

**NAME**

cosh, coshf, coshl - hyperbolic cosine function

**SYNOPSIS**

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

```
double cosh(double x);
```

```
float coshf(float x);
```

```
long double coshl(long double x);
```

Link with *-lm*.

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

```
coshf(), coshl():
```

```
  _BSD_SOURCE || _SVID_SOURCE || _XOPEN_SOURCE >= 600 || _ISOC99_SOURCE ||  
  _POSIX_C_SOURCE >= 200112L;
```

```
or cc -std=c99
```

**DESCRIPTION**

The **cosh()** function returns the hyperbolic cosine of *x*, which is defined mathematically as:

$$\cosh(x) = (\exp(x) + \exp(-x)) / 2$$

**RETURN VALUE**

On success, these functions return the hyperbolic cosine of *x*.

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

If *x* is +0 or -0, 1 is returned.

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

If the result overflows, a range error occurs, and the functions return **+HUGE\_VAL**, **+HUGE\_VALF**, or **+HUGE\_VALL**, respectively.

**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:

Range error: result overflow

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

**CONFORMING TO**

C99, POSIX.1-2001. The variant returning *double* also conforms to SVr4, 4.3BSD.

**BUGS**

In glibc version 2.3.4 and earlier, an overflow floating-point (**FE\_OVERFLOW**) exception is not raised when an overflow occurs.

**SEE ALSO**

[acosh\(3\)](#), [asinh\(3\)](#), [atanh\(3\)](#), [ccos\(3\)](#), [sinh\(3\)](#), [tanh\(3\)](#)

**COLOPHON**

This page is part of release 3.74 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 <http://www.kernel.org/doc/man-pages/>.