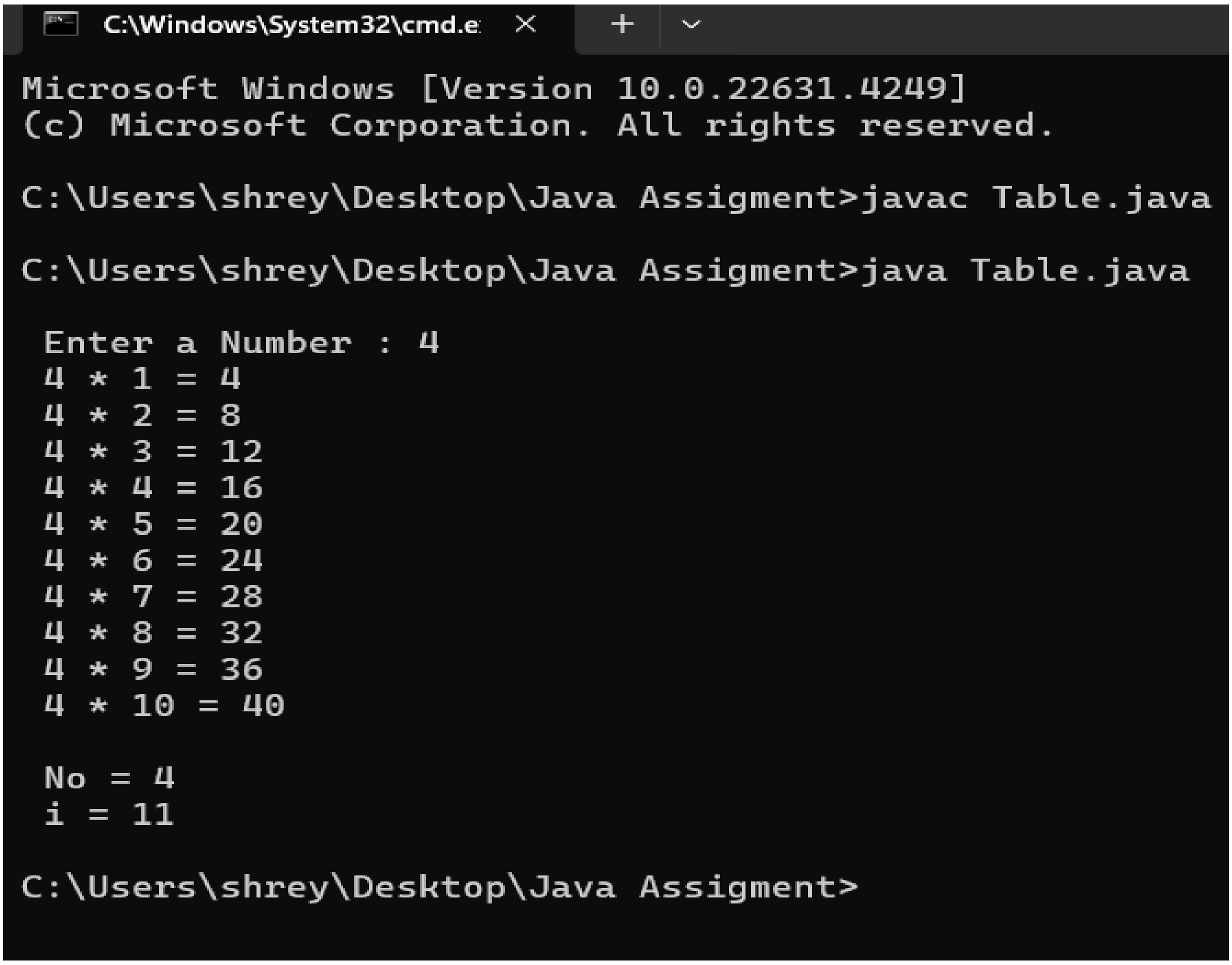
Experiment No:1

Q. Write a Program in Java to print table of given number.

```
import java.lang.*;
import java.util.*;

public class Table
{
        public static void main(String[] args)
        {
                int No = 0, i = 1;
                Scanner S = new Scanner(System.in);

                System.out.print("\n Enter a Number : ");
                No = S.nextInt();

                while( i <= 10 )
                {
                        System.out.println(" " + No + " * " + i + " = " + No * i);
                        i++;
                }

                System.out.println("\n No = " + No + "\n i = " + i);
        }
}
```

Output :



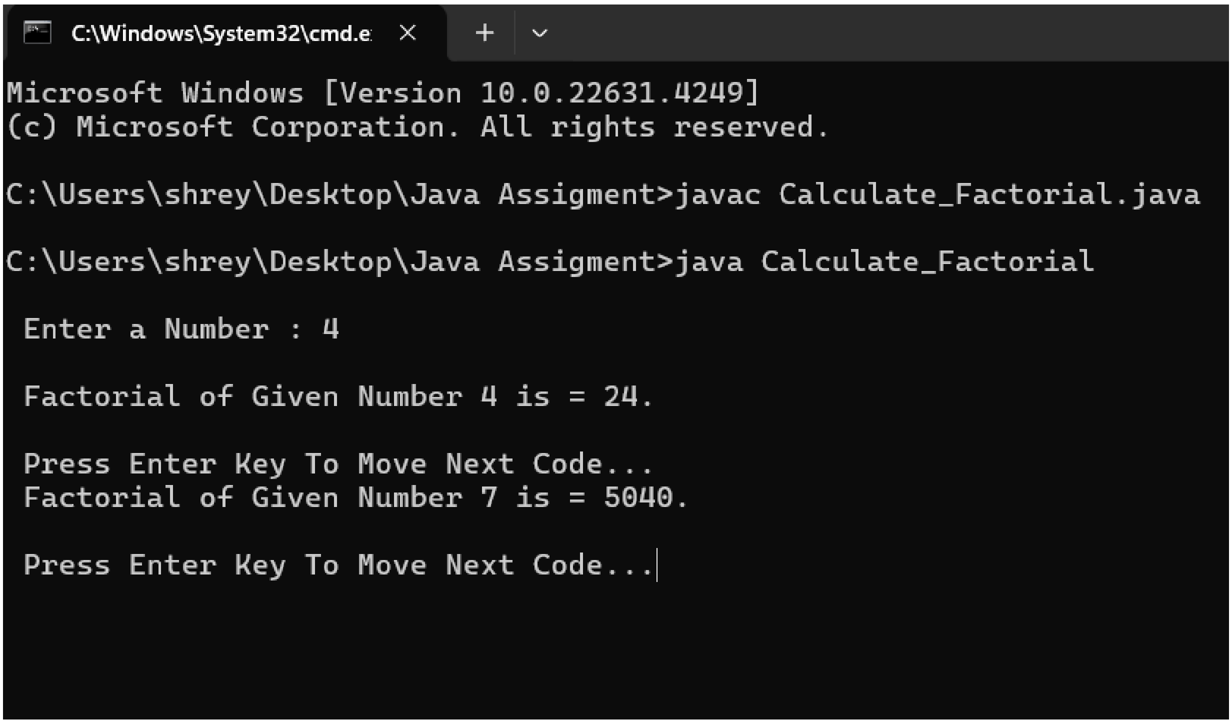
```
Microsoft Windows [Version 10.0.22631.4249]
(c) Microsoft Corporation. All rights reserved.

C:\Users\shrey\Desktop\Java Assigment>javac Table.java

C:\Users\shrey\Desktop\Java Assigment>java Table.java

 Enter a Number : 4
 4 * 1 = 4
 4 * 2 = 8
 4 * 3 = 12
 4 * 4 = 16
 4 * 5 = 20
 4 * 6 = 24
 4 * 7 = 28
 4 * 8 = 32
 4 * 9 = 36
 4 * 10 = 40

 No = 4
 i = 11

C:\Users\shrey\Desktop\Java Assigment>
```

