EXPINT1

PURPOSE

Compute the exponential integral of order 1.

DESCRIPTION

For positive x, the exponential integral of order 1 is defined as:

$$E_1(x) = \int_x^\infty \frac{e^{-t}}{t} dt \qquad x > 0 \qquad \textbf{(EQ Aux-130)}$$

For negative x, the exponential integral of order 1 is defined to be the Cauchy principal value:

$$E_1(x) = -\mathrm{Ei}(-x) \qquad x < 0 \qquad \textbf{(EQ Aux-131)}$$

where Ei is defined as:

$$\mathrm{Ei}(x) = \int_{-x}^\infty \frac{e^{-t}}{t} dt \qquad x > 0 \qquad \textbf{(EQ Aux-132)}$$

The E1 function is undefined for zero.

SYNTAX

LET <y> = EXPINT1(<x>) <SUBSET/EXCEPT/FOR qualification>

where <x> is a non-zero number, variable, or parameter;

<y> is a variable or a parameter (depending on what <x> is where the computed EXPINT1 integral values are stored;

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

EXAMPLES

LET A = EXPINT1(0.1)

LET A = EXPINT1(-0.1)

LET X2 = EXPINT1(X)

NOTE

DATAPLOT uses the routine E1 from the SLATEC Common Mathematical Library to compute this function. SLATEC is a large set of high quality, portable, public domain Fortran routines for various mathematical capabilities maintained by seven federal laboratories.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

EXPINTN	=	Compute the exponential integral of order N.
EXPINTE	=	Compute the principla value of the exponential integral.
ERF	=	Compute the error function.
SININT	=	Compute the sine integral.
COSINT	=	Compute the cosine integral.
LOGINT	=	Compute the logarithmic integral.

REFERENCE

"Handbook of Mathematical Functions, Applied Mathematics Series, Vol. 55," Abramowitz and Stegun, National Bureau of Standards, 1964 (chapter 5).

APPLICATIONS

Special Functions

IMPLEMENTATION DATE

94/9

PROGRAM

```
TITLE E1 EXPONENTIAL INTEGRAL
PLOT EXPINT1(X) FOR X = 0.01 0.01 3 AND
PLOT EXPINT1(X) FOR X = -0.01 -0.01 -2
```