Section 1.1

SR 1.1 What is hardware? What is software?

SR 1.2 What are the two primary functions of an operating system?

SR 1.3 The music on a CD is created using a sampling rate of

44,000 measurements per second. Each measurement is stored as a number that represents a specific voltage level. How many such numbers are used to store a three-minute-long song? How many such numbers does it take to represent one hour of music?

SR 1.4 What happens to information when it is stored digitally?

SR 1.5 How many unique items can be represented with the following?

a. 2 bits

b. 4 bits

c. 5 bits

d. 7 bits

SR 1.6 Suppose you want to represent each of the 50 states of the United States using a unique permutation of bits. How many bits would be needed to store each state representation? Why?

Section 1.2

SR 1.7 How many bytes are there in each of the following?

a. 3 KB

b. 2 MB

c. 4 GB

SR 1.8 How many bits are there in each of the following?

a. 8 bytes

b. 2 KB

c. 4 MB

SR 1.9 The music on a CD is created using a sampling rate of 44,000 measurements per second. Each measurement is stored as a number that represents a specific voltage level. Suppose each of these numbers requires two bytes of storage space. How many MB does it take to represent one hour of music?

SR 1.10 What are the two primary hardware components in a computer? How do they interact?

SR 1.11 What is a memory address?

SR 1.12 What does volatile mean? Which memory devices are volatile and which are nonvolatile?

SR 1.13 Select the word from the following list that best matches each of the following phrases: controller, CPU, main, network card, peripheral, RAM, register, ROM, secondary.

a. Almost all devices in a computer system, other than the CPU and the main memory, are categorized as this.

b. A device that coordinates the activities of a peripheral device.

c. Allows information to be sent and received.

d. This type of memory is usually volatile.

e. This type of memory is usually nonvolatile.

f. This term basically is interchangeable with the term “main memory.”

g. Where the fundamental processing of a computer takes place.

Section 1.3

SR 1.14 What is a file server?

SR 1.15 What is the total number of communication lines needed for a fully connected point-to-point network of five computers? Six computers?

SR 1.16 Describe a benefit of having computers on a network share a communication line. Describe a cost/drawback of sharing a communication line.

SR 1.17 What is the etymology of the word Internet?

SR 1.18 The TCP/IP set of protocols describes communication rules for software that uses the Internet. What does TCP stand for? What does IP stand for?

SR 1.19 Explain the parts of the following URLs:

a. duke.csc.villanova.edu/jss/examples.html

b. java.sun.com/products/index.html

Section 1.4

SR 1.20 When was the Java programming language developed? By whom? When was it introduced to the public?

SR 1.21 Where does processing begin in a Java application?

SR 1.22 What do you predict would be the result of the following line in a Java program?

System.out.println("Hello"); // prints hello

SR 1.23 What do you predict would be the result of the following line in a Java program?

// prints hello System.out.println("Hello");

SR 1.24 Which of the following are not valid Java identifiers? Why?

a. RESULT

b. result

c. 12345

d. x12345y

e. black&white

f. answer\_7

SR 1.25 Suppose a program requires an identifier to represent the sum of the test scores of a class of students. For each of the following names, state whether or not each is a good name to use for the identifier. Explain your answers.

a. x

b. scoreSum

c. sumOfTheTestScoresOfTheStudents

d. smTstScr

SR 1.26 What is white space? How does it affect program execution? How does it affect program readability?

Section 1.5

SR 1.27 We all know that computers are used to perform complex jobs. In this section, you learned that a computer’s instructions can do only simple tasks. Explain this apparent contradiction.

SR 1.28 What is the relationship between a high-level language and a machine language?

SR 1.29 What is Java bytecode?

SR 1.30 Select the word from the following list that best matches each of the following phrases: assembly, compiler, high-level, IDE, interpreter, Java, low-level, machine

a. A program written in this type of language can run directly on a computer.

b. Generally, each language instruction in this type of language ​corresponds to an equivalent machine language instruction.

c. Most programmers write their programs using this type of language.

d. Java is an example of this type of language.

e. This type of program translates code in one language to code in another language.

f. This type of program interweaves the translation of code and the execution of the code.

SR 1.31 What do we mean by the syntax and semantics of a programming language?

SR 1.32 Categorize each of the following situations as a compile-time error, run-time error, or logical error.

a. Misspelling a Java reserved word.

b. Calculating the average of an empty list of numbers by dividing the sum of the numbers on the list (which is zero) by the size of the list (which is also zero).

c. Printing a student’s high-test grade when the student’s average test grade should have been output.

Section 1.6

SR 1.33 List the five general steps required to solve a problem.

SR 1.34 Why is it important to consider more than one approach to solving a problem? Why is it important to consider alternatives early in the process of solving a problem?

