TCDF

PURPOSE

Compute the t cumulative distribution function with υ degrees of freedom.

DESCRIPTION

The t probability density function is:

$$f(x) = \frac{1}{\text{BETA}\left(\frac{1}{2}, \frac{1}{2}\upsilon\right)\sqrt{\upsilon}}\left(1 + \frac{x^2}{\upsilon}\right)^{\frac{-(\upsilon + 1)}{2}}$$ **(EQ 8-315)**

where υ is a positive integer that specifies the degrees of freedom, x can be any real number, and BETA is the beta function (see the documentation for the BETA command in the Mathematical Library Functions chapter for a description of this function). The Evans, Hastings, and Peacock book (see the REFERENCE section below) gives a formula for the cumulative distribution function. Since it is rather complicated, it will not be given here.

SYNTAX

LET <y2> = TCDF(<y1>,<nu>) <SUBSET/EXCEPT/FOR qualification>

where <y1> is a variable, a number, or a parameter;

<y2> is a variable or a parameter (depending on what <y1> is) where the computed t cdf value is stored;

<nu> is a positive integer number, parameter, or variable that specifies the degrees of freedom;

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

EXAMPLES

LET A = TCDF(3,10)
LET Y = TCDF(X1,10)

NOTE

For small to moderate degrees of freedom, DATAPLOT uses an exact finite sum method to approximate the cdf value. For large degrees of freedom, DATAPLOT uses a truncated asymptotic expansion to approximate the cdf value. These methods are documented in the sources listed in the REFERENCE section.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

TPDF	=	Compute the T probability density function.
TPPF	=	Compute the T percent point function.
CHSPDF	=	Compute the chi-square probability density function.
CHSPPF	=	Compute the chi-square percent point function.
CHSCDF	=	Compute the chi-square cumulative distribution function.
FCDF	=	Compute the F cumulative distribution function.
FPDF	=	Compute the F probability density function.
FPPF	=	Compute the F percent point function.
NORCDF	=	Compute the normal cumulative distribution function.
NORPDF	=	Compute the normal probability density function.
NORPPF	=	Compute the normal percent point function.

REFERENCE

"Continuous Univariate Distributions - 2," Johnson and Kotz, Houghton Mifflin, 1970 (chapter 27).

"Statistical Distributions," 2nd Ed., Evans, Hastings, and Peacock, Wiley and Sons, 1993 (chapter 37).

"Handbook of Mathematical Functions, Applied Mathematics Series, Vol. 55," Abramowitz and Stegum, National Bureau of Standards, 1964 (page 948).

"Extended Tables of the Percentage Points of Student's T Distribution," Federigho, Journal of the American Statistical Association, 1969, (pp. 683-688).

APPLICATIONS

Hypothesis Testing

IMPLEMENTATION DATE

Pre-1987

PROGRAM

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TITLE TCDF FOR VARIOUS VALUES OF NU
X1LABEL X; Y1LABEL PROBABILITY
SEGMENT 1 COORDINATES 16 88 21 88; SEGMENT 1 PATTERN SOLID
SEGMENT 2 COORDINATES 16 84 21 84; SEGMENT 2 PATTERN DASH
SEGMENT 3 COORDINATES 16 80 21 80; SEGMENT 3 PATTERN DOT
SEGMENT 4 COORDINATES 16 76 21 76; SEGMENT 4 PATTERN DA2
LEGEND 1 NU = 5; LEGEND 1 COORDINATES 22 87
LEGEND 2 NU = 10; LEGEND 2 COORDINATES 22 83
LEGEND 3 NU = 20; LEGEND 3 COORDINATES 22 79
LEGEND 4 NU = 30; LEGEND 4 COORDINATES 22 75
MAJOR YTIC NUMBER 6; MINOR YTIC NUMBER 1
YLIMITS 0 1; YTIC DECIMAL 1
LINES SOLID DASH DOT DASH2
PLOT TCDF(X,5) FOR X = -4.0 0.1 4 AND
PLOT TCDF(X,10) FOR X = -4.0 0.1 4 AND
PLOT TCDF(X,20) FOR X = -4.0 0.1 4 AND
PLOT TCDF(X,30) FOR X = -4.0 0.1 4
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