WEIGHTED VARIANCE

PURPOSE

Compute the weighted variance of a variable.

DESCRIPTION

The formula for the variance is:

\[ s^2 = \frac{\sum_{i=1}^{N} (x_i - \bar{x})^2}{N - 1} \]  

(EQ 2-23)

while the formula for the weighted variance is:

\[ s_w^2 = \frac{\sum_{i=1}^{N} w_i (x_i - \bar{x}_w)^2}{N - 1} \]

(EQ 2-24)

where \( w_i \) is the weight for the ith observation, \( N' \) is the number of non-zero weights, and \( \bar{x}_w \) is the weighted mean of the observations. Weighted variances are often used for frequency data.

SYNTAX

LET <par> = WEIGHTED VARIANCE <y> <SUBSET/EXCEPT/FOR qualification>

where <y> is a response variable;
<weights> is a variable containing the weights;
<par> is a parameter where the weighted variance is saved;
and where the <SUBSET/EXCEPT/FOR qualification> is optional.

EXAMPLES

LET VAR = WEIGHTED VARIANCE Y1 WEIGHT
LET VAR = WEIGHTED VARIANCE Y1 WEIGHT SUBSET TAG > 2

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

VARIANCE = Compute the variance of a variable.
WEIGHTED MEAN = Compute the weighted mean of a variable.
WEIGHTED STANDARD DEVI = Compute the weighted standard deviation of a variable.

APPLICATIONS

Data Analysis

IMPLEMENTATION DATE

94/11 (there was an error in the computation for earlier versions)

PROGRAM

LET Y = DATA 2 3 5 7 11 13 17 19 23
LET W = DATA 1 1 0 0 4 1 2 1 0
LET A = WEIGHTED VARIANCE Y W

The value 33.9 will be returned for the weighted variance.