

TRINITY INTERNATIONAL COLLEGE

(Tribhuvan University Affiliated)



Lab Report:1.2 Advanced Java Programming

Submitted by:

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1. Write both procedural and object oriented programs to calculate the area of a

- a) Circle
- b) Square
- c) Rectangle
- d) Sphere

Program :

Procedural

Circle :

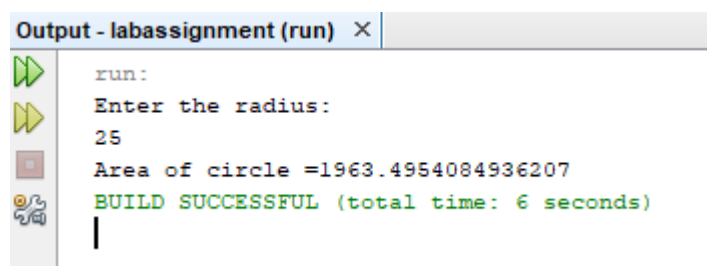
```
package labassignment;

import static java.lang.Math.PI;
import java.util.Scanner;

public class Circle_Procedural {

    public static void main(String[] args) {
        Scanner c = new Scanner(System.in);
        System.out.println("Enter the radius:");
        double radius = c.nextDouble();
        double area = PI * radius * radius;
        System.out.println("Area of circle =" + area);
    }

}
```



```
Output - labassignment (run) X
run:
Enter the radius:
25
Area of circle =1963.4954084936207
BUILD SUCCESSFUL (total time: 6 seconds)
```

Square :

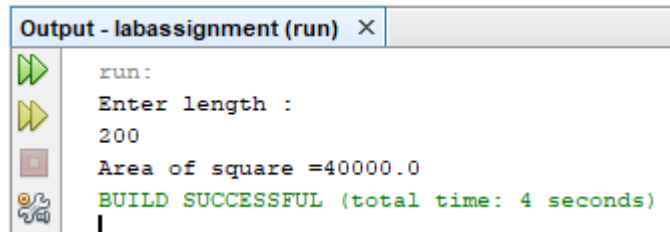
```
package labassignment;
import java.util.Scanner;

public class Square_Procedural {
```

```

public static void main(String[] args) {
    Scanner s =new Scanner(System.in);
    System.out.println("Enter length :");
    double length = s.nextInt();
    double area = length * length ;
    System.out.println("Area of square =" +area);
}
}

```



```

run:
Enter length :
200
Area of square =40000.0
BUILD SUCCESSFUL (total time: 4 seconds)

```

Rectangle :

```

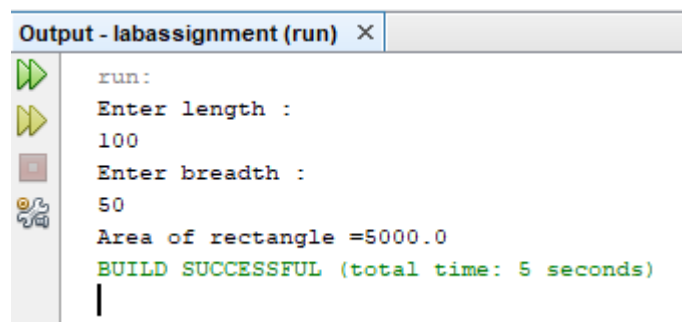
package labassignment;
import java.util.Scanner;

```

```

public class Rectangle_Procedural {
    public static void main(String[] args) {
        Scanner s =new Scanner(System.in);
        System.out.println("Enter length :");
        double length = s.nextDouble();
        System.out.println("Enter breadth :");
        double breadth = s.nextDouble();
        double area = length * breadth ;
        System.out.println("Area of rectangle=" +area);
    }
}

```



```

run:
Enter length :
100
Enter breadth :
50
Area of rectangle =5000.0
BUILD SUCCESSFUL (total time: 5 seconds)

```

Sphere :

```

package labassignment;

