CS3330 LAB 5, DUE 48 HOURS AFTER YOUR LAB ENDS

Objectives:

- Practice Inheritance
- More ArrayList Data Practice

Submission Info:

cs_submit CS3330_LAB-<your_lab_letter> LAB5 <yourpawprint>.cs3330.lab5.zip

Example: cs_submit CS3330_LAB-F LAB5 mremtf.cs3330.lab5.zip

Refer back to LAB3 lecture for assistance in zipping a project.

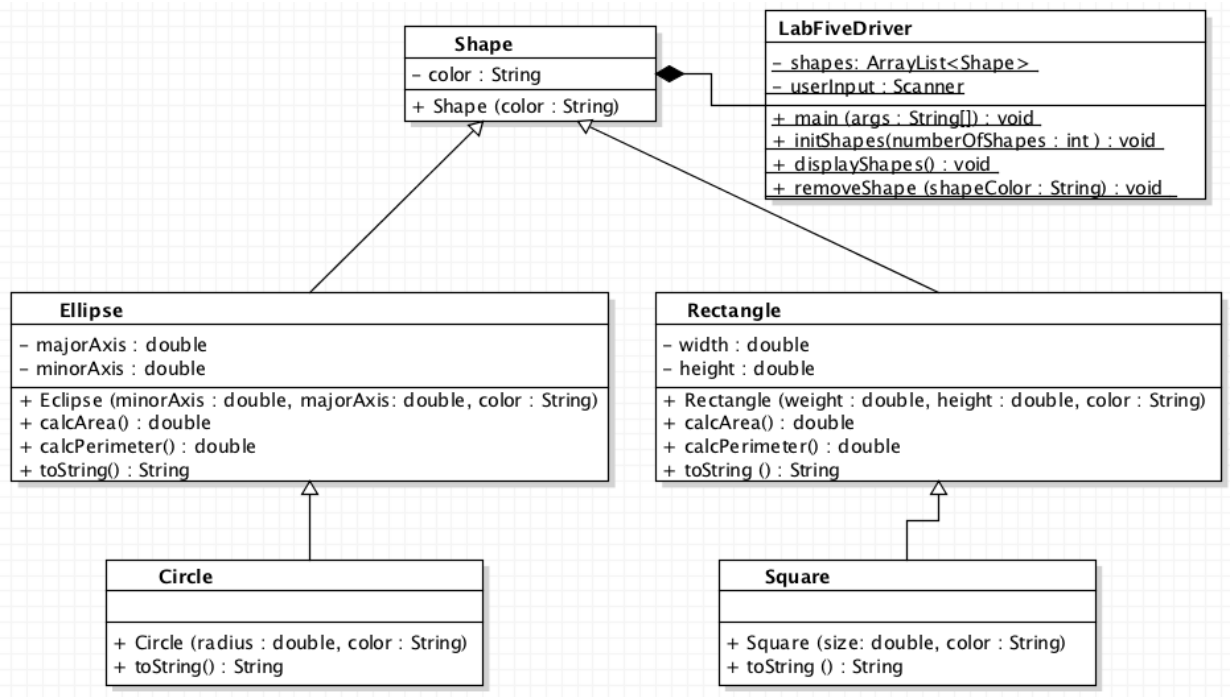
Lab Material:

Download the main method, this LAB 5 document on blackboard, and shapes.csv. Please copy the contents from the main code given into a LabFiveDriver class.

General Lab Info:

You will create **6 separate java classes** in a project that you create. **The objects Shape, Rectangle, and Ellipse have private setters and getters, they are not shown in the diagram or described below.**

UML Class Diagram



Formula Table

	Area	Perimeter
Rectangle	$L * W$	$2L + 2W$
Square*	s^2	$4s$
Ellipse	$\pi * a * b$ Let a = length of major axis and b = length of minor axis	$2\pi * \sqrt{\frac{(a^2 + b^2)}{2}}$
Circle*	πr^2	$2\pi r$

**** These are simply provided for reference.***

LabFiveDriver.java

initShapes(numberOfShapes : int) - Fills the ArrayList named shapes up to the numberOfShapes value passed in.