Experiment No:2

Q. Write a Program in Java to print factorial of given number.

```
import java.lang.*;
import java.util.*;

class Factorial
{
                public int No;
                private int Fact;
                private Scanner scn = new Scanner(System.in);

                public Factorial()
                {
                        Fact = 1;

                        System.out.print("\n Enter a Number : ");
                        No = scn.nextInt();

                        Find_Factorial();
                }

                public Factorial(int Num)
                {
                        No = Num;
                        Fact = 1;

                        Find_Factorial();
                }

                private void Find_Factorial()
                {
                        int Temp = No;

                        while ( Temp > 0 )
                        {
                                Fact *= Temp;
                                Temp--;
                        }
                }

                public void Display_Factorial()
                {
                        System.out.println("\n Factorial of Given Number " + No + " is = " + Fact + ".");
                        System.out.print("\n Press Enter Key To Move Next Code...");
                        scn.nextLine();
                }

}

public class Calculate_Factorial
{
        public static void main(String[] args)
        {
                Factorial Obj1 = new Factorial();
                Obj1.Display_Factorial();

                Factorial Obj2 = new Factorial(7);
                Obj2.Display_Factorial();
        }
}
```

Output :



```
Microsoft Windows [Version 10.0.22631.4249]
(c) Microsoft Corporation. All rights reserved.

C:\Users\shrey\Desktop\Java Assigment>javac Calculate_Factorial.java

C:\Users\shrey\Desktop\Java Assigment>java Calculate_Factorial

 Enter a Number : 4

 Factorial of Given Number 4 is = 24.

 Press Enter Key To Move Next Code...
 Factorial of Given Number 7 is = 5040.

 Press Enter Key To Move Next Code...
```

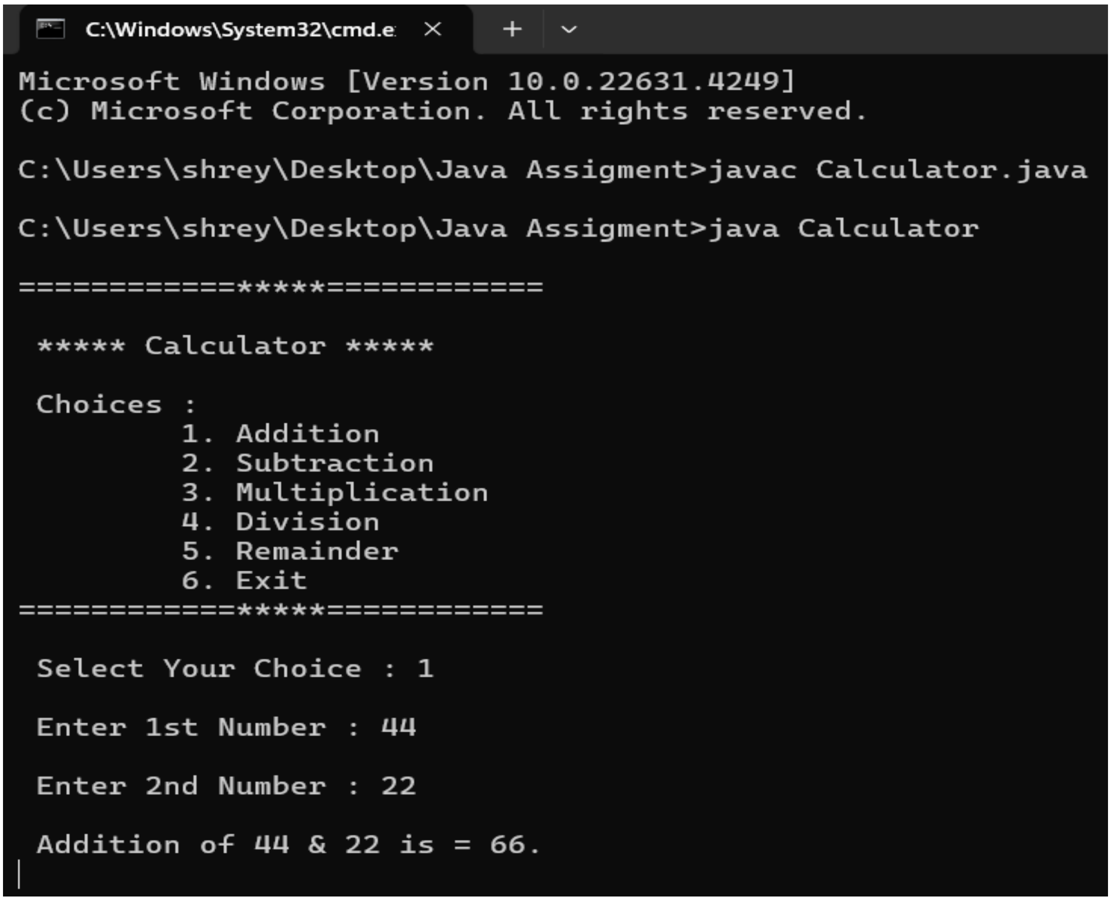
Experiment No:3

Q. Write a Program in Java to create console based calculator (Casestudy-1).

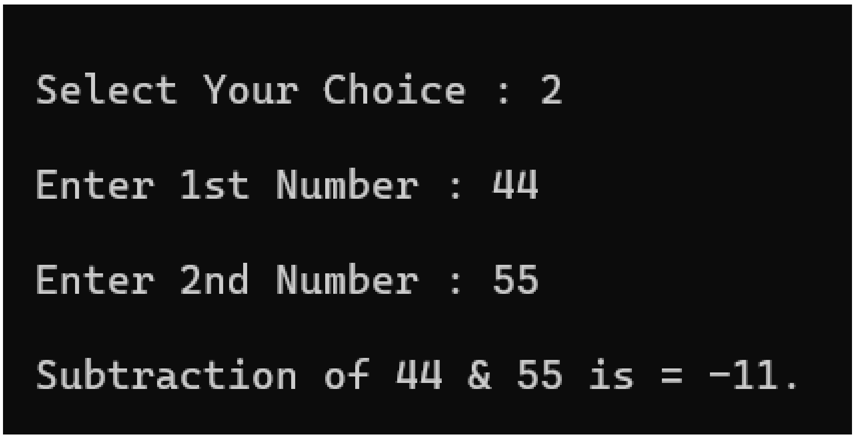
```
import java.lang.*;
import java.util.*;

public class Calculator
{
    public static void main(String[] args)
    {
        int N1 = 0, N2 = 0, Res = 0, Choice = 0;
        Scanner S = new Scanner(System.in);

        while(true)
        {
            System.out.print("\n============*****============\n");

            System.out.print("\n ***** Calculator ***** \n");
            System.out.print("\n Choices : ");
            System.out.print("\n\t 1. Addition");
            System.out.print("\n\t 2. Subtraction");
            System.out.print("\n\t 3. Multiplication");
            System.out.print("\n\t 4. Division");
            System.out.print("\n\t 5. Remainder");
            System.out.print("\n\t 6. Exit");

            System.out.print("\n============*****============\n");

            System.out.print("\n Select Your Choice : ");
            Choice = S.nextInt();

            if((Choice > 0) && (Choice < 6))
            {
                System.out.print("\n Enter 1st Number : ");
                N1 = S.nextInt();
                System.out.print("\n Enter 2nd Number : ");
                N2 = S.nextInt();
            }

            switch(Choice)
            {
                case 1:
                    /// Add
                    Res = N1 + N2;
                    System.out.println("\n Addition of " + N1 + " & " + N2 + " is = " + Res + ".");
                    S.next();
                    break;
                case 2:
                    /// Sub
                    Res = N1 - N2;
                    System.out.println("\n Subtraction of " + N1 + " & " + N2 + " is = " + Res + ".");
                    break;
                case 3:
                     /// Mult
                    Res = N1 * N2;
                    System.out.println("\n Multiplication of " + N1 + " & " + N2 + " is = " + Res + ".");
                    break;
                case 4:
```

```
                                        /// Div
                                        Res = N1 / N2;
                                        System.out.println("\n Division of " + N1 + " & " + N2 + " is = " + Res + ".");
                                        break;
                                case 5:
                                        // Rem
                                        Res = N1 % N2;
                                        System.out.println("\n Remainder of " + N1 + " & " + N2 + " is = " + Res + ".");
                                        break;
                                case 6:
                                        break;
                                default:
                                        /// Invalid
                                        System.out.println("\n Invalid Input!!!");
                        }

                        if(Choice == 6)
                        {
                                break;
                        }
                }
                System.out.print("\n Thanks For Using this Calculator Service...\n ");
        }
}
```

