## COMPLEX MULTIPLICATION

### PURPOSE
Carry out a complex multiplication (element-by-element) of 2 complex variables.

### DESCRIPTION
DATAPLOT stores all variables as reals. Complex variables are supported as a pair of real variables. That is, the pair Y1,Y2 of real variables can be thought of as the single complex variable Y1 + i*Y2 where i is the square root of -1.

Complex multiplication is defined by the following equation:

$$(a + bi)(c + di) = (ac - bd) + (ad + bc)i$$   **(EQ 3-28)**

### SYNTAX
LET <v5> <v6> = COMPLEX MULTIPLICATION <v1> <v2> <v3> <v4>       <SUBSET/EXCEPT/FOR qualification>

where <v1> and <v2> are the real and imaginary components of the first input variable;

<v3> and <v4> are the real and imaginary components of the second input variable;

<v5> and <v6> are the real and imaginary components of the output variable;

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

### EXAMPLES
LET Y5 Y6 = COMPLEX MULTIPLICATION Y1 Y2 Y3 Y4
LET E F = COMPLEX MULTIPLICATION A B C D SUBSET A > 8
LET E F = COMPLEX MULTIPLICATION A B C D FOR I = 1 1 3

### DEFAULT
None

### SYNONYMS
None

### RELATED COMMANDS

| | | |
|---|---|---|
| COMPLEX ADDITION | = | Carries out complex addition. |
| COMPLEX SUBTRACTION | = | Carries out complex subtraction. |
| COMPLEX DIVISION | = | Carries out complex division. |
| COMPLEX EXPONENTIATION | = | Carries out complex exponentiation. |
| COMPLEX SQUARE ROOT | = | Computes the complex square root. |
| COMPLEX CONJUGATE | = | Computes the complex conjugate. |
| COMPLEX ROOTS | = | Computes the complex roots. |
| COMPLEX CONJUGATE | = | Computes the complex conjugate. |
| POLYNOMIAL MULTIPLICATION | = | Carries out polynomial multiplication. |
| VECTOR DOT PRODUCT | = | Computes a vector dot product. |
| MATRIX MULTIPLICATION | = | Carries out a matrix multiplication. |

### APPLICATIONS
Mathematics

### IMPLEMENTATION DATE
87/10

### PROGRAM
READ X1 Y1 X2 Y2
1 2 3 4
3 5 2 1
2 2 4 3
END OF DATA
LET X3 Y3 = COMPLEX MULTIPLICATION X1 Y1 X2 Y2
SET WRITE DECIMALS 0
WRITE X1 Y1 X2 Y2 X3 Y3