INTEGRAL

PURPOSE

Compute a definite integral for a function or for the elements in a variable.

SYNTAX 1

LET <resp> = INTEGRAL <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 integral is being computed;
<lower> is a number or parameter defining the lower limit for the definite integral;
<upper> is a number or parameter defining the upper limit for the definite integral;
and <resp> is a parameter where the evaluated integral is stored.

This syntax is used to find the definite integral of a function. DATAPLOT uses Gaussian quadrature to compute the integral in this case.

SYNTAX 2

LET <par> = INTEGRAL <resp> <x> <SUBSET/EXCEPT/FOR qualification>
where <resp> is the name of a variable for which the integral is to be computed;
<x> is an optional horizontal axis variable (if not specified, equi-spaced horizontal values are used);
<par> is a parameter where the evaluated integral is stored;
and where the <SUBSET/EXCEPT/FOR qualification> is optional.

This syntax is used to find the definite integral of a set of discrete data points. DATAPLOT uses the trapezoid rule to compute the integral in this case.

EXAMPLES

```
LET A = INTEGRAL X**2+2*X**2-4*X+5 WRT X FOR X = 1 3
LET A = INTEGRAL F1 WRT X FOR X = 0 B
LET A = INTEGRAL Y WRT X FOR X = 0 TO B
```

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

CUMULATIVE INTEGRAL	=	Compute the cumulative integrals of elements in a variable.
DERIVATIVE	=	Compute the derivative of a function.
ROOTS	=	Compute the roots of a function.
RUNGE KUTTA	=	Compute the Runge-Kutta solution to a differential equation.
INTERPOLATE	=	Carry out a cubic spline interpolation.

REFERENCE

For a mathematical description of integration, consult any introductory calculus text. Gaussian quadrature and the trapezoid rule are discussed in most standard numerical analysis textbooks.

APPLICATIONS

Mathematics

IMPLEMENTATION DATE

Pre-1987

PROGRAM

```
LET FUNCTION F1 = X**3+2*X**2-4*X+5
LET A1 = INTEGRAL F1 WRT X FOR X = 0 10
LET X = SEQUENCE 0 0.1 10
LET Y1 = F1
LET A2 = INTEGRAL Y1
```