You should not assume, I'm going to input the correct input as the user. Check the sample output for the input format for the different shape objects. Parsing and Validating the input correctly here is critical.

displayShapes() - Displays the contents of ArrayList shapes; calling each stored object's toString method.

removeShape(shapeColor : String) - Removes the first occurrence of a Shape object from the ArrayList shapes that has the same color as the passed shapeColor parameter.

Shape.java

Shape(color : String) - Calls the setColor method to assign the attribute color to the passed color parameter.

Ellipse.java (extends Shape)

Ellipse(minorAxis : double, majorAxis : double, color : String) - Calls the superclass constructor using the passed-in color. Also calls this class' setters to assign the given attributes.

calcArea() : double - Calculates the area using the object's minorAxis and majorAxis attributes. See above table for help on formula.

calcPerimeter() : double - Calculates the perimeter using the object's minorAxis and majorAxis attributes. See above table for help on formula.

toString() : String - Returns a string that is concatenated together with the name of Ellipse, color, calcArea result, calcPerimeter result.

Rectangle.java (extends Shape)

Rectangle(width : double, height : double, color : String) - Calls the superclass constructor using the passed-in color, and calls this class' setters to assign the attributes.

calcArea() : double - Calculates the area using the object's width and height attributes. See above table for help on formula.

calcPerimeter() : double - Calculates the perimeter using the object's width and height attributes. See above table for help on formula.

toString() : String - Returns a string that is concatenated together with the name of Rectangle, color, calcArea result, calcPerimeter result.

Circle.java (extends Ellipse)

Circle(radius : double, color : String) - Calls the superclass constructor using the passed in radius and color.

toString() : String - Returns a string that is concatenated together with the name of Circle, color, calcArea result, calcPerimeter result.

Square.java (extends Rectangle)

Square(size : double, color : String) - Calls the superclass constructor using the passed in size and color.

toString() : String - Returns a string that is concatenated together with the name of Square, color, calcArea result, calcPerimeter result.

OUTPUT TEST 1:

```
Enter number of shapes to create: 5
Enter a shape: circle 4 red
Enter a shape: circlee 4 blue
Invalid Shape! Try Again
Enter a shape: ellipse 3 4 purple
Enter a shape: rectangle 3 2 green
Enter a shape: square 2 brown
Enter a shape: rectanggle 3 3 blue
Invalid Shape! Try Again
Enter a shape: rectangle 5 6 blue

Circle red 50.26548245743669 25.132741228718345
Ellipse purple 37.69911184307752 22.21441469079183
Rectangle green 6.0 10.0
Square brown 4.0 8.0
Rectangle blue 30.0 22.0
Enter a shape color to remove: brown

Circle red 50.26548245743669 25.132741228718345
Ellipse purple 37.69911184307752 22.21441469079183
Rectangle green 6.0 10.0
Rectangle blue 30.0 22.0
```

OUTPUT TEST 2:

```
Enter number of shapes to create: 3
Enter a shape: circle
Invalid Shape! Try Again
Enter a shape: ellipse -3 4
Invalid Shape! Try Again
Enter a shape: ellipse -3 5 blue
Enter a shape: circle green
Invalid Shape! Try Again
Enter a shape: circle 4 blue
Enter a shape: rectangle 4 5
Invalid Shape! Try Again
Enter a shape: rectangle 4 5 blue

Ellipse blue -47.12388980384689 25.90623668683038
Circle blue 50.26548245743669 25.132741228718345
Rectangle blue 20.0 18.0

Enter a shape color to remove:blue
Circle blue 50.26548245743669 25.132741228718345
Rectangle blue 20.0 18.0
```

GRADE GUIDE

30 possible points with a possible 5 bonus points extra

If your program does not compile, produce any input/output (I/O) because most of the source code is commented out then your lab will receive a grade of zero points. If your lab has any runtime errors (Such as NullPointerException or ArrayIndexOutOfBounds), the lab will also receive **ZERO** points. **If you don't have header comments inside of ALL OF YOUR CLASS FILES, you will receive ZERO points as well. NO EXCEPTION!!!!!**

Grading Rubric

5 points: Javadoc and Commenting
6 points: LabFiveDriver Class
7 points: Ellipse class
7 points: Rectangle class
2 points: Shape
3 points: Circle and Square

LAB BONUS QUIZ