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DECUS NO.	FOCAL8-138
TITLE	WCXT: THE WILCOXON MATCHED-PAIRS SIGNED RANKS TEST FOR NON PARAMETRIC DATA
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SOURCE LANGUAGE	FOCAL

OPERATING THE PROGRAM:-

LOADING;
FIRST LOAD FOCAL-8, THEN LOAD WCXT VIA THE TELETYPE,HIGH SPEED READER, OR DISK-MONITOR SYSTEM IN THE NORMALØWAY.

NOTE: THE EXTENDED FUNCTIONS SHOULD BE DELETED FOR THIS PROGRAM.

PROCEDURE;
TYPE "G RETURN" TO START THE PROGRAM.

A) PROGRAM ASKS FOR 'N', THE NUMBER OF X,Y PAIRS.

ENTER ALL DATA WITH' SPACE ' .

B) A TABLE IS NOW PRODUCED, WITH THE USER ENTERING THE VALUES FOR X AND Y, EACH ROW BEING ASSIGNED A NUMBER,'I' BY THE PROGRAM.

C) WHEN 'N' PAIRS HAVE BEEN ENTERED,PROGRAM ASKS IF THE DATA IS OK.

IF ALL VALUES ARE CORRECT, ANSWER Y.

IF A CORRECTION IS TO BE MADE TYPE N,WHEN THE PROGRAM ASKS THE ROW NUMBER , 'I', TO BE CORRECTED. ENTER I THEN ENTER THE CORRECT X AND Y (BOTH MUST BE ENTERED). OK? IS REPEATED UNTIL Y IS ANSWERED.

D) THE PROGRAM NOW COMMENCES RANKING THE DIFFERENCES IN ASCENDING ORDER.

NOTE; IN A BAD CASE, FOR EXAMPLE, 68 PAIRS WHOSE DIFFERENCES ARE IN DESCENDING ORDER THE RANKING CAN TAKE UP TO FIVE MINUTES, PERHAPS GIVING THE IMPRESSION THAT THE PROGRAM HAS GOT HUNG UP.

E) THE RESULTING TYPOUT WILL BE ONE OF THE FOLLOWING.

1)NEGS SMALLER: T=XXXXX (SP =XXXX N=XX

T IS THE SUM OF THE 'NEGATIVE RANKS'
SP IS THE SUM OF THE POSITIVE RANKS,GIVEN AS A CHECK.
N IS THE NUMBER OF DIFFERENCES ANALYSED,(THIS MAY BE LESS THAN N AS ENTERED.

2)POSV SMALLER: T=XXXXX (SN = XXXX N=XX
T IS THE SUM OF THE POSITIVE RANKS, ETC....

3)NEG AND POSV EQUAL: SP=XXXX SN=XXXX N=XX
IN THIS CASE BOTH SUMS ARE EQUAL.

4)ALL PAIRS EQUAL
ALL THE X'S WERE EQUAL TO THEIR RESPECTIVE Y'S GIVING ALL DIFFERENCES AS ZERO,AN UNLIKELY SITUATION

AFTER TYPING THE RESULTS, THE PROGRAM RESTARTS,AND AWAITS THE NEXT VALUE FOR 'N'.

WCXT: THE WILCOXON MATCHED-PAIRS SIGNED RANKS TEST FOR NON PARAMETRIC DATA

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WCXT

DESCRIPTION:-

THIS PROGRAM CARRIES OUT THE "WILCOXON MATCHED-PAIRS SIGNED RANKS TEST FOR NON PARAMETRIC DATA".

EACH VALUE OF X IS SUBTRACTED FROM THE CORRESPONDING VALUE OF Y,THE DIFFERENCES BEING STORED TOGETHER WITH THEIR SIGN. THE DIFFERENCES ARE THEN RANKED IN ASCENDING ORDER OF MAGNITUDE, REGARDLESS OF SIGN.THE SIGN OF EACH DIFFERENCE IS THEN GIVEN TO ITS RANKING INTEGER.

