

**ALPCDF****PURPOSE**

Compute the alpha cumulative distribution function with shape parameters  $\alpha$  and  $\beta$ .

**DESCRIPTION**

The alpha distribution has the following probability density function:

$$f(x, \alpha, \beta) = \frac{\beta \phi\left(\alpha - \frac{\beta}{x}\right)}{x^2 \Phi(\alpha)} \quad x > 0 \quad \text{(EQ Aux-5)}$$

where  $\phi$  is the standard normal density function and  $\Phi$  is the standard normal cumulative distribution function. See the documentation for the NORPDF and NORCDF commands for a description of the normal density and distribution functions. The shape parameters alpha and beta should be positive.

The cumulative distribution is the area under the curve from 0 to x (i.e., the integral of the above function). It has the formula:

$$F(x, \alpha, \beta) = \frac{\Phi\left(\alpha - \frac{\beta}{x}\right)}{\Phi(\alpha)} \quad x > 0 \quad \text{(EQ Aux-6)}$$

**SYNTAX**

LET <y2> = ALPCDF(<y1>,<a>,<b>) <SUBSET/EXCEPT/FOR qualification>

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

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

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

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

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

**EXAMPLES**

LET A = ALPCDF(0.3,10,8)

LET A = ALPCDF(A1,10,8)

LET X2 = ALPCDF(X1,2,6)

**DEFAULT**

None

**SYNONYMS**

None

**RELATED COMMANDS**

|        |   |  |
|--------|---|--|
| ALPPDF | = | Compute the alpha probability density function.          |
| ALPPPF | = | Compute the alpha percent point function.                |
| WEICDF | = | Compute the Weibull cumulative distribution function.    |
| WEIPDF | = | Compute the Weibull probability density function.        |
| WEIPPF | = | Compute the Weibull percent point function.              |
| LGNCDF | = | Compute the log-normal cumulative distribution function. |
| LGNPDF | = | Compute the log-normal probability density function.     |
| LGNPPF | = | Compute the log-normal 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**

"Reliability Applications of the Alpha Distribution," Salvia, IEEE Transactions On Reliability, Vol. R-34, August, 1985, (pp. 251-252).

"Continuous Univariate Distributions," 2nd. ed., Johnson, Kotz, and Balakrishnan, John Wiley and Sons, 1994.

## APPLICATIONS

Reliability, accelerated life testing

## IMPLEMENTATION DATE

95/5

## PROGRAM

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MULTIPLY 2 2; MULTIPLY CORNER COORDINATES 0 0 100 100
TITLE AUTOMATIC
LET A = 2
LET B = 1
X1LABEL ALPHA = ^A, BETA = ^B
PLOT ALPCDF(X,A,B) FOR X = 0.01 0.01 7
LET A = 0.5
LET B = 6
X1LABEL ALPHA = ^A, BETA = ^B
PLOT ALPCDF(X,A,B) FOR X = 0.1 0.1 100
LET A = 6
LET B = 0.5
X1LABEL ALPHA = ^A, BETA = ^B
PLOT ALPCDF(X,A,B) FOR X = 0.001 0.001 0.2
LET A = 0.5
LET B = 0.5
X1LABEL ALPHA = ^A, BETA = ^B
PLOT ALPCDF(X,A,B) FOR X = 0.01 0.01 7
END OF MULTIPLY

```

