

3. Write a program that demonstrates the operator `%` by performing the following tasks:

- Use `Scanner` to read a floating-point value  $x$ .
- Compute  $x \% 2.0$  and store the result in  $y$ .
- Display  $x$  and  $y$  clearly labeled.
- Type cast  $x$  to an `int` value and store the result in  $z$ .
- Display  $x$ ,  $z$ , and  $z \% 2$  clearly labeled.

Try your program with positive and negative values of  $x$ . What implications do your results have for deciding whether a negative integer is odd?

4. If  $u = 2$ ,  $v = 3$ ,  $w = 5$ ,  $x = 7$ , and  $y = 11$ , what is the value of each of the following expressions, assuming `int` variables?

- $u + v * w + x$
- $u + y \% v * w + x$
- $u++ / v + u++ * w$

5. What changes to the `ChangeMaker` program in Listing 2.3 are necessary if it also accepts coins for one dollar and half a dollar?

6. If the `int` variable  $x$  contains 10, what will the following Java statements display?

```
System.out.println("Test 1" + x * 3 * 2.0);
System.out.println("Test 2" + x * 3 + 2.0);
```

Given these results, explain why the following Java statement will not compile:

```
System.out.println("Test 3" + x * 3 - 2.0);
```

7. Write some Java statements that use the `String` methods `indexOf` and `substring` to find the first word in a string. We define *word* to be a string of characters that does not include whitespace. For example, the first word of the string

```
"Hello, my good friend!"
```

is the string "Hello," and the second word is the string "my".

8. Repeat the previous exercise, but find the second word in the string.
9. What does the following Java statement display?

```
System.out.println("\tTest\\\\\\rIt\\'");
```

Does replacing the `r` with an `n` make a difference in what is displayed?

10. Write a single Java statement that will display the words *one*, *two*, and *three*, each on its own line.

## Exercises

1. Write a fragment of code that will test whether an integer variable `score` contains a valid test score. Valid test scores are in the range 0 to 100.
2. Write a fragment of code that will change the integer value stored in `x` as follows. If `x` is even, divide `x` by 2. If `x` is odd, multiply `x` by 3 and subtract 1.
3. Suppose you are writing a program that asks the user to give a yes-or-no response. Assume that the program reads the user's response into the `String` variable `response`.
  - a. If `response` is `yes` or `y`, set the boolean variable `accept` to `true`; otherwise, set it to `false`.
  - b. How would you change the code so that it will also accept `Yes` and `Y`?
4. Consider the following fragment of code:

```
if (x > 5)
    System.out.println("A");
else if (x < 10)
    System.out.println("B");
else
    System.out.println("C");
```

What is displayed if `x` is

- a. 4;      b. 5;      c. 6;      d. 9;      e. 10;      f. 11
5. Consider the following fragment of code:

```
if (x > 5)
{
    System.out.println("A");
    if (x < 10)
        System.out.println("B");
}
else
    System.out.println("C");
```

What is displayed if `x` is

- a. 4;      b. 5;      c. 6;      d. 9;      e. 10;      f. 11
6. We would like to assess a service charge for cashing a check. The service charge depends on the amount of the check. If the check amount is less than \$10, we will charge \$1. If the amount is greater than \$10 but less than \$100, we will charge 10 percent of the amount. If the amount is greater than \$100, but less than \$1,000, we will charge \$5 plus 5 percent of the amount. If the value is over \$1,000, we will charge \$40 plus 1 percent of

the amount. Use a multibranch `if-else` statement in a fragment of code to compute the service charge.

7. What is the value of each of the following boolean expressions if `x` is 5, `y` is 10, and `z` is 15?
  - a. `(x < 5 && y > x)`
  - b. `(x < 5 || y > x)`
  - c. `(x > 3 || y < 10 && z == 15)`
  - d. `(! (x > 3) && x != z || x + y == z)`
8. The following code fragment will not compile. Why?
 

```
if !x > x + y
    x = 2 * x;
else
    x = x + 3;
```
9. Consider the boolean expression `((x > 10) || (x < 100))`. Why is this expression probably not what the programmer intended?
10. Consider the boolean expression `((2 < 5) && (x < 100))`. Why is this expression probably not what the programmer intended?
11. Write a `switch` statement to convert a letter grade into an equivalent numeric value on a four-point scale. Set the value of the variable `gradeValue` to 4.0 for an A, 3.0 for a B, 2.0 for a C, 1.0 for a D, and 0.0 for an F. For any other letter, set the value to 0.0 and display an error message.
12. Consider the previous question, but include + or – letter grades. A+ is 4.25, A– is 3.75, B+ is 3.25, B– is 2.75, and so on.
  - a. Why can't we use one `switch` statement with no other conditionals to convert these additional letter grades?
  - b. Write a fragment of code that will do the conversion using a multibranch `if-else` statement.
  - c. Write a fragment of code that will do the conversion using nested `switch` statements.
13. Imagine a program that displays a menu of five possible choices, lettered *a* through *e*. Suppose the user's selection is read into the character variable `choice`. Write a `switch` statement that reacts to this choice by displaying a message that indicates the choice. Display an error message if the user makes an invalid choice.
14. Repeat the previous exercise, but define an enumeration and use it within the `switch` statement.
15. Repeat Exercise 13, but use a multibranch `if-else` statement instead of a `switch` statement.