

Experiment No: 1

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

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

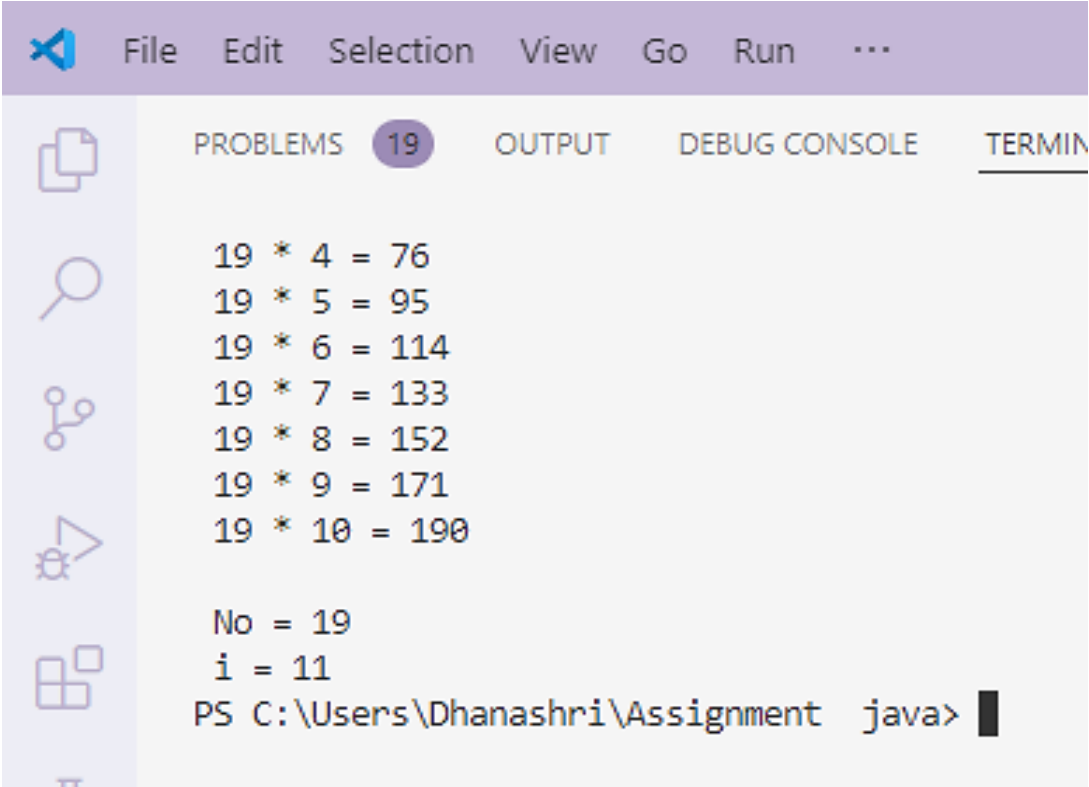
public class Table
{
    public static void main(String[] args)
    {
        int No = 0, i = 1;
        Scanner S = new Scanner(System.in);

        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:



```
File Edit Selection View Go Run ...

PROBLEMS 19 OUTPUT DEBUG CONSOLE TERMINAL

19 * 4 = 76
19 * 5 = 95
19 * 6 = 114
19 * 7 = 133
19 * 8 = 152
19 * 9 = 171
19 * 10 = 190

No = 19
i = 11
PS C:\Users\Dhanashri\Assignment java>
```

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;

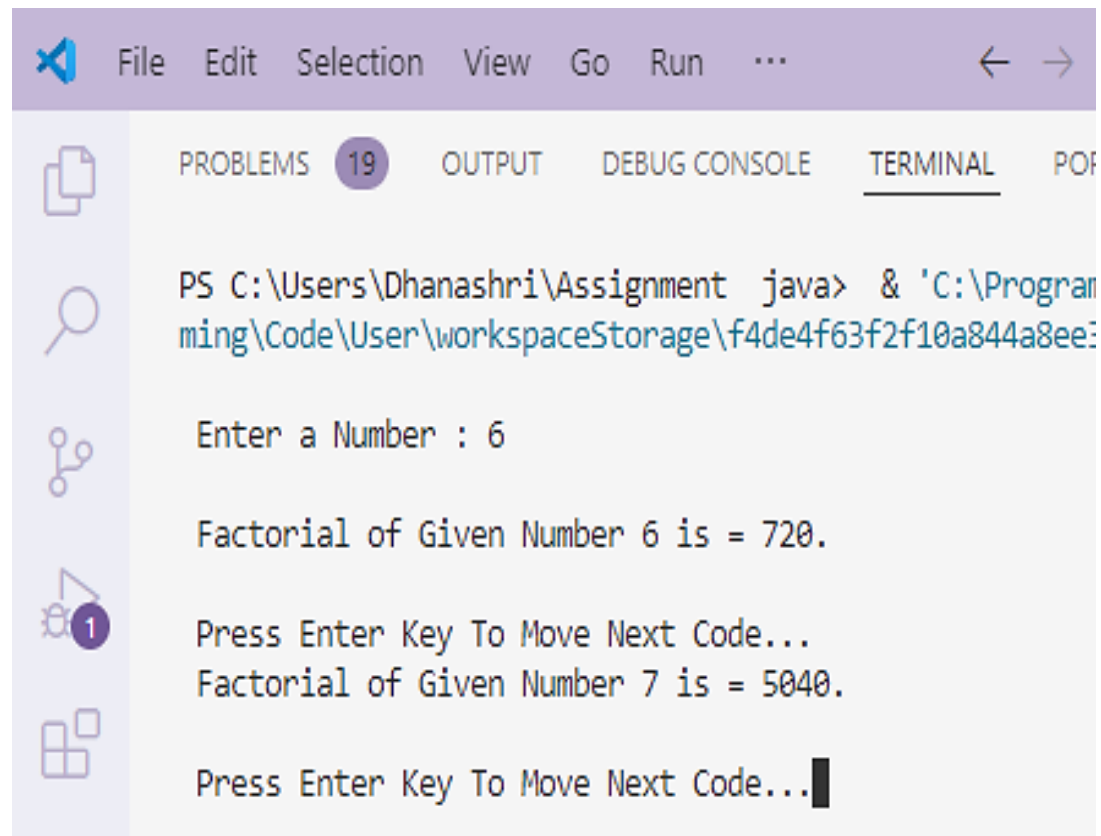
        while ( Temp > 0 )
        {
            Fact *= Temp;
            Temp--;
        }
    }

