FCDF

PURPOSE

Compute the F cumulative distribution function with degrees of freedom parameters ν_1 and ν_2.

DESCRIPTION

The F distribution is the ratio of 2 chi-square distributions with ν_1 and ν_2 degrees of freedom respectively. This yields the following probability density function:

$$f(x) = \frac{\Gamma\left(\frac{\upsilon_1 + \upsilon_2}{2}\right)\left(\frac{\upsilon_1}{\upsilon_2}\right)^{\frac{\upsilon_1}{2}} x^{\frac{\upsilon_1}{2}-1}}{\Gamma\left(\frac{\upsilon_1}{2}\right)\Gamma\left(\frac{\upsilon_2}{2}\right)\left(1 + \frac{\upsilon_1 x}{\upsilon_2}\right)^{\frac{\upsilon_1 + \upsilon_2}{2}}} \qquad \textbf{(EQ 8-207)}$$

The F cumulative distribution can be expressed in terms of the incomplete beta function as follows:

$$F(x) = I_k\left(\frac{\upsilon_1}{2}, \frac{\upsilon_2}{2}\right) \qquad k = \frac{\upsilon_2}{\upsilon_2 + \upsilon_1 x} \qquad \textbf{(EQ 8-208)}$$

where I_k is the incomplete beta function at the value k. See the documentation for the BETCDF command in this chapter for a description of this function. The input value must be greater than or equal to 0. This function is restricted to integer degrees of freedom. However, there are functions for the non-central F (NCFCDF) and the doubly non-central F (DNFCDF). These functions can be used for the central F case with non-integer degrees of freedom by setting the non-centrality parameters to zero.

SYNTAX

LET <y2> = FPDF(<y1>,<nu1>,<nu2>) <SUBSET/EXCEPT/FOR qualification>

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

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

<nu1> and <nu2> are positive integer numbers or parameters that define the degrees of freedom;

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

EXAMPLES

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LET A = FCDF(3,10,8)
LET A = FCDF(A1,10,8)
LET Y = FCDF(X1,10,8)
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NOTE

The F cumulative distribution is evaluated with 6 different approximation formulas depending on the values of ν_1 and ν_2. DATAPLOT uses an exact sum approximation, the Paulson approximation, or a Tukey-Scheffe approximation depending on the region.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

FPDF	=	Compute the F probability density function.
FPPF	=	Compute the F percent point function.
NCFCDF	=	Compute the non-central F cumulative distribution function.
DNFCDF	=	Compute the doubly non-central F cumulative distribution function.
CHSCDF	=	Compute chi-square cumulative distribution function.
CHSPDF	=	Compute chi-square probability density function.
CHSPPF	=	Compute chi-square percent point function.

REFERENCE

"Continuous Univariate Distributions - 2," Johnson and Kotz, Houghton Mifflin, 1970 (chapter 26).

"Handbook of Mathematical Functions, Applied Mathematics Series, Vol. 55," Abramowitz and Stegum, National Bureau of Standards, 1964 (page 946-947).

APPLICATIONS

Hypothesis Testing

IMPLEMENTATION DATE

Pre-1987

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 DA2
LEGEND 1 NU1 = 5, NU2 = 5; LEGEND 1 COORDINATES 70 37
LEGEND 2 NU1 = 5, NU2 = 10; LEGEND 2 COORDINATES 70 33
LEGEND 3 NU1 = 10, NU2 = 5; LEGEND 3 COORDINATES 70 29
LEGEND 4 NU1 = 10, NU2 = 10; LEGEND 4 COORDINATES 70 25
YLIMITS 0 1; MAJOR YTIC NUMBER 6
MINOR YTIC NUMBER 1; YTIC DECIMAL 1
XLIMITS 0 5; XTIC OFFSET 0.5 1
MAJOR XTIC NUMBER 6; MINOR XTIC NUMBER 1
TITLE FCDF FOR VARIOUS VALUES OF NU; X1LABEL X; Y1LABEL PROBABILITY
LINES SOLID DASH DOT DASH2
PLOT FCDF(X,5,5) FOR X = 0 .1 6 AND
PLOT FCDF(X,5,10) FOR X = 0 .1 6 AND
PLOT FCDF(X,10,5) FOR X = 0 .1 6 AND
PLOT FCDF(X,10,10) FOR X = 0 .1 6
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