

Lab 3 – Practice Questions

Task – 1

Suppose you need to process course information. Each course has a name and has students enrolled. You should be able to add/drop a student to/from the course. You can use a class to model the courses, as shown in Figure below

Course	
<code>-courseName: String</code> <code>-students: String[]</code> <code>-numberOfStudents: int</code>	The name of the course. An array to store the students for the course. The number of students (default: 0).
<code>+Course(courseName: String)</code> <code>+getCourseName(): String</code> <code>+addStudent(student: String): void</code> <code>+dropStudent(student: String): void</code> <code>+getStudents(): String[]</code> <code>+getNumberOfStudents(): int</code>	Creates a course with the specified name. Returns the course name. Adds a new student to the course. Drops a student from the course. Returns the students for the course. Returns the number of students for the course.

A **Course** object can be created using the constructor **Course(String name)** by passing a course name. You can add students to the course using the **addStudent(String student)** method, drop a student from the course using the **dropStudent(String student)** method, and return all the students in the course using the **getStudents()** method. Suppose the **Course** class is available; Sample output that creates two courses and adds students to them.

```
Number of students in course1: 3
Peter Jones, Kim Smith, Anne Kennedy,
Number of students in course2: 2
```

Task – 2

Revise the **Course** class as follows:

- The array size is fixed in Task 1. Improve it to automatically increase the array size by creating a new larger array and copying the contents of the current array to it.
- Implement the **dropStudent** method.
- Add a new method named **clear()** that removes all students from the course.

Write a test program that creates a course, adds three students, removes one, and displays the students in the course.

Task – 3

Design a class named **Triangle** that extends **GeometricObject** from the slides. The class contains:

GeometricObject
<div><div>-color: String</div><div>-filled: boolean</div><div>-dateCreated: java.util.Date</div></div>
<div><div>+GeometricObject()</div><div>+GeometricObject(color: String, filled: boolean)</div><div>+getColor(): String</div><div>+setColor(color: String): void</div><div>+isFilled(): boolean</div><div>+setFilled(filled: boolean): void</div><div>+getDateCreated(): java.util.Date</div><div>+toString(): String</div></div>

- 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.
- A method named **toString()** that returns a string description for the triangle.

For the formula to compute the area of a triangle, use google 😊.

The **toString()** method is implemented as follows:

```
return "Triangle: side1 = " + side1 + " side2 = " + side2 + " side3 = " + side3;
```

Write a test program 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 input. The program should display the area, perimeter, color, and true or false to indicate whether it is filled or not.