

NAME

pow, powf, powl – power functions

SYNOPSIS

```
#include <math.h>
```

```
double pow(double x, double y);
```

```
float powf(float x, float y);
```

```
long double powl(long double x, long double y);
```

Link with `-lm`.

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

```
powf(), powl():
```

```
_ISOC99_SOURCE || _POSIX_C_SOURCE >= 200112L
```

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

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

DESCRIPTION

These functions return the value of x raised to the power of y .

RETURN VALUE

On success, these functions return the value of x to the power of y .

If x is a finite value less than 0, and y is a finite noninteger, a domain error occurs, 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 mathematically correct sign.

If result underflows, and is not representable, a range error occurs, and 0.0 is returned.

Except as specified below, if x or y is a NaN, the result is a NaN.

If x is +1, the result is 1.0 (even if y is a NaN).

If y is 0, the result is 1.0 (even if x is a NaN).

If x is +0 (−0), and y is an odd integer greater than 0, the result is +0 (−0).

If x is 0, and y greater than 0 and not an odd integer, the result is +0.

If x is −1, and y is positive infinity or negative infinity, the result is 1.0.

If the absolute value of x is less than 1, and y is negative infinity, the result is positive infinity.

If the absolute value of x is greater than 1, and y is negative infinity, the result is +0.

If the absolute value of x is less than 1, and y is positive infinity, the result is +0.

If the absolute value of x is greater than 1, and y is positive infinity, the result is positive infinity.

If x is negative infinity, and y is an odd integer less than 0, the result is −0.

If x is negative infinity, and y less than 0 and not an odd integer, the result is +0.

If x is negative infinity, and y is an odd integer greater than 0, the result is negative infinity.

If x is negative infinity, and y greater than 0 and not an odd integer, the result is positive infinity.

If x is positive infinity, and y less than 0, the result is +0.

If x is positive infinity, and y greater than 0, the result is positive infinity.

If x is +0 or −0, and y is an odd integer less than 0, a pole error occurs and **HUGE_VAL**, **HUGE_VALF**, or **HUGE_VALL**, is returned, with the same sign as x .

If x is +0 or −0, and y is less than 0 and not an odd integer, a pole error occurs and **+HUGE_VAL**, **+HUGE_VALF**, or **+HUGE_VALL**, is returned.

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 negative, and y is a finite noninteger

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

Pole error: x is zero, and y is negative

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

Range error: the result overflows

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

Range error: the result underflows

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

ATTRIBUTES

For an explanation of the terms used in this section, see **attributes(7)**.

Interface	Attribute	Value
pow() , powf() , powl()	Thread safety	MT-Safe

CONFORMING TO

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

The variant returning *double* also conforms to SVr4, 4.3BSD, C89.

BUGS

On 64-bits, **pow()** may be more than 10,000 times slower for some (rare) inputs than for other nearby inputs. This affects only **pow()**, and not **powf()** nor **powl()**.

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.

If x is negative, then large negative or positive y values yield a NaN as the function result, with *errno* set to **EDOM**, and an invalid (**FE_INVALID**) floating-point exception. For example, with **pow()**, one sees this behavior when the absolute value of y is greater than about 9.223373e18.

In version 2.3.2 and earlier, when an overflow or underflow error occurs, glibc's **pow()** generates a bogus invalid floating-point exception (**FE_INVALID**) in addition to the overflow or underflow exception.

SEE ALSO

cbrt(3), **cpow(3)**, **sqrt(3)**

COLOPHON

This page is part of release 5.05 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/>.