

**WARPDF****PURPOSE**

Compute the Waring probability density function.

**DESCRIPTION**

The Waring distribution has the following probability density function:

$$p(x, c, a) = \frac{(c-a)(a+x-1)!c!}{c(a-1)!(c+x)} \quad x = 0, 1, 2, \dots \quad \text{(EQ Aux-322)}$$

where  $c$  and  $a$  are positive shape parameters with  $c$  being larger than  $a$ .

The Waring distribution is a generalization of the Yule distribution. The Yule distribution is a special case of the Waring distribution with  $a = 1$ . The Yule distribution is often given in the following form:

$$p(x, p) = \frac{p(p!)(x-1)!}{(x+p)!} \quad x = 1, 2, \dots \quad \text{(EQ Aux-323)}$$

where  $p$  is a positive parameter.

In the DATAPLOT WARPDF routine, if the  $a$  parameter is omitted or set to 1, the formula for the Yule distribution is used rather than the Waring distribution formula.

**SYNTAX**

LET <y2> = WARPDF(<y1>,<c>,<a>) <SUBSET/EXCEPT/FOR qualification>

where <y1> is a positive integer number, parameter, or variable;

<c> is a positive number, parameter, or variable that specifies the first shape parameter;

<a> is a positive number, parameter, or variable that specifies the second shape parameter;

<y2> is a variable or a parameter (depending on what <y1> is) where the computed Waring pdf value is stored;

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

If the <a> parameter is omitted or set to 1, this routine calculates the Yule cumulative distribution function. If <a> is larger than <c>, an error message is printed.

**EXAMPLES**

LET A = WARPDF(3,3,0.5)

LET A = WARPDF(10,2)

LET X2 = WARPDF(X1,C,A)

**DEFAULT**

None

**SYNONYMS**

None

**RELATED COMMANDS**

WARCDF	=	Compute the Waring cumulative distribution function.
WARPPF	=	Compute the Waring percent point function.
GEOCDF	=	Compute the geometric cumulative distribution function.
GEOPDF	=	Compute the geometric probability density function.
GEOPPF	=	Compute the geometric percent point function.
NBCDF	=	Compute the negative binomial cumulative distribution function.
NBPDF	=	Compute the negative binomial probability density function.
NBPPF	=	Compute the negative binomial percent point function.
DLGCDF	=	Compute the logarithmic series cumulative distribution function.
DLGPDF	=	Compute the logarithmic series probability density function.
DLGPPF	=	Compute the logarithmic series percent point function.

## REFERENCE

"Discrete Univariate Distributions," 2nd. ed., Johnson, Kotz, and Kemp, John Wiley & Sons, 1994 (pp. 274-279).

## APPLICATIONS

Data Analysis

## IMPLEMENTATION DATE

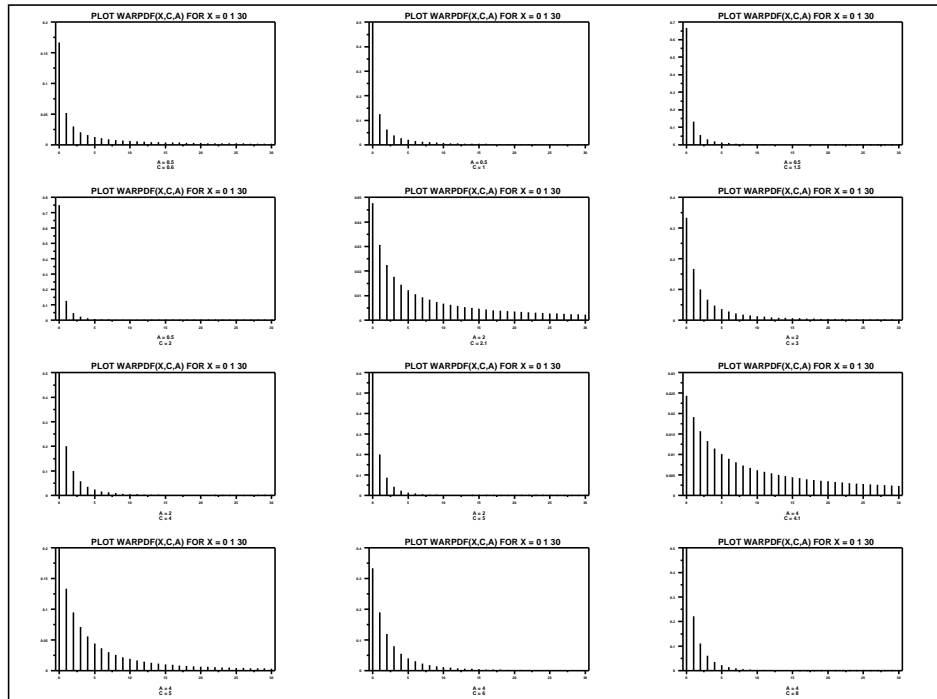
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## PROGRAM 1

```

LET ZA = DATA 0.5 0.5 0.5 0.5 2.0 2.0 2.0 2.0 4.0 4.0 4.0 4.0
LET ZC = DATA 0.6 1.0 1.5 2.0 2.1 3.0 4.0 5.0 4.1 5.0 6.0 8.0
TITLE AUTOMATIC
XTIC OFFSET 0.5 0.5
SPIKE ON
LINE BLANK
MULTIPLY CORNER COORDINATES 0 0 100 100
MULTIPLY 4 3
LOOP FOR K = 1 1 12
  LET A = ZA(K)
  LET C = ZC(K)
  X1LABEL A = ^A
  X2LABEL C = ^C
  PLOT WARPDF(X,C,A) FOR X = 0 1 30
END OF LOOP
END OF MULTIPLY

```



## PROGRAM 2

```
LET Z = SEQUENCE 0.2 0.2 2.4
TITLE AUTOMATIC
XTIC OFFSET 0.5 0.5
SPIKE ON
LINE BLANK
MULTIPLY CORNER COORDINATES 0 0 100 100
MULTIPLY 4 3
LOOP FOR K = 1 1 12
  LET P = Z(K)
  X1LABEL YULE DISTRIBUTION, P = ^P
  PLOT WARPDF(X,P) FOR X = 1 1 50
END OF LOOP
END OF MULTIPLY
```

