270
LET Y(L)=Y(L)-X(L,I)*Y(I)
FOR J=0 TO K
LET A(L,J)=A(L,J)-X(L,I)*A(I,J)
IF J=I THEN 1250
LET X(L,J)=X(L,J)-X(L,I)*X(I,J)
NEXT J
NEXT L
NEXT I
1290 LET S6=C(E(M),E(M))
1300 FOR I=0 TO K
1310 LET S6=S6-Y(I)*C(E(I),E(M))
1320 NEXT I
1330 LET S7=S6/(N-M)
1340 LET R2=1-S7/(S(M)*S(M))
1350 LET R=SOR(R2)
1360 LET S8=SOR(S7)
1370 IF P1=0 THEN 1390
1380 PRINT "VARIANCE-COVARIANCE MATRIX"
1390 FOR I=0 TO K
1400 FOR J=0 TO K
1410 LET A(I,J)=A(I,J)*S7
1420 IF P1=0 THEN 1440
1430 PRINT A(I,J),
1440 NEXT J
1450 IF P1=0 THEN 1460
1460 PRINT
1470 PRINT
1480 NEXT I
1490 PRINT
1500 PRINT "INDEX", "B", "STD. ERR0R", "T-RATIO"
1510 FOR I=0 TO K
1520 PRINT E(I), Y(I), SOR(A(I,I)), Y(I)/SOR(A(I,I))
1530 NEXT I
1540 PRINT
1550 PRINT "R-SQUARED=" R2, "R=" R
1560 PRINT
1570 PRINT "STAND. ERR0R OF EST.="; S8, "D.F.="; (N-M)
1580 PRINT
1590 FOR I=1 TO N
1600 LET Z=D(I,E(M))-Y(I)
1610 FOR J=1 TO K
1620 LET Z=Z-Y(J)*D(I,E(J))
1630 NEXT J
1640 LET Q(I)=Z
1650 NEXT I
1660 LET W=0
1670 FOR I=2 TO N
1680 LET W=W+(Q(I)-Q(I-1))*(Q(I)-Q(I-1))
1690 NEXT I
1700 PRINT
1710 IF P2=0 THEN 1780
1720 PRINT "ACTUAL", "PREDICTED", "RESIDUAL"
1730 LET I = 0
1740 LET I = I + 1
1750 PRINT D(I,E(M)), D(I,E(M))-Q(I), Q(I)
1760 IF I = N THEN 1780
1770 G0 TO 1740
1780 PRINT
1790 PRINT "DURBIN-WATSON STAT.=" W/S6
1800 IF H<6 THEN 1820
1810 G0 TO 1850
1820 PRINT
1830 G0 TO 500
1840 PRINT "CORRELATION MATRIX BECOMING SINGULAR"
1850 PRINT
1860 PRINT "*****PROBLEM COMPLETED*****"
1870 ST0P
1940 DATA 9, 4, 4
1950 DATA 24769, 34181, 35516, 29566
1952 DATA 34181, 35516, 29566, 37009
1954 DATA 35516, 29566, 37009, 34542
1956 DATA 29566, 37009, 34542, 41485
1958 DATA 37007, 34542, 41485, 49972
1960 DATA 9, 4, 4
1961 DATA 24769, 34181, 35516, 29566
1962 DATA 34181, 35516, 29566, 37009
1963 DATA 35516, 29566, 37009, 34542
1964 DATA 29566, 37009, 34542, 41485
1965 DATA 37007, 34542, 41485, 49972
1966 DATA 34542, 41485, 49972, 53944
1967 DATA 41485, 49972, 53944, 47062
1968 DATA 49972, 53944, 47062, 47284
1969 DATA 53944, 47062, 47284, 57765
1970 DATA 1, 1, 1, 1
1972 DATA 3, 4
1974 DATA 2, 2, 1, 0
1980 DATA 1, 3, 4
1982 DATA 3, 3, 0, 1
1984 DATA 1, 2, 3, 4
1990 DATA 4, 1, 0, 0
1992 DATA 4, 3
2046 END

READY
1' BERKSHIRE COMMUNITY COLLEGE USER PROGRAM LIBRARY
2' MODIFIED VERSION OF DARTMOUTH STATISTICS PROGRAM
3' DARTMOUTH PROGRAM NAME: R-X-C***
4' MODIFIED: JULY 2 1970
5' 6' B.C.C. LIBRARY PROGRAM NAME: RXC
7' 8' DESCRIPTION-- ANALYSIS OF TABLE WITH R ROWS AND C COLUMNS
9' 10' SOURCE-- UNKNOWN
11' 12' INSTRUCTIONS-- TYPE RUN FOR INSTRUCTIONS.
