Homework assignment 07

Complete the following programs for this week’s homework.

Programming assignments

Triangle class(40 points)

Given the class GeometricObject below, write a subclass Triangle with the following properties:

- Three doubles - side1, side2, and side3 with default values of 1.0 for the lengths of the sides
- A no-arg constructor that creates a default triangle
- A constructor that takes in 3 doubles for sides to create a triangle. Note: In triangles, the sum of any 2 sides is greater than the other side. The constructor should check to make sure that is the case and throw an IllegalArgumentException if you try to make a triangle that doesn't follow the rule.
- Getters for all 3 sides
- A getArea() method that returns the area of the triangle
- A getPerimeter() method that returns the perimeter
- A toString() method that returns a string description of the triangle like: “Triangle: side 1 = 1.0, side 2 = 1.0, side 3 = 1.0”

Then write a test program that creates an ArrayList of 5 triangle objects. Set each of the following properties to something other than the default:

- three sides of the triangle
- the color
- the Boolean value to indicate whether the triangle is filled

You can enter these by hand, no need to ask the user. Wrap them in a try-catch block and make sure that the constructor exception is handled and tells the user if the rule is broken.

The program should then loop through the ArrayList and print out the sides, color and whether each Triangle is filled

```java
public class GeometricObject {
    private String color = "white";
```
private boolean filled;
private java.util.Date dateCreated;

/** Construct a default geometric object */
public GeometricObject(){
    dateCreated = new java.util.Date();
}

/** Construct a geometric object with the specified color 
* and filled value */
public GeometricObject(String color, boolean filled){
    dateCreated = new java.util.Date();
    this.color = color;
    this.filled = filled;
}

/** Return color */
public String getColor(){
    return color;
}

/** Set color */
public void setColor(String color) {
    this.color = color;
}

/** Return filled. Since filled is boolean,
its getter method is named isFilled */
public boolean isFilled() {
    return filled;
}

/** Set a new filled */
public void setFilled(boolean filled) {
    this.filled = filled;
}

/** Get dateCreated */
public java.util.Date getDateCreated() {
    return dateCreated;
}
/** Return a string representation of this object */
public String toString() {
    return "created on " + dateCreated + "\ncolor: " + color + " and filled: " + filled;
}

Create a new class and copy that in.

Rectangle class and polymorphism(30 points)

Similar to the Triangle problem, write another subclass of the class GeometricObject, including the following methods:

- A `getArea()` method that returns the area of the rectangle
- A `getPerimeter()` method that returns the perimeter
- A `toString()` method that returns a string description of the rectangle like: "Rectangle: side 1 = 1.0, side 2 = 1.0, side 3 = 1.0, side 4 = 1.0"

Then, back in the GeometricObject class, create a `getArea()` and `getPerimeter()` methods that only return -1.0

Write a test class that includes a method `getInfo()` that accepts a GeometricObject and will print the area, perimeter and the summary of the object. In the main method, create a Triangle and a Rectangle instance and pass each of them to the `getInfo()` method.

Bouncing Balls - Processing(30 points)

Create a `Ball` class that will draw an ellipse and bounce off the walls of the screen. Useful datafields for this class may be:

- radius
- x and y positions
- x and y direction of movement
- speed

Useful methods in the class may be:
A constructor
• an `update()` method that will move the ball
• getters for the radius and direction - useful for drawing the balls from the main class

Then in the main class, create an ArrayList that will be used to store the balls. Whenever the mouse is clicked in the sketch, a new Ball should be created at the location the mouse is clicked and start bouncing around the screen.

Remember that comments and good naming conventions factor into your grade! Don’t forget.