NAME

atanh, atanhf, atanhl - inverse hyperbolic tangent function

SYNOPSIS

#include <math.h>

double atanh(double x);
float atanhf(float x);
long double atanhl(long double x);

Link with $\mathit{-lm}.$

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

$\mathbf{atanh}()$:

```
_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 x; that is the value whose hyperbolic tangent is x.

RETURN VALUE

On success, these functions return the inverse 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 +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 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: 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* as set to **EDOM** instead of the POSIX-mandated **ERANGE**. Since version 2.10, glibc does the right thing.

SEE ALSO

 $\operatorname{acosh}(3)$, $\operatorname{asinh}(3)$, $\operatorname{catanh}(3)$, $\operatorname{cosh}(3)$, $\operatorname{sinh}(3)$, $\operatorname{tanh}(3)$

COLOPHON

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