ASSIGNMENT - 6

1.Create a abstract class Bank that has abstract method getROI(). Create two classes SBI, PNB, BOI inherited from Bank. Create a driver class that prints the rate of interest of each bank using super class memory reference.

```
abstract class Banks{

float getRateOfInterest() {

    return 0;

   }}

class SBI extends Banks {

  float getRateOfInterest() {

    return 8.0f;

  }

}

class PNB extends Banks {

    float getRateOfInterest() {

    return 7.0f;

   }}

class BOI extends Banks {

  float getRateOfInterest() {

    return 9.0f;

   }}

public  void main(String[] args) {

    Banks sbi = new SBI();

    Banks pnb = new PNB();

    Banks boi = new BOI();

    System.out.println("SBI Rate of Interest : " + sbi.getRateOfInterest());

    System.out.println("PNB Rate of Interest : " + pnb.getRateOfInterest());

    System.out.println("BOI Rate of Interest : " + boi.getRateOfInterest());

  }
```

OUTPUT :

```
C:\Users\Padmalya Meher\Desktop\25bcsl48>javac Banks.java

C:\Users\Padmalya Meher\Desktop\25bcsl48>java Banks.java
SBI Rate of Interest : 8.0
PNB Rate of Interest : 7.0
BOI Rate of Interest : 9.0
```

2. Define an interface Calculator which has the basic methods add(), sub( ), mul() and div(). Define a concrete class named as DemoCalculator that implements the interface. Define the driver class, which create object reference of the interface Calculator and perform all basic operation of the calculator.

```java
interface Calculator{

 double add(double a,double b);

 double sub(double a,double b);

 double mul(double a,double b);

 double div(double a,double b);

}

class DemoCalculator implements Calculator{

 public double add(double a,double b){

  return a + b;

}

public double sub(double a,double b){

 return a - b;

}

public double mul(double a,double b){

 return a * b;

}

public double div(double a,double b)

{

 if (b == 0)

{

 throw new ArithmeticException("Division by zero is not allowed.");

 }

return a / b;

  }}

 public void main(String args[]){

 Calculator cal = new DemoCalculator();

 double a = 10, b = 5;

System.out.println("The addition is:"+ cal.add(a,b));

System.out.println("The substraction is:"+ cal.sub(a,b));

System.out.println("The multiplication is:"+ cal.mul(a,b));
```

```
System.out.println("The division is:"+ cal.div(a,b));

 }
```

OUTPUT :

```
C:\Users\Padmalya Meher\Desktop\25bcsl48>java Calculator.java
The addition is:44.0
The substraction is:-4.0
The multiplication is:480.0
The division is:0.8333333333333334
```

3.Create an abstract class 'Shape' with three abstract methods namely 'RectangleArea' taking two parameters, 'SquareArea' and 'CircleArea' taking one parameter each. The parameters of 'RectangleArea' are its length and breadth, that of 'SquareArea' is its side and that of 'CircleArea' is its radius. Now create another class 'Area' containing all the three methods 'RectangleArea', 'SquareArea' and 'CircleArea' for printing the area of rectangle, square and circle respectively. Create an object of class 'Area' and call all the three methods.

```
class Rectangle extends Shape2 {

   double length, breadth;

   Rectangle(double length, double breadth) {

      this.length = length;

      this.breadth = breadth;

   }

   double area(){

      return length * breadth;

   }}
class Square extends Shape2 {

   double side;

   Square(double side) {

      this.side = side;

   }

   double area() {

      return side * side;

   }}
class Circle extends Shape2 {
```

```java
    double radius;

    Circle(double radius) {

        this.radius = radius;

    }

    double area() {

        return Math.PI * radius * radius;

    }}

    public void main(String[] args) {

        Shape2 rect = new Rectangle(10, 5);

        Shape2 square = new Square(4);

        Shape2 circle = new Circle(3);

        System.out.println("Rectangle Area: " + rect.area());

        System.out.println("Square Area: " + square.area());

        System.out.printf("Circle Area: %.2f\n", circle.area());

}
```
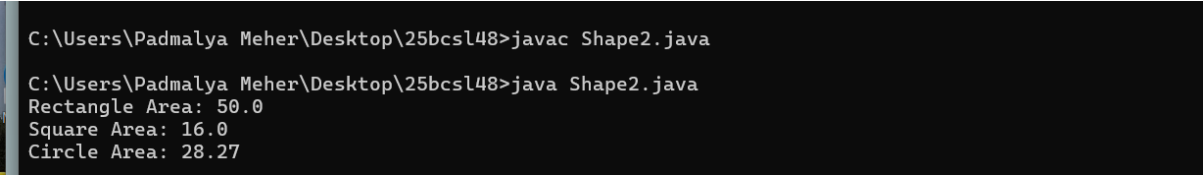
OUTPUT :


```
C:\Users\Padmalya Meher\Desktop\25bcsl48>javac Shape2.java

C:\Users\Padmalya Meher\Desktop\25bcsl48>java Shape2.java
Rectangle Area: 50.0
Square Area: 16.0
Circle Area: 28.27
```