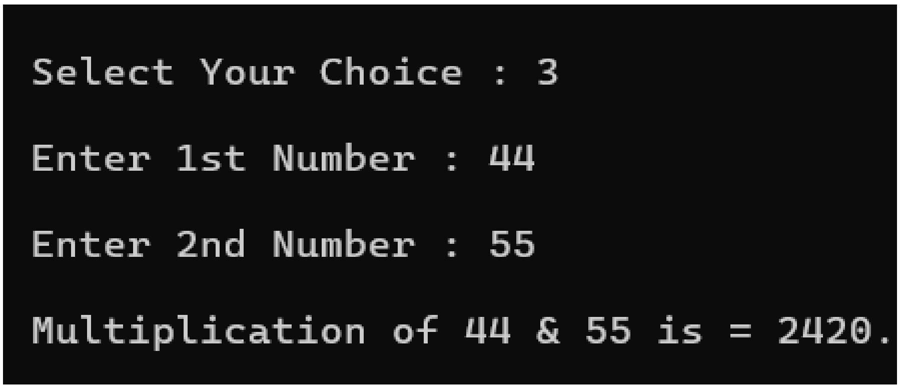
Output :



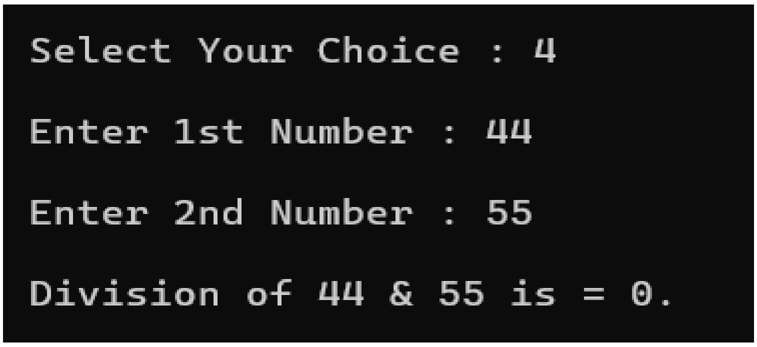
```
Microsoft Windows [Version 10.0.22631.4249]
(c) Microsoft Corporation. All rights reserved.

C:\Users\shrey\Desktop\Java Assigment>javac Calculator.java

C:\Users\shrey\Desktop\Java Assigment>java Calculator

==============*************=============

 ***** Calculator *****

 Choices :
         1. Addition
         2. Subtraction
         3. Multiplication
         4. Division
         5. Remainder
         6. Exit
==============*************=============

 Select Your Choice : 1

 Enter 1st Number : 44

 Enter 2nd Number : 22

 Addition of 44 & 22 is = 66.
```



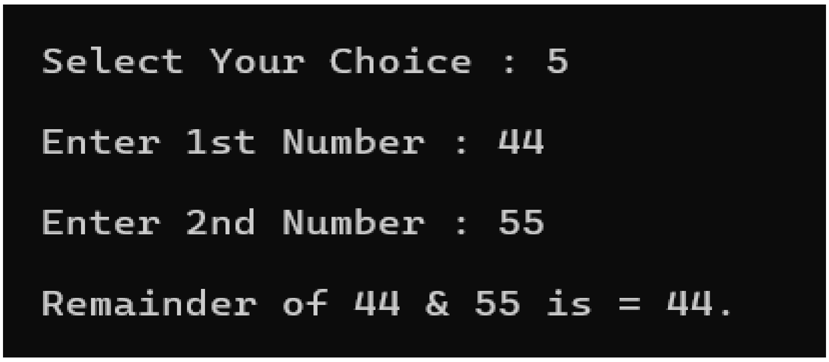
```
Select Your Choice : 2

Enter 1st Number : 44

Enter 2nd Number : 55

Subtraction of 44 & 55 is = -11.
```



```
Select Your Choice : 3

Enter 1st Number : 44

Enter 2nd Number : 55

Multiplication of 44 & 55 is = 2420.
```



```
Select Your Choice : 4

Enter 1st Number : 44

Enter 2nd Number : 55

Division of 44 & 55 is = 0.
```



```
Select Your Choice : 5

Enter 1st Number : 44

Enter 2nd Number : 55

Remainder of 44 & 55 is = 44.
```

