Lab Sheet 7

Exercise 01:

1. final class Student: The Student class is declared as final, which means it cannot be subclassed. It is the final class in this hierarchy and cannot be extended by any other class.

2. final int marks = 100;: The variable marks is declared as final, which means it cannot be changed once initialized. It acts as a constant and has the value 100.

3. final void display(): The method display() is declared as final, which means it cannot be overridden in any subclass. Once a method is marked as final, it cannot be further modified in any subclass.

4. class Undergraduate extends Student { }: The Undergraduate class is a subclass of the Student class. As the Student class is marked as final, it cannot be subclassed, so the attempt to create a subclass called Undergraduate will result in a compilation error.

Outcome:

The code will result in a compilation error due to the attempt to create a subclass of the final class Student. The error will occur in the Undergraduate class, as it is not allowed to extend a final class. Additionally, if there were an attempt to override the final method display() in the subclass, it would also result in a compilation error.

Exercise 02

Shape class

```
package com.mycompany.shapemain;


abstract class Shape
{
   protected String name;


   public Shape(String name)
   {
      this.name = name;
   }
```

```
    abstract void calculateArea();

    void display() {
        System.out.println("The shape is: " + name);
    }
}
```

Rectangle class

```
package com.mycompany.shapemain;
import java.awt.*; class Rectangle
extends Shape
{
    private int length;
private int width;

    public Rectangle(String name, int length, int width)
    {
        super(name);
this.length = length;
this.width = width;
    }
    @Override     void
calculateArea()
 {
```

```
        int area = length * width;
        System.out.println("The area of the rectangle is: " + area);
    }
}
```

Circle class

```
package com.mycompany.shapemain;
import java.awt.*; class
Circle extends Shape
{
    private int radius;     public
Circle(String name, int radius)
    {
        super(name);
this.radius = radius;
    }
    @Override     void
calculateArea()
    {
        double area = Math.PI * radius * radius;
        System.out.println("The area of the circle is: " + area);
    }
}
```

MAIN

```
package com.mycompany.shapemain;

import java.awt.*; public class

ShapeMain {     public static void

main(String[] args)

   {

       Shape circle = new Circle("Circle", 10);

       circle.display();

circle.calculateArea();


       Shape rectangle = new Rectangle("Rectangle", 20, 30);

rectangle.display();        rectangle.calculateArea();

   }

}
```