13' 14'
15' 16'
70 READ T
75 DATA 8
80 DIM O(6),H(6)
85 DIM D(6,6),E(36),F(6,6),R(6),C(6),S(6,6)
90 DIM Q(6),U(6)
95 PRINT "HOW MANY ROWS DOES YOUR TABLE HAVE?"
100 INPUT A
105 IF A>6 THEN 125
110 PRINT "COLUMNS;"
115 INPUT B
120 IF B<=6 THEN 140
125 PRINT "THIS PROGRAM WILL NOT ACCOMMODATE A TABLE LARGER THAN"
130 PRINT "6 X 6. RE-ENTER NUMBER OF ROWS"
135 GOTO 100
140 PRINT "PLEASE TYPE IN YOUR DATA."
144 PRINT "ENTER TABLE BY ROW, ONE ENTRY PER LINE."
145 FOR I = 1 TO A*B
146 INPUT E(I)
147 NEXT I
150 PRINT
155 PRINT
160 PRINT
165 PRINT
170 PRINT
175 LET N = A*B
180 IF N=(A*B) THEN 200
185 PRINT "YOU HAVE NOT ENTERED THE DATA CORRECTLY, BUT THAT'S"
190 PRINT "ALL RIGHT, CHIEF, JUST TRY AGAIN."
195 GOTO 145
200 PRINT "YOUR ";A;"X";B;"TABLE:";
205 PRINT
210 FOR I = 1 TO A
215 FOR J = 1 TO B
220 LET R(I) = 0
221 LET C(J) = 0
225 NEXT J
230 NEXT I
235 LET N = 0
240 FOR I = 1 TO A
245 FOR J = 1 TO B
250 LET D(I, J) = E((I-1)*B + J)
255 LET R(I) = R(I) + D(I, J)
260 LET C(J) = C(J) + D(I, J)
265 LET N = N + D(I, J)
270 PRINT D(I, J); TAB(J*T); 
275 NEXT J
280 PRINT ";: ";R(I)
285 NEXT I
290 FOR I = 1 TO ((B*T + 13)/2)
295 PRINT ";: ";
300 NEXT I
305 PRINT
310 FOR J = 1 TO B
315 PRINT C(J); TAB(J*T);
320 NEXT J
325 PRINT ";: ";N
330 PRINT
335 PRINT
340 PRINT "IS THIS DATA TABLE CORRECT";
345 INPUT A$
350 IF A$ = "N0" THEN 370
355 IF A$ = "YES" THEN 380
360 PRINT "WHAT";
365 G0 TO 345
370 PRINT "THEN TYPE THE TABLE IN AGAIN"
375 GOTO 144
380 FOR I = 1 TO A
385 FOR J = 1 TO B
390 LET F(I, J) = R(I)*C(J)/N
395 LET S(I, J) = (D(I, J) - F(I, J))/2/F(I, J)
400 LET C2 = C2 + S(I, J)
405 NEXT J
410 NEXT I
415 LET G1 = C2
420 LET M = (A-1)*(B-1)
425 LET G = G1/M
430 LET P = 1
435 LET N9 = 1000
440 IF G < 1 THEN 465
445 LET A9 = M
450 LET B9 = N9
455 LET F = G
460 G0 TO 480
465 LET A9 = N9
470 LET B9 = M
475 LET F = 1/G
480 LET A1 = 2/(9*A9)
485 LET B1 = 2/(9*B9)
490 LET Z = ABS((1-B1)*Ft(.333333)-1+A1)
495 LET Z = Z/SQRT(B1+Ft(.666667)+A1)
500 IF B < 4 THEN 520
505 LET P=(1+Z*(.196854+Z*(-.115194+Z*(-.000344+Z*(-.019527)))))+4
510 LET P = .5/P
515 G0 TO 530
520 LET Z = Z*(1 + .03*Z+B/3)
525 G0 TO 505
530 IF G < 1 THEN 540
535 G0 TO 545
LET P = 1-P
LET P1 = INT(10000*P)/10000
IF P1 = 0 THEN 565
PRINT
GO TO 590
PRINT "THE SIGNIFICANCE LEVEL IS LESS THAN .0001. THIS IS"
PRINT "MUCH RARER THAN HEN'S TEETH IN RANDOM NUMBERS."