    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:



The screenshot shows the Visual Studio Code interface with the 'TERMINAL' tab selected. The terminal window displays the output of a Java program. The prompt is 'PS C:\Users\Dhanashri\Assignment java> & 'C:\Programing\Code\User\workspaceStorage\f4de4f63f2f10a844a8ee3'. The program prompts the user to 'Enter a Number : 6'. The output shows 'Factorial of Given Number 6 is = 720.'. The program then prompts the user to 'Press Enter Key To Move Next Code...'. The output shows 'Factorial of Given Number 7 is = 5040.'. The program then prompts the user to 'Press Enter Key To Move Next Code...'. The terminal window has a menu bar with 'File', 'Edit', 'Selection', 'View', 'Go', 'Run', and '...'. The left sidebar has icons for 'PROBLEMS', 'OUTPUT', 'DEBUG CONSOLE', 'TERMINAL', and 'PORTS'. The 'TERMINAL' tab is selected and has a '1' icon next to it.

```
PS C:\Users\Dhanashri\Assignment java> & 'C:\Programing\Code\User\workspaceStorage\f4de4f63f2f10a844a8ee3'  
  
Enter a Number : 6  
  
Factorial of Given Number 6 is = 720.  
  
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!!!");

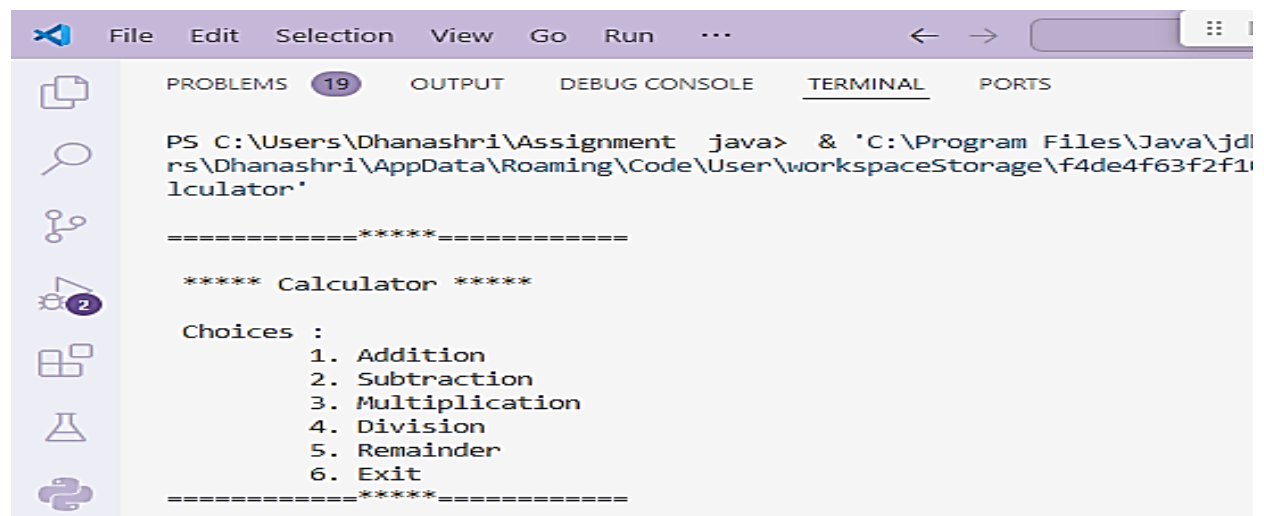
    }

    if(Choice == 6)
    {
        break;
    }

    System.out.print("\n Thanks For Using this Calculator Service...\n");
}
}

```

OUTPUT:



```

PS C:\Users\Dhanashri\Assignment java> & 'C:\Program Files\Java\jdk-11.0.10\bin\java.exe' -cp 'C:\Program Files\Java\jdk-11.0.10\bin\java.exe' 'C:\Users\Dhanashri\AppData\Roaming\Code\User\workspaceStorage\f4de4f63f2f1\workspace\Calculator'

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

***** Calculator *****

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

```

```

Select Your Choice : 1

Enter 1st Number : 38

Enter 2nd Number : 87

Addition of 38 & 87 is = 125.

1

```

```

Select Your Choice : 2

Enter 1st Number : 67

Enter 2nd Number : 4

Subtraction of 67 & 4 is = 63.

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

```

Select Your Choice : 3

Enter 1st Number : 40

Enter 2nd Number : 9

Multiplication of 40 & 9 is = 360.

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

Select Your Choice : 4

Enter 1st Number : 25

Enter 2nd Number : 6

Division of 25 & 6 is = 4.

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

Select Your Choice : 5

Enter 1st Number : 60

Enter 2nd Number : 6

Remainder of 60 & 6 is = 0.

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

Select Your Choice : 8

Invalid Input!!!

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

Select Your Choice : 6

Thanks For Using this Calculator Service...

