

NAME

`sinh`, `sinhf`, `sinhl` – hyperbolic sine function

SYNOPSIS

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

```
double sinh(double x);
```

```
float sinhf(float x);
```

```
long double sinhl(long double x);
```

Link with `-lm`.

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

```
sinhf(), sinhl():
```

```
_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 hyperbolic sine of x , which is defined mathematically as:

$$\sinh(x) = (\exp(x) - \exp(-x)) / 2$$

RETURN VALUE

On success, these functions return the hyperbolic sine of x .

If x is a NaN, a NaN is returned.

If x is $+0$ (-0), $+0$ (-0) is returned.

If x is positive infinity (negative infinity), positive infinity (negative infinity) is returned.

If the result overflows, a range error occurs, and the functions return **HUGE_VAL**, **HUGE_VALF**, or **HUGE_VALL**, respectively, with the same sign as x .

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.

ATTRIBUTES

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

Interface	Attribute	Value
sinh() , sinhf() , sinhl()	Thread safety	MT-Safe

CONFORMING TO

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

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

SEE ALSO

acosh(3), **asinh(3)**, **atanh(3)**, **cosh(3)**, **csinh(3)**, **tanh(3)**

COLOPHON

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