

BETAI**PURPOSE**

Compute the incomplete beta function.

DESCRIPTION

The incomplete beta function is defined as:

$$I_x(x, \alpha, \beta) = \frac{\int_0^x t^{\alpha-1} (1-t)^{\beta-1} dt}{B(\alpha, \beta)} \quad (\text{EQ 6-81})$$

where $B(\alpha, \beta)$ is the complete beta function, and α and β are positive real numbers. See the documentation for the BETA command in this chapter for a description of the complete beta function.

SYNTAX

LET <y2> = BETAI(<x>, <a>,) <SUBSET/EXCEPT/FOR qualification>

where <x> is a positive number, variable, or parameter;

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

 is a positive number, variable, or parameter;

<y2> is a variable or a parameter (depending on what <x>, <a> and are) where the computed incomplete beta values are stored;

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

EXAMPLES

LET A = BETAI(X,1,2)

LET A = BETAI(X,A1,B3)

LET X2 = BETAI(X,2,A1)

LET X2 = BETAI(0.5,0.2,3)

NOTE 1

DATAPLOT uses the routine DBETAI 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.

The DBETAI routine is an implementation of the Bosten and Battiste algorithm (see the REFERENCE section below).

NOTE 2

The incomplete beta function is also the cumulative distribution function of the beta probability function. The DATAPLOT functions BETCDF and BETAI are equivalent.

DEFAULT

None

SYNONYMS

BETCDF

RELATED COMMANDS

BETA	=	Compute the complete beta function.
LN BETA	=	Compute the log beta function.
BETPDF	=	Compute the beta probability density function.
BETPPF	=	Compute the beta percent point function.
GAMMA	=	Compute the gamma function.
GAMMAI	=	Compute the incomplete gamma function.
LOGGAMMA	=	Compute the log gamma function.

REFERENCE

"Handbook of Mathematical Functions, Applied Mathematics Series, Vol. 55," Abramowitz and Stegun, National Bureau of Standards, 1964 (chapter 6, p 263).

"Remark on algorithm 179," Bosten and Battiste, Communications of the ACM, 17, 1974.

APPLICATIONS

Special functions

IMPLEMENTATION DATE

94/9

PROGRAM

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SEGMENT 1 COORDINATES 64 38 69 38; SEGMENT 1 PATTERN SOLID
SEGMENT 2 COORDINATES 64 34 69 34; SEGMENT 2 PATTERN DASH
SEGMENT 3 COORDINATES 64 30 69 30; SEGMENT 3 PATTERN DOT
SEGMENT 4 COORDINATES 64 26 69 26; SEGMENT 4 PATTERN DASH2
LEGEND 1 A = 2, B = 4; LEGEND 1 COORDINATES 70 37
LEGEND 2 A = 1, B = 1; LEGEND 2 COORDINATES 70 33
LEGEND 3 A = 0.5, B = 0.5; LEGEND 3 COORDINATES 70 29
LEGEND 4 A = 0.2, B = 1; LEGEND 4 COORDINATES 70 25
YLIMITS 0 1; MAJOR YTIC NUMBER 6
MINOR YTIC NUMBER 1; YTIC DECIMAL 1
XLIMITS 0 1; XTIC OFFSET 0.1 0.1
MAJOR XTIC NUMBER 6; MINOR XTIC NUMBER 1
LINES SOLID DASH DOT DASH2
TITLE BETAI FOR VARIOUS VALUES OF A AND B
PLOT BETAI(X,2,4) FOR X = 0.01 0.01 0.99 AND
PLOT BETAI(X,1,1) FOR X = 0.01 0.01 0.99 AND
PLOT BETAI(X,0.5,0.5) FOR X = 0.01 0.01 0.99 AND
PLOT BETAI(X,0.2,1) FOR X = 0.01 0.01 0.99

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