PS C:\Users\Dhanashri\Assignment java> █

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();

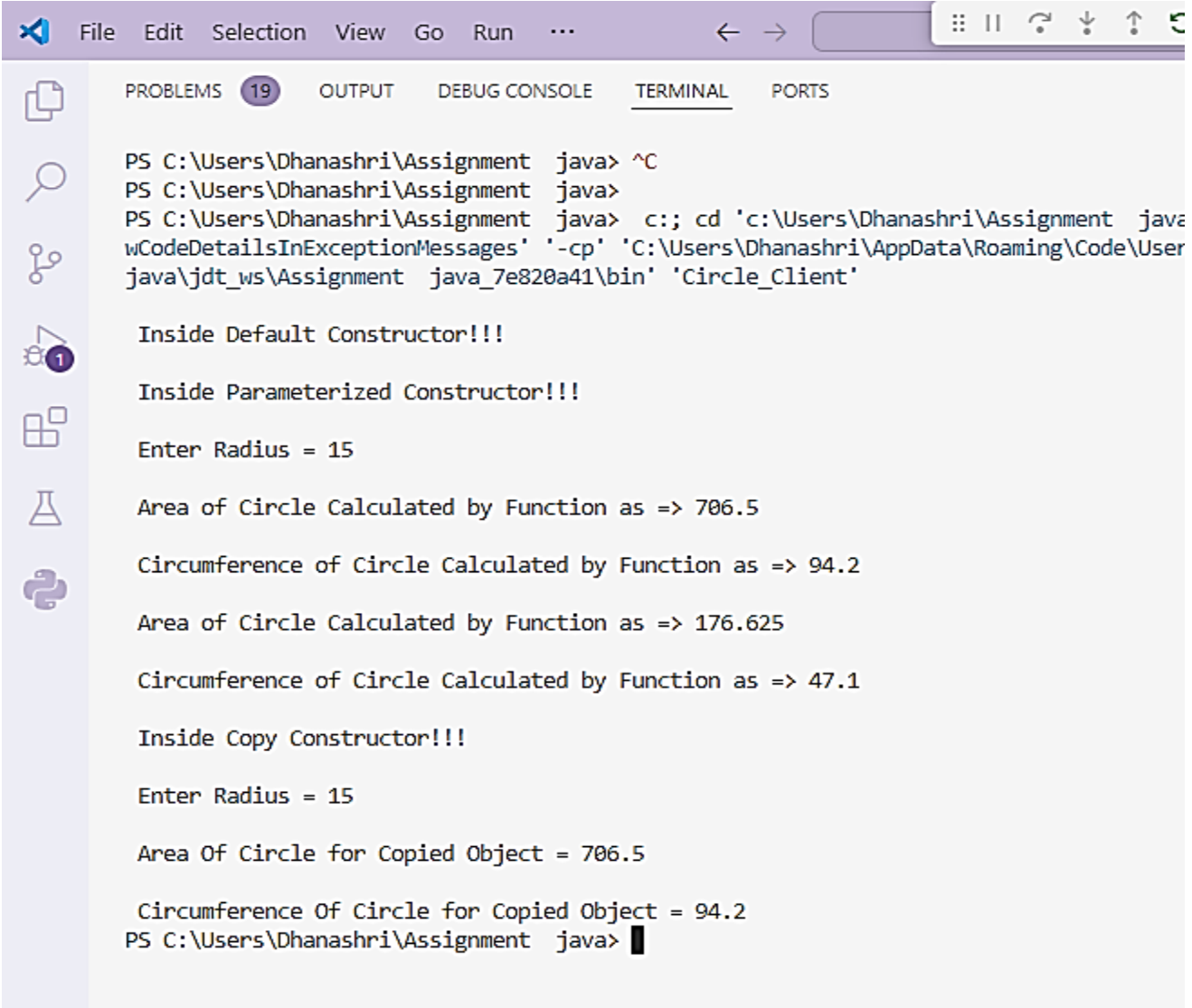
        Obj2.Area_Of_Circle();
        Obj2.Circumference_Of_Circle();

        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:



```

PS C:\Users\Dhanashri\Assignment java> ^C
PS C:\Users\Dhanashri\Assignment java>
PS C:\Users\Dhanashri\Assignment java> c.: cd 'c:\Users\Dhanashri\Assignment java
wCodeDetailsInExceptionMessages' '-cp' 'C:\Users\Dhanashri\AppData\Roaming\Code\User
java\jdt_ws\Assignment java_7e820a41\bin' 'Circle_Client'

Inside Default Constructor!!!

Inside Parameterized Constructor!!!

Enter Radius = 15

Area of Circle Calculated by Function as => 706.5

Circumference of Circle Calculated by Function as => 94.2

Area of Circle Calculated by Function as => 176.625

Circumference of Circle Calculated by Function as => 47.1

Inside Copy Constructor!!!

Enter Radius = 15

Area Of Circle for Copied Object = 706.5

Circumference Of Circle for Copied Object = 94.2
PS C:\Users\Dhanashri\Assignment java> █

```


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);

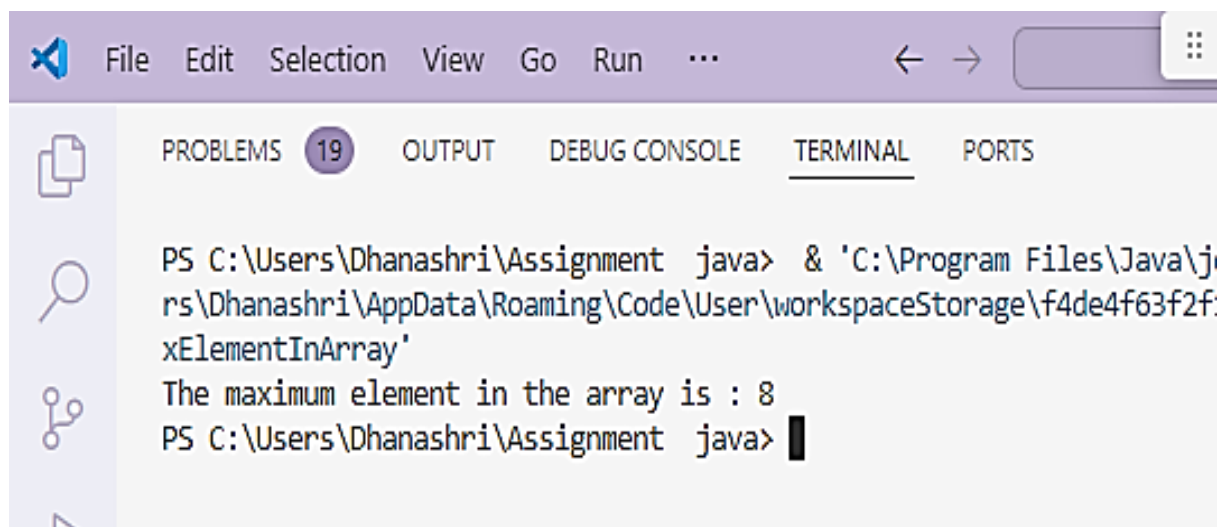
        System.out.println("The maximum element in the array is : " + MaxEle);
    }

