

**NAME**

tanh, tanhf, tanhl - hyperbolic tangent function

**SYNOPSIS**

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

```
double tanh(double x);
```

```
float tanhf(float x);
```

```
long double tanhl(long double x);
```

Link with *-lm*.

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

```
tanhf(), tanhl():
```

```
  _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 tangent of *x*, which is defined mathematically as:

$$\tanh(x) = \sinh(x) / \cosh(x)$$

**RETURN VALUE**

On success, these functions return the hyperbolic tangent 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), +1 (-1) is returned.

**ERRORS**

No errors occur.

**ATTRIBUTES**

For an explanation of the terms used in this section, see [attributes\(7\)](#).

Interface	Attribute	Value
<b>tanh()</b> , <b>tanhf()</b> , <b>tanhl()</b>	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\(3\)](#), [ctanh\(3\)](#), [sinh\(3\)](#)

**COLOPHON**

This page is part of release 4.10 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/>.