Web Engineering Lab

Lab 03 **Marks 100**

Instructions
Work on this quiz/lab individually.

You are **NOT** allowed to use internet, mobile phone.

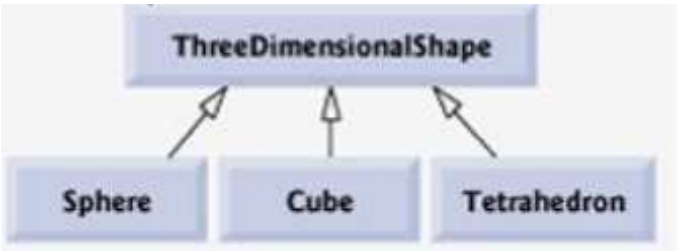
You are **NOT** allowed to borrow anything from your peer student.

What you have to do
Program the following tasks. The name of your files will be according to the task given in this lab.

Lab timing: 09:20AM – 11:00AM

Task 1 [100]

Implement the ThreeDimensionalShape hierarchy as shown in the following figure.



Each `ThreeDimensionalShape` should have methods `getArea` and `getVolume` to calculate the surface area and volume, respectively, of the three-dimensional shape.

Write a `Driver` class that uses an **`array of ThreeDimensionalShape`** references to objects of each concrete class in the hierarchy. The program should print a text description of the object to which each array element refers. Also, in the loop that processes all the shapes in the array, determine whether each shape is a `Sphere`, `Cube` or `Tetrahedron`. Make a call to area and volume, polymaprphically.
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Instruction:

- `Area of a Sphere:` $4\pi r^2$
- `Area of a Cube:` $6a^2$ `(a is the side length of a cube)`
- `Area of a Tetrahedron:` $\sqrt{3}\,a^2$
- `Volume of a Sphere: 4/3` πr^3
- `Volume of a Cube:` a^3 `(a is the side length of a cube)`
- `Volume of a Tetrahedron:` $a^3/(6\sqrt{2})$

- You can use `instanceof` operator to determine the type of object e.g., `if(obj instanceof ----------){}`
- You can override `String toString()` method in your respective class to print the text description of the object. This method will be invoked whenever you will print the object of that class. e.g., `System.out.println(obj);`
- Take input for all the required parameters (i.e., radius, side-length, etc.).

☺ ☺ ☺ **BEST OF LUCK** ☺ ☺ ☺