    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:

The screenshot shows a Java IDE interface with a menu bar (File, Edit, Selection, View, Go, Run, ...) and a toolbar. Below the menu bar, there are tabs for PROBLEMS (19), OUTPUT, DEBUG CONSOLE, TERMINAL, and PORTS. The TERMINAL tab is active, displaying the command prompt output. The command executed is 'PS C:\Users\Dhanashri\Assignment java> & 'C:\Program Files\Java\j...rs\Dhanashri\AppData\Roaming\Code\User\workspaceStorage\f4de4f63f2f: xElementInArray''. The output is 'The maximum element in the array is : 8'. The prompt 'PS C:\Users\Dhanashri\Assignment java>' is shown again at the end of the output line.

```
PS C:\Users\Dhanashri\Assignment java> & 'C:\Program Files\Java\j...rs\Dhanashri\AppData\Roaming\Code\User\workspaceStorage\f4de4f63f2f: xElementInArray'
The maximum element in the array is : 8
PS C:\Users\Dhanashri\Assignment java>
```

Experiment No: 6

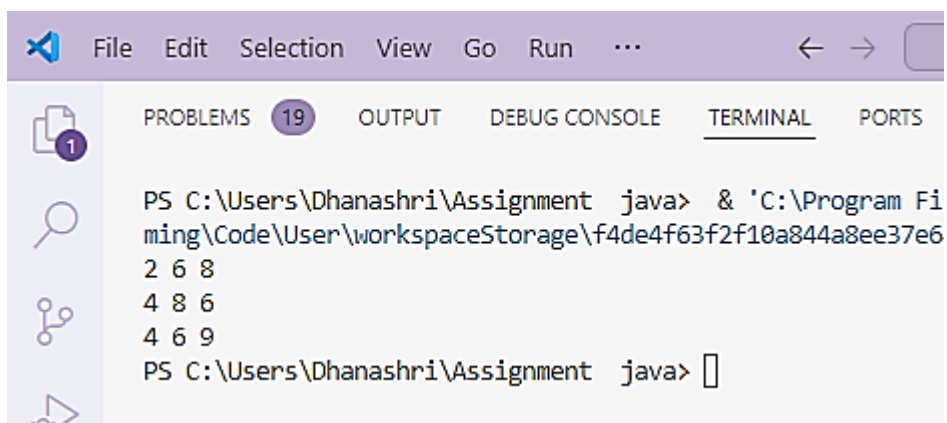
Q. Write a Program in Java to Addition of Matrix.

```
public class ArrayMatrixAddition
{
    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];

        for(int i=0;i<3;i++)
        {
            for(int j=0;j<3;j++)
            {
                c[i][j]=a[i][j]+b[i][j];
                System.out.print(c[i][j]+" ");
            }
            System.out.println();
        }
    }
}
```

OUTPUT:

A screenshot of a Java IDE's terminal window. The terminal shows the command prompt 'PS C:\Users\Dhanashri\Assignment java>' followed by the command '& 'C:\Program Files\ming\Code\User\workspaceStorage\f4de4f63f2f10a844a8ee37e6'. The output of the program is displayed as three rows of numbers: '2 6 8', '4 8 6', and '4 6 9'. The terminal window has a menu bar with 'File', 'Edit', 'Selection', 'View', 'Go', 'Run', and '...'. Below the menu bar are tabs for 'PROBLEMS' (19), 'OUTPUT', 'DEBUG CONSOLE', 'TERMINAL' (selected), and 'PORTS'. On the left side of the terminal window, there are icons for a file, a search, a network, and a play button.

```
PS C:\Users\Dhanashri\Assignment java> & 'C:\Program Files\ming\Code\User\workspaceStorage\f4de4f63f2f10a844a8ee37e6
2 6 8
4 8 6
4 6 9
PS C:\Users\Dhanashri\Assignment java>
```

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:");

