```
6           printer(x);
7           printer("barack", "obama");
8           System.out.println("z = " + z);
9       }
10
11      public static void printer(x, y double) {
12          int z = 5;
13          System.out.println("x = " + double x + " and y = " + y);
14          System.out.println("The value from main is: " + bubble);
15      }
16  }
```

4. What output is produced by the following program?

```
1   public class Odds {
2       public static void main(String[] args) {
3           printOdds(3);
4           printOdds(17 / 2);
5
6           int x = 25;
7           printOdds(37 - x + 1);
8       }
9
10      public static void printOdds(int n) {
11          for (int i = 1; i <= n; i++) {
12              int odd = 2 * i - 1;
13              System.out.print(odd + " ");
14          }
15          System.out.println();
16      }
17  }
```

5. What is the output of the following program?

```
1   public class Weird {
2       public static void main(String[] args) {
3           int number = 8;
4           halfTheFun(11);
5           halfTheFun(2 - 3 + 2 * 8);
6           halfTheFun(number);
7           System.out.println("number = " + number);
8       }
9
10      public static void halfTheFun(int number) {
11          number = number / 2;
12          for (int count = 1; count <= number; count++) {
13              System.out.print(count + " ");
```

8. What output is produced by the following program?

```
1  public class MysteryTouch {
2      public static void main(String[] args) {
3          String head = "shoulders";
4          String knees = "toes";
5          String elbow = "head";
6          String eye = "eyes and ears";
7          String ear = "eye";
8
9          touch(ear, elbow);
10         touch(elbow, ear);
11         touch(head, "elbow");
12         touch(eye, eye);
13         touch(knees, "Toes");
14         touch(head, "knees " + knees);
15     }
16
17     public static void touch(String elbow, String ear) {
18         System.out.println("touch your " + elbow + " to your " + ear);
19     }
20 }
```

9. What output is produced by the following program?

```
1  public class MysterySoda {
2      public static void main(String[] args) {
3          String soda = "Coke";
4          String pop = "Pepsi";
5          String Coke = "pop";
6          String Pepsi = "soda";
7          String say = pop;
8
9          carbonated(Coke, soda, pop);
10         carbonated(pop, Pepsi, Pepsi);
11         carbonated("pop", pop, "Kool-Aid");
12         carbonated(say, "say", pop);
13     }
14     public static void carbonated(String Coke, String soda, String pop) {
15         System.out.println("say " + soda + " not " + pop + " or " + Coke);
16     }
17 }
```

10. Write a method called `printStrings` that accepts a `String` and a number of repetitions as parameters and prints that `String` the given number of times with a space after each time. For example, the call

```
printStrings("abc", 5);
```

will print the following output:

```
abc abc abc abc abc
```

11. The `System.out.println` command works on many different types of values, such as integers or doubles. What is the term for such a method?

Section 3.2: Methods That Return Values

12. What is wrong with the following program?

```
1  public class Temperature {
2      public static void main(String[] args) {
3          double tempf = 98.6;
4          double tempc = 0.0;
5          ftoc(tempf, tempc);
6          System.out.println("Body temp in C is: " + tempc);
7      }
8
9      // converts Fahrenheit temperatures to Celsius
10     public static void ftoc(double tempf, double tempc) {
11         tempc = (tempf - 32) * 5 / 9;
12     }
13 }
```

13. Evaluate the following expressions:

a. `Math.abs(-1.6)`
b. `Math.abs(2 + -4)`
c. `Math.pow(6, 2)`
d. `Math.pow(5 / 2, 6)`
e. `Math.ceil(9.1)`
f. `Math.ceil(115.8)`
g. `Math.max(7, 4)`
h. `Math.min(8, 3 + 2)`
i. `Math.min(-2, -5)`
j. `Math.sqrt(64)`
k. `Math.sqrt(76 + 45)`
l. `100 + Math.log10(100)`
m. `13 + Math.abs(-7) - Math.pow(2, 3) + 5`
n. `Math.sqrt(16) * Math.max(Math.abs(-5), Math.abs(-3))`
o. `7 - 2 + Math.log10(1000) + Math.log(Math.pow(Math.E, 5))`
p. `Math.max(18 - 5, Math.ceil(4.6 * 3))`

14. What output is produced by the following program?

```
1  public class MysteryReturn {
2      public static void main(String[] args) {
3          int x = 1, y = 2, z = 3;
4          z = mystery(x, z, y);
5          System.out.println(x + " " + y + " " + z);
```

```
6           x = mystery(z, z, x);
7           System.out.println(x + " " + y + " " + z);
8           y = mystery(y, y, z);
9           System.out.println(x + " " + y + " " + z);
10      }
11
12      public static int mystery(int z, int x, int y) {
13          z--;
14          x = 2 * y + z;
15          y = x - 1;
16          System.out.println(y + " " + z);
17          return x;
18      }
19  }
```