4.Write a program to implement multiple inheritance using interface.

```java
interface A {

    void methodA();

}
interface B {

    void methodB();

}
class MyClass implements A, B {

    public void methodA() {

        System.out.println("Method A from Interface A");

    }
```
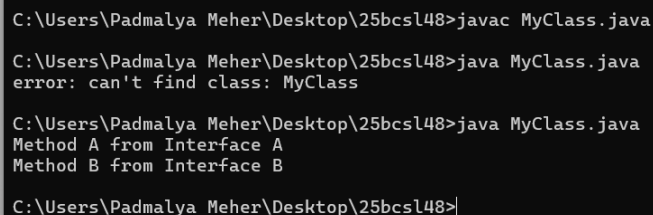
```java
    public void methodB() {

        System.out.println("Method B from Interface B");

    }

    public void main(String[] args)

    {

        MyClass obj = new MyClass();

        obj.methodA();

        obj.methodB();

    }

}
```

OUTPUT :

```
C:\Users\Padmalya Meher\Desktop\25bcsl48>javac MyClass.java

C:\Users\Padmalya Meher\Desktop\25bcsl48>java MyClass.java
error: can't find class: MyClass

C:\Users\Padmalya Meher\Desktop\25bcsl48>java MyClass.java
Method A from Interface A
Method B from Interface B

C:\Users\Padmalya Meher\Desktop\25bcsl48>
```

5.Create an interface Servicing that has abstract methods getServiceTime(). Create two class Car, Bike that implement interface. Create a driver class that creates the objects of two class and displays the service time.

```java
interface Servicing {

    String getServiceTime();

}class Car implements Servicing {

    public String getServiceTime() {

        return "Car service time is: 4 hours";

    }

}

class Bike implements Servicing {

    public String getServiceTime() {

    return "Bike service time is: 3 hours";

    }}

    public  void main(String[] args) {

        Servicing myCar = new Car();
```

```
        Servicing myBike = new Bike();

        System.out.println(myCar.getServiceTime());

        System.out.println(myBike.getServiceTime());

}
```

OUTPUT :

```
C:\Users\Padmalya Meher\Desktop\25bcsl48>javac Servicing.java

C:\Users\Padmalya Meher\Desktop\25bcsl48>java  Servicing.java
Car service time is: 4 hours
Bike service time is: 3 hours
```

