3.27 *(Printing the Decimmal Equivalent of a Binary Number)* Input an integer containing only 0s and 1s (i.e., a "binary" integer) and print its decimal equivalent. Use the modulus and division operators to pick off the "binary" number's digits one at a time from right to left. Much as in the decimal number system, where the rightmost digit has a positional value of 1, the next digit left has a positional value of 10, then 100, then 1000, and so on, in the binary number system the rightmost digit has a positional value of 1, the next digit left has a positional value of 2, then 4, then 8, and so on. Thus the decimal number 234 can be interpreted as 2 * 100 + 3 * 10 + 4 * 1. The decimal equivalent of binary 1101 is 1 * 1 + 0 * 2 + 1 * 4 + 1 * 8 or 1 + 0 + 4 + 8, or 13. [*Note:* To learn more about binary numbers, refer to Appendix D.]

3.34 *(Factorial)* The factorial of a nonnegative integer n is written $n!$ (pronounced "n factorial") and is defined as follows:

$$n! = n \cdot (n-1) \cdot (n-2) \cdot \ldots \cdot 1 \quad \text{(for values of } n \text{ greater than 1)}$$

and

$$n! = 1 \quad \text{(for } n = 0 \text{ or } n = 1\text{)}.$$

For example, $5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1$, which is 120. Use `while` statements in each of the following:

a) Write a program that reads a nonnegative integer and computes and prints its factorial.

b) Write a program that estimates the value of the mathematical constant e by using the formula:

$$e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \ldots$$

Prompt the user for the desired accuracy of e (i.e., the number of terms in the summation).

c) Write a program that computes the value of e^x by using the formula

$$e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots$$

Prompt the user for the desired accuracy of e (i.e., the number of terms in the summation).

4.10 *(Factorials)* The factorial function is used frequently in probability problems. Using the definition of factorial in Exercise 3.34, write a program that uses a `for` statement to evaluate the factorials of the integers from 1 to 5. Print the results in tabular format. What difficulty might prevent you from calculating the factorial of 20?

4.13 *(Bar Chart)* One interesting application of computers is drawing graphs and bar charts. Write a program that reads five numbers (each between 1 and 30). Assume that the user enters only valid values. For each number that's read, your program should print a line containing that number of adjacent asterisks. For example, if your program reads the number 7, it should print *******.

4.28 *("The Twelve Days of Christmas" Song)* Write a program that uses repetition and `switch` statements to print the song "The Twelve Days of Christmas." One `switch` statement should be used to print the day (i.e., "first," "second," etc.). A separate `switch` statement should be used to print the remainder of each verse.