CLGAMA	CERN Program Library	C306

Author(s) : K.S. Kölbig — **Library:** MATHLIB

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Language : Fortran — **Revised:**

Logarithm of the Gamma Function for Complex Argument

Function subprograms CLGAMA and WLGAMA calculate the logarithm of the gamma function

$$\ln\Gamma(z) \;=\; \ln\int_0^\infty e^{-t}t^{z-1}\,dt \qquad (\mathrm{Re}\ z>0)$$

for complex $z \neq -n$, $(n=0,1,2,\ldots)$. The imaginary part Im $\ln\Gamma(z)$ is calculated in such a way that it is continuous for $|\arg z|<\pi$, i.e. it is not taken mod 2π.

The double-precision version WLGAMA is available only on computers which support a COMPLEX*16 Fortran data type.

Structure:

FUNCTION subprograms
User Entry Names: CLGAMA, WLGAMA
Files Referenced: Unit 6
External References: MTLMTR (N002), ABEND (Z035)

Usage:

In any arithmetic expression,

CLGAMA(Z) or WLGAMA(Z) has the value $\ln\Gamma(\mathrm{Z})$,

where CLGAMA is of type COMPLEX, WLGAMA is of type COMPLEX*16, and Z has the same type as the function name.

Method:

The method is described in Ref. 1.

Accuracy:

CLGAMA (except on CDC and Cray computers) has full single-precision accuracy. For most values of the argument X, WLGAMA (and CLGAMA on CDC and Cray computers) has an accuracy of approximately two significant digits less than the machine precision.

Error handling:

Error C306.1: $\mathrm{Z}=-n$, $(n=0,1,2,\cdots)$. The function value is set equal to zero, and a message is written on Unit 6, unless subroutine MTLSET (N002) has been called.

References:

1. K.S. Kölbig, Programs for computing the logarithm of the gamma function, and the digamma function, for complex argument, Computer Phys. Comm. **4** (1972) 221–226.

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