FINALLY,THE "POSITIVE" AND "NEGATIVE RANKS ARE SUMMED SEPARATELY,AND THE SUMS COMPARED. THE SMALLER OF THE TWO SUMS, TOGETHER WITH "N",(THE NUMBER OF PAIRS ANALYSED),ARE USED TO TEST FOR SIGNIFICANCE.IF N IS 25 OR LESS THIS CAN BE DONE USING THE STANDARD TABLE OF CRITICAL VALUES OF T FOR THE WILCOXON TEST.IF N IS GREATER THAN 25,A VALUE OF Z MUST BE CALCULATED FOR USE AS AN OBSERVED VALUE IN THE NORMAL DISTRIBUTION OF T.

BOTH THE ABOVE TABLES AND FORMULA WILL BE FOUND IN STANDARD WORKS.

TIES BETWEEN THE VALUES OF X AND Y,GIVING A DIFFERENCE OF ZERO,ARE DROPPED FROM THE ANALYSIS,"N" BEING ADJUSTED ACCORDINGLY.

TIES FOR RANK ORDER ARE ALL ASSIGNED THE AVERAGE OF THE RANKS THAT WOULD HAVE BEEN ASSIGNED IN THE ABSENCE OF TIES.

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C-FOCAL,1969

01.05 T !,"WILCOXON T",!!
01.07 E
01.10 A "N",N,!!;S M=N;T "        X      Y",!!
01.20 F I=1,N;T %2.0,"I"I;T %4.2;A "  "X,"    "Y,!;S D(I)=Y-X
01.24 A "OK",A;I (A-0Y)1.25,1.29
01.25 A !"I?",I;
01.26 A "      X?",X,"    Y?",Y;S D(I)=Y-X;G 1.24
01.29 T !
01.30 S X=0;F I=1,N;D 2
01.33 I (X)1.3
01.35 S T=0
01.40 F I=1,N-1; S K=I+1;D 3
01.50 I (T)1.35,1.6
01.60 F I=1,N-1;S K=I+1;S Y=2;D 4
01.70 D 6;T %2.0, "N",N,!!!!
01.80 G 1.07

02.05 I (I-N)2.1,2.1
02.06 R
02.10 I (D<I>)2.5,2.3,2.5
02.30 S N=N-1
02.40 F T=I,N;S K=T+1;S D(T)=D(K);
02.45 S X=-1
02.50 C

03.10 I (FABS<D[I]>-FABS<D[K]>)3.2,3.2,3.3
03.20 G 3.4
03.30 S H=D(I);S D(I)=D(K);S D(K)=H;S T=-1
03.40 C

04.10 I (FABS<D[I]>-FABS<D[K]>)4.2,4.25,4.2
04.20 S D(I)=I*FSGN(D<I>);S H=I;DO 5;G 4.7
04.25 S J=K
04.30 S J=J+1;I (N-J)4.5,4.4,4.4
04.40 I (FABS<D[K]>-FABS<D[J]>)4.5,4.3,4.5
04.50 F C=I,J-1;S D(C)=((I+J-1)/Y)*FSGN(D<C>);S H=C;D 5
04.60 S I=J-1;I (J-N)4.9,4.65,4.9
04.65 S K=J;G 4.8
04.70 I (K-N)4.9,4.8,4.8
04.80 S D(K)=K*FSGN(D<K>);S H=K;D 5
04.90 C

05.10 I (D<H>)5.2,5.4,5.3
05.20 S SN=SN+FABS(D<H>);G 5.5
05.30 S SP=SP+D<H>;G 5.5
05.40 T "PROGRAM ERROR";Q
05.50 C

06.05 I (N)5.4,6.5,6.1
06.10 I (SN-SP)6.2,6.4,6.3
06.20 T "NEGS SMALLER:    T",SN,"      ","(SP  ",SP,"     ";R
06.30 T "POSV SMALLER:    T",SP,"      ","(SN  ",SN,"     ";R
06.40 T "NEG AND POSV EQUAL:  SUMS:",SP,"      ";R
06.50 T "ALL PAIRS EQUAL";Q
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