

EXPINTN**PURPOSE**

Compute the exponential integral of order n.

DESCRIPTION

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

$$E_n(x) = \int_1^{\infty} \frac{e^{-xt}}{t^n} dt \quad x > 0 \quad \text{(EQ Aux-136)}$$

SYNTAX

LET <y> = EXPINTN(<x>,<n>) <SUBSET/EXCEPT/FOR qualification>

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

<n> is a positive integer number, parameter, or variable;

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

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

EXAMPLES

LET A = EXPINTN(0.1,2)

LET A = EXPINTN(2,4)

LET X2 = EXPINTN(X,N)

NOTE 1

If n is 1, then x cannot be zero. For $n > 1$, $E_n(0) = 1/(n-1)$.

NOTE 2

DATAPLOT uses the routine EXINT 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

EXPINT1	=	Compute the exponential integral of order 1.
EXPINTE	=	Compute the principal 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

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TITLE EN EXPONENTIAL INTEGRALS
LINE SOLID DOT DASH DA2 DA3
PLOT EXPINTN(X,2) FOR X = 0 0.01 3 AND
PLOT EXPINTN(X,3) FOR X = 0 0.01 3 AND
PLOT EXPINTN(X,4) FOR X = 0 0.01 3 AND
PLOT EXPINTN(X,5) FOR X = 0 0.01 3 AND
PLOT EXPINTN(X,20) FOR X = 0 0.01 3
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