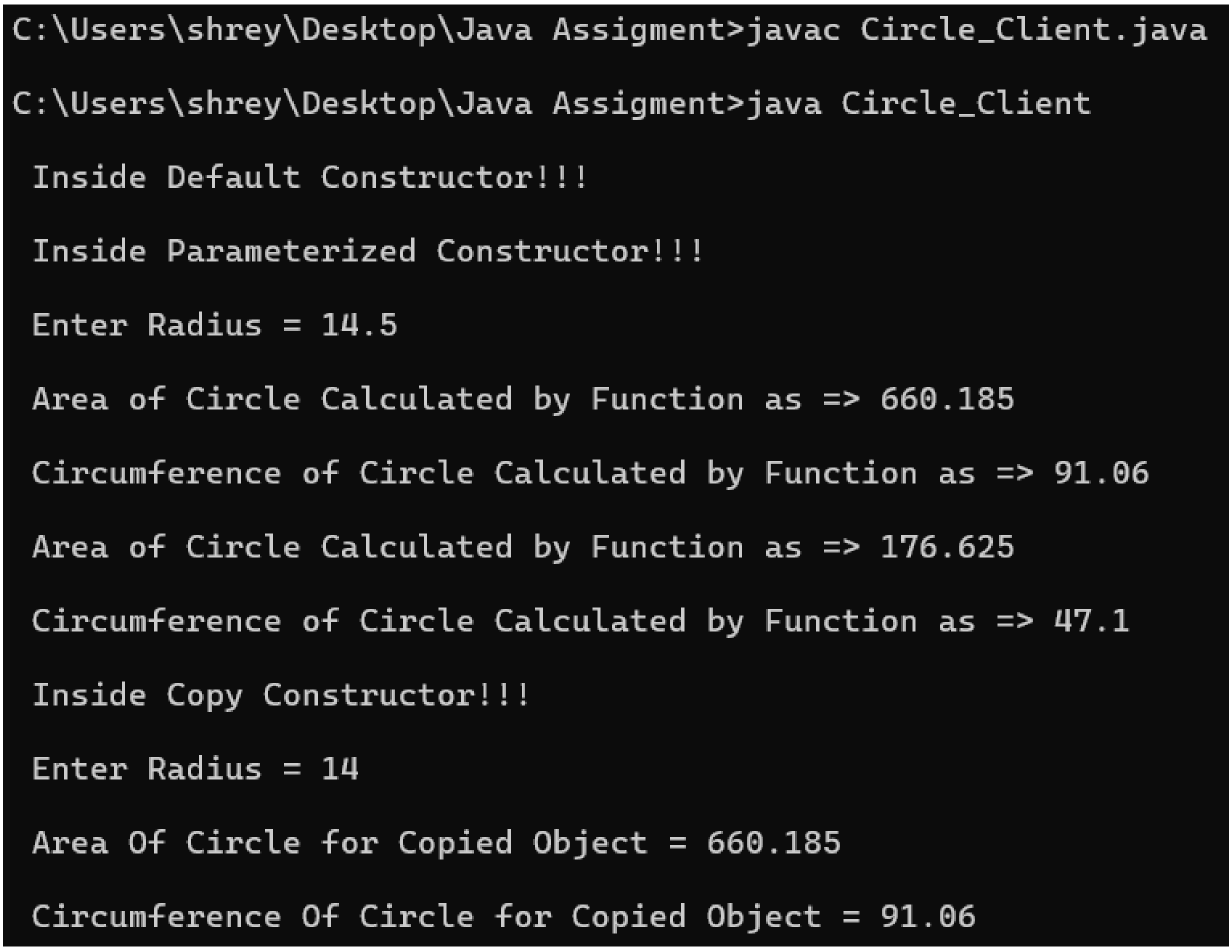
Experiment No:4

Q. Write a Program in Java to demonstrate all type of constructors.

```
import java.lang.*;
import java.util.*;

class Circle
{
	private float Rad;		// Private Characteristic or Data Member of Class Circle
	public float Area, Circum;	// Public Characteristics or Data Members of Class Circle

	// Default Constructor
	public Circle()
	{
		Rad = Area = Circum = 0.0f;
		 System.out.println("\n Inside Default Constructor!!!");
	}

	// Parameterized Constructor
	public Circle(float R)
	{
		Rad = R;
		Area = Circum = 0.0f;
		System.out.println("\n Inside Parameterized Constructor!!!");
	}

	// Copy Constructor
	public Circle(Circle Ref)
	{
		this.Rad = Ref.Rad;
		this.Area = Ref.Area;
		this.Circum = Ref.Circum;
		System.out.println("\n Inside Copy Constructor!!!");
	}

	// Accept Radius Member Function
	public void Accept_Radius()
	{
		Scanner scanner = new Scanner(System.in);
		System.out.print("\n Enter Radius = ");
		this.Rad = scanner.nextFloat();
	}

	// Calculate Area_Of_Circle Member Function
	public void Area_Of_Circle()
	{
		Area = (float) (3.14 * Rad * Rad);
		System.out.println("\n Area of Circle Calculated by Function as => " + Area);
	}

	// Calculate Circumference_Of_Circle Member Function
	public void Circumference_Of_Circle()
	{
		Circum = (float) (2 * 3.14 * Rad);
		System.out.println("\n Circumference of Circle Calculated by Function as => " + this.Circum);
	}
}
```

```
public class Circle_Client
{
        public static void main(String[] args)
        {
                Circle Obj1 = new Circle();
                Circle Obj2 = new Circle(7.5f);

                Obj1.Accept_Radius();
                Obj1.Area_Of_Circle();
                Obj1.Circumference_Of_Circle();

                Obj2.Area_Of_Circle();
                Obj2.Circumference_Of_Circle();

                Circle Obj3 = new Circle(Obj1);
                Obj3.Accept_Radius();

                System.out.println("\n Area Of Circle for Copied Object = " + Obj3.Area);
                System.out.println("\n Circumference Of Circle for Copied Object = " + Obj3.Circum);
        }
}
```

Output :



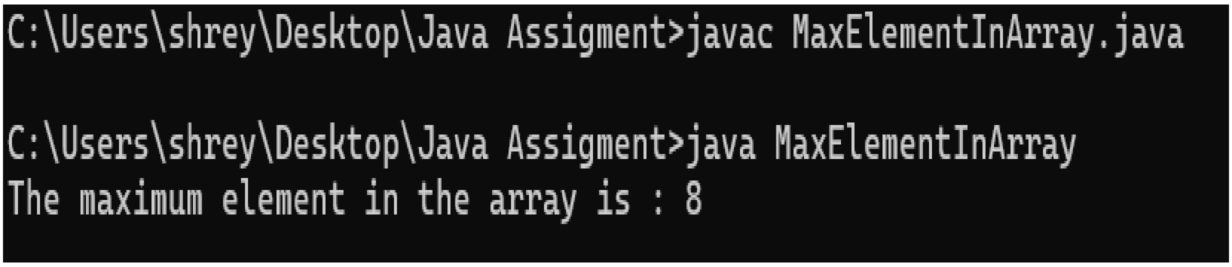
```
C:\Users\shrey\Desktop\Java Assigment>javac Circle_Client.java

C:\Users\shrey\Desktop\Java Assigment>java Circle_Client

 Inside Default Constructor!!!

 Inside Parameterized Constructor!!!

 Enter Radius = 14.5

 Area of Circle Calculated by Function as => 660.185

 Circumference of Circle Calculated by Function as => 91.06

 Area of Circle Calculated by Function as => 176.625

 Circumference of Circle Calculated by Function as => 47.1

 Inside Copy Constructor!!!

 Enter Radius = 14

 Area Of Circle for Copied Object = 660.185

 Circumference Of Circle for Copied Object = 91.06
```

Experiment No:5

Q. Write a Program in Java to find out maximum element from an array.

```
import java.lang.*;
import java.util.*;

public class MaxElementInArray
{
        public static void main(String[] args)
        {
                int[] Numbers = {3, 5, 7, 2, 8, -1, 4}; // Sample array
                int MaxEle = findMax(Numbers);

                System.out.println("The maximum element in the array is : " + MaxEle);
        }

        public static int findMax(int[] Num)
        {
                int Max = Num[0]; // Assume first element is the max

                 for (int i = 1; i < Num.length; i++)
                {
                        if (i == 0 || Num[i] > Max)
                        {
                                Max = Num[i];
                        }
                }

                return Max;
        }
}
```

Output :



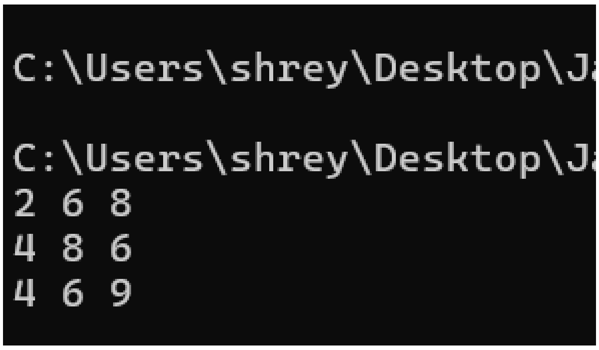
```
C:\Users\shrey\Desktop\Java Assigment>javac MaxElementInArray.java

C:\Users\shrey\Desktop\Java Assigment>java MaxElementInArray
The maximum element in the array is : 8
```

Experiment No:6

Q.Write a Program in java to Addition of Matrix

```
public class MatrixAddition
{
        public static void main(String args[])
        {
                int a[][]={{1,3,4},{2,4,3},{3,4,5}};
                int b[][]={{1,3,4},{2,4,3},{1,2,4}};

                 int c[][]=new int[3][3];  //3 rows and 3 columns
                for(int i=0;i<3;i++)
                {
                 for(int j=0;j<3;j++)
                {
                     c[i][j]=a[i][j]+b[i][j];    //use - for subtraction
                     System.out.print(c[i][j]+" ");
                 }
                System.out.println();//new line
                }
        }
 }
```

Output :



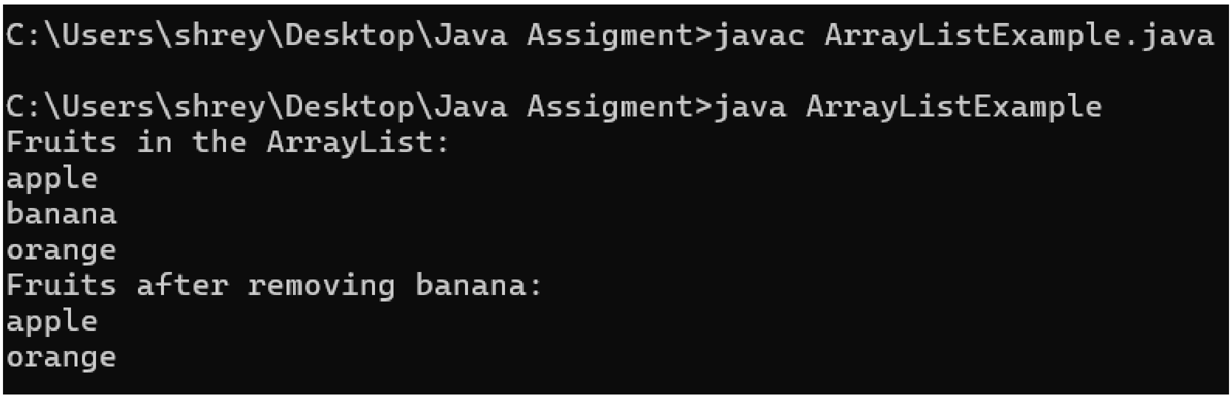
```
C:\Users\shrey\Desktop\J

C:\Users\shrey\Desktop\J
2 6 8
4 8 6
4 6 9
```

