Q & A

Q: Section 7.1 says that `%o` and `%x` are used to write unsigned integers in octal and hex notation. How do I write ordinary (signed) integers in octal or hex? [p. 130]

A: You can use `%o` and `%x` to print a signed integer as long as its value isn't negative. These conversions cause `printf` to treat a signed integer as though it were unsigned; in other words, `printf` will assume that the sign bit is part of the number's magnitude. As long as the sign bit is 0, there's no problem. If the sign bit is 1, `printf` will print an unexpectedly large number.

Q: But what if the number *is* negative? How can I write it in octal or hex?

A: There's no direct way to print a negative number in octal or hex. Fortunately, the need to do so is pretty rare. You can, of course, test whether the number is negative and print a minus sign yourself:

```
if (i < 0)
  printf("-%x", -i);
else
  printf("%x", i);
```

Q: Why are floating constants stored in `double` form rather than `float` form? [p. 133]

A: For historical reasons, C gives preference to the `double` type; `float` is treated as a second-class citizen. Consider, for instance, the discussion of `float` in Kernighan and Ritchie's *The C Programming Language*: "The main reason for using `float` is to save storage in large arrays, or, less often, to save time on machines where double-precision arithmetic is particularly expensive." C originally mandated that all floating-point arithmetic be done in double precision. (C89 and C99 have no such requirement.)

***Q: What do hexadecimal floating constants look like, and what are they good for? [p. 134]**

A: A hexadecimal floating constant begins with `0x` or `0X` and must contain an exponent, which is preceded by the letter `P` (or `p`). The exponent may have a sign, and the constant may end with `f`, `F`, `l`, or `L`. The exponent is expressed in decimal, but represents a power of 2, not a power of 10. For example, `0x1.Bp3` represents the number $1.6875 \times 2^3 = 13.5$. The hex digit `B` corresponds to the bit pattern 1011. The `B` occurs to the right of the period, so each 1 bit represents a negative power of 2. Summing these powers of 2 ($2^{-1} + 2^{-3} + 2^{-4}$) yields .6875.

Hexadecimal floating constants are primarily useful for specifying constants that require great precision (including mathematical constants such as e and π). Hex numbers have a precise binary representation, whereas a constant written in decimal may be subject to a tiny rounding error when converted to binary. Hexa-