1. Write a program to find the sum, difference, product, quotient and remainder of two numbers passed as command line argument.

```java
import java.util.Scanner;

public class Sumdiff
{


    public static void main(String[] args)
    {
        Scanner in = new Scanner(System.in);
        System.out.print("Input 1st integer: ");
        int firstInt = in.nextInt();
        System.out.print("Input 2nd integer: ");
        int secondInt = in.nextInt();


    System.out.printf("Sum of two integers: %d%n", firstInt + secondInt);
    System.out.printf("Difference of two integers: %d%n", firstInt - secondInt);
        System.out.printf("Product of two integers: %d%n", firstInt * secondInt);
        System.out.printf("Average of two integers: %.2f%n", (double) (firstInt +
secondInt) / 2);
        System.out.printf("remainder of two integers: %d%n",firstInt % secondInt);
        System.out.printf("quotient of two integers: %d%n",firstInt / secondInt);
    System.out.printf("Distance of two integers: %d%n", Math.abs(firstInt -
secondInt));
        System.out.printf("Max integer: %d%n", Math.max(firstInt, secondInt));
    System.out.printf("Min integer: %d%n", Math.min(firstInt, secondInt));
    }
}
```

2. Given the sides of a triangle, write a program to check whether the triangle is equilateral, isosceles or scalene and find its area.

```java
import java.util.Scanner;
```

```java
public class  Triarea1 {

        private static Scanner sc;

    private static double Area;

        public static void main(String[] args) {

                double a, b, c;

                sc = new Scanner(System.in);


                System.out.println("\n Please Enter Three sides of triangle: ");

                a = sc.nextDouble();

                b = sc.nextDouble();

                c = sc.nextDouble();

                   if(a==b && b==c)

        System.out.println("Equilateral");

        else if ((a==b && b!=c ) || (a!=b && c==a) || (c==b && c!=a))

        System.out.println("Isosceles");

      else if(a!=b && b!=c && c!=a)

        System.out.println("Scalene");

                Area = AreaofaTriangle(a, b, c);

                System.out.format("\n The Area of triangle = %.2f\n",Area);

        }

        public static double AreaofaTriangle( double a, double b, double c ) {

                double s;

                s = (a + b + c)/2;

                Area = Math.sqrt(s*(s-a)*(s-b)*(s-c));

                return Area;

        }

}
```

3. Read an array of 10 or more numbers and write a program to find the

a) Smallest element in the array
b) Largest element in the array

c) Second largest element in the array

```java
import java.util.Scanner;
public class Array
{
    public static void main(String[] args)
    {
        int n, temp;
        Scanner s = new Scanner(System.in);
        System.out.print("Enter no. of elements you want in array(Minimum 10):");
        n = s.nextInt();
        int a[] = new int[n];
        System.out.println("Enter all the elements:");
        for (int i = 0; i < n; i++)
        {
            a[i] = s.nextInt();
        }
        for (int i = 0; i < n; i++)
        {
            for (int j = i + 1; j < n; j++)
            {
                if (a[i] > a[j])
                {
                    temp = a[i];
                    a[i] = a[j];
                    a[j] = temp;
                }
            }
        }
        System.out.println("Largest:"+a[n-1]);
        System.out.println("Second Largest:"+a[n-2]);
        System.out.println("Smallest:"+a[0]);
    }
}
```

4. Write a program to perform base conversion

a) Integer to binary
b) Integer to Octal
c) Integer to Hexadecimal

```java
import java.util.*;
class Baseconversion
{
Scanner scan;
int num;
void getVal()
```

```
{
System.out.println("Decimal to Hexadecimal,Octal and Binary");
scan= new Scanner(System.in);
System.out.println("\nEnter the number:");
num=Integer.parseInt(scan.nextLine());
}
void convert()
{
String hexa=Integer.toHexString(num);
System.out.println("HexaDecimal value is:" + hexa);
String octal=Integer.toOctalString(num);
System.out.println("Octal value is:" + octal);
String binary=Integer.toBinaryString(num);
System.out.println("Binary value is:"+binary);
}}

class Decimal_Conversion
{
public static void main(String args[])
{
Baseconversion obj=new Baseconversion();
obj.getVal();
obj.convert();
}
}
```

5. Write a program to merge two arrays.

```
import java.util.Arrays;

import java.lang.*;

public class MergeArray1

{

public static void main(String[] args)

{

int[] firstArray = {23,45,12,78,4,90,1};

int[] secondArray = {77,11,45,88,32,56,3};

int fal = firstArray.length;

int sal = secondArray.length;

int[] result = new int[fal + sal];

System.arraycopy(firstArray, 0, result, 0, fal);
```

