Questions

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■ **R4.1** Write declarations for storing the following quantities. Choose between integers and floating-point numbers. Declare constants when appropriate.

a. The number of days per week

b. The number of days until the end of the semester

c. The number of centimeters in an inch

d. The height of the tallest person in your class, in centimeters

■ **R4.2** What is the value of `mystery` after this sequence of statements?

```
int mystery = 1;
mystery = 1 - 2 * mystery;
mystery = mystery + 1;
```

■ **R4.3** What is wrong with the following sequence of statements?

```
int mystery = 1;
mystery = mystery + 1;
int mystery = 1 - 2 * mystery;
```

■■ **R4.4** Write the following Java expressions in mathematical notation.

a. `dm = m * (Math.sqrt(1 + v / c) / Math.sqrt(1 - v / c) - 1);`

b. `volume = Math.PI * r * r * h;`

c. `volume = 4 * Math.PI * Math.pow(r, 3) / 3;`

d. `z = Math.sqrt(x * x + y * y);`

■■ **R4.5** Write the following mathematical expressions in Java.

$$s = s_0 + v_0 t + \frac{1}{2} g t^2$$

$$G = 4\pi^2 \frac{a^3}{p^2(m_1 + m_2)}$$

$$\text{FV} = \text{PV} \cdot \left(1 + \frac{\text{INT}}{100}\right)^{\text{YRS}}$$

$$c = \sqrt{a^2 + b^2 - 2ab\cos\gamma}$$

■■ **R4.6** What are the values of the following expressions? In each line, assume that

```
double x = 2.5;
double y = -1.5;
int m = 18;
int n = 4;
```

a. `x + n * y - (x + n) * y`

b. `m / n + m % n`

c. `5 * x - n / 5`

d. `1 - (1 - (1 - (1 - (1 - n))))`

e. `Math.sqrt(Math.sqrt(n))`

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■ **R4.7** What are the values of the following expressions, assuming that `n` is 17 and `m` is 18?

a. `n / 10 + n % 10`

b. `n % 2 + m % 2`

c. `(m + n) / 2`

d. `(m + n) / 2.0`

e. `(int) (0.5 * (m + n))`

f. `(int) Math.round(0.5 * (m + n))`

■■ **R4.8** What are the values of the following expressions? In each line, assume that

```
String s = "Hello";
String t = "World";
```

a. `s.length() + t.length()`

b. `s.substring(1, 2)`

c. `s.substring(s.length() / 2, s.length())`

d. `s + t`

e. `t + s`

■ **R4.9** Find at least five *compile-time* errors in the following program.

```
public class HasErrors
{
   public static void main();
   {
      System.out.print(Please enter two numbers:)
      x = in.readDouble;
      y = in.readDouble;
      System.out.println("The sum is " + x + y);
   }
}
```

■■ **R4.10** Find three *run-time* errors in the following program.

```
public class HasErrors
{
   public static void main(String[] args)
   {
      int x = 0;
      int y = 0;
      Scanner in = new Scanner("System.in");
      System.out.print("Please enter an integer:");
      x = in.readInt();
      System.out.print("Please enter another integer: ");
      x = in.readInt();
      System.out.println("The sum is " + x + y);
   }
}
```

1.
   a.
      i. final int MONDAY = 1;
      ii. final int TUESDAY = 2;
      iii. final int WEDNESDAY = 3;
      iv. final int THURSDAY = 4;
      v. final int FRIDAY = 5;
      vi. final int SATURDAY = 6;
      vii. final int SUNDAY = 7;
   b.
      i. int endSemester = daysInSemester - daysIntoSemester;
   c.
      i. final int CENTIMETERSININCHES = 2.54;
   d.
      i. int maxHeight = Math.max(studentHeights);
2. 1
3. mystery has already been defined.
4. a. $dm = m \times \frac{\sqrt{1+\frac{v}{c}}}{\sqrt{1-\frac{v}{c}}-1}$

   b. $V = \pi \cdot r^2 \cdot h$

   c. $V = 4 \cdot \pi \cdot \frac{r^3}{3}$

   d. $z = \sqrt{x^2 + y^2}$
5.
   a. s = so + (vo*t) + (.5*g * Math.pow(t,2);
   b. g = (4* Math.pow(Math.pi,2)) * (Math.pow(a,3) / Math.pow(p,2) * (m1 + m2));
   c. FV = PV * Math.pow((1 + (INT/100)),YRS);
   d. c = Math.sqrt(Math.pow(a,2) + Math.pow(b,2) - (2*a*b*Math.acos(y)));
6. d
   a. 6.25
   b. 6.5
   c. 11.7
   d. -3
   e. 1.41
7. d
   a. 8.7
   b. 1
   c. 17
   d. 17.5
   e. 17
   f. 18
8. f
   a. 10
   b. el
   c. llo
   d. HelloWorld
   e. WorldHello
9. d
   a. No "String[] args"
   b. No semicolon on the print statement
   c. The print statement does not have quotes
   d. there is no scanner imported
   e. "readDouble" is not the correct method of the scanner
   f. Not declaration of the doubles
   g. "printline" is not a method of System.out
10. d
   a. "System.in" should not be in quotes
   b. readInt() is not the correct method of the scanner
   c. "x+y" in the print statement is using string concatenation, not addition with the "+" symbol.
11. d
   a. The code is experiencing a roundoff error. Use Math.round() so that it number can be rounded to a smaller decimal number
12.
   a. 2 is an int
   b. 2.0 is a double
   c. '2' is a string
   d. "2" is a string
   e. "2.0" is a string

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▪▪ **R4.11** Consider the following code:

```
CashRegister register = new CashRegister();
register.recordPurchase(19.93);
register.receivePayment(20, 0, 0, 0, 0);
System.out.print("Change: ");
System.out.println(register.giveChange());
```

The code segment prints the total as `0.07000000000000028`. Explain why. Give a recommendation to improve the code so that users will not be confused.

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▪ **R4.12** Explain the differences between `2`, `2.0`, `'2'`, `"2"`, and `"2.0"`.

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