27 Additional C99 Support for Mathematics

Simplicity does not precede complexity, but follows it.

This chapter completes our coverage of the standard library by describing five headers that are new in C99. These headers, like some of the older ones, provide support for working with numbers. However, the new headers are more specialized than the old ones. Some of them will appeal primarily to engineers, scientists, and mathematicians, who may need complex numbers as well as greater control over the representation of numbers and the way floating-point arithmetic is performed.

The first two sections discuss headers related to the integer types. The `<stdint.h>` header (Section 27.1) declares integer types that have a specified number of bits. The `<inttypes.h>` header (Section 27.2) provides macros that are useful for reading and writing values of the `<stdint.h>` types.

The next two sections describe C99's support for complex numbers. Section 27.3 includes a review of complex numbers as well as a discussion of C99's complex types. Section 27.4 then covers the `<complex.h>` header, which supplies functions that perform mathematical operations on complex numbers.

The headers discussed in the last two sections are related to the floating types. The `<tgmath.h>` header (Section 27.5) provides type-generic macros that make it easier to call library functions in `<complex.h>` and `<math.h>`. The functions in the `<fenv.h>` header (Section 27.6) give programs access to floating-point status flags and control modes.

27.1 The `<stdint.h>` Header (C99): Integer Types

The `<stdint.h>` header declares integer types containing a specified number of bits. In addition, it defines macros that represent the minimum and maximum values of these types as well as of integer types declared in other headers.