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## **Red Hat Enterprise Linux Release 9.2 Manual Pages on 'ilogb.3p' command**

**\$ man ilogb.3p**

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

ilogb, ilogbf, ilogbl ? return an unbiased exponent

### SYNOPSIS

```
#include <math.h>

int ilogb(double x);

int ilogbf(float x);

int ilogbl(long double x);
```

### 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 return the exponent part of their argument  $x$ .

Formally, the return value is the integral part of  $\log_r|x|$  as a signed integral value, for non-zero  $x$ , where  $r$  is the radix of the machine's floating-point arithmetic, which is the value of `FLT_RADIX` defined in `<float.h>`.

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 exponent part of `x` as a signed integer value. They are equivalent to calling the corresponding `logb()` function and casting the returned value to type `int`.

If `x` is 0, the value `FP_ILOGB0` shall be returned. On XSI-conformant systems, a domain error shall occur; otherwise, a domain error may occur.

If `x` is `?Inf`, the value `{INT_MAX}` shall be returned. On XSI-conformant systems, a domain error shall occur; otherwise, a domain error may occur.

If `x` is a NaN, the value `FP_ILOGBNAN` shall be returned. On XSI-conformant systems, a domain error shall occur; otherwise, a domain error may occur.

If the correct value is greater than `{INT_MAX}`, a domain error shall occur and an unspecified value shall be returned. On XSI-conformant systems, a domain error shall occur and `{INT_MAX}` shall be returned.

If the correct value is less than `{INT_MIN}`, a domain error shall occur and an unspecified value shall be returned. On XSI-conformant systems, a domain error shall occur and `{INT_MIN}` shall be returned.

## ERRORS

These functions shall fail if:

### Domain Error

The correct value is not representable as an integer.

The `x` argument is zero, NaN, or `?Inf`.

If the integer expression `(math_errhandling & MATH_ERRNO)` is non-zero, then `errno` shall be set to `[EDOM]`. If the in?

teger expression `(math_errhandling & MATH_ERREXCEPT)` is

non-zero, then the invalid floating-point exception shall be raised.

These functions may fail if:

#### Domain Error

The `x` argument is zero, NaN, or `±Inf`.

If the integer expression `(math_errhandling & MATH_ERRNO)` is non-zero, then `errno` shall be set to `[EDOM]`. If the integer expression `(math_errhandling & MATH_ERREXCEPT)` is non-zero, then the invalid 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

The errors come from taking the expected floating-point value and converting it to `int`, which is an invalid operation in IEEE Std 754:1985 (since overflow, infinity, and NaN are not representable in a type `int`), so should be a domain error.

There are no known implementations that overflow. For overflow to happen, `{INT_MAX}` must be less than `LDBL_MAX_EXP*log2(FLT_RADIX)` or `{INT_MIN}` must be greater than `LDBL_MIN_EXP*log2(FLT_RADIX)` if subnormals are not supported, or `{INT_MIN}` must be greater than `(LDBL_MIN_EXP-LDBL_MANT_DIG)*log2(FLT_RADIX)` if subnormals are supported.

#### FUTURE DIRECTIONS

None.

#### SEE ALSO

`feclearexcept()`, `fetestexcept()`, `logb()`, `scalbln()`

The Base Definitions volume of POSIX.1:2017, Section 4.20, Treatment of

Error Conditions for Mathematical Functions, <float.h>, <math.h>

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