System.arraycopy(secondArray, 0, result, fal, sal);

System.out.println(Arrays.toString(result));

}

}

Output:

6. Java Programming Code to Find HCF LCM of Two Numbers

```java
import java.util.Scanner;

public class Hcflcm
{
    public static void main(String args[])
    {
        int a, b, x, y, t, hcf, lcm;
        Scanner scan = new Scanner(System.in);

        System.out.print("Enter Two Number : ");
        x = scan.nextInt();
        y = scan.nextInt();
        a = x;
        b = y;
        while(b != 0)
        {
            t = b;
            b = a%b;
            a = t;
        }

        hcf = a;
```

```
        lcm = (x*y)/hcf;


        System.out.print("HCF = " +hcf);

        System.out.print("\nLCM = " +lcm);

    }

}
```

7. Write a program to find the trace and transpose of a matrix.

```java
import java.util.*;
import java.io.*;
class Matrix1
{
public static void main(String args[])throws IOException
{
 DataInputStream in=new DataInputStream(System.in);
 int a[][]=new int[10][10];
 int sum=0;
 int i,j;
 int row,column,temp;
 System.out.println("Enter the no:f rows:");
 row=Integer.parseInt(in.readLine());
 System.out.println("Enter the no:of column:");
 column=Integer.parseInt(in.readLine());
 System.out.println("Enter the elements for the matrix:");
 for(i=0;i<row;i++)
 for(j=0;j<column;j++)
 a[i][j]=Integer.parseInt(in.readLine());
 System.out.println("The matrix is:");
 for(i=0;i<row;i++)
 {
```

```java
for(j=0;j<column;j++)
System.out.print(a[i][j]+"\t");
System.out.println();
}
System.out.println("The transpose of the matrix is:");
temp=row;
row=column;
column=temp;
for(i=0;i<row;i++)
{
for(j=0;j<column;j++)
System.out.print(a[j][i]+"\t");
System.out.println();
}
if(row!=column)
System.out.println("it is not a square matrix!!There is no trace for the matrix!!!");
else
{
for(i=0;i<row;i++)
for(j=0;j<column;j++)
if(i==j)
sum=sum+a[i][j];
System.out.println("The sum of the trace is:"+sum);
}
}
}
```

Output:

8. Write java program to find the sum of the digits and reverse of a given number using class and objects.

```java
import java.util.Scanner;

public class Sr
{
    public static void main(String[] args)
    {
        int n, a, m = 0, sum = 0;
        Scanner s = new Scanner(System.in);
        System.out.print("Enter any number:");
        n = s.nextInt();
        do
        {
            a = n % 10;
            m = m * 10 + a;
            sum = sum + a;
            n = n / 10;
        }
        while( n > 0);
        System.out.println("Reverse:"+m);
        System.out.println("Sum of digits:"+sum);
    }
}
```

9. Write a Java Programming Code to Check given string Anagram or Not. If the two strings are anagram to each other, then one string can be rearranged to form the other string. For Example: abc and cba are anagram.

```java
import java.util.Scanner;


public class Anagram
{
    public static void main(String[] input)
    {
```

```java
String str1, str2;

int len, len1, len2, i, j, found=0, not_found=0;

Scanner scan = new Scanner(System.in);


System.out.print("Enter First String : ");

str1 = scan.nextLine();

System.out.print("Enter Second String : ");

str2 = scan.nextLine();


len1 = str1.length();

len2 = str2.length();

 if(len1 == len2)

{

   len = len1;

   for(i=0; i<len; i++)

   {

      found = 0;

      for(j=0; j<len; j++)

      {

         if(str1.charAt(i) == str2.charAt(j))

         {

            found = 1;

            break;

         }

      }

      if(found == 0)

      {

         not_found = 1;

         break;

      }

   }
```

```java
        if(not_found == 1)

        {

            System.out.print("Strings are not Anagram to Each Other..!!");

        }

        else

        {

            System.out.print("Strings are Anagram");

        }

    }

    else

    {

        System.out.print("Both Strings Must have the same number of Character to be an Anagram");

    }

  }

}
```

10. Write a Java Program to remove all vowels from a string

```java
import java.util.Scanner;

public class Removevowels

{

  public static void main(String args[])

  {

    String strOrig, strNew;

    Scanner scan = new Scanner(System.in);


    System.out.print("Enter a String : ");

    strOrig = scan.nextLine();


    System.out.print("Removing Vowels from The String [" +strOrig+ "]\n");

    strNew = strOrig.replaceAll("[aeiouAEIOU]", "");


    System.out.print("All Vowels Removed Successfully..!!\nNow the String is :\n");
```

```
        System.out.print(strNew);

    }

}
```

