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Red Hat Enterprise Linux Release 9.2 Manual Pages on 'lgamma.3p' command

\$ man lgamma.3p

LGAMMA(3P) POSIX Programmer's Manual LGAMMA(3P)

PROLOG

This manual page is part of the POSIX Programmer's Manual. The Linux implementation of this interface may differ (consult the corresponding Linux manual page for details of Linux behavior), or the interface may not be implemented on Linux.

NAME

lgamma, lgammaf, lgammal, signgam ? log gamma function

SYNOPSIS

```
#include <math.h>

double lgamma(double x);

float lgammaf(float x);

long double lgammal(long double x);

extern int signgam;
```

DESCRIPTION

The functionality described on this reference page is aligned with the ISO C standard. Any conflict between the requirements described here and the ISO C standard is unintentional. This volume of POSIX.1?2017 defers to the ISO C standard.

These functions shall compute $\log_e \Gamma(x)$ where $\Gamma(x)$ is defined as $\Gamma(x) = \int_0^\infty t^{x-1} e^{-t} dt$. The argument x need not be a non-positive integer ($\Gamma(x)$ is defined over the reals, except the non-positive integers).

If x is NaN, -Inf, or a negative integer, the value of signgam is un?

specified.

These functions need not be thread-safe.

An application wishing to check for error situations should set `errno` to zero and call `feclearexcept(FE_ALL_EXCEPT)` before calling these functions. On return, if `errno` is non-zero or `fetestexcept(FE_INVALID | FE_DIVBYZERO | FE_OVERFLOW | FE_UNDERFLOW)` is non-zero, an error has occurred.

RETURN VALUE

Upon successful completion, these functions shall return the logarithmic gamma of x .

If x is a non-positive integer, a pole error shall occur and `lgamma()`, `lgammaf()`, and `lgammal()` shall return `+HUGE_VAL`, `+HUGE_VALF`, and `+HUGE_VALL`, respectively.

If the correct value would cause overflow, a range error shall occur and `lgamma()`, `lgammaf()`, and `lgammal()` shall return `?HUGE_VAL`, `?HUGE_VALF`, and `?HUGE_VALL` (having the same sign as the correct value), respectively.

If x is NaN, a NaN shall be returned.

If x is 1 or 2, `+0` shall be returned.

If x is `?Inf`, `+Inf` shall be returned.

ERRORS

These functions shall fail if:

Pole Error The x argument is a negative integer or zero.

If the integer expression `(math_errhandling & MATH_ERRNO)` is non-zero, then `errno` shall be set to `[ERANGE]`. If the integer expression `(math_errhandling & MATH_ERREXCEPT)` is non-zero, then the divide-by-zero floating-point exception shall be raised.

Range Error The result overflows.

If the integer expression `(math_errhandling & MATH_ERRNO)` is non-zero, then `errno` shall be set to `[ERANGE]`. If the integer expression `(math_errhandling & MATH_ERREXCEPT)` is non-zero, then the overflow floating-point exception shall

be raised.

The following sections are informative.

EXAMPLES

None.

APPLICATION USAGE

On error, the expressions (`math_errhandling` & `MATH_ERRNO`) and (`math_errhandling` & `MATH_ERREXCEPT`) are independent of each other, but at least one of them must be non-zero.

RATIONALE

None.

FUTURE DIRECTIONS

None.

SEE ALSO

`exp()`, `feclearexcept()`, `fetestexcept()`, `isnan()`

The Base Definitions volume of POSIX.1-2017, Section 4.20, Treatment of Error Conditions for Mathematical Functions, `<math.h>`

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