

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 4.10 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/>.