

VECTOR DOT PRODUCT**PURPOSE**

Compute the dot product (= inner product) of 2 vectors in R^d with real elements.

DESCRIPTION

The formula for the vector dot product for vectors v_1 and v_2 with components v_{1i} and v_{2i} respectively is:

$$v_1 \bullet v_2 = \sum_{i=1}^n v_{1i} v_{2i} \quad (\text{EQ 3-63})$$

SYNTAX

LET <p> = VECTOR DOT PRODUCT <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 the parameter whose value is the computed dot product of <v1> and <v2>;

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

EXAMPLES

LET DP = VECTOR DOT PRODUCT Y1 Y2

NOTE 1

The vector (x_1, x_2, \dots, x_n) represents the line segment from the origin $(0,0,\dots,0)$ to the point (x_1, x_2, \dots, x_n) . 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 $x=(x_1,x_2,x_3)$ can be written as $a=x_1i + x_2j + x_3k$ where

$$i = (1,0,0) \quad j = (0,1,0) \quad k = (0,0,1)$$

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

INNER PRODUCT for DOT PRODUCT

RELATED COMMANDS

VECTOR ADDITION	=	Carries out a vector addition.
VECTOR SUBTRACTION	=	Carries out a vector subtraction.
VECTOR CROSS PRODUCT	=	Computes a vector cross product.
VECTOR LENGTH	=	Computes the vector length.
VECTOR DISTANCE	=	Computes the vector distance.
VECTOR ANGLE	=	Computes the vector angle.

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 DOT PRODUCT Y1 Y2; WRITE Y1 Y2 A