Lab 7

Question 1:

Consider the following class definition:

```java
public class AClass
{
    private int u;
    private int v;

    public void print()
    {
    }

    public void set(int x, int y)
    {
    }

    public AClass()
    {
    }

    public AClass(int x, int y)
    {
    }
}
```

What is wrong with the following class definition?

```java
class BClass AClass
{
    private int w;

    public void print()
    {
        System.out.println("u + v + w = " + (u + v + w));
    }

    public BClass()
    {
        super();
        w = 0;
    }

    public BClass(int x, int y, int z)
    {
        super(x, y);
        w = z;
    }
}
```

Question 2:

1. **Design a Ship class that the following members:**

   a. A field for the name of the ship (a string).
   b. A field for the year that the ship was built (a string)
   c. A constructor and appropriate accessors and mutators.
   d. A toString method that displays the ship's name and the year it was built.

2. **Design a CruiseShip class that extends the Ship class. The CruiseShip class should have the following members:**

   a. A field for the maximum number of passengers (an int).
   b. Constructor and appropriate accessors and mutators.
   c. A toString method that overrides the toString method in the base class. **The CruiseShip class's toString method should display only the ship's name and the maximum number of passengers.**

3. **Design a CargoShip class that extends the Ship class. The CargoShip class should have the following members:**

   a. A field for the cargo capacity in tonnage (an int).
   b. A constructor and appropriate accessors and mutators.
   c. A toString method that overrides the toString method in the base class.

   The CargoShip class's toString method should display only the ship's name and the ship's cargo capacity.

4. **Write a program that tests various operations of the following classes Ship ,CruiseShip and CargoShip.**

Question 3:

1. A point in the x-y plane is represented by its x-coordinate and y-coordinate. Design the class Point that can store and process a point in the x-y plane. You should then perform operations on a point, such as showing the point, setting the coordinates of the point, printing the coordinates of the point, returning the x-coordinate, and returning the y-coordinate. Also, write a test program to test various operations on a point.

2. Every circle has a centre and a radius. Given the radius, we can determine the circle's area and circumference. Given the centre, we can determine its position in the x-y plane. The centre of a circle is a point in the x-y plane. Design the class Circle that can store the radius and centre of the circle. Because the centre is a point in the x-y plane and you designed the class to capture the properties of a point in Programming Exercise 1, you must derive the class Circle from the class Point. You should be able to perform the usual operations on a circle, such as setting the radius, printing the radius, calculating and printing the area and circumference, and carrying out the usual operations on the centre.

3. Every cylinder has a base and height, where the base is a circle. Design the class Cylinder that can capture the properties of a cylinder and perform the usual operations on a cylinder. Derive this class from the class Circle designed in Programming Exercise 2. Some of the operations that can be performed on a cylinder are as follows: calculate and print the volume, calculate and print the surface area, set the height, set the radius of the base, and set the centre of the base.

   A cylinder's volume is $\pi r^2 h$, and its surface area is $2\pi r h + 2\pi r^2$.