

DECUS NO.

FOCAL8-96

TITLE

STATISTICS - STANDARD DEVIATION

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SOURCE LANGUAGE

FOCAL

STATISTICS - STANDARD DEVIATION

DECUS Program Library Write-up

DECUS No. FOCAL8-96

DESCRIPTION

Accepts any number of data values from the keyboard or from paper tape, computes and prints out mean, variance, standard deviation, coefficient of variation, maximum data value, minimum data value, and number of data points.

OPTIONS

- 1. Loading only first section of program tape sets up for keyboard entry.
- 2. Paper tape input via high speed reader is possible by loading first and second sections of program tape.

ERROR CORRECTIONS

- 1. If an error is discovered during keyboard entry <u>before</u> a space or carriage return has been entered, a back arrow (—) (shift 0) erases the entire entry back to the colon. The correct value may then be entered.
- 2. If an error is discovered during keyboard entry after a space or carriage return has been entered, but before the next value has been entered, the instruction "IERR" may be entered instead of the next value. This recalls the previous value and allows it to be changed.
- 3. After all data has been entered, the program allows one final means of error correction. Before the data is processed it asks "NO. OF UNCORRECTED ERRORS." If none, enter \emptyset . If errors exist, enter the number of errors to be corrected.

NOTE: This is the only means of correcting errors when data is input via paper tape.

OPERATING INSTRUCTIONS

NOTE: If you wish to identify the information, type "C," then the title (see examples).

- Load FOCAL. W(8/68), rejecting the extended functions.
- 2. Load program tape in accordance with the options desired.
- 3. Type "GO."
- 4. Enter data values; enter "Ø" (zero) when all values have been entered.
- 5. In response to "NO. OF UNCORRECTED ERRORS?", enter the number requiring correction (zero or a carriage return if none), then enter the incorrect and correct values as requested.

NOTE: If error correction results in changing the maximum or minimum values to lower or higher values respectively, a caution note will be printed next to the value.

GENERAL INFORMATION AND COMMENTS

1. Equations used:

$$Mean = \frac{\sum_{i=1}^{N} Y_i^1}{N}$$

Variance =
$$\sum_{i=1}^{N} (Y_i - \overline{Y})^2 = \frac{\sum Y^2}{N} - \left(\frac{\sum Y}{N}\right)^2$$

Standard Deviation = Variance

Coefficient of Variation = $\frac{\text{Standard Deviation}}{\text{Mean}}$ (not defined if Mean= \emptyset

SAMPLE PROGRAMS

*C 1) DEMONSTRATION OF KEYBOARD ENTRY OF DATA

*

*GO

ENTER VALUES

:1.4563 :1.4571 :1.4566 : 1.4578 :1.4533

:1.457Ø :1.4559 :Ø

NO. OF UNCORRECTED ERRORS :Ø

 MEAN =
 1.4563

 VARIANCE =
 Ø.ØØØØ

 STANDARD DEVIATION =
 Ø.ØØ21

 COEFF. OF VARIATION =
 Ø.ØØ14

 NO. OF VALUES =
 7

 MAXIMUM =
 1.4578ØØØ

 MINIMUM =
 1.4533ØØØ

```
*C 2) DEMONSTRATION OF TAPE ENTRY OF DATA VIA HIGH SPEED READER
*GO
TAPE READY:
:::::
::
NO. OF UNCORRECTED ERRORS :Ø
                                  1.4563
              MEAN =
                                  ø.øøøø
          VARIANCE =
STANDARD DEVIATION =
                                  Ø.ØØ21
                                  Ø.ØØ14
COEFF. OF VARIATION =
                                  7
     NO. OF VALUES =
                              1.4578ØØØ
          MAXIMUM =
                              1.4533ØØØ
           MINIMUM =
*C 3) DEMONSTRATION OF ERROR CORRECTION-TAPE INPUT
TAPE READY:
:::::
::
NO. OF UNCORRECTED ERRORS:1
INCORRECT VALUE: 1.4599
  CORRECT VALUE: 1.4559
                                  1.4563
              MEAN =
                                  ø.øøøø
          VARIANCE =
STANDARD DEVIATION =
                                 Ø.ØØ21
                                  Ø.ØØ14
COEFF. OF VARIATION =
```