```

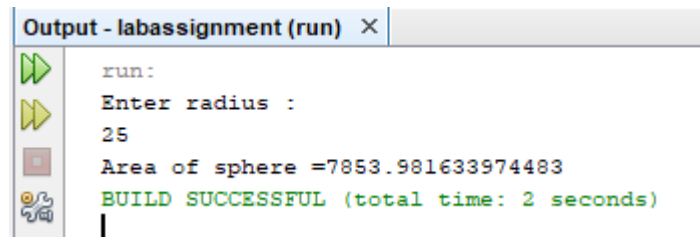
```

import static java.lang.Math.PI;
import java.util.Scanner;

public class Sphere_Procedural {

    public static void main(String[] args) {
        Scanner s = new Scanner(System.in);
        System.out.println("Enter radius :");
        double radius = s.nextDouble();
        double area = 4 * PI * radius * radius;
        System.out.println("Area of sphere =" + area);
    }
}

```



```

Output - labassignment (run) X
run:
Enter radius :
25
Area of sphere =7853.981633974483
BUILD SUCCESSFUL (total time: 2 seconds)

```

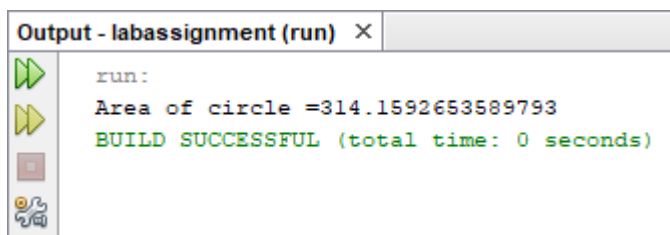
Object Oriented

Circle :

```

package labassignment;
import static java.lang.Math.PI;
public class Circle {
    private double r;
    public Circle(double r) {
        this.r = r;
    }
    public double area() {
        return PI * r * r;
    }
    public static void main(String[] args) {
        Circle c = new Circle(10);
        System.out.println("Area of circle =" + c.area());
    }
}

```



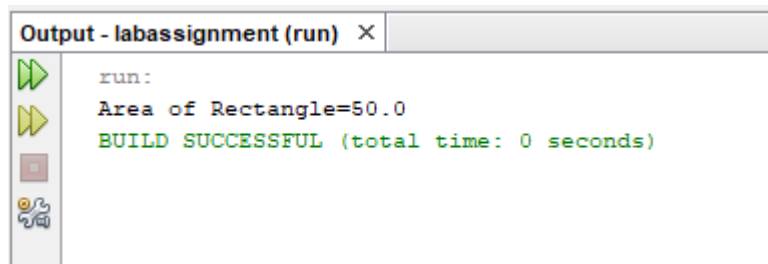
```

Output - labassignment (run) X
run:
Area of circle =314.1592653589793
BUILD SUCCESSFUL (total time: 0 seconds)

```

Rectangle:

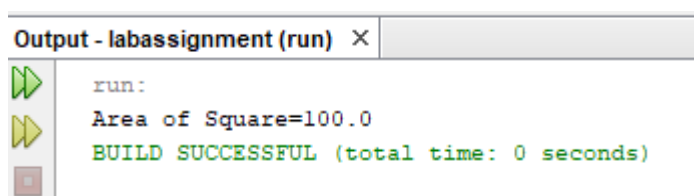
```
package labassignment;
import java.util.*;
public class Rectangle {
    private float l, b;
    public Rectangle(float l, float b) {
        this.l = l;
        this.b = b;
    }
    public float area() {
        return l * b;
    }
    public static void main(String[] args) {
        Rectangle r = new Rectangle(10, 5);
        System.out.println("Area of Rectangle=" + r.area());
    }
}
```



```
Output - labassignment (run) X
run:
Area of Rectangle=50.0
BUILD SUCCESSFUL (total time: 0 seconds)
```

Square :

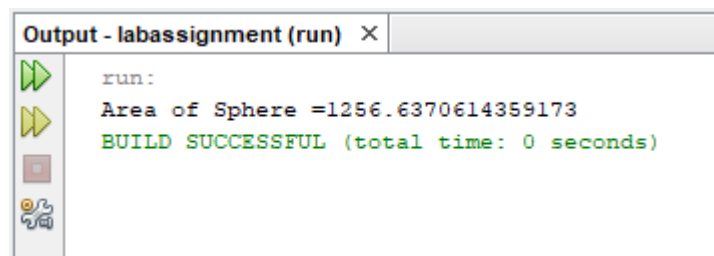
```
package labassignment;
import java.util.*;
public class Square {
    private float l;
    public Square(float l) {
        this.l = l;
    }
    public float area() {
        return l * l;
    }
    public static void main(String[] args) {
        Square r = new Square(10);
        System.out.println("Area of Square=" + r.area());
    }
}
```



```
Output - labassignment (run) X
run:
Area of Square=100.0
BUILD SUCCESSFUL (total time: 0 seconds)
```

