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Submitter :
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Gamma Function for Complex Argument

Function subprograms `CGAMMA` and `WGAMMA` calculate the gamma function

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

for complex arguments $z \neq -n, (n = 0, 1, 2, \cdots)$.

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

Structure:

`FUNCTION` subprograms
User Entry Names: `CGAMMA`, `WGAMMA`
Files Referenced: `Unit 6`
External References: `MTLMTR` (N002), `ABEND` (Z035)

Usage:

In any arithmetic expression,

`CGAMMA(Z)` or `WGAMMA(Z)` has the value $\Gamma(\mathtt{Z})$,

where `CGAMMA` is of type `COMPLEX`, `WGAMMA` is of type `COMPLEX*16`, and `Z` has the same type as the function name.

Method:

The method is described in Ref. 1.

Accuracy:

`CGAMMA` (except on CDC and Cray computers) has full single-precision accuracy. For most values of the argument `Z`, `WGAMMA` (and `CGAMMA` on CDC and Cray computers) has an accuracy of approximately one significant digit less than the machine precision.

Error handling:

Error `C305.1`: $\mathtt{Z} = -n, (n = 0, 1, 2, \cdots)$. 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. Y.L. Luke, The special functions and their approximations, v.II, (Academic Press, New York 1969) 304–305

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