Q: Why doesn't this chapter discuss screen control: moving the cursor, changing the colors of characters on the screen, and so on?

A: C provides no standard functions for screen control. The C standard addresses only issues that can reasonably be standardized across a wide range of computers and operating systems; screen control is outside this realm. The customary way to solve this problem in UNIX is to use the `curses` library, which supports screen control in a terminal-independent manner.

Similarly, there are no standard functions for building programs with a graphical user interface. However, you can most likely use C function calls to access the windowing API (application programming interface) for your operating system.

Exercises

Section 22.1

1. Indicate whether each of the following files is more likely to contain text data or binary data:
   (a) A file of object code produced by a C compiler
   (b) A program listing produced by a C compiler
   (c) An email message sent from one computer to another
   (d) A file containing a graphics image

Section 22.2

W 2. Indicate which mode string is most likely to be passed to `fopen` in each of the following situations:
   (a) A database management system opens a file containing records to be updated.
   (b) A mail program opens a file of saved messages so that it can add additional messages to the end.
   (c) A graphics program opens a file containing a picture to be displayed on the screen.
   (d) An operating system command interpreter opens a "shell script" (or "batch file") containing commands to be executed.

3. Find the error in the following program fragment and show how to fix it.

```
FILE *fp;

if (fp = fopen(filename, "r")) {
  read characters until end-of-file
}
fclose(fp);
```

Section 22.3

W 4. Show how each of the following numbers will look if displayed by `printf` with `%#012.5g` as the conversion specification:
   (a) 83.7361
   (b) 29748.6607
   (c) 1054932234.0
   (d) 0.0000235218

5. Is there any difference between the `printf` conversion specifications `%.4d` and `%04d`? If so, explain what it is.