NAME

expm1, expm1f, expm11 - exponential minus 1

SYNOPSIS

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

```
double expm1(double x);
```

float expm1f(float x);

long double expm1l(long double x);

Link with -lm.

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

expm1():

```
_ISOC99_SOURCE || _POSIX_C_SOURCE >= 200112L || _XOPEN_SOURCE >= 500 || /* Since glibc 2.19: */ _DEFAULT_SOURCE || /* Glibc versions <= 2.19: */ _BSD_SOURCE || _SVID_SOURCE
```

expm1f(), expm1l():

```
_ISOC99_SOURCE || _POSIX_C_SOURCE >= 200112L || /* Since glibc 2.19: */ _DE-FAULT_SOURCE || /* Glibc versions <= 2.19: */ _BSD_SOURCE || _SVID_SOURCE
```

DESCRIPTION

These functions return a value equivalent to

```
\exp(x) - 1
```

The result is computed in a way that is accurate even if the value of x is near zero—a case where exp(x) - 1 would be inaccurate due to subtraction of two numbers that are nearly equal.

RETURN VALUE

On success, these functions return exp(x) - 1.

If x is a NaN, a NaN is returned.

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

If *x* is positive infinity, positive infinity is returned.

If x is negative infinity, -1 is returned.

If the result overflows, a range error occurs, and the functions return -HUGE_VAL, -HUGE_VALF, or -HUGE_VALL, respectively.

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, overflow

errno is set to **ERANGE** (but see BUGS). An overflow floating-point exception (**FE_OVER-FLOW**) is raised.

ATTRIBUTES

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

Interface	Attribute	Value
expm1(), expm1f(), expm1l()	Thread safety	MT-Safe

CONFORMING TO

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

BUGS

For some large negative x values (where the function result approaches -1), **expm1**() raises a bogus underflow floating-point exception.

For some large positive x values, expm1() raises a bogus invalid floating-point exception in addition to the

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expected overflow exception, and returns a NaN instead of positive infinity.

Before version 2.11, the glibc implementation did not set *errno* to **ERANGE** when a range error occurred.

SEE ALSO

 $\exp(3), \log(3), \log 1p(3)$

COLOPHON

This page is part of release 4.16 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/.

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