Sphere:

```
package labassignment;
import static java.lang.Math.PI;
public class Sphere {
    private double r;
    public Sphere(double r) {
        this.r = r;
    }
    public double area() {
        return 4 * PI * r * r;
    }
    public static void main(String[] args) {
        Sphere c = new Sphere(10);
        System.out.println("Area of Sphere =" + c.area());
    }
}
```



2. Write a static method to calculate the sum of a one dimensional array.

Program :

```
package labassignment;

import java.util.Scanner;

public class Sum_Ofarray {

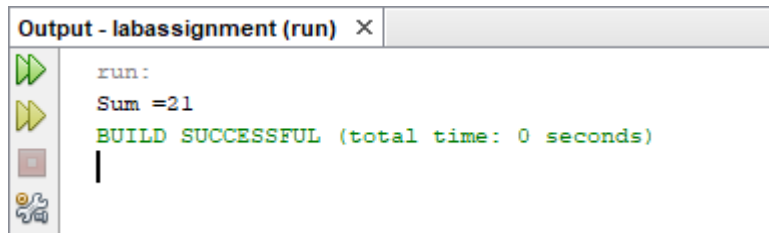
    private static int Sum(int[] data) {
        int i, sum = 0;
        for (i = 0; i < data.length; i++) {
            sum = sum + data[i];
        }
    }
}
```

```

    }
    return sum;
}

public static void main(String[] args) {
    Scanner s = new Scanner(System.in);
    int[] data = {1, 2, 3, 4, 5, 6};
    System.out.println("Sum =" + Sum(data));
}
}

```



3. Write a static method to calculate the average of a one dimensional array.

Program :

```

package labassignment;

import java.util.Scanner;

public class Average_Ofarray {

    private static float Average(float[] data) {
        float sum = 0;
        int i;
        float l = data.length;
        for (i = 0; i < l; i++) {
            sum = sum + data[i];
        }
        return sum / l;
    }

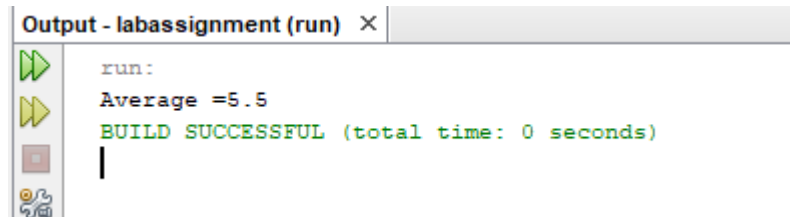
    public static void main(String[] args) {
        Scanner s = new Scanner(System.in);
        float[] data = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};
    }
}

```

```

        System.out.println("Average =" + Average(data));
    }
}

```



4. Create a class with static methods to calculate the sum, difference and product of two matrices (represented by 2D arrays). The methods must return the resulting matrices.

Program :

```

package labassignment;

public class Operation_2Darray {

    public static void main(String[] args) {
        double[][] a = {{ 1, 2},
            {3, 4}};
        double[][] b = {{ 5, 6},
            {7, 8}};

        System.out.println("Matrix A ::");
        for (int i = 0; i < a.length; i++) {
            for (int j = 0; j < b.length; j++) {
                System.out.print(a[i][j] + "\t");
            }
            System.out.println();
        }

        System.out.println("Matrix B ::");
        for (int i = 0; i < a.length; i++) {
            for (int j = 0; j < b.length; j++) {
                System.out.print(b[i][j] + "\t");
            }
            System.out.println();
        }
    }
}