Experiment No:7

Q. Write a Program in Java to demonstrate arraylist .

```
import java.lang.*;
import java.util.*;

public class ArrayListExample
{

        public static void main(String[] args)
        {
                ArrayList<String> fruits = new ArrayList<>();

                fruits.add("apple");
                fruits.add("banana");
                fruits.add("orange");

                System.out.println("Fruits in the ArrayList:");

                for (String fruit : fruits)
                {
                        System.out.println(fruit);
                }

                fruits.remove("banana");

                System.out.println("Fruits after removing banana:");

                for (String fruit : fruits)
                {
                        System.out.println(fruit);
                }
        }
}
```

Output :



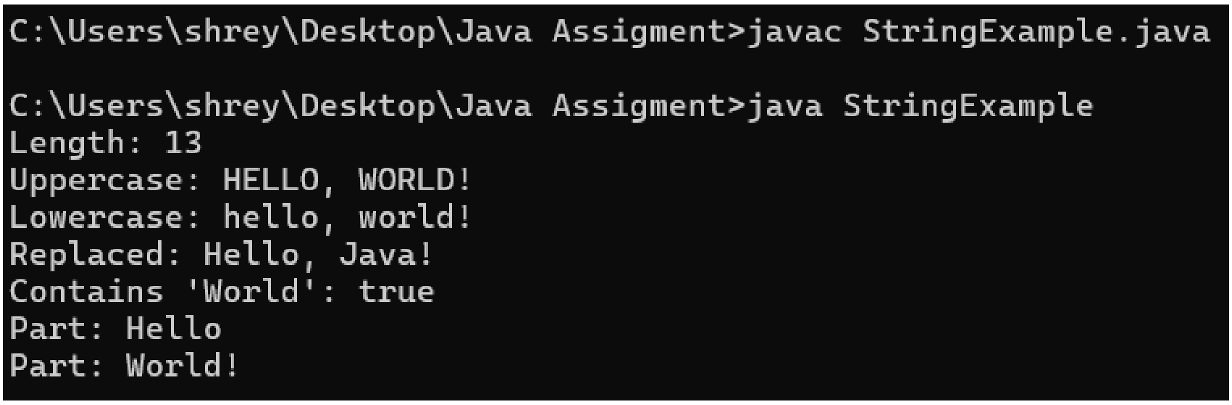
```
C:\Users\shrey\Desktop\Java Assigment>javac ArrayListExample.java

C:\Users\shrey\Desktop\Java Assigment>java ArrayListExample
Fruits in the ArrayList:
apple
banana
orange
Fruits after removing banana:
apple
orange
```

Experiment No:8

Q. Write a Program in Java for implementation of string functions .

```
import java.lang.*;
import java.util.*;

public class StringExample
{
        public static void main(String[] args)
        {
                String str = "Hello, World!";

                // Print length of string
                System.out.println("Length: " + str.length());

                // Convert to uppercase and lowercase
                System.out.println("Uppercase: " + str.toUpperCase());
                System.out.println("Lowercase: " + str.toLowerCase());

                // Replace substring
                String newStr = str.replace("World", "Java");
                System.out.println("Replaced: " + newStr);

                // Check if string contains a substring
                System.out.println("Contains 'World': " + str.contains("World"));

                // Split string
                String[] parts = str.split(", ");

                for (String part : parts)
                {
                        System.out.println("Part: " + part);
                }
        }
}
```

Output :



```
C:\Users\shrey\Desktop\Java Assigment>javac StringExample.java

C:\Users\shrey\Desktop\Java Assigment>java StringExample
Length: 13
Uppercase: HELLO, WORLD!
Lowercase: hello, world!
Replaced: Hello, Java!
Contains 'World': true
Part: Hello
Part: World!
```

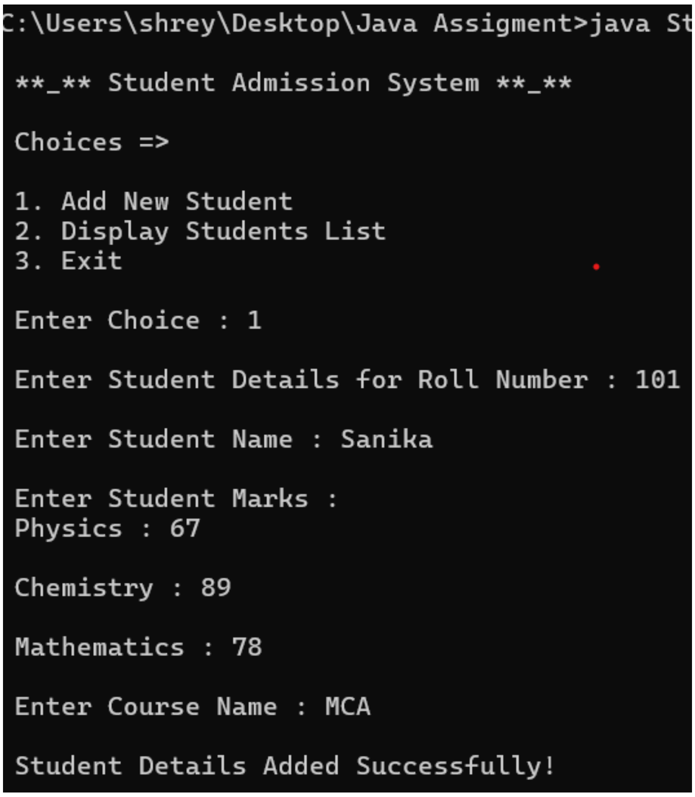
Experiment No:9

Q. Write a Program in Java to implement Student admission system with use of arraylist.(Casestudy-2)

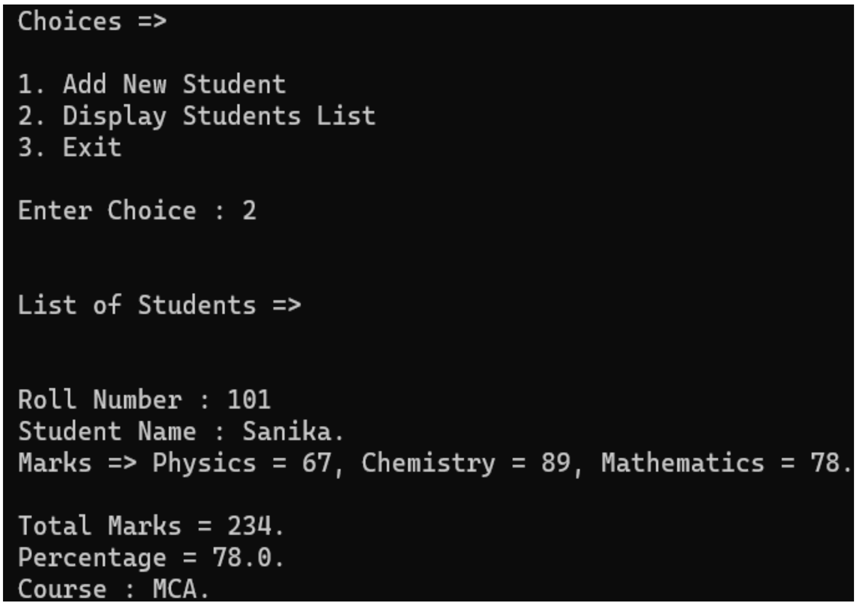
```
import java.lang.*;
import java.util.*;

class Student
{
        private int Roll_No;
        private String Name;
        private int Phy, Chem, Maths, Tot;
        private float Per;
        private String Course;


        public Student(int RNo, String Nm, int P, int C, int M, String Crs)
        {
                this.Roll_No = RNo;
                this.Name = Nm;
                this.Phy = P;
                this.Chem = C;
                this.Maths = M;
                this.Course = Crs;

                this.Calulate();
        }

        private void Calulate()
        {
                this.Tot = this.Phy + this.Chem + this.Maths;
                this.Per = ((float)this.Tot)/ 3;
        }

        @Override
        public String toString()
        {
                return "\n Roll Number : " + Roll_No + "\n Student Name : " + Name + ". \n Marks => Physics = " +
                Phy + ", Chemistry = " + Chem + ", Mathematics = " + Maths + ". \n\n Total Marks = " + Tot + ".\n
                Percentage = " + Per + ".\n Course : " + Course + ".\n====######====\n";
        }
}


public class StudentAdmissionSystem
{
        private static int RNo = 101;

        private ArrayList<Student> StudentsList;
        private Scanner scanner;

        public StudentAdmissionSystem()
        {
                StudentsList = new ArrayList<>();
                scanner = new Scanner(System.in);
         }
```

```
    public void AddNewStudent()
    {
        Scanner scn = new Scanner(System.in);

        System.out.print("\n Enter Student Details for Roll Number : " + RNo);
        System.out.print("\n\n Enter Student Name : ");
        String SName = scanner.nextLine();

        System.out.print("\n Enter Student Marks : ");
        System.out.print("\n Physics : ");
        int P = Integer.parseInt(scanner.nextLine());
        System.out.print("\n Chemistry : ");
        int C = Integer.parseInt(scanner.nextLine());
        System.out.print("\n Mathematics : ");
        int M = Integer.parseInt(scanner.nextLine());

        System.out.print("\n Enter Course Name : ");
        String CourseNm = scanner.nextLine();

        Student NewStud = new Student(RNo, SName, P, C, M, CourseNm);
        StudentsList.add(NewStud);
        System.out.println("\n Student Details Added Successfully!\n ------------------------------------ \n");
        RNo++;

        System.out.print("\n Press Enter Key To Go To Main Menu ...");
        scn.nextLine();
    }

    public void DisplayAllStudents()
    {
        Scanner scn = new Scanner(System.in);

        if (StudentsList.isEmpty())
        {
            System.out.println("\n No Student Added Yet.");
         }
        else
        {
            System.out.println("\n\n List of Students => \n");
            for (Student Std : StudentsList)
            {
                System.out.println(Std);
            }
        }
        System.out.print("\n Press Enter Key To Go To Main Menu ...");
        scn.nextLine();
}

    public void menu()
    {
        while (true)
        {
            System.out.println("\n **_** Student Admission System **_**\n");

            System.out.println(" Choices => \n");
            System.out.println(" 1. Add New Student");
            System.out.println(" 2. Display Students List");
            System.out.println(" 3. Exit");
            System.out.print("\n Enter Choice : ");
            int choice = Integer.parseInt(scanner.nextLine());
            switch (choice)
            {
                case 1:
                    AddNewStudent();
                    break;
                case 2:
                    DisplayAllStudents();
                    break;

                case 3:
                    System.out.println("\n Exiting the system.<*Thanks*>\n");
                    return;
                default:
                    System.out.println("\n Invalid option, please try again.\n");
            }
        }
    }

    public static void main(String[] args)
    {
        StudentAdmissionSystem system = new StudentAdmissionSystem();
        system.menu();
    }
}
```

