

NAME

`j0`, `j0f`, `j0l`, `j1`, `j1f`, `j1l`, `jn`, `jnf`, `jnl` – Bessel functions of the first kind

SYNOPSIS

```
#include <math.h>

double j0(double x);
double j1(double x);
double jn(int n, double x);

float j0f(float x);
float j1f(float x);
float jnf(int n, float x);

long double j0l(long double x);
long double j1l(long double x);
long double jnl(int n, long double x);
```

Link with `-lm`.

Feature Test Macro Requirements for glibc (see [feature_test_macros\(7\)](#)):

```
j0(), j1(), jn():
    _XOPEN_SOURCE || /* Since glibc 2.19: */ _DEFAULT_SOURCE || /* Glibc versions <= 2.19: */
    _SVID_SOURCE || _BSD_SOURCE
j0f(), j0l(), j1f(), j1l(), jnf(), jnl():
    _XOPEN_SOURCE >= 600 || (_ISOC99_SOURCE && _XOPEN_SOURCE) || /* Since glibc 2.19:
    */ _DEFAULT_SOURCE || /* Glibc versions <= 2.19: */ _SVID_SOURCE || _BSD_SOURCE
```

DESCRIPTION

The `j0()` and `j1()` functions return Bessel functions of x of the first kind of orders 0 and 1, respectively. The `jn()` function returns the Bessel function of x of the first kind of order n .

The `j0f()`, `j1f()`, and `jnf()`, functions are versions that take and return *float* values. The `j0l()`, `j1l()`, and `jnl()` functions are versions that take and return *long double* values.

RETURN VALUE

On success, these functions return the appropriate Bessel value of the first kind for x .

If x is a NaN, a NaN is returned.

If x is too large in magnitude, or the result underflows, a range error occurs, and the return value is 0.

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: result underflow, or x is too large in magnitude
errno is set to **ERANGE**.

These functions do not raise exceptions for [fetestexcept\(3\)](#).

ATTRIBUTES

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

Interface	Attribute	Value
<code>j0()</code> , <code>j0f()</code> , <code>j0l()</code>	Thread safety	MT-Safe
<code>j1()</code> , <code>j1f()</code> , <code>j1l()</code>	Thread safety	MT-Safe
<code>jn()</code> , <code>jnf()</code> , <code>jnl()</code>	Thread safety	MT-Safe

CONFORMING TO

The functions returning *double* conform to SVr4, 4.3BSD, POSIX.1-2001, and POSIX.1-2008. The others are nonstandard functions that also exist on the BSDs.

BUGS

There are errors of up to $2e-16$ in the values returned by **j0()**, **j1()** and **jn()** for values of x between -8 and 8 .

SEE ALSO

[y0\(3\)](#)

COLOPHON

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