```



```

Sum(a, b);
Difference(a, b);
Product(a, b);
}

public static void Sum(double[][] a, double[][] b) {
    double sum[][] = new double[2][2];
    int i = 0, j = 0;
    for (i = 0; i < a.length; i++) {
        for (j = 0; j < b.length; j++) {
            sum[i][j] = a[i][j] + b[i][j];
        }
    }

    System.out.println();
    System.out.println("Sum of the matrix A and matrix B ::");
    for (i = 0; i < a.length; i++) {
        for (j = 0; j < b.length; j++) {
            System.out.print(sum[i][j] + "\t");
        }
        System.out.println();
    }
}

public static void Difference(double[][] a, double[][] b) {
    double difference[][] = new double[2][2];
    int i = 0, j = 0;
    for (i = 0; i < a.length; i++) {
        for (j = 0; j < b.length; j++) {
            difference[i][j] = a[i][j] - b[i][j];
        }
    }

    System.out.println();
    System.out.println("Difference of the matrix A and matrix B ::");
    for (i = 0; i < a.length; i++) {
        for (j = 0; j < b.length; j++) {
            System.out.print(difference[i][j] + "\t");
        }
        System.out.println();
    }
}

public static void Product(double[][] a, double[][] b) {
    double product[][] = new double[2][2];
    int i = 0, j = 0;

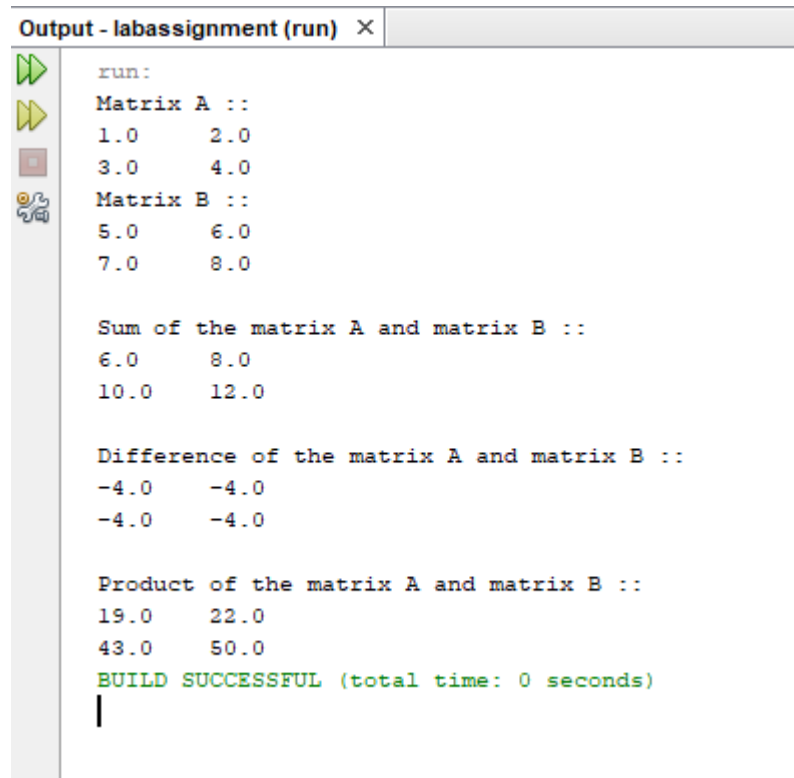
```

```

    for (i = 0; i < a.length; i++) {
        for (j = 0; j < b.length; j++) {
            for (int k = 0; k < 2; k++) {
                product[i][j] = product[i][j] + a[i][k] * b[k][j];
            }
        }
    }

    System.out.println();
    System.out.println("Product of the matrix A and matrix B ::");
    for (i = 0; i < a.length; i++) {
        for (j = 0; j < b.length; j++) {
            System.out.print(product[i][j] + "\t");
        }
        System.out.println();
    }
}
}

```



```

Output - labassignment (run) X
run:
Matrix A ::
1.0    2.0
3.0    4.0
Matrix B ::
5.0    6.0
7.0    8.0

Sum of the matrix A and matrix B ::
6.0    8.0
10.0   12.0

Difference of the matrix A and matrix B ::
-4.0   -4.0
-4.0   -4.0

Product of the matrix A and matrix B ::
19.0   22.0
43.0   50.0
BUILD SUCCESSFUL (total time: 0 seconds)
|

