

**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()**, **tanh()**:

```
_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>tanh()</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**

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