# Unit 1—Getting Started with Java

# Chapter 4— Introduction to Control Statements

EXERCISE 4.1

1.

a. x \*= 2;

b. y %= 2;

2.

a. x = x + 5;

b. x = x \* x;

exercise 4.2

1.

a. 2

b. 4

c. 64

d. 2

2. Both answers assume that generator refers to an instance of class Random.

a. System.out.println(1 + generator.nextInt(20));

b. System.out.println(1 + 10 \* generator.nextDouble());

EXERCISE 4.3

1. Jill uses a while statement in her instructions because there might be more than one cow to milk.
2. Jill uses an if-else statement in her instructions because there are two different types of cows, leading to two different cases (colors of buckets) for depositing the milk.

a.

if (the piece is red)

put it on a red square

else

put it on a black square

b.

if (your shoes are muddy)

take them off and leave them outside the door

c.

while (there are more marbles on the floor){

pick a marble up off the floor

put the marble in a bag

* 1. This segment leaves the larger value in y and the smaller value in x.
  2. This segment inputs a user-specified number of integers and outputs the average of their absolute values.

EXERCISE 4.4

1. The condition of an if statement must contain a Boolean expression.
2. The curly braces enclose a sequence of statements that are treated as a logical unit.
3. An if statement provides a one-way decision. A single action is executed if the condition is true; otherwise, control proceeds to the next statement after the if statement. An if-else statement provides a two-way decision. The action following the condition is executed if the condition is true; otherwise, the action after the else is executed.
   1. true
   2. true
   3. false
   4. x > 0
   5. numSeconds == 60
   6. c == Math.round(Math.sqrt(a \* a + b \* b))
   7. 5
   8. Equal

if (x > y)

System.out.println(x);

else

System.out.println(y);

System.out.print("Enter the first whole number: ");

x = reader.nextInt();

System.out.print("Enter the second whole number: ");

y = reader.nextInt();

if (x > y){ // if true, we need to exchange x and y

temp = y;

y = x;

x = temp;

}

System.out.println(x);

System.out.println(y);

EXERCISE 4.5

1. A while loop terminates its execution when its condition becomes false.
2. The three components of a while loop are the continuation condition, loop body statements, and update statements.
3. The body of the loop does not execute.
   1. This code displays the powers of 2 from 1 to 10.
   2. This code inputs an arbitrary number of numbers from the user and computes and displays their product.

int limit = 10, count = 1;

while (count <= limit){

System.out.println(count \* count);

System.out.println(Math.pow(count, 3));

count++;

}

int limit = 10, count = 1;

Random rand = new Random();

while (count <= limit){

System.out.println(1 + rand.nextInt(limit));

count++;

System.out.println(product);

}

String name = "";

int age = 0;

Scanner reader = new Scanner(System.in);

System.out.print("Enter a name: ");

name = reader.readLine();

System.out.print("Enter an age: ");

age = reader.readInt();

while (age != 100){

System.out.print("Enter a name: ");

name = reader.readLine();

System.out.print("Enter an age: ");

age = reader.readInt();

}

EXERCISE 4.6

2. This code displays the exponents and their powers of base 2 from 1 to a given limit.
3. This code computes 2 to a given power. The result is left in base.

a.

int limit = 10, count = 1;

for (count = 1; count <= limit; count++){

System.out.println(count \* count);

System.out.println(Math.pow(count, 3));

}

b.

int limit = 10, count = 1;

String s = "";

for (count = limit; count >= 1; count--){

s = s + count;

}



int i = 1;

while (i <= 5){

System.out.print("Enter an integer: ");

int number = reader.nextInt();

System.out.println(Math.pow(number, 2));

i++;

}

int base = 2;

int count = expo;

while (count > 1){

base = base \* base;

count--;

}

EXERCISE 4.7

a. This code displays the even numbers between 1 and a given limit.

b. This code plays a guessing game with the user. The user guesses a number between 1 and 10, and if it equals the computer’s random number, the user wins. The guessing loop is repeated until the user guesses correctly.

a.

int limit = 10, count = 1;

for (count = 1; count <= limit; count++){

if (count % 2 != 0){

System.out.println(count \* count);

System.out.println(Math.pow(count, 3));

}

}

b.

int limit = 10, count = 1;

String s = "";

for (count = limit; count >= 1; count--){

if (count % 2 == 0)

s = s + count;

}

EXERCISE 4.8

1. This statement opens a scanner on a text file for input.
2. a.

while (reader.hasNext())

System.out.println(reader.nextInt());

b.

while (reader.hasNext()){

int num1 = reader.nextInt();

int num2 = reader.nextInt();

System.out.println(Math.max(num1, num2));

}

EXERCISE 4.9

1. This loop has an off-by-one error in which the value of limit is not included because < instead of <= is used.
2. This loop is infinite because number is incremented from 9 to 11, thus missing the termination condition by one.

EXERCISE 4.10

* + - 1. JOptionPane.showInputDialog("Enter your name");
      2. JOptionPane.showMessageDialog(null, "Ken Lambert\nLexington, VA 24450")
      3. An I/O dialog box returns the data from the user as a string to the program. This string of digits must then be converted to an int or a double by using the method Integer.parseInt or Double.parseDouble.
      4. If the panel should have the same width and height at startup, it should have a preferred size.

Review Questions

## Written Questions

A. False

B. True

C. True

D. Syntactically incorrect because x < y returns a Boolean value that cannot be compared to 25.

E. True

A. if (x > y)  
 System.out.println ("greater");  
 else if (x < y)  
 System.out.println ("less");

else

System.out.println ("equal");

B. if (y < 0)  
 System.out.println (x + 10);

C. if (x > 90)  
 System.out.println ("A");  
 else if (x > 80)  
 System.out.println ("B");  
 else  
 System.out.println ("C");

A. Correct

B. Incorrect because = does not return a Boolean value; you should use == instead.

C. Incorrect because comparison is not enclosed in parentheses.

A. while (x <= y){  
 if (x > 0)  
 System.out.println (x);  
 x = x + 1;  
 }

B. int product = 1;  
 while (x <= y){  
 product = product \* (x \* x);  
 x = x + 1;  
 }  
 System.out.println (product);

C. while (y >= 0){  
 System.out.println (y);  
 y = y - 1;  
 }

A. if (x > y)

System.out.println(x);

else

System.out.println(y);

B. System.out.println(Math.max(x, y));