■ *Additional conversion specifiers.* C99 adds the F, a, and A conversion specifiers. F is the same as f except for the way in which infinity and NaN (see below) are written. The a and A conversion specifications are rarely used. They're related to hexadecimal floating constants, which are discussed in the Q&A section at the end of Chapter 7.

IEEE floating-point standard ➤*23.4*

■ *Ability to write infinity and NaN.* The IEEE 754 floating-point standard allows the result of a floating-point operation to be infinity, negative infinity, or NaN ("not a number"). For example. dividing 1.0 by 0.0 yields positive infinity, dividing −1.0 by 0.0 yields negative infinity, and dividing 0.0 by 0.0 yields NaN (because the result is mathematically undefined). In C99, the a, A, e, E, f, F, g, and G conversion specifiers are capable of converting these special values to a form that can be displayed. a, e, f, and g convert positive infinity to inf or infinity (either one is legal), negative infinity to -inf or -infinity, and NaN to nan or -nan (possibly followed by a series of characters enclosed in parentheses). A, E, F, and G are equivalent to a, e, f, and g, except that upper-case letters are used (INF. INFINITY, NAN).

wide characters ➤*25.2*

■ *Support for wide characters.* Another C99 feature is the ability of fprintf to write wide characters. The %lc conversion specification is used to write a single wide character; %ls is used for a string of wide characters.

■ *Previously undefined conversion specifications now allowed.* In C89, the effect of using %le, %lE, %lf, %lg. and %lG is undefined. These conversion specifications are legal in C99 (the l length modifier is simply ignored).

Examples of ...printf Conversion Specifications

Whew! It's about time for a few examples. We've seen plenty of everyday conversion specifications in previous chapters, so we'll concentrate here on illustrating some of the more advanced ones. As in previous chapters, I'll use • to represent the space character.

Let's start off by examining the effect of flags on the %d conversion (they have a similar effect on other conversions). The first line of Table 22.7 shows the effect of %8d without any flags. The next four lines show the effect of the -, +, *space*, and 0 flags (the # flag is never used with %d). The remaining lines show the effect of combinations of flags.

Table 22.7
Effect of Flags on
the %d Conversion

Conversion Specification	Result of Applying Conversion to 123	Result of Applying Conversion to −123
%8d	•••••123	••••-123
%-8d	123•••••	-123••••
%+8d	••••+123	••••-123
% 8d	•••••123	••••-123
%08d	00000123	-0000123
%-+8d	+123••••	-123••••
%- 8d	•123••••	-123••••
%+08d	+0000123	-0000123
% 08d	•0000123	-0000123