PRINT "IN FACT, YOU MIGHT SAY RARER THAN RUM'S TEETH IN"
PRINT "RANDOM NUMBERS!"
GO TO 715
PRINT "THE SIGNIFICANCE LEVEL IS", P1
PRINT
LET P = P1
IF P > .1 THEN 635
IF P > .05 THEN 685
IF P > .01 THEN 695
IF P > .001 THEN 705
PRINT "P < .0R = .001. RARER THAN HEN'S TEETH IN RANDOM NUMBERS!"
GO TO 715
PRINT "P > .10. GET MORE CASES OR FORGET IT."
PRINT "DO YOU WANT MORE OUTPUT (PERCENTAGE TABLES, GAMMA, ETC.)?"
INPUT AS
IF A$ = "NO" THEN 1640
IF A$ = "YES" THEN 670
PRINT "WHAT?"
GO TO 645
PRINT "G.O. HERE GOES, BUT I WOULDN'T GIVE YOU TWO CENTS FOR IT."
GO TO 715
AS TO 715
PRINT ".10 >= P > .05. BORDERLINE. ONE IN 11 ISN'T ALL THAT RARE"
GO TO 715
PRINT ".05 >= P > .01. MOST PEOPLE WOULD BUY 20 TO 1 ODDS."
GO TO 715
PRINT ".01 . P > .001. YOU DON'T SEE MANY LIKE THAT WITH"
PRINT "RANDOM NUMBERS."
PRINT
PRINT "WOULD YOU LIKE TO KNOW THE ABSOLUTE VALUE OF CHI-SQUARE?"
INPUT AS
IF A$ = "YES" THEN 755
IF A$ = "NO" THEN 775
PRINT "COME ON, YES OR NO?"
GO TO 730
PRINT
GO SUB 1665
PRINT TAB(9)
PRINT "CHI-SQUARE IS ";ABS(C2);" WITH ";(A-1)*(B-1);"D.F."
PRINT
PRINT
PRINT "DO YOU WANT THE PERCENTAGE TABLE?"
INPUT AS
IF A$ = "NO" THEN 1065
PRINT "TYPE 'H' IF YOU WANT IT DONE HORIZONTALLY, 'V' IF" PRINT "VERTICALLY, AND 'B' IF BOTH."
INPUT AS
IF A$ = "H" THEN 940
IF A$ = "V" THEN 845
IF A$ = "B" THEN 845
PRINT "WHAT?"