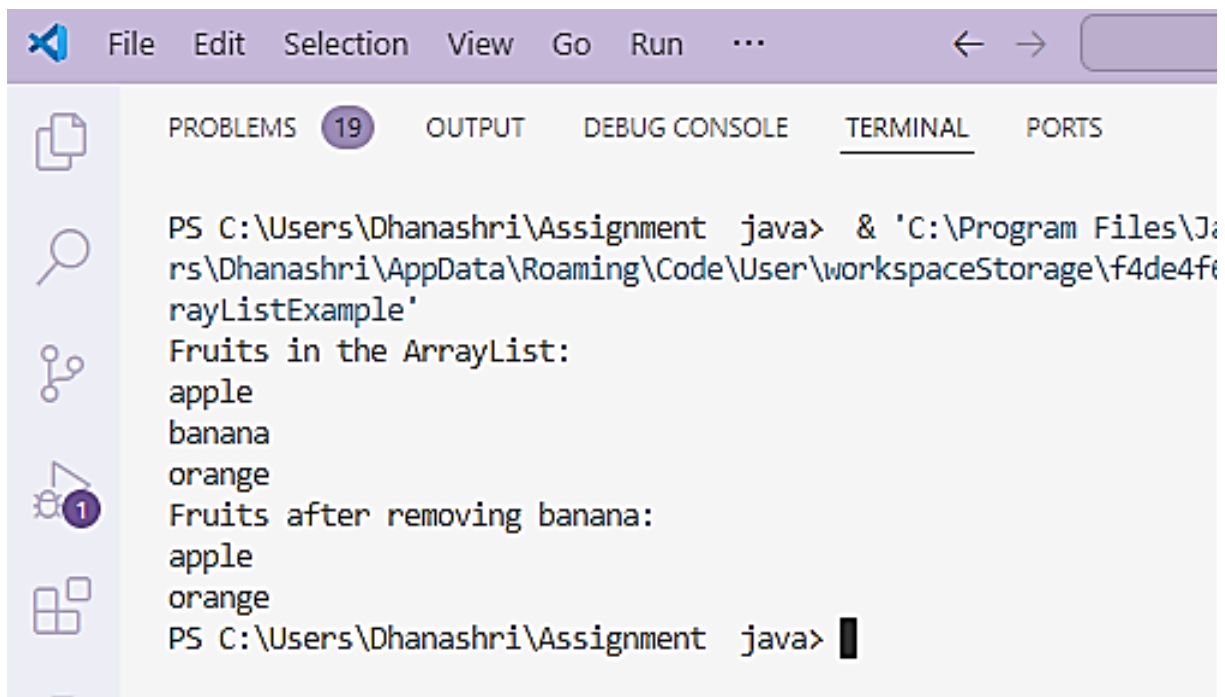
        for (String fruit : fruits)
        {
            System.out.println(fruit);
        }

        fruits.remove("banana");

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

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

OUTPUT:



```
PS C:\Users\Dhanashri\Assignment java> & 'C:\Program Files\Java\jdk-11.0.10\bin\java.exe' -cp 'C:\Users\Dhanashri\AppData\Roaming\Code\User\workspaceStorage\f4de4f0e-4e4e-4e4e-4e4e-4e4e\ArrayListExample'
Fruits in the ArrayList:
apple
banana
orange
Fruits after removing banana:
apple
orange
PS C:\Users\Dhanashri\Assignment java> █
```

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());

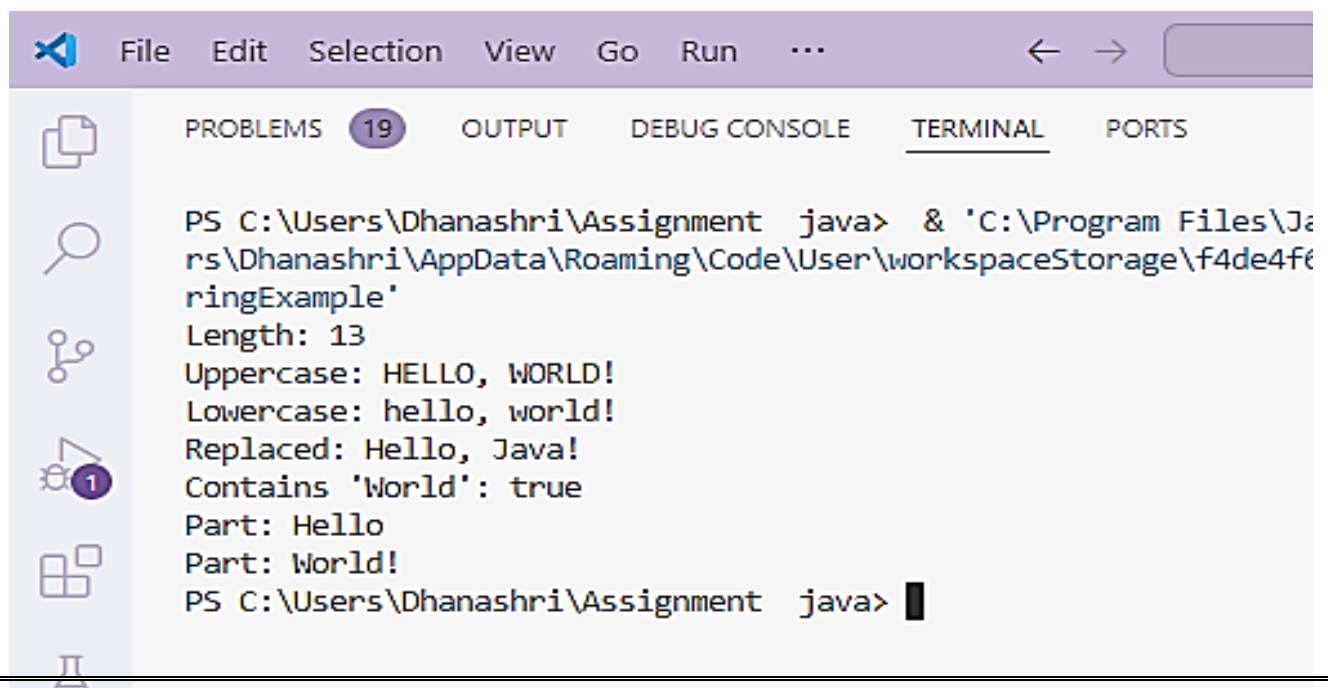
        // Replace substring
        String newStr = str.replace("World", "Java");
        System.out.println("Replaced: " + newStr);

        // 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:



```
PS C:\Users\Dhanashri\Assignment java> & 'C:\Program Files\Java\jdk-11.0.10\bin\java.exe' -cp 'C:\Users\Dhanashri\AppData\Roaming\Code\User\workspaceStorage\f4de4f6e-8b4e-4b4e-8b4e-8b4e\StringExample'
Length: 13
Uppercase: HELLO, WORLD!
Lowercase: hello, world!
Replaced: Hello, Java!
Contains 'World': true
Part: Hello
Part: World!
PS C:\Users\Dhanashri\Assignment java>
```

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:

```

PS C:\Users\Dhanashri\Assignment java> c:; cd 'c:\Users\Dhanashri\Assignmen
wCodeDetailsInExceptionMessages' '-cp' 'C:\Users\Dhanashri\AppData\Roaming\Co
java\jdt_ws\Assignment java_7e820a41\bin' 'StudentAdmissionSystem'

**_** 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 : Ghadge Dhanshri Prakash

Enter Student Marks :
Physics : 78

Chemistry : 90

Mathematics : 87

Enter Course Name : BSC

Student Details Added Successfully!

