**Chapter 4**

**Exercise 1**

Find the error in each of the following code segments, and explain how to correct it:

1. i = 1;

while (i <= 10);

++i;

}

* + **Error:** Semicolon after the while condition makes it an empty loop. Also, unmatched closing brace.
  + **Fix:**
  + int i = 1;
  + while (i <= 10) {
  + ++i;
  + }

1. for (k = 0.1; k != 1.0; k += 0.1)

System.out.println(k);

* + **Error:** Floating-point precision can cause an infinite loop.
  + **Fix:** Use an integer loop or compare with a tolerance.
  + for (double k = 0.1; k < 1.0; k += 0.1)
  + System.out.println(k);

1. switch (n) {

case 1:

System.out.println("The number is 1");

case 2:

System.out.println("The number is 2");

break;

default:

System.out.println("The number is not 1 or 2");

break;

}

* + **Error:** Missing break; after case 1: causes fall-through.
  + **Fix:**
  + switch (n) {
  + case 1:
  + System.out.println("The number is 1");
  + break;
  + case 2:
  + System.out.println("The number is 2");
  + break;
  + default:
  + System.out.println("The number is not 1 or 2");
  + break;
  + }

1. The following code should print the values 1 to 10:

n = 1;

while (n < 10)

System.out.println(n++);

* + **Error:** Loop will not print 10. Loop condition should be n <= 10.
  + **Fix:**
  + int n = 1;
  + while (n <= 10)
  + System.out.println(n++);

**Exercise 2**

4.5 Describe the four basic elements of counter-controlled repetition.

1. Control variable initialization.
2. Loop-continuation condition.
3. Increment/decrement of the control variable.
4. Body of the loop.

4.6 Compare and contrast the while and for repetition statements.

* while: Best when the number of iterations isn’t known.
* for: Best when iterations are predictable, since it consolidates initialization, condition, and increment in one line.

4.7 Discuss a situation in which it would be more appropriate to use a do…while statement than a while statement. Explain why.

Use do...while when the loop body must run at least once regardless of the condition. For example, a menu that should appear once before asking for a valid input.

4.8 Compare and contrast the break and continue statements.

* break: Exits the loop completely.
* continue: Skips the rest of the current iteration and continues with the next.

4.9 Find and correct the error(s) in each of the following segments of code:

a) For (i = 100, i >= 1, i++) System.out.println(i);

// Incorrect: For (i = 100, i >= 1, i++)

for (int i = 100; i >= 1; i--)

System.out.println(i);

b) The following code should print whether integer value is od or even:

switch (value % 2) {

case 0:

System.out.println("Even integer");

case 1:

System.out.println("Odd integer");

}

// Missing break statements

switch (value % 2) {

case 0:

System.out.println("Even integer");

break;

case 1:

System.out.println("Odd integer");

break;

}

c) The following code should output the odd integers from 19 to 1:

for (i = 19; i >= 1; i += 2)

System.out.println(i);

// Loop increments instead of decrements

for (int i = 19; i >= 1; i -= 2)

System.out.println(i);

d) The following code should output the even integers from 2 to 100:

counter = 2;

do {

System.out.println(counter);

counter += 2;

} While (counter < 100);

// "While" should be lowercase, and condition should be <=

int counter = 2;

do {

System.out.println(counter);

counter += 2;

} while (counter <= 100);

4.10 What does the following program do?

// Exercise 4.10: Printing.java

public class Printing {

public static void main(String[] args) {

for (int i = 1; i <= 10; i++) {

for (int j = 1; j <= 5; j++)

System.out.print('@');

System.out.println();

}

}

}

Ans: It prints 10 lines, each containing 5 @ characters:

4.11 (Find the Smallest Value) Write an application that finds the smallest of several integers. Assume that the first value read specifies the number of values to input from the user.

4.12 (Calculating the Product of Odd Integers)

Write an application that calculates the product of the odd integers from 1 to 15.

4.13 (Factorials) Factorials are used frequently in probability problems. The factorial of a positive integer n (written n! and pronounced “n factorial”) is equal to the product of the positive integers from 1 to n. Write an application that calculates the factorials of 1 through 20. Use type long. Display the results in tabular format. What difficulty might prevent you from calculating the factorial of 100?

4.14 (Modified Compound-Interest Program) Modify the compound-interest application to repeat its steps for interest rates of 5%, 6%, 7%, 8%, 9% and 10%. Use a for loop to vary the interest rate.

**Making a Difference**

**4.30 (Global Warming Facts Quiz)**

The controversial issue of global warming has been widely publicized by the film “An Inconvenient Truth,” featuring former Vice President Al Gore. Mr. Gore and a U.N. network of scientists, the Intergovernmental Panel on Climate Change, shared the 2007 Nobel Peace Prize in recognition of “their efforts to build up and disseminate greater knowledge about man-made climate change.” Research both sides of the global warming issue online (you might want to search for phrases like “global warming skeptics”). Create a five-question multiplechoice quiz on global warming, each question having four possible answers (numbered 1–4). Be objective and try to fairly represent both sides of the issue. Next, write an application that administers the quiz, calculates the number of correct answers (zero through five) and returns a message to the user. If the user correctly answers five questions, print “Excellent”; if four, print “Very good”; if three or fewer, print “Time to brush up on your knowledge of global warming,” and include a list of some of the websites where you found your facts.

**4.31 (Tax Plan Alternatives; The “FairTax”)**

There are many proposals to make taxation fairer. Check out the FairTax initiative in the United States at www.fairtax.org. Research how the proposed FairTax works. One suggestion is to eliminate income taxes and most other taxes in favor of a 23% consumption tax on all products and services that you buy. Some FairTax opponents question the 23% figure and say that because of the way the tax is calculated, it would be more accurate to say the rate is 30%—check this carefully. Write a program that prompts the user to enter expenses in various expense categories they have (e.g., housing, food, clothing, transportation, education, health care, vacations), then prints the estimated FairTax that person would pay.

**4.32 (Facebook User Base Growth)**

According to CNNMoney.com, Facebook hit one billion users in October 2012. Using the compound-growth technique you learned in Fig. 4.6 and assuming its user base grows at a rate of 4% per month, how many months will it take for Facebook to grow its user base to 1.5 billion users? How many months will it take for Facebook to grow its user base to two billion users?