

**PA2PPF****PURPOSE**

Compute the standard form of the Pareto second kind percent point function. This distribution is sometimes referred to as the Lomax distribution.

**DESCRIPTION**

The standard form of the Pareto distribution of the second kind has the probability density function:

$$f(x, \gamma) = \frac{\gamma}{(1+x)^{\gamma+1}} \quad x > 0, \gamma > 0 \quad \text{(EQ Aux-248)}$$

where  $\gamma$  is the shape parameter. The percent point function is:

$$G(p, \gamma) = (1-p)^{\frac{-1}{\gamma}} - 1 \quad \gamma > 0 \quad \text{(EQ Aux-249)}$$

**SYNTAX**

LET <y> = PA2PPF(<p>,<gamma>) <SUBSET/EXCEPT/FOR qualification>

where <p> is a variable, a number, or a parameter;

<y> is a variable or a parameter (depending on what <p> is) where the computed Pareto pdf value is saved;

<gamma> is a number or parameter that specifies the shape parameter;

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

**EXAMPLES**

LET A = PA2PPF(0.9,1.5)

LET X2 = PA2PPF(X1,GAMMA)

**NOTE 1**

The general form of the Pareto second kind probability density function is:

$$f(x, \gamma, k) = \frac{\gamma k^\gamma}{(k+x)^{\gamma+1}} \quad x > 0, \gamma > 0 \quad \text{(EQ Aux-250)}$$

where k is a positive location parameter. The general form of the percent point function is:

$$G(p, \gamma, k) = k(1-p)^{\frac{-1}{\gamma}} - k \quad \gamma > 0 \quad \text{(EQ Aux-251)}$$

**NOTE 2**

Johnson, Kotz, and Balakrishnan also define Pareto distributions of the first, third, and fourth kind. DATAPLOT supports the Pareto distribution of the first kind (see the documentation for the PARPDF command for details). It does not support the other two types at this time.

**DEFAULT**

None

**SYNONYMS**

None

**RELATED COMMANDS**

PA2CDF	=	Compute the Pareto second kind cumulative distribution function.
PA2PDF	=	Compute the Pareto second kind probability density function.
PARCDF	=	Compute the Pareto cumulative distribution function.
PARPDF	=	Compute the Pareto probability density function.
PARPPF	=	Compute the Pareto percent point function.
GEPCDF	=	Compute the generalized Pareto cumulative distribution function.
GEPPDF	=	Compute the generalized Pareto probability density function.
GEPPPF	=	Compute the generalized Pareto percent point function.

## REFERENCE

“Continuous Univariate Distributions - Vol. I,” 2nd. Ed., Johnson, Kotz, and Balakrishnan, John Wiley and Sons, 1994 (chapter 20).

## APPLICATIONS

Income Distributions

## IMPLEMENTATION DATE

95/10

## PROGRAM

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MULTIPLY 2 2; MULTIPLY CORNER COORDINATES 0 0 100 100
Y1LABEL X
X1LABEL PROBABILITY
.
LET GAMMA = 0.2
TITLE PARETO (KIND 2) PPF - GAMMA = ^GAMMA
PLOT PA2PPF(P,GAMMA) FOR P = 0.01 0.01 0.9
LET GAMMA = 0.5
TITLE PARETO (KIND 2) PPF - GAMMA = ^GAMMA
PLOT PA2PPF(P,GAMMA) FOR P = 0.01 0.01 0.99
LET GAMMA = 1.0
TITLE PARETO (KIND 2) PPF - GAMMA = ^GAMMA
PLOT PA2PPF(P,GAMMA) FOR P = 0.01 0.01 0.99
LET GAMMA = 2.0
TITLE PARETO (KIND 2) PPF - GAMMA = ^GAMMA
PLOT PA2PPF(P,GAMMA) FOR P = 0.01 0.01 0.99
END OF MULTIPLY

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