

## CUMULATIVE INTEGRAL

### PURPOSE

Compute the cumulative integral for a variable.

### DESCRIPTION

The INTEGRAL command is used to calculate the definite integral of a function. It can also be used to approximate the integral for a series of discrete data points. The CUMULATIVE INTEGRAL command only applies to the case of a discrete set of points. Where the INTEGRAL command returns a single scalar value for the entire set of points, the CUMULATIVE INTEGRAL command returns a variable of the same length as the original set of points (the first element will always be zero). Element I of the variable returned by CUMULATIVE INTEGRAL is the integral of elements 1 through I of the original data set.

### SYNTAX

LET <y2> = CUMULATIVE INTEGRAL <y1> <x1> <SUBSET/EXCEPT/FOR qualification>

where <y1> is a variable containing the vertical elements for the integration;

<x1> is an optional variable containing the horizontal elements for the integration (if not specified, equi-spaced points are used);

<y2> is a variable where the computed cumulative integrals are stored;

and where the <SUBSET/EXCEPT/FOR qualification> is optional.

### EXAMPLES

```
LET Y2 = CUMULATIVE INTEGRAL Y1
```

```
LET Y2 = CUMULATIVE INTEGRAL Y1 SUBSET Y1 > 0
```

### NOTE

This command uses the trapezoid rule to compute the integral (Gaussian quadrature is used to calculate the integral of a function).

### DEFAULT

None

### SYNONYMS

None

### RELATED COMMANDS

INTEGRAL	=	Compute the integral of a function or a variable.
CUMULATIVE PRODUCT	=	Compute the cumulative product of a variable.
CUMULATIVE SUM	=	Compute the cumulative sum of a variable.

### APPLICATIONS

Mathematics

### IMPLEMENTATION DATE

Pre-1987

### PROGRAM

```
LET FUNCTION F = X**2 + 2*X - 8
LET X = SEQUENCE 0 .1 10
LET Y1 = F
LET Y2 = CUMULATIVE INTEGRAL Y1
```