

# ATANH(3)

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ATANH(3)   Linux Programmer's Manual   ATANH(3)

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## NAME

atanh, atanhf, atanh1 - inverse hyperbolic tangent function

## SYNOPSIS

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

```
double atanh(double x);
```

```
float atanhf(float x);
```

```
long double atanh1(long double x);
```

Link with -lm.

Feature Test Macro Requirements for glibc (see **feature\_test\_macros(7)**):

**atanh()**:

```
_BSD_SOURCE || _SVID_SOURCE || _XOPEN_SOURCE >= 500 ||  
_XOPEN_SOURCE && _XOPEN_SOURCE_EXTENDED || _ISOC99_SOURCE  
|| _POSIX_C_SOURCE >= 200112L;
```

or cc -std=c99

**atanhf()**, **atanhl()**:

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

or `cc -std=c99`

## DESCRIPTION

The **atanh**() function calculates the inverse hyperbolic tangent of  $\underline{x}$ ; that is the value whose hyperbolic tangent is  $\underline{x}$ .

## RETURN VALUE

On success, these functions return the inverse hyperbolic tangent of  $\underline{x}$ .

If  $\underline{x}$  is a NaN, a NaN is returned.

If  $\underline{x}$  is +0 (-0), +0 (-0) is returned.

If  $\underline{x}$  is +1 or -1, a pole error occurs, and the functions return **HUGE\_VAL**, **HUGE\_VALF**, or **HUGE\_VALL**, respectively, with the mathematically correct sign.

If the absolute value of  $\underline{x}$  is greater than 1, a domain error occurs, and a NaN 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:**  $\underline{x}$  less than -1 or greater than +1 `errno` is set to **EDOM**.  
An invalid floating-point exception (**FE\_INVALID**) is raised.

**Pole error:** `x` is +1 or -1 `errno` is set to **ERANGE** (but see BUGS). A divide-by-zero floating-point exception (**FE\_DIVBYZERO**) is raised.

## CONFORMING TO

C99, POSIX.1-2001. The variant returning `double` also conforms to SVr4, 4.3BSD, C89.

## BUGS

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.

## SEE ALSO

**acosh**(3), **asinh**(3), **catanh**(3), **cosh**(3), **sinh**(3), **tanh**(3)

## COLOPHON

This page is part of release 3.54 of the Linux man-pages project. A description of the project, and information about reporting bugs, can be found at <http://www.kernel.org/doc/man-pages/>.

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