GO TO 810
840 GO TO 810
22
845 PRINT " VERTICAL PERCENTAGE TABLE"
850 PRINT
855 FOR I = 1 TO A
860 FOR J = 1 TO B
865 LET UI = INT(1000*(D(I,J)/C(J))+.5)/10
870 LET U(J) = U(J) + UI
875 PRINT UI;TAB(J*T);
880 NEXT J
885 PRINT ": "; INT(1000*R(I)/N+.5)/10
890 LET V = V + INT(1000*R(I)/N +.5)/10
895 NEXT I
900 FOR I = 1 TO ((B*T + 13)/2)
905 PRINT ", ";
910 NEXT I
915 PRINT
920 FOR J = 1 TO B
925 PRINT U(J);" ";TAB(J*T);
930 NEXT J
935 GO TO 945
940 GO TO 960
945 PRINT "; "; V; " ";
950 PRINT
955 I
F AS = "V" THEN 1065
960 PRINT " HORIZONTAL PERCENTAGE TABLE"
965 PRINT
970 FOR I = 1 TO A
975 FOR J = 1 TO B
980 LET T1 = INT(1000*(D(I,J)/R(I))+.5)/10
985 LET Q(I)= Q(I) + T1
990 PRINT T1;TAB(J*T);
995 NEXT J
1000 PRINT "; "; Q(I); " ";
1005 NEXT I
1010 FOR I = 1 TO ((B*T + 13)/2)
1015 PRINT ", ";
1020 NEXT I
1025 PRINT
1030 FOR J = 1 TO B
1035 LET H5=INT(1000*(C(J)/N)+.5)/10
1040 LET W6 = W6 + H5
1045 PRINT H5; TAB(J*T);
1050 NEXT J
1055 PRINT "; "; W6; " ";
1060 PRINT
1065 PRINT
1070 PRINT
1075 PRINT
1080 PRINT " DO YOU WANT THE EXPECTED CELL VALUES"
1085 INPUT AS
1090 IF AS = "NO" THEN 1220
1095 IF AS = "YES" THEN 1110
1100 PRINT " WHAT"
1105 GO TO 1035
1110 PRINT
1115 PRINT TAB(5);"EXPECTED CELL VALUES"
1120 PRINT
1125 PRINT
1130 FOR I = 1 TO A
1135 FOR J = 1 TO B
1140 PRINT INT(100*F(I,J)+.5)/100;TAB(J*T);
1145 LET H(I) = H(I) + INT(100*F(I,J) + 5)/100
1150 LET Q(J) = Q(J) + INT(100*F(I,J) + 5)/100
1155 NEXT J
1160 PRINT "": "; H(I)
1165 NEXT I
1170 FOR I = 1 TO ((B*T + 13)/2)
1175 PRINT """;
1180 NEXT I
1185 PRINT
1190 FOR J = 1 TO B
1195 PRINT Q(J); TAB(J*T);)
1200 NEXT J
1205 PRINT "": "; N
1210 PRINT
1215 PRINT
1220 PRINT
1225 PRINT
1230 PRINT "DO YOU WANT THE DIFFERENCE BETWEEN THE OBSERVED VALUE"
1235 PRINT "AND THE EXPECTED VALUE FOR EACH CELL";
1240 INPUT AS
1245 IF AS = "YES" THEN 1265
1250 IF AS = "NO" THEN 1355
1255 PRINT "WHAT";
1260 G0 TO 1240
1265 PRINT
1270 PRINT
1275 PRINT
1280 PRINT
1285 PRINT "OBSERVED VALUE MINUS EXPECTED VALUE"
1290 PRINT
1295 FOR I = 1 TO A
1300 FOR J = 1 TO B
1305 PRINT INT(100*Q(I,J) - F(I,J))/100; TAB(J*T);)
1310 NEXT J
1315 PRINT """
1320 NEXT I
1325 FOR I = 1 TO ((B*T + 7)/2)
1330 PRINT """;
1335 NEXT I
1340 PRINT
1345 PRINT TAB(B*T);"""
1350 PRINT
1355 PRINT
1360 PRINT
1365 PRINT
1370 PRINT
1375 PRINT "ARE BOTH THE ROW AND COLUMN SCALES ORDINAL";
1380 INPUT AS
1385 IF AS = "NO" THEN 1650
