The C99 version of <math.h> also includes a number of completely new functions (and function-like macros). I'll give a brief description of each one. As in Section 23.3, I won't discuss error conditions for these functions, but Appendix D—which lists all standard library functions in alphabetical order—provides this information. I won't list the names of all the new functions in the left margin; instead, I'll show just the name of the primary function. For example, there are three new functions that compute the arc hyperbolic cosine: acosh, acoshf, and acoshl. I'll describe acosh and display only its name in the left margin.

Keep in mind that many of the new functions are highly specialized. As a result, the descriptions of these functions may seem sketchy. A discussion of what these functions are used for is outside the scope of this book.

Classification Macros

```
int  fpclassify (real-floating  x) ;
int  isfinite (real-floating  x) ;
int  isinf (real-floating  x) ;
int  isnan (real-floating  x) ;
int  isnormal (real-floating  x) ;
int  signbit (real-floating  x) ;
```

Our first category consists of function-like macros that are used to determine whether a floating-point value is a "normal" number or a special value such as infinity or NaN. The macros in this group are designed to accept arguments of any real floating type (float, double, or long double).

fpclassify   The fpclassify macro classifies its argument, returning the value of one of the number-classification macros shown in Table 23.9. An implementation may support other classifications by defining additional macros whose names begin with FP_ and an upper-case letter.

Table 23.9
Number-Classification
Macros

Name	Meaning
FP_INFINITE	Infinity (positive or negative)
FP_NAN	Not a number
FP_NORMAL	Normal (not zero, subnormal, infinite, or NaN)
FP_SUBNORMAL	Subnormal
FP_ZERO	Zero (positive or negative)

isfinite
isinf
isnan
isnormal

The isfinite macro returns a nonzero value if its argument has a finite value (zero, subnormal, or normal, but not infinite or NaN). isinf returns a nonzero value if its argument has the value infinity (positive or negative). isnan returns a nonzero value if its argument is a NaN value. isnormal returns a nonzero value if its argument has a normal value (not zero, subnormal, infinite, or NaN).

signbit   The last classification macro is a bit different from the others. signbit returns a nonzero value if the sign of its argument is negative. The argument need not be a finite number; signbit also works for infinity and NaN.