15. Write the result of each expression. Note that a variable's value changes only if you reassign it using the = operator.

```
double grade = 2.7;
Math.round(grade);                                  // grade =
grade = Math.round(grade);                          // grade =

double min = Math.min(grade, Math.floor(2.9));      //   min =

double x = Math.pow(2, 4);                          //     x =
x = Math.sqrt(64);                                  //     x =

int count = 25;
Math.sqrt(count);                                   // count =
count = (int) Math.sqrt(count);                     // count =

int a = Math.abs(Math.min(-1, -3));                 //     a =
```

16. Write a method called `min` that takes three integers as parameters and returns the smallest of the three values; for example, a call of `min(3, -2, 7)` would return `-2`, and a call of `min(19, 27, 6)` would return `6`. Use `Math.min` to write your solution.

17. Write a method called `countQuarters` that takes an `int` representing a number of cents as a parameter and returns the number of quarter coins represented by that many cents. Don't count any whole dollars, because those would be dispensed as dollar bills. For example, `countQuarters(64)` would return 2, because 64 cents is equivalent to 2 quarters with 14 cents left over. A call of `countQuarters(1278)` would return 3, because after the 12 dollars are taken out, 3 quarters remain in the 78 cents that are left.

Section 3.3: Using Objects

18. What output is produced by the following code?

```
String first = "James";
String last = "Kirk";
String middle = "T.";
System.out.println(last);
System.out.println("My name is " + first);
System.out.println(first + " " + last);
```

```
System.out.println(last + ", " + first + " " + middle);
System.out.println(middle + " is for Tiberius");
```

19. Assuming that the following variables have been declared:

```
//          index 0123456789012345
String str1 = "Frodo Baggins";
String str2 = "Gandalf the GRAY";
```

evaluate the following expressions:

a. `str1.length()`
b. `str1.charAt(7)`
c. `str2.charAt(0)`
d. `str1.indexOf("o")`
e. `str2.toUpperCase()`
f. `str1.toLowerCase().indexOf("B")`
g. `str1.substring(4)`
h. `str2.substring(3, 14)`
i. `str2.replace("a", "oo")`
j. `str2.replace("gray", "white")`
k. `"str1".replace("r", "range")`

20. Assuming that the following variables have been declared:

```
String str1 = "Q.E.D.";
String str2 = "Arcturan Megadonkey";
String str3 = "Sirius Cybernetics Corporation";
```

evaluate the following expressions:

a. `str1.length()`
b. `str2.length()`
c. `str1.toLowerCase()`
d. `str2.toUpperCase()`
e. `str1.substring(2, 4)`
f. `str2.substring(10, 14)`
g. `str1.indexOf("D")`
h. `str1.indexOf(".")`
i. `str2.indexOf("donkey")`
j. `str3.indexOf("X")`
k. `str2 + str3.charAt(17)`
l. `str3.substring(9, str3.indexOf("e"))`
m. `str3.substring(7, 12)`
n. `str2.toLowerCase().substring(9, 13) + str3.substring(18, str3.length() - 7)`

21. Consider the following `String`:

```
String quote = "Four score and seven years ago";
```

What expression produces the new `String "SCORE"`? What expression produces `"four years"`?

22. Write a program that outputs "The Name Game," where the user inputs a first and last name and a song in the following format is printed about their first, then last, name. Use a method to avoid redundancy.

```
What is your name? Fifty Cent
Fifty Fifty, bo-Bifty
Banana-fana fo-Fifty
Fee-fi-mo-Mifty
FIFTY!
Cent, Cent, bo-Bent
Banana-fana fo-Fent
Fee-fi-mo-Ment
CENT!
```

23. Consider the following code fragment:

```
Scanner console = new Scanner(System.in);
System.out.print("How much money do you have? ");
double money = console.nextDouble();
```

Describe what will happen when the user types each of the following values. If the code will run successfully, describe the value that will be stored in the variable `money`.

a. `34.50`
b. `6`
c. `$25.00`
d. `million`
e. `100*5`
f. `600x000`
g. `none`
h. `645`

24. Write Java code to read an integer from the user, then print that number multiplied by 2. You may assume that the user types a valid integer.

25. Consider the following program. Modify the code to use a `Scanner` to prompt the user for the values of `low` and `high`.

```
1  public class SumNumbers {
2      public static void main(String[] args) {
3          int low = 1;
4          int high = 1000;
5          int sum = 0;
6          for (int i = low; i <= high; i++) {
7              sum += i;
8          }
9          System.out.println("sum = " + sum);
10     }
11 }
```

Below is a sample execution in which the user asks for the sum of the values 1 through 10:

```
low? 1
high? 10
sum = 55
```