1390 IF AS = "YES" THEN 1405
1395 PRINT "WHAT";
1400 G0 TO 1360
1405 PRINT "DO YOU WANT TO KNOW GAMMA";
1410 INPUT AS
1415 IF AS = "NO" THEN 1595
1420 IF AS = "YES" THEN 1440
1425 PRINT "WHAT DID YOU SAY"
1430 PRINT "PLEASE TYPE 'YES' OR 'NO'"
1435 G0 TO 1410
1440 LET G1 = 0
1445 FOR I = 1 TO (A - 1)
1450 FOR J = 1 TO (B - 1)
1455 LET X = 0
1460 FOR K = (I+1) TO A
1465 FOR L = (J+1) TO B
1470 LET X = X + D(K,L)
1475 NEXT L
1480 NEXT K
1485 LET G1 = G1 + (D(I,J)*X)
1490 NEXT J
1495 NEXT I
1500 LET G2 = 0
1505 FOR I = 1 TO (A-1)
1510 FOR J = B TO 2 STEP -1
1515 LET X = 0
1520 FOR K = (I+1) TO A
1525 FOR L = (J-1) TO 1 STEP -1
1530 LET X = X + D(K,L)
1535 NEXT L
1540 NEXT K
1545 LET G2 = G2 + (D(I,J)*X)
1550 NEXT J
1555 NEXT I
1560 LET G9 = (G1-G2) / (G1+G2)
1565 PRINT
1570 G0SUB 1665
1575 PRINT TAB(20);"GAMMA IS "; -INT(10000*G9)/10000
1580 PRINT
1585 PRINT
1590 G0 TO 1600
1595 PRINT "TSK-TSK. NO INTELLECTUAL CURIOUSITY."
1600 PRINT "ARE BOTH THE ROWS AND THE COLUMNS INTERVAL SCALES?"
1605 INPUT AS
1610 IF AS = "NO" THEN 1660
1615 IF AS = "YES" THEN 1630
1620 PRINT "HOW'S THAT AGAIN? A SIMPLE 'YES' OR 'NO' WILL SUFFICE."
1625 G0 TO 1605
1630 PRINT "HAVE YOU CONSIDERED PRODUCT MOMENT CORRELATIONS? I"
1635 PRINT "CAN'T DO THEM, BUT THERE ARE OTHER PROGRAMS WHICH CAN."
1640 PRINT "SO LONG."
1645 STOP
1650 PRINT "THAT'S ALL I CAN DO FOR YOU. BYE-BYE."
1655 STOP
1660 PRINT "THEY AREN'T? THEN I'LL BE SHOWING ALONG. GOOD-BY."
1665 FOR I = 0 TO 9
1670 PRINT " "
1675 NEXT I
1685 REM
1690 REM
1695 RESTORE
1700 REM
1705 END

READY
BERKSHIRE COMMUNITY COLLEGE USER PROGRAM LIBRARY
MODIFIED VERSION OF DARTMOUTH COLLEGE STATISTICS PROGRAM
DARTMOUTH PROGRAM NAME: CORREL***
MODIFIED: JULY 2 1970
B.C.C. LIBRARY PROGRAM NAME: CORREL
DESCRIPTION--COMPUTES A CORRELATION COEFFICIENT
SOURCE--UNKNOWN
INSTRUCTIONS--THE DATA CONSISTS OF N SETS OF NUMBERS.
EACH SET CONSISTS OF TWO ELEMENTS, X AND Y. N IS
ENTERED AS DATA IN LINE 900. IN LINE 910 AND FOLLOWING
ENTER DATA ALTERNATING X AND Y VALUES. SAMPLE DATA
ARE IN LINES 900-910.
* * * * * * MAIN PROGRAM * * * * * * * *
READ N
FOR I = 1 TO N
READ X, Y
LET S1 = S1 + X
LET S2 = S2 + Y
LET S3 = S3 + X*Y
LET S4 = S4 + X*X
LET S5 = S5 + Y*Y
NEXT I
PRINT "THE CORRELATION COEFFICIENT = ";
LET A = N*S3 - S1*S2
LET B = SQRT((N*S4 - S1*2)*(N*S5 - S2*2))
LET A = INT(A/B*1000+.5)/1000
PRINT A
DATA 5
DATA 1,5,2,3,0,4,-5,5,-11
END
READY