

**GAMMAIP****PURPOSE**

Compute the incomplete gamma function ratio.

**DESCRIPTION**

The incomplete gamma function ratio (also commonly referred to as the incomplete gamma function) is defined as:

$$P(x, a) = \frac{\int_0^x e^{-t} t^{a-1} dt}{\Gamma(a)} \quad (x \geq 0) \quad \text{(EQ 6-90)}$$

where  $\Gamma$  is the gamma function and  $a$  is a positive shape parameter. The incomplete gamma function is defined as:

$$\gamma(x, a) = \int_0^x e^{-t} t^{a-1} dt \quad (x \geq 0) \quad \text{(EQ 6-91)}$$

where  $a$  is a positive shape parameter. The GAMMAIP function computes the incomplete gamma function ratio while the GAMMAI function computes the incomplete gamma function. See the documentation for the GAMMA function for the formula for the gamma function.

**SYNTAX**

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

where <y1> is a non-negative number, variable or parameter;

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

<y2> is a variable or a parameter (depending on what <y1> and <a> are) where the computed incomplete gamma values are stored;

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

**EXAMPLES**

LET A = GAMMAIP(2.3,1)

LET A = GAMMAIP(X,A1)

LET X2 = GAMMAIP(X1,4.2)

**NOTE**

DATAPLOT uses a slightly modified form of the routine DGAMI from the SLATEC Common Mathematical Library to compute this function. SLATEC is a large set of high quality, portable, public domain Fortran routines for various mathematical capabilities maintained by seven federal laboratories.

**DEFAULT**

None

**SYNONYMS**

None

**RELATED COMMANDS**

GAMMA	=	Compute the gamma function.
LOGGAMMA	=	Compute the log (to base e) gamma function.
GAMMAI	=	Compute the incomplete gamma function.
GAMMAIC	=	Compute the complementary incomplete Gamma function.
GAMMAR	=	Compute the reciprocal gamma function.
TRICOMI	=	Compute Tricomi's incomplete gamma function.
DIGAMMA	=	Compute the digamma function.

**REFERENCE**

"Handbook of Mathematical Functions, Applied Mathematics Series, Vol. 55," Abramowitz and Stegun, National Bureau of Standards, 1964 (chapter 6).

“Numerical Recipes: The Art of Scientific Computing (FORTRAN Version),” 2nd Edition, Press, Flannery, Teukolsky, and Vetterling, Cambridge University Press, 1992 (chapter 6).

## APPLICATIONS

Special Functions

## IMPLEMENTATION DATE

94/9

## PROGRAM

```
TITLE INCOMPLETE GAMMA FUNCTIONS
LINE DOT SOLID DASH DASH
PLOT GAMMAIP(X,0.5) FOR X = 0.01 0.01 10 AND
PLOT GAMMAIP(X,1) FOR X = 0.01 0.01 10 AND
PLOT GAMMAIP(X,3) FOR X = 0.01 0.01 10 AND
PLOT GAMMAIP(X,4) FOR X = 0.01 0.01 10
```