```

2



Press Enter Key To Go To Main Menu ...k

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

Choices =>

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

Enter Choice : 2

List of Students =>

Roll Number : 101

Student Name : Ghadge Dhanshri Prakash.

Marks => Physics = 78, Chemistry = 90, Mathematics = 87.

Total Marks = 255.

Percentage = 85.0.

Course : BSC.

====#####=====

Enter Choice : 5

Invalid option, please try again.

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

Choices =>

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



Enter Choice : 3

Exiting the system.<*Thanks*>



PS C:\Users\Dhanashri\Assignment java> █

Experiment No : 10

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

```
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());
        }

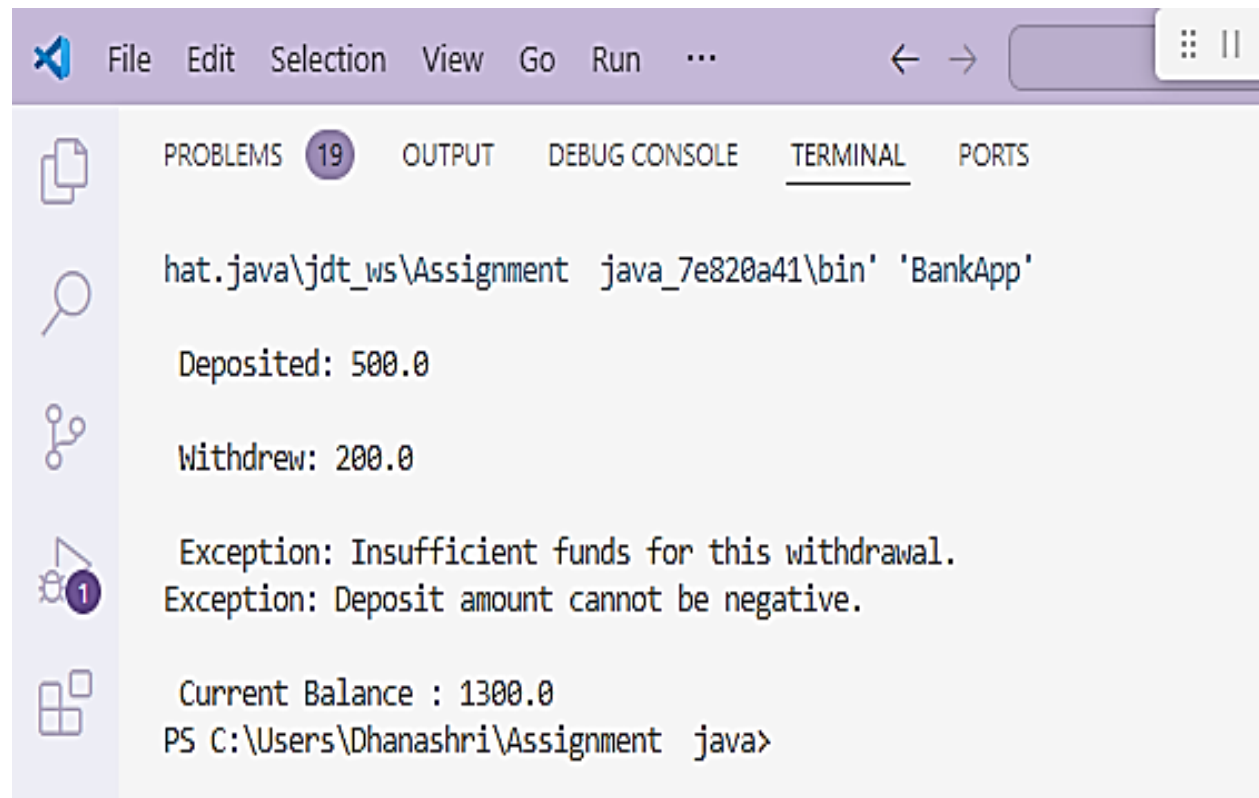
        try
        {
            account.deposit(-100); // This will cause NegativeAmountException
        }

        catch (NegativeAmountException e)
        {
            System.out.println("Exception: " + e.getMessage());
        }

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

```

OUTPUT:



The screenshot shows the Visual Studio Code interface with the terminal panel active. The terminal displays the output of a Java program named 'BankApp'. The program has executed several commands: 'Deposited: 500.0', 'Withdrew: 200.0', and 'Current Balance : 1300.0'. It also shows two exception messages: 'Exception: Insufficient funds for this withdrawal.' and 'Exception: Deposit amount cannot be negative.' The terminal prompt is 'PS C:\Users\Dhanashri\Assignment java>'.

```
hat.java\jdt_ws\Assignment  java_7e820a41\bin' 'BankApp'  
  
Deposited: 500.0  
  
Withdrew: 200.0  
  
Exception: Insufficient funds for this withdrawal.  
Exception: Deposit amount cannot be negative.  
  
Current Balance : 1300.0  
PS C:\Users\Dhanashri\Assignment  java>
```

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 MultilevelInheritance
{
    public static void main(String[] arguments)
    {
        Cube cube = new Cube();
        cube.display();
        cube.area();
        cube.volume();
    }
}
```

OUTPUT:

[illegible]

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();
        dog.eat();
        cat.eat();
        dog.bark();
        cat.meow();
    }
}
```

OUTPUT

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:

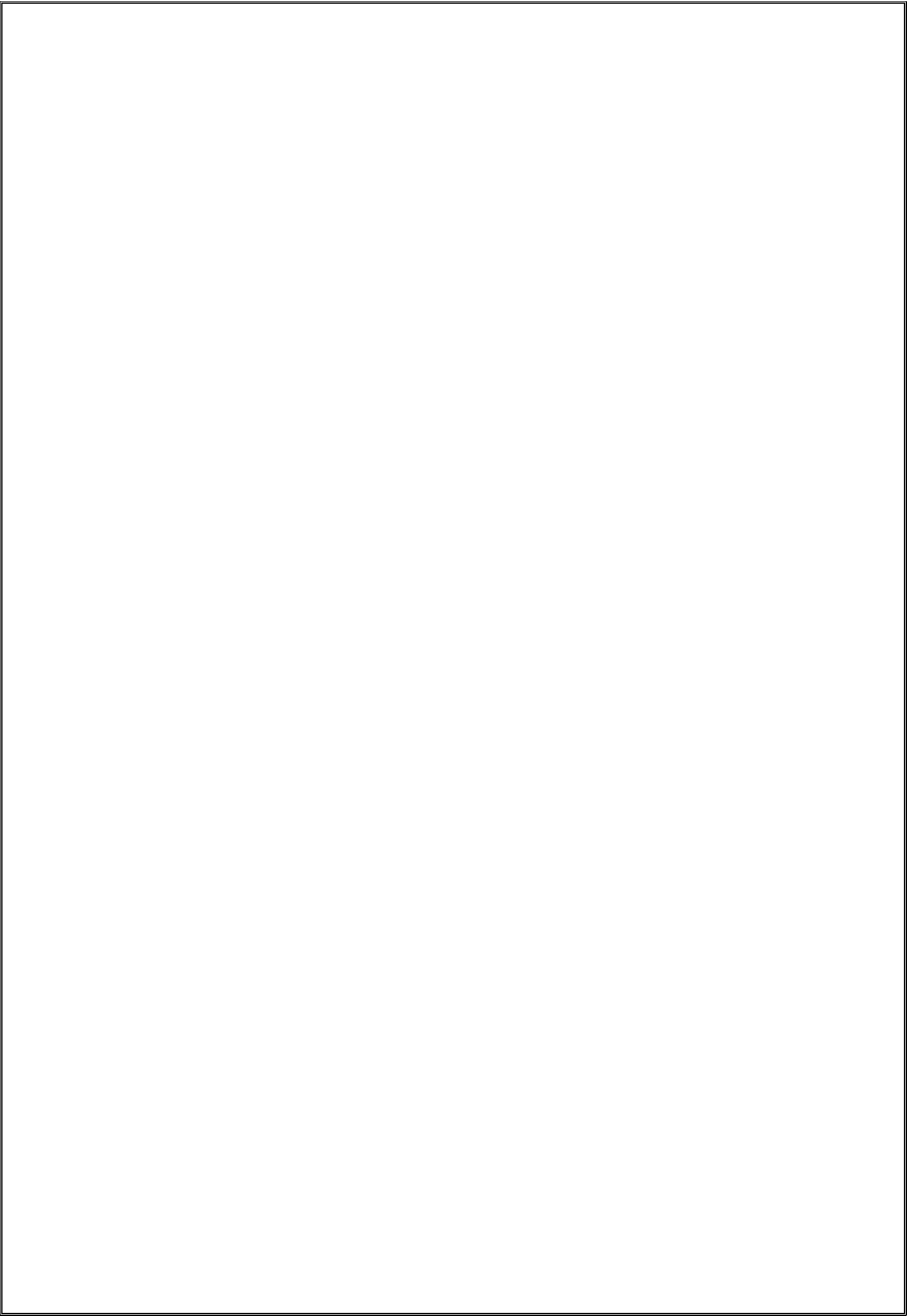
```

File Edit Selection View Go Run ...
PROBLEMS 22 OUTPUT DEBUG CONSOLE TERMINAL
PS C:\Users\Dhanashri\Assignment java> & 'C:\Programs\Dhanashri\AppData\Roaming\Code\User\workspaceSt... terface_Client'

Bicycle present state :
speed: 2 gear: 2

Bike present state :
speed: 1 gear: 1
PS C:\Users\Dhanashri\Assignment java>

```



Experiment No: 14

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

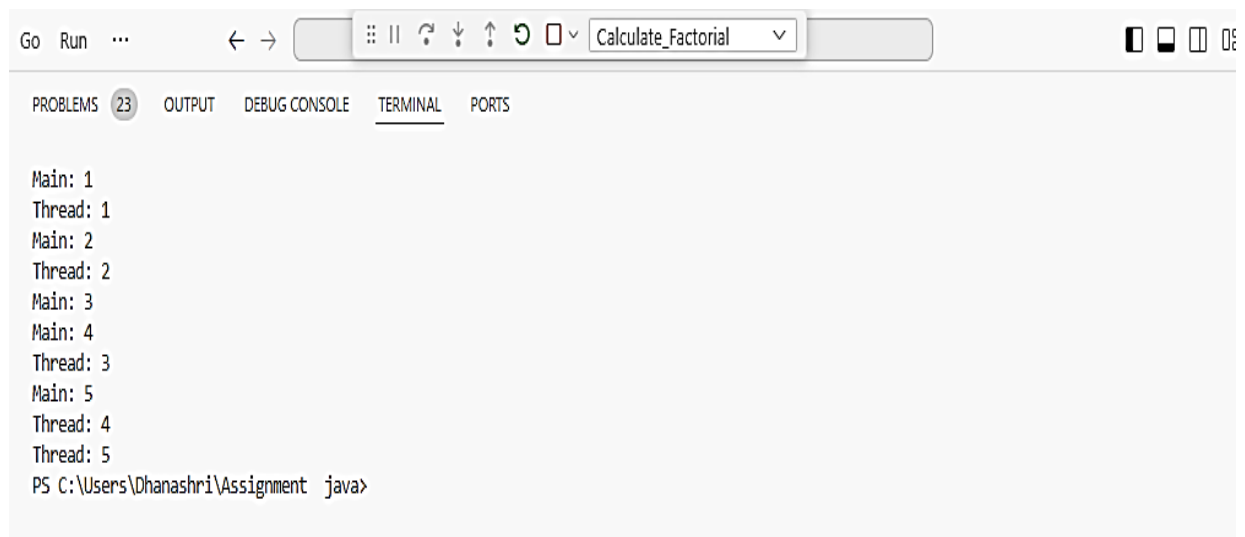
A. Using the Thread Class

```
// 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:



```
Go Run ... < > [Icons] Calculate_Factorial v [Icons]
PROBLEMS 23 OUTPUT DEBUG CONSOLE TERMINAL PORTS
Main: 1
Thread: 1
Main: 2
Thread: 2
Main: 3
Main: 4
Thread: 3
Main: 5
Thread: 4
Thread: 5
PS C:\Users\Dhanashri\Assignment java>
```

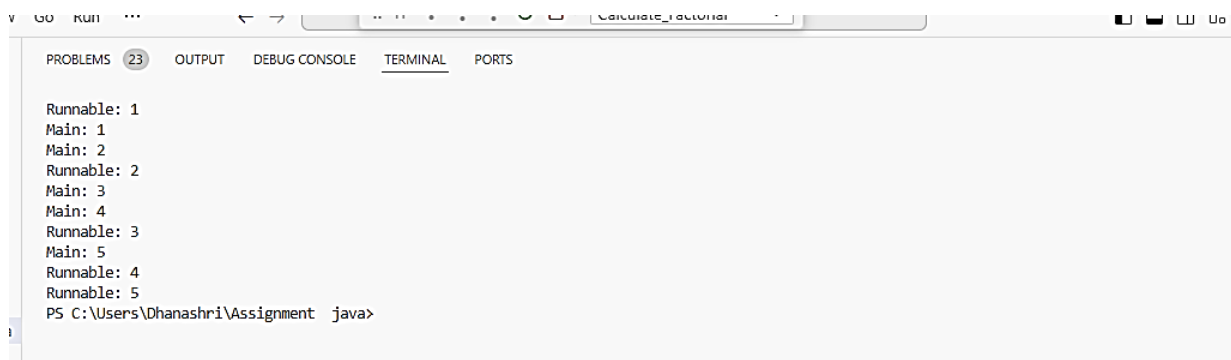
B Using the Runnable Interface

```
// 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:



```
PROBLEMS 23 OUTPUT DEBUG CONSOLE TERMINAL PORTS

Runnable: 1
Main: 1
Main: 2
Runnable: 2
Main: 3
Main: 4
Runnable: 3
Main: 5
Runnable: 4
Runnable: 5
PS C:\Users\Dhanashri\Assignment java>
```

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

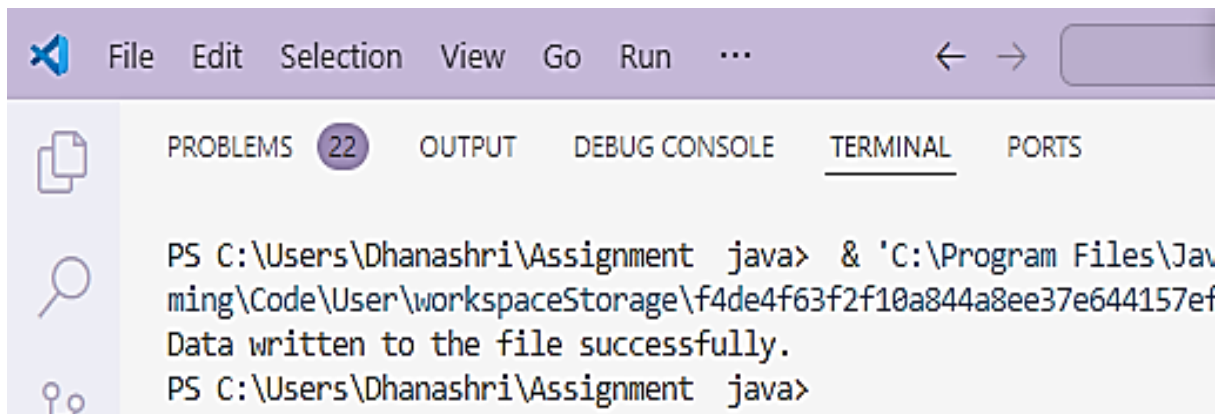
```
import java.io.BufferedWriter;
import java.io.FileWriter;
import java.io.IOException;

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:



```
PS C:\Users\Dhanashri\Assignment java> & 'C:\Program Files\Java\jdk-11.0.10\bin\java.exe -Duser.dir=C:\Users\Dhanashri\Assignment -classpath C:\Users\Dhanashri\workspaceStorage\f4de4f63f2f10a844a8ee37e644157ef\classes *.class'
Data written to the file successfully.
PS C:\Users\Dhanashri\Assignment java>
```

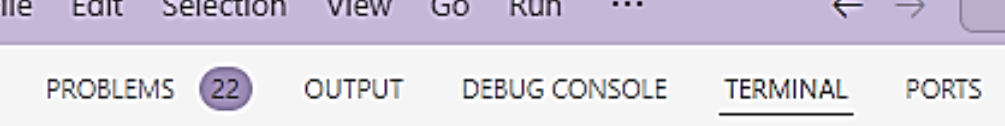
B. Reading Data from a File

```
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:



The screenshot shows the Visual Studio Code interface. The top menu bar includes File, Edit, Selection, View, Go, Run, and a search icon. The left sidebar contains icons for Explorer, Search, Source Control, and Run and Debug. The main editor area displays the 'TERMINAL' tab, which shows the output of a Java program. The output text is: PS C:\Users\Dhanashri\Assignment java> & 'C:\Program Files\Java\ming\Code\User\workspaceStorage\f4de4f63f2f10a844a8ee37e644157ef Hello, World! Welcome to Java File I/O. This is a simple example. Goodbye! PS C:\Users\Dhanashri\Assignment java>