```

5. Write a program to demonstrate encapsulation.

Program :

```

package labassignment;

public class Encapsulation_Program {

    private String name;
    private String college;
    private int phone;

    public String getname() {
        return name;
    }

    public String getcollegename() {
        return college;
    }

    public int getphone() {
        return phone;
    }

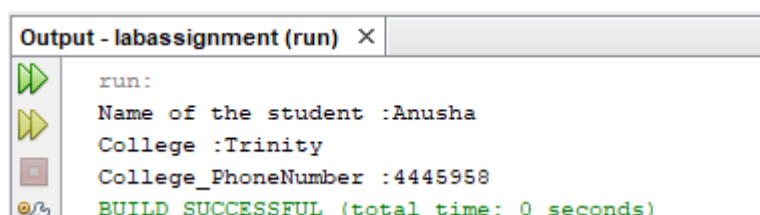
    public void setname(String sname) {
        name = sname;
    }

    public void setcollegename(String scollege) {
        college = scollege;
    }

    public void setphone(int sphone) {
        phone = sphone;
    }

    public static void main(String[] args) {
        Encapsulation_Program e = new Encapsulation_Program();
        e.setname("Anusha");
        e.setcollegename("Trinity");
        e.setphone(4445958);
        System.out.println("Name of the student :"+ e.getname());
        System.out.println("College :"+ e.getcollegename());
        System.out.println("College_PhoneNumber :"+ e.getphone());
    }
}

```



```

Output - labassignment (run) ×
run:
Name of the student :Anusha
College :Trinity
College_PhoneNumber :4445958
BUILD SUCCESSFUL (total time: 0 seconds)

```

6. Write a program to demonstrate inheritance.

Program :

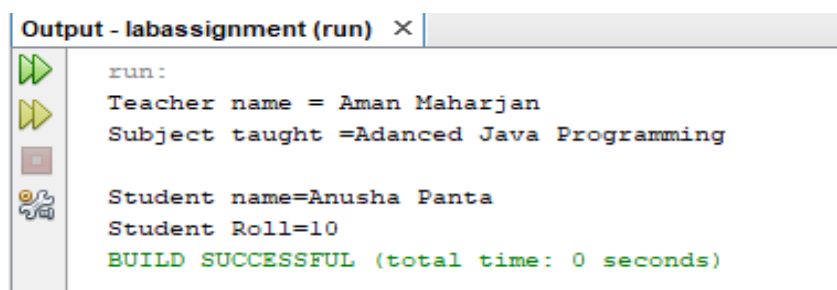
```
package labassignment;

class Teacher{
    String tname;
    String subject;

    void t_display(){
        System.out.println("Teacher name = " + tname);
        System.out.println("Subject taught =" + subject);
    }
}

class Student extends Teacher{
    private String sname;
    private int roll;
    void setData(String student,String teacher,String sub,int r){
        sname=student;
        tname=teacher;
        subject=sub;
        roll=r;
    }
    void s_display(){
        System.out.println("Student name=" + sname);
        System.out.println("Student Roll=" + roll);
    }
}

public class Inheritance_Program {
    public static void main(String[] args) {
        Student s = new Student();
        s.setData("Anusha Panta","Aman Maharjan", "Adanced Java Programming",10);
        s.t_display();
        System.out.println();
        s.s_display();
    }
}
```



```
Output - labassignment (run) ×
run:
Teacher name = Aman Maharjan
Subject taught =Adanced Java Programming

Student name=Anusha Panta
Student Roll=10
BUILD SUCCESSFUL (total time: 0 seconds)
```

7. Write a program to demonstrate polymorphism using non-abstract class as parent.

Program :

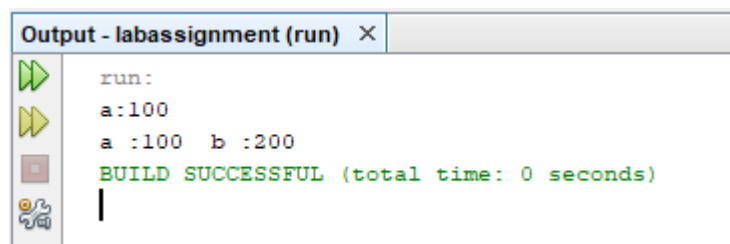
```
package labassignment;

abstract class test{
    public abstract void demo();
}

class test1{
    void demo(int a){
        System.out.println("a:"+a);
    }
}

class test2 extends test1{
    void demo(int a,int b){
        System.out.println("a :"+a +"\\tb :"+b);
    }
}

public class Nonabstract_Asparent {
    public static void main(String[] args) {
        test2 t2=new test2();
        t2.demo(100);
        t2.demo(100, 200);
    }
}
```



```
Output - labassignment (run) ×
run:
a:100
a :100 b :200
BUILD SUCCESSFUL (total time: 0 seconds)
```

