Rocky Enterprise Linux 9.2 Manual Pages on command 'tgamma.3'

$ man tgamma.3

TGAMMA(3) Linux Programmer's Manual TGAMMA(3)

NAME

tgamma, tgammaf, tgammal - true gamma function

SYNOPSIS

#include <math.h>

double tgamma(double x);

float tgammaf(float x);

long double tgammal(long double x);

Link with -lm.

Feature Test Macro Requirements for glibc (see feature_test_macros(7)):

tgamma(), tgammaf(), tgammal():

_ISOC99_SOURCE || _POSIX_C_SOURCE >= 200112L

DESCRIPTION

These functions calculate the Gamma function of x.

The Gamma function is defined by

Gamma(x) = integral from 0 to infinity of t^(x-1) e^-t dt

It is defined for every real number except for nonpositive integers.

For nonnegative integral m one has

Gamma(m+1) = m!

and, more generally, for all x:

Gamma(x+1) = x * Gamma(x)

Furthermore, the following is valid for all values of x outside the poles:

Gamma(x) * Gamma(1 - x) = PI / sin(PI * x)

RETURN VALUE

On success, these functions return Gamma(x).

If x is a NaN, a NaN is returned.

If x is positive infinity, positive infinity is returned.

If x is a negative integer, or is negative infinity, a domain error oc?

curs, and a NaN is returned.

If the result overflows, a range error occurs, and the functions return HUGE_VAL, HUGE_VALF, or HUGE_VALL, respectively, with the correct math?

ematical sign.

If the result underflows, a range error occurs, and the functions re?

turn 0, with the correct mathematical sign.

If x is -0 or +0, a pole error occurs, and the functions return HUGE_VAL, HUGE_VALF, or HUGE_VALL, respectively, with the same sign as the 0.

ERRORS

See math_error(7) for information on how to determine whether an error has occurred when calling these functions.

The following errors can occur:

Domain error: x is a negative integer, or negative infinity

errno is set to EDOM. An invalid floating-point exception (FE_INVALID) is raised (but see BUGS).

Pole error: x is +0 or -0

errno is set to ERANGE. A divide-by-zero floating-point excep?

tion (FE_DIVBYZERO) is raised.

Range error: result overflow

errno is set to ERANGE. An overflow floating-point exception (FE_OVERFLOW) is raised.

glibc also gives the following error which is not specified in C99 or POSIX.1-2001.

Range error: result underflow

An underflow floating-point exception (FE_UNDERFLOW) is raised, and errno is set to ERANGE.

VERSIONS

These functions first appeared in glibc in version 2.1.

ATTRIBUTES

For an explanation of the terms used in this section, see at? tributes(7).

Interface	Attribute	Value
tgamma(), tgammaf(), tgammal()	Thread safety	MT-Safe

CONFORMING TO

C99, POSIX.1-2001, POSIX.1-2008.

NOTES

This function had to be called "true gamma function" since there is al? ready a function gamma(3) that returns something else (see gamma(3) for details).

BUGS

Before version 2.18, the glibc implementation of these functions did not set errno to EDOM when x is negative infinity.

Before glibc 2.19, the glibc implementation of these functions did not set errno to ERANGE on an underflow range error. x

In glibc versions 2.3.3 and earlier, an argument of +0 or -0 incor? rectly produced a domain error (errno set to EDOM and an FE_INVALID ex? ception raised), rather than a pole error.

SEE ALSO

gamma(3), lgamma(3)

COLOPHON

This page is part of release 5.10 of the Linux man-pages project. A

description of the project, information about reporting bugs, and the latest version of this page, can be found at https://www.kernel.org/doc/man-pages/.