LAB TEST 02 (G1 & G2) time: 1hr

CSE 2112

Object Oriented Programming Lab

Playing with Shapes:

You are playing and arranging different shapes on your own in your room. The area of your room is 2000m^2. You enjoy coloring different types of shapes. You can either fill or not fill you shape with different colors. Your are given only three types of shapes Circle, Rectangle and Square. You have to calculate the area of the shapes and identify whether those can be accommodated in your room or not.[Consider everything on 2D coordinate system]

- Now you have to write four different classes named Shape, Circle, Rectangle and Square. [You must know by now that Circle, Rectangle and Square are different types of shapes and also Square is one type of Rectangle].
- The Shape class contains: two instance variables color (String) and filled (boolean), two constructors: a no-arg (no-argument) constructor that initializes the color to "green" and filled to true, and a constructor that initializes the color and filled to the given values.Write actuator and mutator for all the instance variables.
- The Circle class contains an instance variable radius (double). Three constructors: a no-arg constructor initializes the radius to 1.0, a constructor with radius only and another that initializes radius, color and filled. Write actuator and mutator for all the instance variables. Write methods getArea() and getPerimeter() to calculate the area and perimeter.
- The Rectangle class contains two instance variables width (double) and length (double).Three constructors: a no-arg constructor initializes the width and length to 1.0, a constructor with width and length only and another that initializes width, length, color and filled. Write actuator and mutator for all the instance variables. Write methods getArea() and getPerimeter() to calculate the area and perimeter.
- The Square class has no instance variable, but inherits the instance variables width and length from its superclass Rectangle.
  Provide the appropriate constructors (as shown in the class diagram). Hint:
  public Square(double side) {

```
    super(side, side);  // Call superclass Rectangle(double, double)
}
```

Write actuator and mutator for all the instance variables. Write methods getArea() and getPerimeter() to calculate the area and perimeter.

- Now create MyOwnRoom class which contains the main() method. Perform the following within the main() method.
    - Read all the input from text file.
    - Create an array of **Shape** and put all the fields with appropriate values.
    - Display the areas of the shapes.
    - If the total sum of the area exceeds the area of your room keep discarding the shapes from the bottom of the file.

These classes must meet the following requirements:

1. All classes, whenever appropriate, should utilize the power of inheritance. Lack of/improper use of inheritance in areas where inheritance is deemed much more advantageous will result in point deductions.
2. All classes and methods should be abstract if appropriate.
3. All variables should be protected if appropriate.
4. Make sure your program can read text file in the following format:
   [Type] [Color] [Filled/Not Filled] [additional1] [additional2]...

Data File Example:
Circle Red True 50
Circle Blue False 100
Rectangle Green False 20.2 80.5
Rectangle White False 56.2 140.5
Square Yellow False 150.6

Console Output Example:
Total Circle area _____
Total Rectangle area _____
Total Square _____
Total area _____
Total area is greater than the Room area. So, the updated total area _____