SR 1.35 What are the primary concepts that support object-oriented programming?

Section 2.1

SR 2.1 What is a string literal?

SR 2.2 What is the difference between the print and println methods?

SR 2.3 What is a parameter?

SR 2.4 What output is produced by the following code fragment?

System.out.println("One ");

System.out.print("Two ");

System.out.println("Three ");

SR 2.5 What output is produced by the following code fragment?

System.out.print("Ready ");

System.out.println();

System.out.println("Set ");

System.out.println();

System.out.println("Go ");

SR 2.6 What output is produced by the following statement? What is produced if the inner parentheses are removed?

System.out.println("It is good to be " + (5 + 5));

SR 2.7 What is an escape sequence? Give some examples.

SR 2.8 Write a single println statement that will output the following exactly as shown (including line breaks and quotation marks).

“I made this letter longer than usual because I lack the time to make it short.”

Blaise Pascal

Section 2.2

SR 2.9 What is a variable declaration?

SR 2.10 Given the following variable declarations, answer each question.

int count = 0, value, total;

final int MAX\_VALUE = 100;

int myValue = 50;

a. How many variables are declared?

b. What is the type of these declared variables?

c. Which of the variables are given an initial value?

d. Based on the above declarations, is the following assignment statement valid? Explain.

myValue = 100;

e. Based on the above declarations, is the following assignment statement valid? Explain.

MAX\_VALUE = 50;

SR 2.11 Your program needs a variable of type int to hold the number of CDs in a music collection. The initial value should be zero. Write a declaration statement for the variable.

SR 2.12 Your program needs a variable of type int to hold the number of feet in a mile (5280). Write a declaration statement for the variable.

SR 2.13 Briefly describe three reasons for using a constant in a program instead of a literal value.

Section 2.3

SR 2.14 What is primitive data? How are primitive data types different from objects?

SR 2.15 How many values can be stored in an integer variable?

SR 2.16 What are the four integer data types in Java? How are they different?

SR 2.17 What type does Java automatically assign to an integer literal? How can you indicate that an integer literal should be considered a different type?

SR 2.18 What type does Java automatically assign to a floating point literal? How can you indicate that a floating point literal should be considered a different type?

SR 2.19 What is a character set?

SR 2.20 How many characters are supported by the ASCII character set, the extended ASCII character set, and the Unicode character set?

Section 2.4

SR 2.21 What is the result of 19%5 when evaluated in a Java expression? Explain.

SR 2.22 What is the result of 13/4 when evaluated in a Java expression? Explain.

SR 2.23 If an integer variable diameter currently holds the value 5, what is its value after the following statement is executed? Explain.

diameter = diameter \* 4;

SR 2.24 What is operator precedence?

SR 2.25 What is the value of each of the following expressions?

a. 15 + 7 \* 3

b. (15 + 7) \* 3

c. 3 \* 6 + 10 / 5 + 5

d. 27 % 5 + 7 % 3

e. 100 / 2 / 2 / 2

f. 100 / ( 2 / 2) / 2

SR 2.26 For each of the following expressions state whether they are valid or invalid. If invalid, explain why.

a. result = ( 5 + 2 );

b. result = ( 5 + 2 \* ( 15 - 3 );

c. result = ( 5 + 2 (;

d. result = ( 5 + 2 ( 4 ) );

SR 2.27 What value is contained in the integer variable result after the ​following sequence of statements is executed?

result = 27;

result = result + 3;

result = result / 7;

result = result \* 2;

SR 2.28 What value is contained in the integer variable result after the following sequence of statements is executed?

int base;

int result;

base = 5;

result = base + 3;

base = 7;

SR 2.29 What is an assignment operator?

SR 2.30 If an integer variable weight currently holds the value 100, what is its value after the following statement is executed? Explain.

weight - = 17;

Section 2.5

SR 2.31 Why are widening conversions safer than narrowing conversions?

SR 2.32 Identify each of the following conversions as either a widening conversion or a narrowing conversion.

a. int to long

b. int to byte

c. byte to short

d. byte to char

e. short to double

SR 2.33 Assuming result is a float variable and value is an int variable, what type of variable will value be after the following assignment statement is executed? Explain.

result = value;

SR 2.34 Assuming result is a float variable that contains the value 27.32 and value is an int variable that contains the value 15, what are the values of each of the variables after the following assignment statement is executed? Explain. value = ( int) result;

SR 2.35 Given the following declarations, what result is stored by each of the following assignment statements?

int iResult, num1 = 17, num2 = 5;

double fResult, val1 = 12.0, val2 = 2.34;

a. iResult = num1 / num2;

b. fResult = num1 / num2;

c. fResult = val1 / num2;

d. fResult = (double) num1 / num2;

e. iResult = (int) val1 / num2;

Section 2.6

SR 2.36 Identify which line of the GasMileage program does each of the following.

a. Tells the program that we will be using the Scanner class.

b. Creates a Scanner object.

c. Sets up the Scanner object scan to read from the standard input stream.

d. Reads an integer from the standard input stream.