8. Write a program to demonstrate polymorphism using abstract class as parent.

Program :

```

package labassignment;

import static java.lang.Math.PI;

abstract class Shape {
    public abstract double area();
}

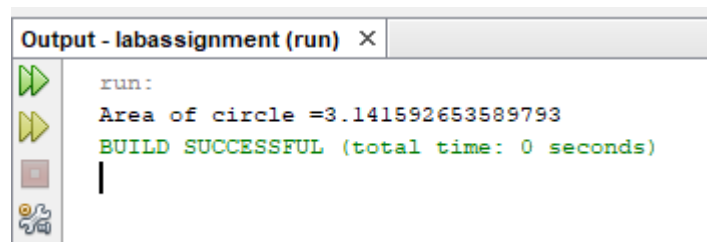
public class Abstract_Asparent extends Shape {
    private double r;

    public Abstract_Asparent(double r) {
        this.r = r;
    }

    @Override
    public double area() {
        return PI * r * r;
    }

    public static void main(String[] args) {
        Abstract_Asparent a = new Abstract_Asparent(1);
        System.out.println("Area of circle =" + a.area());
    }
}

```



```

Output - labassignment (run) ×
run:
Area of circle =3.141592653589793
BUILD SUCCESSFUL (total time: 0 seconds)

```

9. Write a program to demonstrate polymorphism using interface as parent.

Program :

```

package labassignment;

import static java.lang.Math.PI;

interface Shapes {
    double area();
}

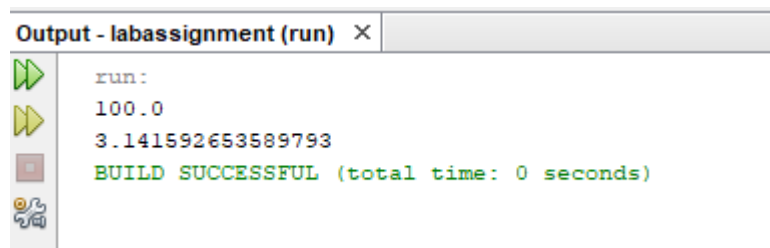
```

```
}
```

```
class Squares implements Shapes {  
    public double l;  
    public Squares(double l) {  
        this.l = l;  
    }  
    @Override  
    public double area() {  
        return l * l;  
    }  
}
```

```
class Circles implements Shapes {  
    public double r;  
    public Circles(double r) {  
        this.r = r;  
    }  
    @Override  
    public double area() {  
        return PI * r * r;  
    }  
}
```

```
public class Interface_program {  
    public static void main(String[] args) {  
        Shapes[] shapes = new Shapes[]{  
            new Squares(10),  
            new Circles(1)  
        };  
        for (Shapes s : shapes) {  
            System.out.println(s.area());  
        }  
    }  
}
```



```
Output - labassignment (run) X  
run:  
100.0  
3.141592653589793  
BUILD SUCCESSFUL (total time: 0 seconds)
```

10. Write a program to create two classes Circle and Square, with appropriate fields and methods, in a package name shape. Create a separate class ShapeDemo to test the classes.

