CAUPDF

PURPOSE
Compute the standard Cauchy (i.e, median=0, 75% point at 1) probability density function.

DESCRIPTION
The standard form of the Cauchy distribution has the following probability density function:

$$f(x) = \frac{1}{\pi(1 + x^2)} \qquad \textbf{(EQ 8-129)}$$

The input value can be any real number. The Cauchy distribution does not have a finite mean or standard deviation. It is similar to the normal distribution, but it has longer and flatter tails.

SYNTAX
LET <y2> = CAUPDF(<y1>)   <SUBSET/EXCEPT/FOR qualification>
where <y1> is a variable, a number, or a parameter;
         <y2> is a variable or a parameter (depending on what <y1> is) where the computed Cauchy pdf value is stored;
and where the <SUBSET/EXCEPT/FOR qualification> is optional.

EXAMPLES
LET A = CAUPDF(3)
LET Y = CAUPDF(X1)

NOTE
The general form of the Cauchy probability density function is:

$$f(x) = \left(\frac{1}{s}\right)\frac{1}{\pi\left(1 + \left(\frac{x-t}{s}\right)^2\right)} \qquad \textbf{(EQ 8-130)}$$

which is mathematically equivalent to the more commonly used formula:

$$f(x) = \frac{s}{\pi(s^2 + (x-t)^2)} \qquad \textbf{(EQ 8-131)}$$

where t and s are the location and scale parameters respectively. See topic (3) under the General considerations section at the beginning of this chapter for a discussion of generating pdf values for the general form of the distribution.

DEFAULT
None

SYNONYMS
None

RELATED COMMANDS
CAUCDF	=	Compute the Cauchy cumulative distribution function.
CAUPPF	=	Compute the Cauchy percent point function.
NORCDF	=	Compute the normal cumulative distribution function.
NORPDF	=	Compute the normal probability density function.
NORPPF	=	Compute the normal percent point function.
TCDF	=	Compute the T cumulative distribution function.
TPDF	=	Compute the T probability density function.
TPPF	=	Compute the T percent point function.

REFERENCE
"Continuous Univariate Distributions - 1," Johnson and Kotz, Houghton Mifflin, 1970 (chapter 16).

"Handbook of Mathematical Functions, Applied Mathematics Series, Vol. 55," Abramowitz and Stegum, National Bureau of Standards, 1964 (page 930).

APPLICATIONS

Data Analysis

IMPLEMENTATION DATE

94/4

PROGRAM

        YLIMITS 0 0.3
        YTIC OFFSET 0 0.03
        MAJOR YTIC NUMBER 4
        MINOR YTIC NUMBER 1
        YTIC DECIMAL 1
        XLIMITS -5 5
        XTIC OFFSET 0.6 0.6
        TITLE AUTOMATIC
        X1LABEL X
        Y1LABEL PROBABILITY
        PLOT CAUPDF(X) FOR X = -5.5 0.01 5.5