

NaN ► 23.4 (“domain error”) is stored in `errno`. In some implementations of `<math.h>`, functions return a special value known as NaN (“not a number”) when a domain error occurs.

■ **Range error:** The return value of a function is outside the range of double values. If the return value’s magnitude is too large (overflow), the function returns positive or negative `HUGE_VAL`, depending on the sign of the correct result. In addition, `ERANGE` (“range error”) is stored in `errno`. If the return value’s magnitude is too small to represent (underflow), the function returns zero; some implementations may also store `ERANGE` in `errno`.

underflow ► 23.4

We’ll ignore the possibility of error for the remainder of this section. However, the function descriptions in Appendix D explain the circumstances that lead to each type of error.

Trigonometric Functions

```
double acos(double x);
double asin(double x);
double atan(double x);
double atan2(double y, double x);
double cos(double x);
double sin(double x);
double tan(double x);
```

cos sin tan The `cos`, `sin`, and `tan` functions compute the cosine, sine, and tangent, respectively. If `PI` is defined to be 3.14159265, passing `PI/4` to `cos`, `sin`, and `tan` produces the following results:

```
cos(PI/4) ⇒ 0.707107
sin(PI/4) ⇒ 0.707107
tan(PI/4) ⇒ 1.0
```

Note that arguments to `cos`, `sin`, and `tan` are expressed in radians, not degrees.

acos, asin, and atan compute the arc cosine, arc sine, and arc tangent:

```
acos(1.0) ⇒ 0.0
asin(1.0) ⇒ 1.5708
atan(1.0) ⇒ 0.785398
```

Applying `acos` to a value returned by `cos` won’t necessarily yield the original argument to `cos`, since `acos` always returns a value between 0 and π . `asin` and `atan` return a value between $-\pi/2$ and $\pi/2$.

atan2 `atan2` computes the arc tangent of y/x , where y is the function’s first argument and x is its second. The return value of `atan2` is between $-\pi$ and π . The call `atan(x)` is equivalent to `atan2(x, 1.0)`.