Program :

Square.java

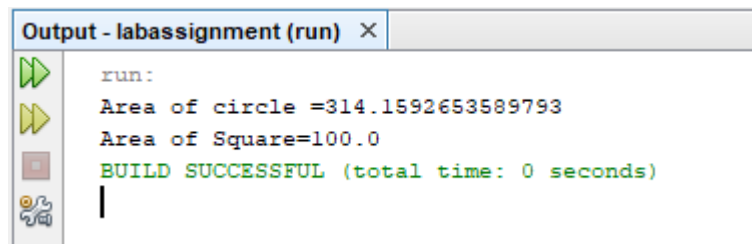
```
package Shapes;
import java.util.*;
public class Square {
    private float l;
    public Square(float l) {
        this.l = l;
    }
    public float area() {
        return l * l;
    }
}
```

Circle.java

```
package Shapes;
import static java.lang.Math.PI;
public class Circle {
    private double r;
    public Circle(double r) {
        this.r = r;
    }
    public double area() {
        return PI * r * r;
    }
}
```

ShapeDemo.java

```
package Test;
import Shapes.Circle;
import Shapes.Square;
public class ShapeDemo {
    public static void main(String[] args) {
        Circle c = new Circle(10);
        System.out.println("Area of circle =" + c.area());
        Square r = new Square(10);
        System.out.println("Area of Square=" + r.area());
    }
}
```

11. An array is called balanced if it's even numbered elements (a[0], a[2], etc.) are even and its odd numbered elements (a[1], a[3], etc.) are odd. Write a function named balanced that accepts an array of integers which returns 1 if the array is balanced and returns 0 otherwise.

Program:

```
package labassignment;

import java.util.Scanner;

public class Balanced_Array {

    private static int Check_Balanced_Array(int[] data) {
        int i = 0;
        int even_count = 0;
        int odd_count = 0;
        int array_length = data.length;
        for (i = 0; i < data.length; i += 2) {

            if (data[i] % 2 == 0) {
                even_count += 1;
            }
        }
        for (i = 1; i < data.length; i += 2) {

            if (data[i] % 2 == 1) {
                odd_count += 1;
            }
        }

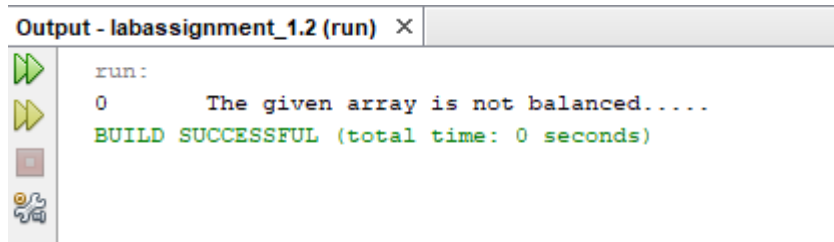
        // System.out.println("even="+even_count+"odd="+odd_count+"array="+array_length);
        if (even_count + odd_count == array_length) {
```

```

        return 1;
    } else {
        return 0;
    }
}

public static void main(String[] args) {
    Scanner in = new Scanner(System.in);
    int[] data = {0, 1, 2, 3, 4, 5, 9};
    int result = Check_Balanced_Array(data);
    if (result == 1) {
        System.out.println(result + "\tThe given array is balanced.....");
    } else {
        System.out.println(result + "\tThe given array is not balanced.....");
    }
}
}

```



12. Write an object oriented program to find area and perimeter of rectangle.

Program:

```

package labassignment;
import java.util.*;
public class Rectangle_OO {

    private float l = 0, b = 0;

    public Rectangle_OO(float l, float b) {
        this.l = l;
        this.b = b;
    }

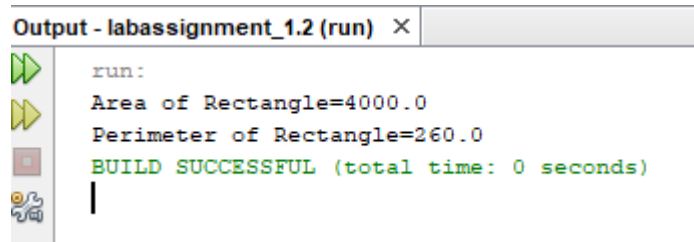
    public float area() {
        return l * b;
    }

    public float perimeter() {

```

```
        return 2 * l + 2 * b;
    }

    public static void main(String[] args) {
        Rectangle_OO r = new Rectangle_OO(80, 50);
        System.out.println("Area of Rectangle=" + r.area());
        System.out.println("Perimeter of Rectangle=" + r.perimeter());
    }
}
```



```
Output - labassignment_1.2 (run) X
run:
Area of Rectangle=4000.0
Perimeter of Rectangle=260.0
BUILD SUCCESSFUL (total time: 0 seconds)
```