ROOTS

PURPOSE
Determine the real roots of a function.

SYNTAX
LET <resp> = ROOTS <function> WRT <var> FOR <var> = <lower> <upper>

where <function> is the name of a previously defined function or a functional expression;

<var> is the variable for which the roots are being computed;

<lower> is a number or parameter defining the lower limit for finding roots;

<upper> is a number or parameter defining the upper limit for finding roots;

and   <resp> is a parameter where the computed roots are stored.

EXAMPLES
LET A = ROOTS X**2+2*X**2-4*X+5 WRT X FOR X = -10 10

LET A = ROOTS F1 WRT X FOR X = 0 B

NOTE 1
DATAPLOT uses an inward bracketing followed by bisection algorithm to find roots. The Numerical Recipes book listed in the REFERENCE gives a description of these methods (although DATAPLOT does not use their implementation).

NOTE 2
DATAPLOT assumes convergence when the ratio of the difference between two iterations in the root finding algorithm and the current value of the root is smaller than a specified cutoff (defaults to 0.000001). The ROOT ACCURACY command can be used to modify the value of the cutoff.

DEFAULT
None

SYNONYMS
None

RELATED COMMANDS
POLYNOMIAL ROOTS	=	Compute the real and complex roots of a polynomial.
DERIVATIVE	=	Compute the derivative of a function.
INTEGRAL	=	Compute the integral of a function.
ROOT ACCURACY	=	Specify the convergence limit for the ROOTS command.

REFERENCE
"A First Course in Numerical Analysis," 2nd ed., Ralston and Rabinowitz, 1978, McGraw-Hill.

"Numerical Recipes: The Art of Scientific Computing (FORTRAN Version)," Press, Flannery, Teukolsky, and Vetterling, Cambridge University Press, 1989 (chapter 9).

APPLICATIONS
Mathematics

IMPLEMENTATION DATE
Pre-1987

PROGRAM
LET FUNCTION F1 = X**3+2*X**2-4*X+5

LET A1 = ROOTS F1 WRT X FOR X = 0 10