ADNAN MENDERES UNIVERSITY
CSE 203 Object-Oriented Programming

Lab 06

- You should submit **ONLY solutions of Homework**. Submit **whole java project file in zipped format** and named project file as ***studentNo_NameSurname_AssignmentX***. X is the number of Lab, for this lab: Assignment6.
- Do your homeworks in **ECLIPSE IDE**.
- Do not use Turkish Characters(ç,ğ,ı,ö,ş,ü) for naming project, methods, classes.
- Late submissions are not allowed.
- You should do homework **YOURSELF**. Group working is not allowed.
- Copy homework will be evaluated as 0.
- **DO NOT upload a screenshot (except Question 3) or something else.**
- Use Google Classroom for your questions. Do not send private messages.

HOMEWORK (Inheritance-Polymorphism)

1- Design a class named GeometricObject. The class contains:
- String data field named color with default value "white" indicates color of the object, boolean data field named filled indicates whether the object is filled with a color, Date data field named dateCreated indicates date when the object was created.
- A no-arg constructor that creates a Date object and assign it to dateCreated data field.
- A constructor that take String color and boolean filled parameters as and input. Creates a Date object and assign it to dateCreated data field. Creates GeometricObject with the specified color and filled values.
- The accessor (getter) methods for all three data fields.
- The mutator (setter) methods for color and filled data fields
- A method named toString() that returns a string description (dateCreated, color and filled datafields) for the GeometricObject.

2- Design a class named Triangle that extends GeometricObject. The class contains:
- Three double data fields named side1, side2, and side3 with default values 1.0 to denote three sides of the triangle.
- A no-arg constructor that creates a default triangle.
- A constructor that creates a triangle with the specified side1, side2, and side3.
- The accessor methods for all three data fields.
- A method named getArea() that returns the area of this triangle.
- A method named getPerimeter() that returns the perimeter of this triangle.
- An **overridden** method named toString() that returns a string description for the triangle that contains side lengths, area, perimeter, dateCreated, color and filled datafields of triangle. Use super() keyword to access superclass's toString() method.

For the formula to compute the area of a triangle as follows:

$$s = (\text{side1} + \text{side2} + \text{side3})/2;$$

$$\text{area} = \sqrt{s(s - \text{side1})(s - \text{side2})(s - \text{side3})}$$

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3- Draw the UML diagrams for the classes Triangle and GeometricObject. You may upload screenshot(.jpg, .png, .pdf) for this section. (You may use **Dia uml tool** or **Visio** or **online uml diagram tools**)

4- Write a test program in Test.java class that prompts the user to enter three sides of the triangle, a color, and a Boolean value to indicate whether the triangle is filled. The program should create a Triangle object with these sides and set the color and filled properties using the user input. The program should display the sides of triangle, area, perimeter, date of creation, color, and true or false to indicate whether it is filled or not. Note that implementation of the date should be in superclass GeometricObject .

5- (Polymorphism Example)

- In section 4, by creating Triangle object like:
  `Triangle triangle = new Triangle(side1, side2, side3);` subclass reference is assigned to subclass variable.
- For this section in Test.java, assign subclass reference to superclass variable and print toString() method of this variable. Which class does the invoked toString() method belong? Explain. Write your answer as a comment in Test.java class.

SAMPLE RUN:

```
Enter three sides: 7 2,5 6
Enter the color: white
Enter a boolean value for filled: true
TRIANGLE CLASS: Triangle: side1 = 7.0 side2 = 2.5 side3 = 6.0
The area is 7.307690726214404
The perimeter is 15.5
GEOMETRIC OBJECT CLASS: created on Thu Oct 03 11:51:35 EET 2019
color: white and filled: true

----------OUTPUT OF POLIMORPHISM EXAMPLE--------------
TRIANGLE CLASS: Triangle: side1 = 7.0 side2 = 2.5 side3 = 6.0
The area is 7.307690726214404
The perimeter is 15.5
GEOMETRIC OBJECT CLASS: created on Thu Oct 03 11:51:35 EET 2019
color: white and filled: true
```