SR 2.37 Assume you already have instantiated a Scanner object named myScanner and an int variable named value as follows in your program:

Scanner myScanner = new Scanner(System.in);

int value = 0;

Write program statements that will ask the user to enter their age, and store their response in value.

Section 3.1

SR 3.1 What is a null reference?

SR 3.2 What does the new operator accomplish?

SR 3.3 Write a declaration for a String variable called author, and initialize it to the string "Fred Brooks". Draw a graphic representation of the variable and its value.

SR 3.4 Write a code statement that sets the value of an integer variable called size to the length of a String object called name.

SR 3.5 What is an alias? How does it relate to garbage collection?

Section 3.2

SR 3.6 Assume s1, s2, and s3 are String variables initialized to "Amanda", "Bobby", and "Chris", respectively. Which String variable or variables are changed by each of the following statements?

a. System.out.println(s1);

b. s1 = s3.toLowerCase();

c. System.out.println(s2.replace(‘B’, ‘M’));

d. s3 = s2.concat(s1);

SR 3.7 What output is produced by the following code fragment?

String s1 = "Foundations";

String s2;

System.out.println(s1.charAt(1));

s2 = s1.substring(0, 5);

System.out.println(s2);

System.out.println(s1.length());

System.out.println(s2.length());

SR 3.8 Write a statement that prints the value of a String object called title in all uppercase letters.

SR 3.9 Write a declaration for a String variable called front, and initialize it to the first 10 characters of another String object called description.

Section 3.3

SR 3.10 What is a Java package?

SR 3.11 What does the java.net package contain? The javafx.scene.shape package?

SR 3.12 What package contains the Scanner class? The String class? The Random class? The Math class?

SR 3.13 Using the online Java API documentation, describe the Point class.

SR 3.14 What does an import statement accomplish?

SR 3.15 Why doesn’t the String class have to be specifically imported into our programs?

Section 3.4

SR 3.16 Given a Random object called rand, what does the call rand.nextInt() return?

SR 3.17 Given a Random object called rand, what does the call rand.nextInt(20) return?

SR 3.18 Assuming that a Random object has been created called generator, what is the range of the result of each of the following expressions?

a. generator.nextInt(50)

b. generator.nextInt(5) + 10

c. generator.nextInt(10) + 5

d. generator.nextInt(50) - 25

SR 3.19 Assuming that a Random object has been created called generator, write expressions that generate each of the following ranges of integers, including the endpoints. Use the version of the nextInt method that accepts a single integer parameter.

a. 0 to 30

b. 10 to 19

c. -5 to 5

Section 3.5

SR 3.20 What is a class method (also called a static method)?

SR 3.21 What is the value of each of the following expressions?

a. a. Math.abs(10) + Math.abs(-10)

b. b. Math.pow(2, 4)

c. c. Math.pow(4, 2)

d. d. Math.pow(3, 5)

e. e. Math.pow(5, 3)

f. f. Math.sqrt(16)

SR 3.22 Write a statement that prints the sine of an angle measuring 1.23 radians.

SR 3.23 Write a declaration for a double variable called result and initialize it to 5 raised to the power 2.5. SR 3.24 Using the online Java API documentation, list three methods of the Math class that are not included in Figure 3.5.

Section 3.6

SR 3.25 Describe how you request a NumberFormat object for use within a program.

SR 3.26 Suppose that in your program you have a double variable named cost. You want to output the value stored in cost formatted as the currency of the current locale.

a. Write a code statement that declares and requests a NumberFormat object named moneyFormat that can be used to represent currency in the format of the current locale.

b. Write a code statement that uses the moneyFormat object and prints the value of cost, formatted as the currency of the current locale.

c. What would be the output from the statement you wrote in part (b) if the value in cost is 54.89 and your computer’s locale is set to the United States? What if your computer’s locale is set to the United Kingdom?

SR 3.27 What are the steps to output a floating point value as a percentage using Java’s formatting classes?

SR 3.28 Write code statements that prompt for and read in a double value from the user, and then print the result of taking the square root of the absolute value of the input value. Output the result to two decimal places.

Section 3.7

SR 3.29 Write the declaration of an enumerated type that represents movie ratings.

SR 3.30 Suppose that an enumerated type called CardSuit has been defined as follows: enum CardSuit {clubs, diamonds, hearts, spades} What is the output of the following code sequence?

CardSuit card1, card2;

card1 = CardSuit.clubs;

card2 = CardSuit.hearts;

System.out.println(card1);

System.out.println(card2.name());

System.out.println(card1.ordinal());

System.out.println(card2.ordinal());

SR 3.31 Why use an enumerated type such as CardSuit defined in the previous question? Why not just use String variables and assign them values such as "hearts"?