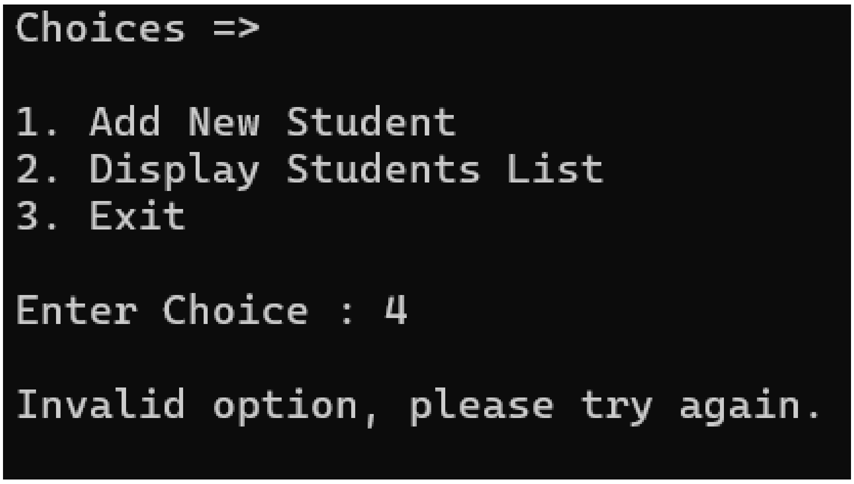
Output :



```
C:\Users\shrey\Desktop\Java Assigment>java St

**_** Student Admission System **_**

Choices =>

1. Add New Student
2. Display Students List
3. Exit

Enter Choice : 1

Enter Student Details for Roll Number : 101

Enter Student Name : Sanika

Enter Student Marks :
Physics : 67

Chemistry : 89

Mathematics : 78

Enter Course Name : MCA

Student Details Added Successfully!
```



```
Choices =>

1. Add New Student
2. Display Students List
3. Exit

Enter Choice : 2


List of Students =>


Roll Number : 101
Student Name : Sanika.
Marks => Physics = 67, Chemistry = 89, Mathematics = 78.

Total Marks = 234.
Percentage = 78.0.
Course : MCA.
```



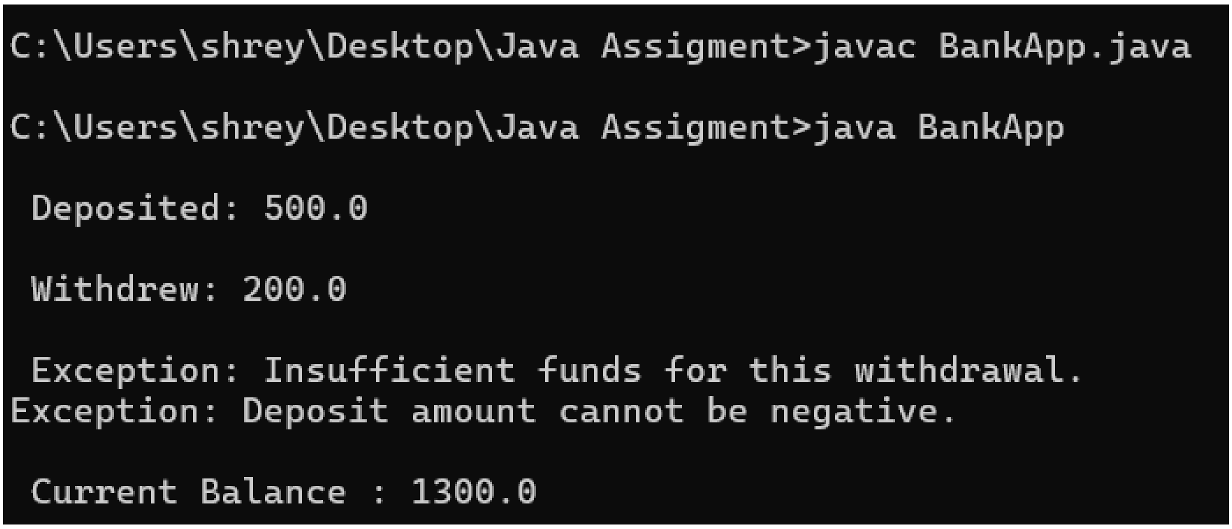
```
Choices =>

1. Add New Student
2. Display Students List
3. Exit

Enter Choice : 4

Invalid option, please try again.
```

Experiment No:10

Q. Write a Program in Java to demonstrate use of exception handeling.

```
import java.lang.*;
import java.util.*;

// Custom Exception for Insufficient Funds
class InsufficientFundsException extends Exception
{
   public InsufficientFundsException(String message)
   {
      super(message);
   }
}

// Custom Exception for Negative Amount
class NegativeAmountException extends Exception
{
   public NegativeAmountException(String message)
   {
      super(message);
   }
}

// Bank Account class
class BankAccount
{
   private double balance;

   public BankAccount(double initialBalance)
   {
      if (initialBalance < 0)
      {
         throw new IllegalArgumentException("Initial balance cannot be negative.");
      }
      this.balance = initialBalance;
   }

   public void deposit(double amount) throws NegativeAmountException
   {
      if (amount < 0)
      {
         throw new NegativeAmountException("Deposit amount cannot be negative.");
      }
      balance += amount;
      System.out.println("\n Deposited: " + amount);

   }
public void withdraw(double amount) throws InsufficientFundsException,
NegativeAmountException
    {
        if (amount < 0)
        {
            throw new NegativeAmountException("Withdrawal amount cannot be
            negative.");
        }
        if (amount > balance)
        {
            throw new InsufficientFundsException("Insufficient funds for this
            withdrawal.");
        }
        balance -= amount;
        System.out.println("\n Withdrew: " + amount);
    }

     public double getBalance()
    {
        return balance;
    }
 }

 // Main class
 public class BankApp
 {
    public static void main(String[] args)
    {
        BankAccount account = new BankAccount(1000);

         try
        {
            account.deposit(500);
            account.withdraw(200);
            account.withdraw(1500); // This will cause InsufficientFundsException
        }
        catch (InsufficientFundsException | NegativeAmountException e)
        {
            System.out.println("\n Exception: " + e.getMessage());
        }

        try
        {
            account.deposit(-100); // This will cause NegativeAmountException
        }
        catch (NegativeAmountException e)
        {
            System.out.println("Exception: " + e.getMessage());
        }

        System.out.println("\n Current Balance : " + account.getBalance());
    }
 }
```

