



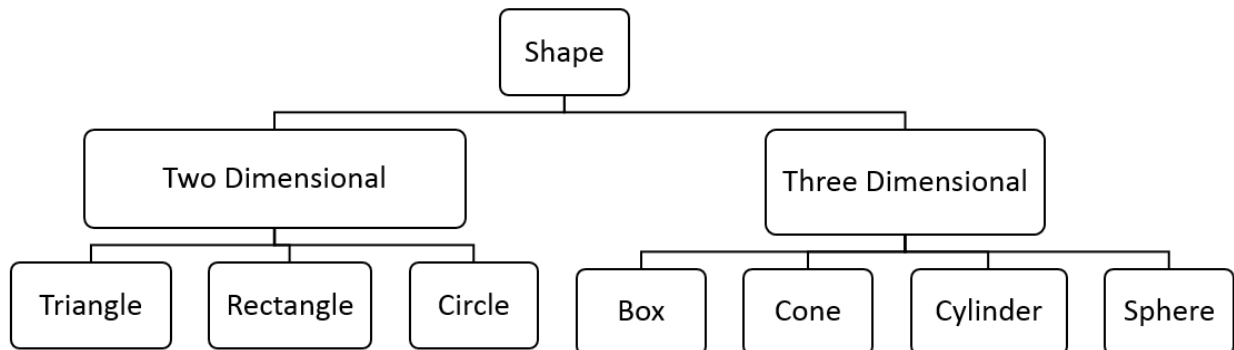
Trincomalee Campus, Eastern University Sri Lanka

Faculty of Applied Science

Department of Computer Science

CO2115 – Practical work on CO21252 (Object Oriented Programming)

Q1. Consider the following class hierarchy:



- The classes Two-dimensional and Three-dimensional should be defined as abstract classes, under the super class “Shape”.
- toString() should be defined for each Figure to return the “Type of Figure” and the relevant data for that class as String.
- The class Two-dimensional contains the methods **getArea()** and **getCircumference()**.

where

Triangle:

$$\text{Area} = \frac{1}{2} * \text{Base} * \text{Height}$$

$$\text{Circumference} = \text{Side1} + \text{Side2} + \text{Side3}$$

Rectangle:

$$\text{Area} = \text{Height} * \text{Width}$$

$$\text{Circumference} = 2 * (\text{Height} + \text{Width})$$

Circle:

$$\text{Area} = \text{pi} * \text{Radius} * \text{Radius}$$

$$\text{Circumference} = 2 * \text{Pi} * \text{Radius}$$

- The class Three-dimensional contains the methods **getSurface()** and **getVolume()**.

where

Box:

$$\text{Surface} = 2 * (\text{Height} * \text{Width} + \text{Width} * \text{Length} + \text{Length} * \text{Height})$$

$$\text{Volume} = \text{Height} * \text{Width} * \text{Length}$$

Cone:

$$\text{Surface} = 2 * \pi * \text{Radius} * (\text{Radius} + \text{Height})$$

$$\text{Volume} = 1/3 * \pi * \text{Radius} * \text{Radius} * \text{Height}$$

Cylinder:

$$\text{Surface} = 2 * \pi * \text{Radius} * (\text{Radius} + \text{Height})$$

$$\text{Volume} = \pi * \text{Radius} * \text{Radius} * \text{Height}$$

Sphere:

$$\text{Surface} = 4 * \pi * \text{Radius} * \text{Radius}$$

$$\text{Volume} = 4/3 * \pi * \text{Radius} * \text{Radius} * \text{Radius}$$

- Implement the above classes in Java
(Include default constructors, destructors, access methods and other functions required for the above classes) (70 marks)
- Write a test program to test the above classes by creating objects for each child classes. (30 marks)