6.Create a Package *btech* which has one class *Student*. Accept student detail through parameterized constructor of *Student* class. Write a method *display*()to display the student details. Create another class *Test* containing the main method which will use the package *btech* and calculate total marks and percentage of marks. One sample output is shown below.

```
D:\>javac -d . Student.java

D:\>javac StudentMain.java

D:\>java StudentMain
Enter Roll no:= 101
Enter Name:= Abhay
Enter 3 sub mark:= 87 56 91
Roll_no : 101
Name    : Abhay
-----MARKS-------
Sub 1   : 87
Sub 2   : 56
Sub 3   : 91
Total   : 234
percentage: 78
-----------------
```

```java
import java.util.Scanner;

class Student6 {

    private int rollNo;

    private String name;

    private int[] marks;

    public Student6(int rollNo, String name, int[] marks) {

        this.rollNo = rollNo;

        this.name = name;

        this.marks = marks;

    }

    public int getTotal() {

        int total = 0;

        for (int mark : marks) {

            total += mark;
```

```java
        }
        return total;
    }
    public double getPercentage() {
        return getTotal() / (double) marks.length;
    }
    public void display() {
        System.out.println("\n-----------------------------");
        System.out.println("Roll No    : " + rollNo);
        System.out.println("Name       : " + name);
        System.out.println("----------- MARKS -----------");
        for (int i = 0; i < marks.length; i++) {
            System.out.println("Subject " + (i + 1) + "  : " + marks[i]);
        }
        System.out.println("Total Marks : " + getTotal());
        System.out.printf("Percentage  : %.2f%%\n", getPercentage());
        System.out.println("-----------------------------");
    }}
    public void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        System.out.print("Enter Roll No: ");
        int rollNo = sc.nextInt();
        sc.nextLine();
        System.out.print("Enter Name: ");
        String name = sc.nextLine();
int[] marks = new int[3];
        System.out.print("Enter marks of 3 subjects (separated by space): ");
        for (int i = 0; i < 3; i++) {
            marks[i] = sc.nextInt();
        }
        Student6 student = new Student6(rollNo, name, marks);
        student.display();
```

```
            sc.close();

}
```

OUTPUT :

```
C:\Users\Padmalya Meher\Desktop\25bcsl48>javac Student6.java

C:\Users\Padmalya Meher\Desktop\25bcsl48>java Student6.java
Enter Roll No: 165
Enter Name: Rajbhi
Enter marks of 3 subjects (separated by space): 90 86 98

-----------------------------
Roll No    : 165
Name       : Rajbhi
----------- MARKS -----------
Subject 1  : 90
Subject 2  : 86
Subject 3  : 98
Total Marks : 274
Percentage  : 91.33%
-----------------------------
```

7.Create a sub-package called _arithmetic_ under the package _btech_. The _arithmetic_ package should contain a class _MyMath_ having methods to deal with different arithmetic operations (addition, subtraction, multiplication, division and mod). Create a class _Test_ containing the main method which will use the methods of sub-package _arithmetic_.

```java
import java.util.Scanner;

class MyMath {

  public int add(int a, int b) {

    return a + b;

  }

  public int subtract(int a, int b) {

    return a - b;

   public int multiply(int a, int b) {

    return a * b;

  }

  public double divide(int a, int b) {

    if (b == 0) {

      System.out.println("Error: Cannot divide by zero!");

      return 0;

    }

    return (double) a / b;

  }public int mod(int a, int b) {

    if (b == 0) {
```

```java
        System.out.println("Error: Cannot mod by zero!");

        return 0;

    }

    return a % b;

}}

public void main(String[] args) {

    Scanner sc = new Scanner(System.in);

    MyMath math = new MyMath();

    System.out.print("Enter first number: ");

    int a = sc.nextInt();

    System.out.print("Enter second number: ");

    int b = sc.nextInt();

    System.out.println("\n--- Arithmetic Operations ---");

    System.out.println("Addition      : " + math.add(a, b));

    System.out.println("Subtraction    : " + math.subtract(a, b));

    System.out.println("Multiplication  : " + math.multiply(a, b));

    System.out.println("Division      : " + math.divide(a, b));

    System.out.println("Modulo       : " + math.mod(a, b));

    sc.close();

}
}
```

OUTPUT :

```
C:\Users\Padmalya Meher\Desktop\25bcsl48>javac MyMath.java

C:\Users\Padmalya Meher\Desktop\25bcsl48>java MyMath.java
Enter first number: 245
Enter second number: 653

--- Arithmetic Operations ---
Addition      : 898
Subtraction    : -408
Multiplication  : 159985
Division      : 0.37519142419601836
Modulo       : 245
```

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