FCAPPF

PURPOSE
Compute the folded Cauchy percent point function.

DESCRIPTION
If X is Cauchy distributed, then ABS(X) has a folded Cauchy distribution whose probability density function can be expressed in terms of the standard Cauchy distribution as:

$$f(x, \mu, \sigma) = \frac{1}{\sigma}\left(\text{CAUPDF}\left(\frac{x - \mu}{\sigma}\right) + \text{CAUPDF}\left(\frac{x + \mu}{\sigma}\right)\right) \qquad x \geq 0 \qquad \textbf{(EQ Aux-140)}$$

where CAUPDF is the probability density function of a standard Cauchy distribution and u and s are the location and scale parameters of the parent Cauchy distribution. These parameters are shape parameters for the folded Cauchy distribution. If u is zero, the folded Cauchy distribution reduces to a half-Cauchy distribution.

The folded Cauchy percent point function is computed numerically using a bisection method.

SYNTAX
LET <y> = FCAPPF(<p>,<u>,<s>)   <SUBSET/EXCEPT/FOR qualification>
where <p> is a number, parameter, or variable in the range (0,1);
    <u> is a number, parameter, or variable that defines the location parameter of the parent Cauchy distribution;
    <s> is a number, parameter, or variable that defines the scale parameter of the parent Cauchy distribution;
    <y> is a variable or a parameter (depending on what <p> is) where the computed folded Cauchy ppf value is stored;
and where the <SUBSET/EXCEPT/FOR qualification> is optional.

EXAMPLES
LET A = FCAPPF(0.95,2,0.7)
LET X2 = FCAPPF(X1,U,SD)

NOTE
Folded distributions are typically used when measurements are taken without regard to sign and the underlying distribution is assumed to be Cauchy.

DEFAULT
None

SYNONYMS
None

RELATED COMMANDS
FCACDF	=	Compute the folded Cauchy cumulative distribution function.
FCAPDF	=	Compute the folded Cauchy probability density function.
CAUCDF	=	Compute the Cauchy cumulative distribution function.
CAUPDF	=	Compute the Cauchy probability density function.
CAUPPF	=	Compute the Cauchy percent point function.
FNRCDF	=	Compute the folded normal cumulative distribution function.
FNRPDF	=	Compute the folded normal probability density function.
FNRPPF	=	Compute the folded normal percent point function.
HFCCDF	=	Compute the half-Cauchy cumulative distribution function.
HFCPDF	=	Compute the half-Cauchy probability density function.
HFCPPF	=	Compute the half-Cauchy percent point function.

REFERENCE
"Continuous Univariate Distributions - Vol. 1," 2nd Ed., Johnson, Kotz, and Balakrishnan, Wiley and Sons, 1994 (page 328).

APPLICATIONS
Data Analysis

IMPLEMENTATION DATE

     96/1

PROGRAM

     MULTIPLOT 2 2; MULTIPLOT CORNER COORDINATES 0 0 100 100
     TITLE AUTOMATIC
     LET U = 0.5
     LET SD = 6
     X1LABEL U = ^U, SD= ^SD
     PLOT FCAPPF(P,U,SD) FOR P = 0 0.01 0.99
     LET U = 6
     LET SD = 0.5
     X1LABEL U = ^U, SD= ^SD
     PLOT FCAPPF(P,U,SD) FOR P = 0 0.01 0.99
     LET U = 2
     LET SD = 10
     X1LABEL U = ^U, SD= ^SD
     PLOT FCAPPF(P,U,SD) FOR P = 0 0.1 0.99
     LET U = 3
     LET SD = 2
     X1LABEL U = ^U, SD= ^SD
     PLOT FCAPPF(P,U,SD) FOR P = 0 0.01 0.99
     END OF MULTIPLOT