Chapter 3 Exercise Solutions

EX 3.1. Write a statement that prints the number of characters in a `String` object called `overview`.

```
System.out.println(overview.length());
```

EX 3.2. Write a statement that prints the 8th character of a `String` object called `introduction`.

```
System.out.println(introduction.charAt(7));
```

EX 3.3. Declare a `String` variable named `str` and initialize it to contain the same characters as a `String` object called `name`, except in all uppercase characters.

```
String str = name.toUpperCase();
```

EX 3.4. Write a declaration for a `String` variable called `change` and initialize it to the characters stored in another `String` object called `original` with all `'e'` characters changed to `'j'`.

```
String change = original.replace('e', 'j');
```

EX 3.5. What output is produced by the following code fragment?

```
String m1, m2, m3;
m1 = "Quest for the Holy Grail";
m2 = m1.toLowerCase();
m3 = m1 + " " + m2;
System.out.println(m3.replace('h', 'z'));
```

The output produced is:

```
Quest for tze Holy Grail quest for tze zoly grail
```

The original string is concatenated with a lowercase version of itself, then all lowercase 'h' characters are replaced with 'z'.

EX 3.6. What is the effect of the following import statement?

```
import java.awt.*;
```

*This statement allows the program in which it is written to access all classes (because of the wildcard *) in the package java.awt without any further reference to the package name.*

EX 3.7. 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(20)

0 to 19, inclusive

b. generator.nextInt(8) + 1

1 to 8, incluslive

c. generator.nextInt(12) + 2

2 to 13, inclusive

d. generator.nextInt(35) + 10

10 to 44, inclusive

e. generator.nextInt(100) – 50

-50 to 49, inclusive

EX 3.8. Write code to declare and instantiate an object of the `Random` class (call the object reference variable `rand`). Then write a list of expressions using the `nextInt` method that generate random numbers in the following specified ranges, including the endpoints. Use the version of the `nextInt` method that accepts a single integer parameter.

```
Random rand = new Random();
```

a. 0 to 10

```
rand.nextInt(11)
```

b. 0 to 400

```
rand.nextInt(401)
```

c. 1 to 10

```
rand.nextInt(10) + 1
```

d. 1 to 400

```
rand.nextInt(400) + 1
```

e. 25 to 50

```
rand.nextInt(26) + 25
```

f. –10 to 15

```
rand.nextInt(26) - 10
```

EX 3.9. Write an assignment statement that computes the square root of the sum of `num1` and `num2` and assigns the result to `num3`.

```
num3 = Math.sqr(num1 + num2);
```

EX 3.10. Write a single statement that computes and prints the absolute value of `total`.

```
System.out.println(Math.abs(total));
```

EX 3.11. Write code statements to create a `DecimalFormat` object that will round a formatted value to 4 decimal places. Then write a statement that uses that object to print the value of `result`, properly formatted.

```
DecimalFormat fmt = new DecimalFormat("0.####");
System.out.println(fmt.format(result));
```

EX 3.12. Write code statements that prompt for and read a double value from the user, and then print the result of raising that value to the fourth power. Output the results to 3 decimal places.

```
Scanner scan = new Scanner(System.in);
DecimalFormat fmt = new DecimalFormat("0.###");
System.out.println("Enter a value: ");
double num = scan.nextDouble();
System.out.println(fmt.format(Math.pow(num, 4)));
```

EX 3.13. Write a declaration for an enumerated type that represents the days of the week.

```
enum Days {sunday, monday, tuesday, wednesday, thursday,
friday, saturday}
```

EX 3.14. Compare and contrast a traditional coordinate system and the coordinate system used by Java graphical components.

A traditional coordinate system has the origin in the lower-left corner, with x increasing to the right and y increasing upward. The coordinate system used by Java has the origin in the upper-left corner with x increasing to the right and y increasing downward.

EX 3.15. Write a declaration for each of the following:

a. A line that extends from point (60, 100) to point (30, 90)

```
Line line = new Line(60, 100, 30, 90);
```

b. A rectangle that is 20 pixels wide, 100 pixels high, and has its upper-left corner at point (10, 10).

```
Rectangle rect = new Rectangle(10, 10, 20, 100);
```

c. A circle that is centered at point (50, 75) and has a radius of 30.

```
Circle circle = new Circle(50, 75, 30);
```

d. An ellipse that is centered at point (150, 180) and is 100 pixels wide and 80 pixels high.

```
Ellipse ellipse = new Ellipse(150, 180, 50, 40);
```

EX 3.16. Are the following lines hirizontal, vertical, or neither?

a. new Line(30, 90, 30, 10)

vertical

b. new Line(85, 70, 70, 85)

neither

c. new Line(20, 40, 150, 40)

horizontal

EX 3.17. Is each of the following ellipses wider than it is tall or taller than it is wide?

a. new Ellipse(300, 100, 50, 10)

wider than it is tall

b. new Ellipse (100, 200, 20, 40)

taller than it is wide

c. new Ellipse (150, 220, 60, 30)

wider than it is tall

EX 3.18. How do you make a shape that has no fill color, so tht you can see the elements behind it?

Set its fill color to null:

```
circle.setFill(null);
```

EX 3.19. Write a line of code that rotates an ellipse called myEllipse 45 degrees clockwise.

```
myEllipse.setRotate(45);
```