Output :



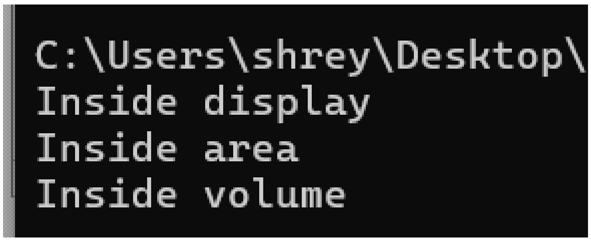
```
C:\Users\shrey\Desktop\Java Assigment>javac BankApp.java

C:\Users\shrey\Desktop\Java Assigment>java BankApp

 Deposited: 500.0

 Withdrew: 200.0

 Exception: Insufficient funds for this withdrawal.
Exception: Deposit amount cannot be negative.

 Current Balance : 1300.0
```

Experiment No:11

Q.Write a program in java to demonstrate Multilevel Inheritance.

```
class Shape
{
   public void display()
   {
      System.out.println("Inside display");
   }
}
class Rectangle extends Shape
{
   public void area()
   {
      System.out.println("Inside area");
   }
}
class Cube extends Rectangle
{
                  public void volume()
   {
      System.out.println("Inside volume");
   }
}
public class Multilevel
{
   public static void main(String[] arguments)
   {
      Cube cube = new Cube();
      cube.display();
      cube.area();
      cube.volume();
   }
}
```

Output :



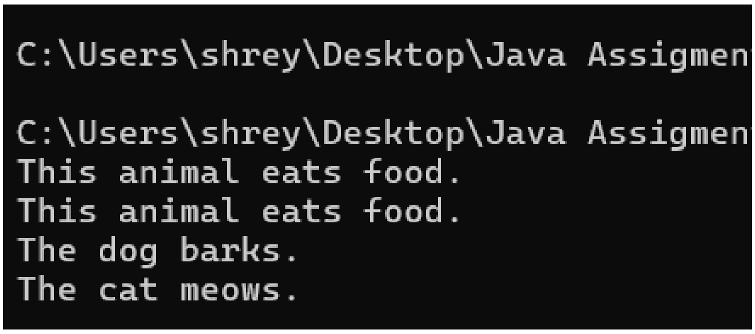
```
C:\Users\shrey\Desktop\
Inside display
Inside area
Inside volume
```

Experiment No:12

Q. Write a Program in Java to demonstrate Hierarchical Inheritance.

```
import java.lang.*;
import java.util.*;

// Superclass
class Animal
{
        void eat()
        {
                System.out.println("This animal eats food.");
        }
}

// Subclass 1
class Dog extends Animal
{
        void bark()
        {
                System.out.println("The dog barks.");
        }
}

// Subclass 2
class Cat extends Animal
{
        void meow()
        {
                System.out.println("The cat meows.");
        }
}

public class Animals_Test
{
        public static void main(String[] args)
        {
                Dog dog = new Dog();
                Cat cat = new Cat();

                // Calling methods from the superclass
                dog.eat();                    // Output: This animal eats food.
                cat.eat();                    // Output: This animal eats food.

                // Calling methods from the subclasses
                dog.bark();                   // Output: The dog barks.
                cat.meow();                   // Output: The cat meows.
        }
}
```

Output :



```
C:\Users\shrey\Desktop\Java Assigmen

C:\Users\shrey\Desktop\Java Assigmen
This animal eats food.
This animal eats food.
The dog barks.
The cat meows.
```

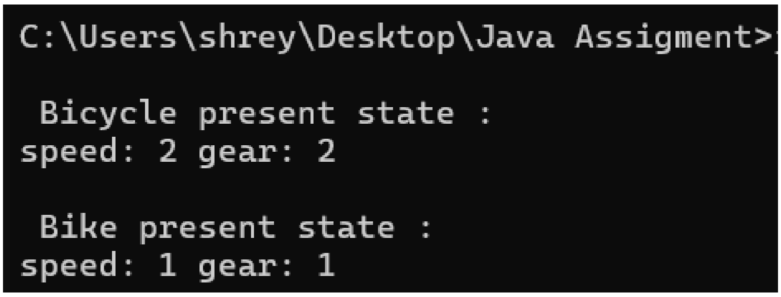
Experiment No:13

Q. Write a Program in Java to demonstrate use of interface.

```
import java.lang.*;
import java.util.*;
import java.io.*;


interface Vehicle
{
                // All Abstract Methods.
                void changeGear(int a);
                void speedUp(int a);
                void applyBrakes(int a);
}


class Bicycle implements Vehicle
{
                int speed;
                int gear;


                // to change gear
                @Override
                public void changeGear(int newGear)
                {
                                gear = newGear;
                }


                // to increase speed
                @Override
                public void speedUp(int increment)
                {
                                speed = speed + increment;
                }


                // to decrease speed
                @Override
                public void applyBrakes(int decrement)
                {
                                speed = speed - decrement;
                }

                public void printStates()
                {
                                System.out.println("speed: " + speed + " gear: " + gear);
                }
}
```

```
class Bike implements Vehicle
{
        int speed;
        int gear;

        // to change gear
        @Override
        public void changeGear(int newGear)
        {
                gear = newGear;
        }

        // to increase speed
        @Override
        public void speedUp(int increment)
        {
                speed = speed + increment;
        }

        // to decrease speed
        @Override
        public void applyBrakes(int decrement)
        {
                speed = speed - decrement;
        }

        public void printStates()
        {
                System.out.println("speed: " + speed + " gear: " + gear);
        }
}


class Interface_Client
{
        public static void main (String[] args)
        {
                // Creating an Object of Bicycle
                Bicycle bicycle = new Bicycle();
                bicycle.changeGear(2);
                bicycle.speedUp(3);
                bicycle.applyBrakes(1);

                System.out.println("\n Bicycle present state : ");
                bicycle.printStates();

                // Creating Object of the bike.
                Bike bike = new Bike();
                bike.changeGear(1);
                bike.speedUp(4);
                bike.applyBrakes(3);

                System.out.println("\n Bike present state : ");
                bike.printStates();
        }
}
```

Output :



```
C:\Users\shrey\Desktop\Java Assigment>

 Bicycle present state :
speed: 2 gear: 2

 Bike present state :
speed: 1 gear: 1
```

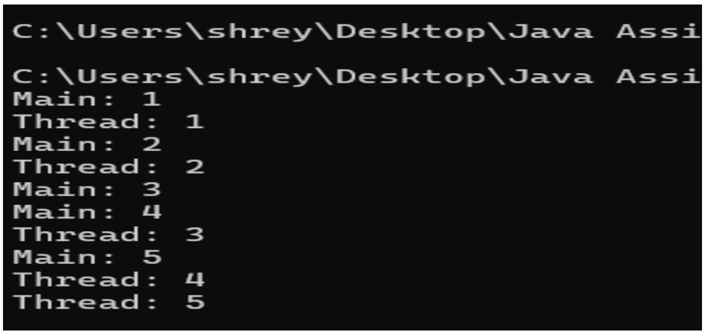
Experiment No:14

Q. Write a Program in Java to Designing and using Thread class.

A. Using the Thread Class

```
// Custom Thread class
class MyThread extends Thread
{
   @Override
   public void run()
   {
      for (int i = 1; i <= 5; i++)
     {
         System.out.println("Thread: " + i);
         try
         {
               Thread.sleep(500); // Sleep for 500 milliseconds
         }
         catch (InterruptedException e)
         {
              System.out.println("Thread interrupted: " + e.getMessage());
         }
      }
   }
}


// Main class
public class ThreadExample
{
   public static void main(String[] args)
   {
      MyThread thread = new MyThread(); // Create a new thread
      thread.start(); // Start the thread

      // Main thread printing numbers
      for (int i = 1; i <= 5; i++)
      {
         System.out.println("Main: " + i);
         try
         {
               Thread.sleep(300); // Sleep for 300 milliseconds
         }
         catch (InterruptedException e)
         {
              System.out.println("Main thread interrupted: " + e.getMessage());
         }
  }
}
```

