

**GOMCDF****PURPOSE**

Compute the Gompertz cumulative distribution function.

**DESCRIPTION**

The Gompertz distribution has the following probability density function:

$$f(x, c, b) = bc^x e^{\frac{-b(c^x-1)}{\log(c)}} \quad x \geq 0, b > 0, c \geq 1 \quad (\text{EQ Aux-183})$$

where b and c are shape parameters. It has the following cumulative distribution function:

$$F(x, c, b) = 1 - e^{\frac{-b(c^x-1)}{\log(c)}} \quad x \geq 0, b > 0, c \geq 1 \quad (\text{EQ Aux-184})$$

**SYNTAX**

LET <y> = GOMCDF(<x>,<c>,<b>) <SUBSET/EXCEPT/FOR qualification>

where <x> is a positive number, parameter, or a variable;

<y> is a variable or a parameter (depending on what <x> is where the computed Gompertz cdf value is saved;

<c> is a number, parameter, or variable (greater than 1) 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 = GOMCDF(3,1.5,0.6)

LET X2 = GOMCDF(X1,ALPHA,CONST)

**NOTE 1**

If c is 1, this distribution reduces to the exponential distribution. The Gompertz distribution can be interpreted as a truncated extreme value type I distribution.

**NOTE 2**

There are several forms given for the Gompertz distribution in the literature. Some of these are given in Johnson, Kotz, and Balakrishnan (see the Reference section below). In particular, one common form uses the parameter  $\alpha$  where  $\alpha = \log(c)$ . Simply replace c with  $\text{EXP}(\alpha)$  in the pdf formula given above.

**DEFAULT**

None

**SYNONYMS**

None

**RELATED COMMANDS**

GOMPDF	=	Compute the Gompertz probability density function.
GOMPPF	=	Compute the Gompertz percent point function.
EXPCDF	=	Compute the exponential cumulative distribution function.
EXPPDF	=	Compute the exponential probability density function.
EXPPPF	=	Compute the exponential 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.
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 II percent point function.

## REFERENCE

"Continuous Univariate Distributions," 2nd. ed., Johnson, Kotz, and Balakrishnan, John Wiley and Sons, 1994 (pp. 25-26, 81-85).

## APPLICATIONS

Life Testing

## IMPLEMENTATION DATE

95/10

## PROGRAM

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LET C1 = DATA 1.1 1.1 1.1 2 2 5 5 5
LET B1 = DATA 0.5 1 2 0.5 1 2 0.5 1 2
.
MULTIPLY 3 3; MULTIPLY CORNER COORDINATES 0 0 100 100
TITLE AUTOMATIC
LOOP FOR K = 1 1 9
  LET C = C1(K)
  LET B = B1(K)
  X1LABEL C = ^C, B = ^B
  PLOT GOMCDF(X,C,B) FOR X = 0 0.01 5
END OF LOOP
END OF MULTIPLY

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