BBNPPF

PURPOSE

Compute the beta-binomial percent point function with shape parameters a, b, and N.

DESCRIPTION

The beta-binomial distribution has the following probability density function:

$$p(x, \alpha, \beta, n) = \sum_{i=0}^{x} \frac{B(n-i+\alpha, i+\beta)}{(n+1)\, B(n-i+1, i+1)\, B(\alpha, \beta)} \qquad x = 0, 1, 2, \ldots, n, \alpha, \beta > 0 \qquad \textbf{(EQ Aux-26)}$$

where B is the complete beta function and a and b are shape parameters. See the documentation for the BETA command for a description of the complete beta function.

The percent point function is the inverse of the cumulative distribution function. The cumulative distribution sums the probability from 0 to the given x value. The percent point function takes a cumulative probability value and computes the corresponding x value.

SYNTAX

LET <y> = BBNPPF(<p>,<a>,<b>,<n>) <SUBSET/EXCEPT/FOR qualification>

where <p> is a number, parameter, or variable containing values between 0 and 1;

<y> is a variable or a parameter (depending on what <p> is) where the computed beta-binomial ppf value is stored;

<a> is a number, parameter, or variable that specifies the first shape parameter;

<b> is a number, parameter, or variable that specifies the second shape parameter;

<n> is a number, parameter, or variable that specifies the third shape parameter;

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

EXAMPLES

LET A = BBNPPF(10,0.5,0.9,22)
LET A = BBNPPF(P,2.1,4,N)
LET X2 = BBNPPF(P,ALPHA,BETA,N)

NOTE

The beta-binomial distribution is derived from a binomial distribution B:n,p where the p parameter is a beta distributed variable with parameters a and b.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

BBNCDF	=	Compute the beta-binomial cumulative distribution function.
BBNPDF	=	Compute the beta-binomial probability density function.
BETCDF	=	Compute the beta cumulative distribution function.
BETPDF	=	Compute the beta probability density function.
BETPPF	=	Compute the beta percent point function.
BINCDF	=	Compute the binomial cumulative distribution function.
BINPDF	=	Compute the binomial probability density function.
BINPPF	=	Compute the binomial percent point function.

REFERENCE

"Empirical Bayes Estimation Of Generator Reliability," Martz, Kvam, and Abramson, Technometrics, February, 1996 (page 23).

"Statistical Distributions," 2nd Edition, Evans, Hastings, and Peacock, 1994 (chapter 5).

APPLICATIONS

Reliability, Bayeseian Analysis

IMPLEMENTATION DATE

96/2

PROGRAM

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XLIMITS 0 1
YLIMITS 0 50
YTIC OFFSET 0.5 0.5
LINE BLANK
SPIKE ON
SPIKE THICKNESS 0.3
TITLE AUTOMATIC
Y1LABEL NUMBER OF SUCCESSES
X1LABEL PROBABILITY
.
MULTIPLOT 2 2; MULTIPLOT CORNER COORDINATES 0 0 100 100
PLOT BBNPPF(P,0.5,0.5,50) FOR P = 0 0.05 1
PLOT BBNPPF(P,3.0,0.5,50) FOR P = 0 0.05 1
PLOT BBNPPF(P,0.5,3.0,50) FOR P = 0 0.05 1
PLOT BBNPPF(P,3.0,3.0,50) FOR P = 0 0.05 1
END OF MULTIPLOT
```