Section 3.8

SR 3.32 How can we represent a primitive value as an object?

SR 3.33 What wrapper classes correspond to each of the following primitive types: byte, int, double, char, and boolean?

SR 3.34 Suppose that an int variable named number has been declared and initialized and an Integer variable named holdNumber has been declared. Show two approaches in Java for having holdNumber represent the value stored in number.

SR 3.35 Write a statement that prints out the largest possible int value.

Section 3.9

SR 3.36 In what situation might you omit the main method in a JavaFX application?

SR 3.37 What is a stage in the JavaFX theatre metaphor?

SR 3.38 What does the root node of a scene contain?

SR 3.39 Describe where the point (20, 50) is in the Java coordinate system.

Section 3.10

SR 3.40 How do you make one shape appear in front of another?

SR 3.41 Write a declaration for a Rectangle that is 100 pixels wide, 200 pixels high, with its upper-left corner positioned at point (30, 20).

SR 3.42 Is the ellipse defined in the following statement wider than it is tall or taller than it is wide?

Ellipse ellipse = new Ellipse(100, 150, 70, 90);

SR 3.43 What is the effect of calling setFill on a Circle object, passing it a parameter of null?

SR 3.44 What is the advantage of grouping particular elements in a scene?

Section 3.11

SR 3.45 What is an RGB value?

SR 3.46 Write a statement to create a Color object equivalent to Color.PINK using the rgb method.

SR 3.47 Write a statement to create a Color object equivalent to Color.YELLOW using the color method.

Section 4.1

SR 4.1 What is an attribute?

SR 4.2 What is an operation?

SR 4.3 List some attributes and operations that might be defined for a class called Book that represents a book in a library.

SR 4.4 True or False? Explain.

a. We should use only classes from the Java standard class library when writing our programs—there is no need to define or use other classes.

b. An operation on an object can change the state of an object.

c. The current state of an object can affect the result of an operation on that object.

d. In Java, the state of an object is represented by its methods.

Section 4.2

SR 4.5 What is the difference between an object and a class?

SR 4.6 Describe the instance data of the Die class.

SR 4.7 Which of the methods defined for the Die class can change the state of a Die object—that is, which of the methods assign values to the instance data?

SR 4.8 What happens when you pass an object to a print or println method?

SR 4.9 What is the scope of a variable?

SR 4.10 What are UML diagrams designed to do?

Section 4.3

SR 4.11 Objects should be self-governing. Explain.

SR 4.12 What is the interface to an object?

SR 4.13 What is a modifier?

SR 4.14 Why might a constant be given public visibility?

SR 4.15 Describe each of the following:

a. public method

b. private method

c. public variable

d. private variable

Section 4.4

SR 4.16 Why is a method invoked through (or on) a particular

object? What is the exception to that rule?

SR 4.17 What does it mean for a method to return a value?

SR 4.18 What does the return statement do?

SR 4.19 Is a return statement required?

SR 4.20 Explain the difference between an actual parameter and a formal parameter.

SR 4.21 Write a method called getFaceDown for the Die class that returns the current “face down” value of the die. Hint: On a standard die, the sum of any two opposite faces is seven.

SR 4.22 In the Transactions program:

a. How many Account objects are created?

b. How many arguments (actual parameters) are passed to the ​ withdraw method when it is invoked on the acct2 object?

c. How many arguments (actual parameters) are passed to the ​ addInterest method when it is invoked on the acct3 object?

SR 4.23 Which of the Account class methods would you classify as accessor methods? As mutator methods? As service methods?

Section 4.5

SR 4.24 What are constructors used for?

SR 4.25 How are constructors defined?

Section 4.6

SR 4.26 What is the relationship between an ellipse and an arc?

SR 4.27 Which type of arc is used to display a “pie” shape? A simple curve?

SR 4.28 What start angle and arc length would you specify to include the complete bottom half of the underlying ellipse? What alternative values could you use?

Section 4.7

SR 4.29 What is the difference between an Image and an ImageView?

SR 4.30 What is a layout pane?

SR 4.31 How are style properties set for JavaFX nodes?

Section 4.8

SR 4.32 What is the relationship among GUI controls, events, and event handlers?

SR 4.33 What type of event does a Button object generate when it is pushed?

SR 4.34 Summarize the three techniques for defining a JavaFX event handler.

SR 4.35 What is a FlowPane?

Section 4.9

SR 4.36 Describe what happens in the FahrenheitConverter program when a user types a number into the text field and presses Return.

SR 4.37 How are rows and columns numbered in a GridPane layout? How would you specify the cell that is three over and two down from the upper left corner?