

**NAME**

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

**LIBRARY**

Math library (*libm*, *-lm*)

**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);
```

Feature Test Macro Requirements for glibc (see **feature\_test\_macros(7)**):

```
j0(), j1(), jn():
    _XOPEN_SOURCE
    || /* Since glibc 2.19: */ _DEFAULT_SOURCE
    || /* glibc <= 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 <= 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
<b>j0()</b> , <b>j0f()</b> , <b>j0l()</b>	Thread safety	MT-Safe
<b>j1()</b> , <b>j1f()</b> , <b>j1l()</b>	Thread safety	MT-Safe
<b>jn()</b> , <b>jnf()</b> , <b>jnl()</b>	Thread safety	MT-Safe

## STANDARDS

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)**