Lab 13 (October 23 or October 24)

Instructions: Complete the exercises below. Be sure to show your code to one of the lab TAs before you leave, so that you can receive credit for this lab. You must also upload a copy of all your source code (.java) files to the link on Blackboard by 11:59 PM on Tuesday, October 24.

1. In an *n*-sided regular polygon, all sides have the same length and all angles have the same degree (i.e., the polygon is both equilateral and equiangular). Design a class named `RegularPolygon` that contains:

    a. A `private int` data field named `n` that defines the number of sides in the polygon (the default value is 3).

    b. A `private double` data field named `side` that stores the length of the side (the default value is 1).

    c. A `public` no-argument constructor that creates a regular polygon with default values for the number of sides and side length.

    d. A `public` constructor that creates a regular polygon with the specified number of sides and length of side.

    e. `public` accessor ("getter") and mutator ("setter") methods for all data fields.

    f. A `public` method named `getPerimeter()` that returns the perimeter of the polygon.

    Implement this class and write a test program (or, at least, add a `main()` method) that creates two `RegularPolygon` objects. The first `RegularPolygon` should have 5 sides of length 10, while the second `RegularPolygon` has 12 sides of length 14. Display the properties of both objects and display their perimeter values.

2. Design a class named `Rectangle` to represent a rectangle. The class contains:

    a. Two `private double` data fields named "width" and "height" that specify the width and height of the rectangle. The default values are 1 for both width and height.

    b. A `private String` data field named "color" that specifies the color of a rectangle. The default color for a `Rectangle` is "white".

c. A `public` no-argument constructor that creates a default `Rectangle` with default values for its width and height

d. A `public` constructor that creates a rectangle with a specified width and height (but the default color).

e. `public` accessor ("getter") and mutator ("setter") methods for all three data fields.

f. A `public` method named `getArea()` that returns the area of this rectangle.

g. A `public` method named `getPerimeter()` that returns the rectangle's perimeter.

Implement this class and write a test program (or, at least, add a `main()` method) that creates two `Rectangle` objects. Assign width 4 and height 40 to the first object and width 3.5 and height 35.9 to the second object. Assign the color "red" to both `Rectangle` objects. Display the properties of both objects and find their areas and perimeters.

Grading Guidelines: This lab is graded on a scale of 0-3 points, assigned as follows:

0 points: Student is absent or does not appear to have completed any work for the lab

1 point: Student has written only one program, but it does not compile or run at all due to errors.

2 points: Student has written (or attempted to write) both programs, but only one compiles and runs without error.

3 points: Student has written both programs, and they both compile and run correctly, without any apparent errors.