Lab 3: Inheritance and Polymorphism

1. Create a base class Complex with member variables real and imaginary with constructor to initialize values of real and imaginary. Also include the member method called display to display the values of complex number (x + iy).

Then create a child class ComplexNumber with member variables real and imaginary and member method add which adds it's real with parents real and it's imaginary with parents imaginary and return the result as a complex type. Also include constructor that initializes it's member variable values.

Add methods to add, subtract another ComplexNumber.

2. Create a superclass Person and its sub-classes Teacher and Student. The name variable of Person should be accessible from its subclasses directly, however the age variable should be accessed via public methods only.

3. Create an abstract class Shape with abstract method double getVolume(). Create child classes Cuboid, Cylinder, Sphere which extends Shape class where:

i) class Cube has member variable double length, breadth, height and overridden method double getVolume() which returns volume of Cuboid object.

ii)class Cylinder has member variables double length and double radius and an overridden method double getVolume() which returns its volume.

iii)class Sphere has member variable double radius and overridden method double getVolume() which returns its volume.

Create an array of type Shape to hold 10 objects (e.g Shape s[]=new Shape[10]) which holds different types of objects like cuboid object, cylinder object or sphere object. Finally print the volumes of the objects present in the Shape array.

4. Create an interface called Queue- First In First Out (FIFO), that includes methods to enqueue (ie. to add item to queue) and dequeue (ie. to remove item from queue). Create a StringQueue to implement the Queue. A StringQueue should have a constructor that defines its size at the beginning.