# GEVPDF

## PURPOSE

Compute the standard form of the generalized extreme value probability density function with shape parameter g.

## DESCRIPTION

For positive $\gamma$, the standard form of the generalized extreme value probability density function is:

$$f(x) = e^{-[1-\gamma x]^{1/\gamma}[1-\gamma x]^{\frac{1}{\gamma}-1}} \qquad -\infty < x < \frac{1}{\gamma} \qquad \textbf{(EQ Aux-155)}$$

For negative $\gamma$, the standard form of the generalized extreme value probability density function is:

$$f(x) = e^{-[1-\gamma x]^{1/\gamma}[1-\gamma x]^{\frac{1}{\gamma}-1}} \qquad \frac{1}{\gamma} < x < \infty \qquad \textbf{(EQ Aux-156)}$$

For zero $\gamma$, the standard form of the generalized extreme value probability density function is:

$$f(x) = e^{-e^{-x}e^{-x}} \qquad -\infty < x < \infty \qquad \textbf{(EQ Aux-157)}$$

## SYNTAX

LET <y> = GEVPDF(<x>,<gamma>) <SUBSET/EXCEPT/FOR qualification>
where <x> is a variable, a number, or a parameter;
<y> is a variable or a parameter (depending on what <x> is) where the computed generalized extreme value pdf value is saved;
<gamma> is a variable, number or parameter that specifies the shape parameter;
and where the <SUBSET/EXCEPT/FOR qualification> is optional.

## EXAMPLES

LET A = GEVPDF(3,1.5)
LET X2 = GEVPDF(X1,GAMMA)

## NOTE

For positive $\gamma$, the general form of the generalized extreme value probability density function is:

$$f(x) = \frac{e^{-\left[1-\gamma\left(\frac{x-\mu}{\sigma}\right)\right]^{1/\gamma}\left[1-\gamma\left(\frac{x-\mu}{\sigma}\right)\right]^{\frac{1}{\gamma}-1}}}{\sigma} \qquad -\infty < x < \mu + \frac{\sigma}{\gamma} \qquad \textbf{(EQ Aux-158)}$$

For negative $\gamma$, the general form of the generalized extreme value probability density function is:

$$f(x) = \frac{e^{-\left[1-\gamma\left(\frac{x-\mu}{\sigma}\right)\right]^{1/\gamma}\left[1-\gamma\left(\frac{x-\mu}{\sigma}\right)\right]^{\frac{1}{\gamma}-1}}}{\sigma} \qquad \mu + \frac{\sigma}{\gamma} < x < \infty \qquad \textbf{(EQ Aux-159)}$$

For zero $\gamma$, the general form of the generalized extreme value probability density function is:

$$f(x) = \frac{e^{-e^{\frac{-(x-\mu)}{\sigma}}e^{\frac{-(x-\mu)}{\sigma}}}}{\sigma} \qquad -\infty < x < \infty \qquad \textbf{(EQ Aux-160)}$$

## DEFAULT

None

## SYNONYMS

None

## RELATED COMMANDS

| | | |
|---|---|---|
| GEVCDF | = | Compute the generalized extreme value cumulative distribution function. |
| GEVPPF | = | Compute the generalized extreme value percent point function. |

| | | |
|---|---|---|
| EV2CDF | = | Compute the extreme value type II cumulative distribution function. |
| EV2PDF | = | Compute the extreme value type II probability density function. |
| EV2PPF | = | Compute the extreme value type I percent point function. |
| EV1CDF | = | Compute the extreme value type I cumulative distribution function. |
| EV1PDF | = | Compute the extreme value type I probability density function. |
| EV1PPF | = | Compute the extreme value type I percent point function. |
| WEICDF | = | Compute the Weibull cumulative distribution function. |
| WEIPDF | = | Compute the Weibull probability density function. |
| WEIPPF | = | Compute the Weibull percent point function. |

## REFERENCE

"Continuous Univariate Distributions - Volume 2," 2nd. Ed., Johnson, Kotz, and Balakrishnan, Wiley and Sons, 1994 (pp. 75-76).

## APPLICATIONS

Extreme Value Analysis, Reliability

## IMPLEMENTATION DATE

95/9

## PROGRAM

```
MULTIPLOT 3 3; MULTIPLOT CORNER COORDINATES 0 0 100 100
TITLE AUTOMATIC
LET GAMMA = DATA 0.0 0.5 -0.5 1.0 -1.0 2.0 -2.0 5.0 -5.0
LET START = DATA -5 -4   -1.99 -3   -0.99 -3   -0.49 -3   -0.19
LET STOP  = DATA  5  1.99  4     0.99 3     0.49 3     0.19 3
LOOP FOR K = 1 1 9
    LET G = GAMMA(K); X1LABEL GAMMA = ^G
    LET A1 = START(K); LET A2 = STOP(K)
    PLOT GEVPDF(X,G) FOR X = A1 0.01 A2
END OF LOOP
END OF MULTIPLOT
```