VECTOR DISTANCE

PURPOSE

Compute the (Euclidean) distance between 2 vectors in R^d with real elements.

DESCRIPTION

The formula for the vector distancefor vectors Y1 and Y2 with components $Y1_i$ and $Y2_i$ respectively is:

$$D = \sqrt{\sum_{i=1}^{N} (Y1_i - Y2_i)^2}$$

(EQ 3-62)

SYNTAX

LET \<p> = VECTOR DISTANCE \<v1> \<v2>   \<SUBSET/EXCEPT/FOR/qualification>

where \<v1> is the variable containing the (real) elements of the first vector;

     \<v2> is the variable containing the (real) elements of the second vector;

     \<p> is a parameter where the computed distance is saved;

and where the \<SUBSET/EXCEPT/FOR qualification> is optional and rarely used in this context.

EXAMPLES

LET THETA = VECTOR DISTANCE Y1 Y2

NOTE 1

The vector (x1, x2, ... ,xn) represents the line sgment from the origin (0,0,...,0) to the point (x1, x2, ..., xn). That is, each element of the vector represents the corresponding value on the corresponding axis. Vectors are sometimes represented in terms of the unit coordinate vectors. For example, for the 3d case the vector x=(x1,x2,x3) can be written as $a=x_1 i + x_2 j + x_3 k$ where

     i = (1,0,0)   j = (0,1,0)   l = (0,0,1)

NOTE 2

Storagewise, a DATAPLOT "variable" and a mathematical "vector" are identical. The ordering of elements within a DATAPLOT variable is identical to the ordering of elements within a mathematical vector. Thus to store the vector with elements 4 11 37 8 19 in the variable Y, enter the following command (the READ and SERIAL READ commands can be used to store longer vectors):

LET Y = DATA 4 11 37 8 19

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

VECTOR ADDITION	=	Carries out a vector addition.
VECTOR SUBTRACTION	=	Carries out a vector subtraction.
VECTOR DOT PRODUCT	=	Computes a vector dot product.
VECTOR LENGTH	=	Computes the vector length.
VECTOR ANGLE	=	Computes the vector angle.
MATRIX EUCLIDEAN NORM	=	Computes the matrix euclidean norm.

APPLICATIONS

Mathematics

IMPLEMENTATION DATE

87/10

PROGRAM

LET Y1 = DATA 4 2 3 1 6
LET Y2 = DATA 1 2 4 6 3
LET A = VECTOR DISTANCE Y1 Y2; WRITE Y1 Y2 A