1.4533ØØØ

1.4559ØØØ**CAUTION**CHANGED DURING CORRECTIONS

NO. OF VALUES =

= MUMIXAM

MINIMUM =

*C 4) DEMONSTRATION OF ERROR CORRECTION-KEYBOARD ENTRY

*GO

ENTER VALUES

:1.4563 :1.457∅ ←1.4571 :1.4566 :1.4533 :1.4579

:1ERR

DELETED- 1.4579ØØ

ENTER CORRECT VALUE:1.45788 ←1.4578

:1.457Ø :1.4599 :Ø

NO. OF INCORRECTED ERRORS:1

INCORRECT VALUE:1.4599 CORRECT VALUE:1.4559

> MEAN = 1.4563 VARIANCE = Ø.ØØØ

STANDARD DEVIATION = $\emptyset.\emptyset\emptyset21$ COEFF. OF VARIATION = $\emptyset.\emptyset\emptyset14$

NO. OF VALUES = 7

MAXIMUM = 1.4559ØØØ**CAUTION**CHANGED DURING CORRECTIONS

MINIMUM = 1.4533000


```
PICKER LIBRARY PROGRAM S-1 12/19/69.
Ø1.Ø1 C
01.02 E
Ø1.Ø4 S
           MI=1E4Ø; S MA=-MIN; T !! "ENTER VALUES", !!!; S L=1
Ø1.Ø6 A
           Y: I (Y-1ERR)1. Ø8; T !! "DELETED-"H,!
           "ENTER CORRECT VALUE"H, !:; S L=Ø; G 1.Ø6
Ø1.Ø7 A
Ø1.Ø8 I
           (Y)1.09,3.01,1.09
Ø1.Ø9 I
           (H)1.1\emptyset, 1.33, 1.1\emptyset
           YS=YS+H; S Y2=Y2+H T 2; D 2; S N=N+1; S L=L+1; S H=Y
Ø1.1Ø S
Ø1.12 I
           (L-5)1.\emptyset6;T :;S L=\emptyset;G 1.\emptyset6
Ø1.14 S
           M=YS/N; S V=Y2/N-M \uparrow 2; T %8.04, !!!
                              MEAN = "M,"
Ø1.16 T
Ø1.17 T
                          VARIANCE = "V,!
Ø1.18 T
           " STANDARD DEVIATION = "FSQT(V), !
Ø1.19 T
           " COEFF. OF VARIATION = ";1 (M)1.30,1.31,1.30
Ø1.2Ø T
           %5,!"
                        NO. OF VALUES ="N,!
           %8.Ø8,"
                                  MAXIMUM = "MA; I (BF-1)1.22; D 1.32
Ø1.21 T
Ø1.22 T
           1 11
                            MINIMUM = "MI; I (LF-1)1.23; D 1.32
Ø1.23 T
           !!!;Q
Ø1.3Ø T
           FSQT<V>/M,;G 1.20
Ø1.31 T
           "NOT DEFINED, MEAN=0";G 1.20
           "**CAUTION**CHANGED DURING CORRECTIONS"
Ø1.32 T
Ø1.33 S
           H=Y;G 1.06
Ø2.Ø1 I
           (H-MA)2.\emptyset2, 2.\emptyset2; SMA=H
Ø2.Ø2 I
          (H-MI)2.Ø3;R
Ø2.Ø3 S
           MI≔H
Ø3.Ø1 D
           1.1\emptyset; A !!"NO. OF UNCORRECTED ERRORS "K;1 (K)3.\emptyset2,1.14;
Ø3.Ø2 F
           J=1, K; D 4
Ø3.Ø3 G
          1.14
Ø4.Ø1 A
           !"INCORRECT VALUE"I,!," CORRECT VALUE"C,!
Ø4.Ø2 S
           Y2=Y2-1 + 2+C + 2; S YS=YS-I+C
Ø4.Ø3 I
          (MIN-1)4.04,4.10;
Ø4.Ø4 i
          (MA-1)4.05, 4.12;
Ø4.Ø5 S
          H=C;D 2;R
Ø4.1Ø I
           (C-1)4.11;S LF=1
Ø4.11 S
          MI=C:G 4.Ø4
Ø4.12 I
           (I-C)4.13;S BF=1
Ø4.13 S
           MA=C:R
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C-FOCAL, 8/68
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Ø1.Ø1 C PICKER LIBRARY PROGRAM S-1A 12/19/69 (OVERLAY ON S-1)
Ø1.Ø4 S MI=1E4Ø;S MA=-MI;A ::TAPE READY"M
Ø1.Ø5 *
Ø1.Ø6 A Y
Ø1.Ø7

Ø3.Ø1 * D 1.1Ø;A::"NO. OF UNCORRECTED ERRORS "K;I (K)3.Ø2,1.14;
```