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### ***Rocky Enterprise Linux 9.2 Manual Pages on command 'lgammal\_r.3'***

**\$ man lgammal\_r.3**

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

#### **NAME**

lgamma, lgammaf, lgammal, lgamma\_r, lgammaf\_r, lgammal\_r, signgam - log gamma function

#### **SYNOPSIS**

```
#include <math.h>

double lgamma(double x);

float lgammaf(float x);

long double lgammal(long double x);

double lgamma_r(double x, int *signp);

float lgammaf_r(float x, int *signp);

long double lgammal_r(long double x, int *signp);

extern int signgam;

Link with -lm.
```

Feature Test Macro Requirements for glibc (see feature\_test\_macros(7)):

```
lgamma():

    _ISOC99_SOURCE || _POSIX_C_SOURCE >= 200112L || _XOPEN_SOURCE
    || /* Since glibc 2.19: */ _DEFAULT_SOURCE
    || /* Glibc versions <= 2.19: */ _BSD_SOURCE || _SVID_SOURCE
```

```
lgammaf(), lgammal():

    _ISOC99_SOURCE || _POSIX_C_SOURCE >= 200112L
    || /* Since glibc 2.19: */ _DEFAULT_SOURCE
    || /* Glibc versions <= 2.19: */ _BSD_SOURCE || _SVID_SOURCE
```

```
lgamma_r(), lgammaf_r(), lgammal_r():
```

```
/* Since glibc 2.19: */ _DEFAULT_SOURCE
```

```
|| /* Glibc versions <= 2.19: */ _BSD_SOURCE || _SVID_SOURCE
```

signgam:

```
_XOPEN_SOURCE
```

```
|| /* Since glibc 2.19: */ _DEFAULT_SOURCE
```

```
|| /* Glibc versions <= 2.19: */ _BSD_SOURCE || _SVID_SOURCE
```

## DESCRIPTION

For the definition of the Gamma function, see `tgamma(3)`.

The `lgamma()`, `lgammaf()`, and `lgammal()` functions return the natural logarithm of the absolute value of the Gamma function. The sign of the Gamma function is returned in the external integer `signgam` declared in `<math.h>`. It is 1 when the Gamma function is positive or zero, -1 when it is negative.

Since using a constant location `signgam` is not thread-safe, the functions `lgamma_r()`, `lgammaf_r()`, and `lgammal_r()` have been introduced; they return the sign via the argument `signp`.

## RETURN VALUE

On success, these functions return the natural logarithm of  $\Gamma(x)$ .

If  $x$  is a NaN, a NaN is returned.

If  $x$  is 1 or 2, +0 is returned.

If  $x$  is positive infinity or negative infinity, positive infinity is returned.

If  $x$  is a nonpositive integer, a pole error occurs, and the functions return `+HUGE_VAL`, `+HUGE_VALF`, or `+HUGE_VALL`, respectively.

If the result overflows, a range error occurs, and the functions return `HUGE_VAL`, `HUGE_VALF`, or `HUGE_VALL`, respectively, with the correct mathematical sign.

## 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:

Pole error:  $x$  is a nonpositive integer

`errno` is set to `ERANGE` (but see `BUGS`). A divide-by-zero floating-point exception (`FE_DIVBYZERO`) is raised.

Range error: result overflow

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

raised.

## CONFORMING TO

The `lgamma()` functions are specified in C99, POSIX.1-2001, and POSIX.1-2008. `signgam` is specified in POSIX.1-2001 and POSIX.1-2008, but not in C99. The `lgamma_r()` functions are nonstandard, but present on several other systems.

## BUGS

In `glibc` 2.9 and earlier, when a pole error occurs, `errno` is set to `EDOM`; instead of the POSIX-mandated `ERANGE`. Since version 2.10, `glibc` does the right thing.

## SEE ALSO

`tgamma(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/>.

2017-09-15

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