Output :



```
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C:\Users\shrey\Desktop\Java Assi
Main:  1
Thread:  1
Main:  2
Thread:  2
Main:  3
Main:  4
Thread:  3
Main:  5
Thread:  4
Thread:  5
```

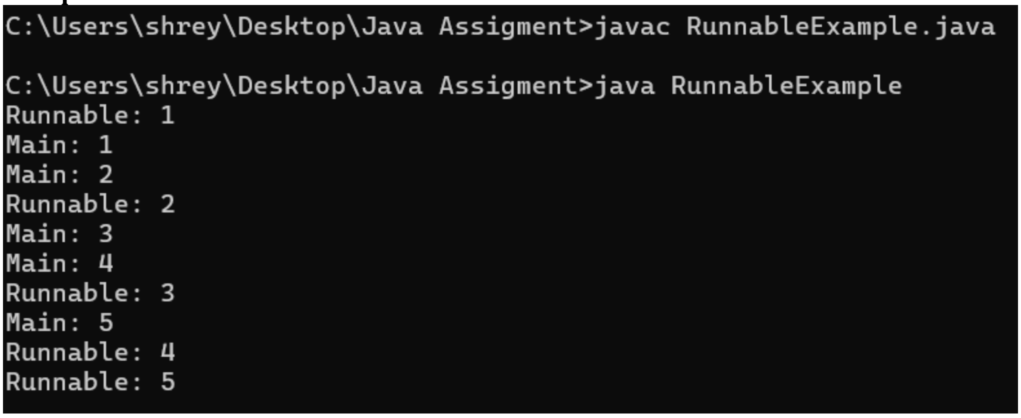
B. Using the Runnable Interface

```
// Custom Runnable class
class MyRunnable implements Runnable
{
   @Override
   public void run()
   {
      for (int i = 1; i <= 5; i++)
      {
              System.out.println("Runnable: " + i);
              try
              {
                            Thread.sleep(500); // Sleep for 500 milliseconds
               }
              catch (InterruptedException e)
              {
                            System.out.println("Runnable interrupted: " + e.getMessage());
              }
      }
   }
}

// Main class
public class RunnableExample
{
   public static void main(String[] args)
   {
              MyRunnable myRunnable = new MyRunnable(); // Create a new Runnable
              Thread thread = new Thread(myRunnable); // Create a thread using Runnable
              thread.start(); // Start the thread

              // Main thread printing numbers
              for (int i = 1; i <= 5; i++)
              {
                            System.out.println("Main: " + i);
                            try
                            {
                            Thread.sleep(300); // Sleep for 300 milliseconds
                            }
                            catch (InterruptedException e)
                            {
                            System.out.println("Main thread interrupted: " + e.getMessage());
                            }
              }
    }
}
```

Output :



```
C:\Users\shrey\Desktop\Java Assigment>javac RunnableExample.java

C:\Users\shrey\Desktop\Java Assigment>java RunnableExample
Runnable: 1
Main: 1
Main: 2
Runnable: 2
Main: 3
Main: 4
Runnable: 3
Main: 5
Runnable: 4
Runnable: 5
```

Experiment No:15

Q. Write a Program in Java to Using readers and writers to write data into Files.

A. Writing Data to a File

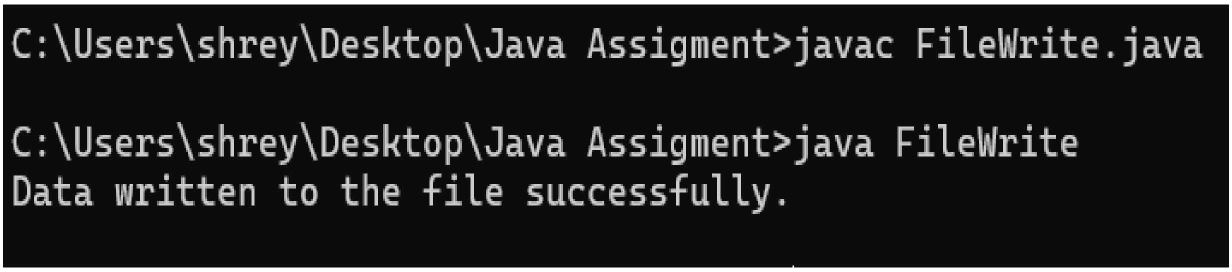
```
import java.io.BufferedWriter;
import java.io.FileWriter;
import java.io.IOException;

public class FileWrite
{
        public static void main(String[] args)
        {
                String filename = "example.txt";

                // Data to be written to the file
                String[] data = {
                                        "Hello, World!",
                                        "Welcome to Java File I/O.",
                                        "This is a simple example.",
                                        "Goodbye!"
                                };

                try (BufferedWriter writer = new BufferedWriter(new FileWriter(filename)))
                {
                        for (String line : data)
                        {
                        writer.write(line);
                        writer.newLine(); // Write a new line after each entry
                        }
                        System.out.println("Data written to the file successfully.");
                 }
                catch (IOException e)
                {
                        System.out.println("An error occurred while writing to the file: " + e.getMessage());
                }
        }
}
```

Output :



```
C:\Users\shrey\Desktop\Java Assigment>javac FileWrite.java

C:\Users\shrey\Desktop\Java Assigment>java FileWrite
Data written to the file successfully.
```

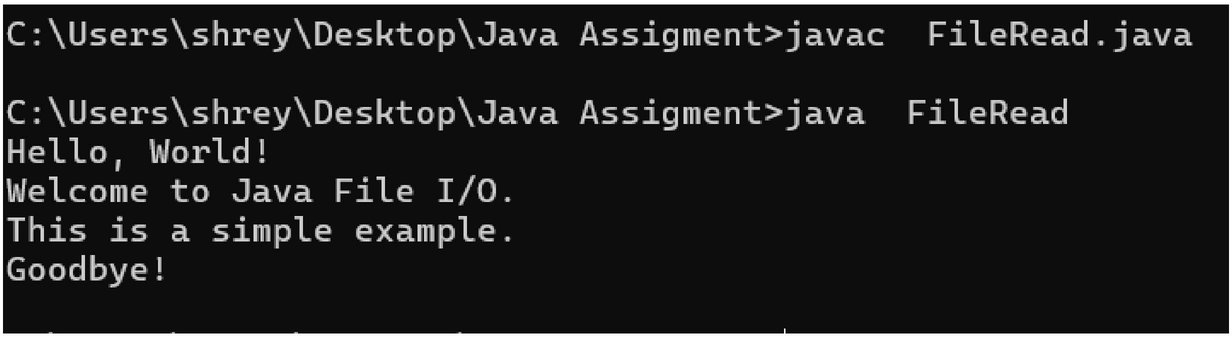
B. Reading Data from a File

```
import java.io.BufferedReader;
import java.io.FileReader;
import java.io.IOException;

public class FileRead
{
        public static void main(String[] args)
        {
                String filename = "example.txt";

                try (BufferedReader reader = new BufferedReader(new FileReader(filename)))
                {
                        String line;
                        while ((line = reader.readLine()) != null)
                        {
                        System.out.println(line); // Print each line read from the file
                        }
                }
                catch (IOException e)
                {
                        System.out.println("An error occurred while reading the file: " + e.getMessage());
                }
        }
}
```

Output :



```
C:\Users\shrey\Desktop\Java Assigment>javac  FileRead.java

C:\Users\shrey\Desktop\Java Assigment>java  FileRead
Hello, World!
Welcome to Java File I/O.
This is a simple example.
Goodbye!
```