11. Create a class Student to read and display the student details. Create another class mark inherit from student to read marks of 5 subjects and find total and average. Write a Java program to display the result of a student.

```
import java.lang.*;

import java.io.*;

class Student

{

        int roll_no;

}

class Result extends Student

{

        String name;

        int sub1,sub2,sub3,sub4,sub5;

        int total;

        float per;

        void read() throws IOException

        {

                BufferedReader br = new BufferedReader(new InputStreamReader(System.in));

System.out.println ("Enter Name of Student");

                name = br.readLine();

                System.out.println ("Enter Roll No. of Student");

                roll_no = Integer.parseInt(br.readLine());

                System.out.println ("Enter marks out of 100 of 1st subject");

                sub1 = Integer.parseInt(br.readLine());

                System.out.println ("Enter marks out of 100 of 2nd subject");

                sub2 = Integer.parseInt(br.readLine());
```

```java
                System.out.println ("Enter marks out of 100 of 3nd subject");

                sub3 = Integer.parseInt(br.readLine());

                System.out.println ("Enter marks out of 100 of 4nd subject");

                sub4 = Integer.parseInt(br.readLine());

                System.out.println ("Enter marks out of 100 of 5nd subject");

                sub5 = Integer.parseInt(br.readLine());

        }

        void display()

        {

                total=sub1+sub2+sub3+sub4+sub5;

                per=(total*100)/500;

                System.out.println ("Roll No. = "+roll_no);

                System.out.println ("Name = "+name);

                System.out.println ("Marks of 1st Subject = "+sub1);

                System.out.println ("Marks of 2nd Subject = "+sub2);

                System.out.println ("Marks of 3st Subject = "+sub3);

                System.out.println ("Marks of 4nd Subject = "+sub4);

                System.out.println ("Marks of 5st Subject = "+sub5);

                System.out.println ("Total Marks = "+total);

                System.out.println ("Percentage = "+per+"%");

        }
}
class Studresult
{
        public static void main(String args[]) throws IOException
        {
                Result s=new Result();

                s.read();

                s.display();

        }
}
```

12. Using class and objects, write a java program to find the sum of two complex numbers

(Hint: Use object as parameter to function).

```java
class Complex

  {

     int Real,Imag;

     Complex()

     {}



  Complex(int Real1,int Imag1)

  {

     Real=Real1;

     Imag=Imag1;

  }



  Complex AddComplex(Complex C1,Complex C2)

  {

     Complex CSum=new Complex();

     CSum.Real=C1.Real+C2.Real;

     CSum.Imag=C1.Imag+C2.Imag;

     return CSum;

  }
}


class Complexmain

{

  public static void main(String[] a)

  {

     Complex C1=new Complex(4,8);

     Complex C2=new Complex(5,7);
```

```
        Complex C3=new Complex();

        C3=C3.AddComplex(C1,C2);

        System.out.println("SUM:" + C3.Real +"+i" + C3.Imag);

    }

}
```

13. Write a program to count and display total number of objects created to a class (Hint: static members).

```
class Test

{

    static int noOfObjects = 0;

    {

        noOfObjects += 1;

    }

    public Test()

    {

    }

    public Test(int n)

    {

    }

    public Test(String s)

    {

    }

    public static void main(String args[])

    {

        Test t1 = new Test();

        Test t2 = new Test(5);

        Test t3 = new Test("GFG");

        System.out.println(Test.noOfObjects);

    }
```

}

14. Write a java program to find the volume of cube, rectangular box, cylinder using function overloading.

```java
class Overload {

  double area(float l, float w, float h) {

    return l * w * h;

  }


  double area(float l) {

    return l * l * l;

  }


  double area(float r, float h) {

    return 3.1416 * r * r * h;

  }

}

public class MethodOverloading {

  public static void main(String args[]) {

    Overload overload = new Overload();

    double rectangleBox = overload.area(5, 8, 9);

    System.out.println("Area of ractangular box is " + rectangleBox);

    System.out.println("");

    double cube = overload.area(5);

    System.out.println("Area of cube is " + cube);

    System.out.println("");

    double cylinder = overload.area(6, 12);

    System.out.println("Area of cylinder is " + cylinder);

  }

}
```

15. Create an abstract class shape and create TwoDim and ThreeDim as sub classes. Create classes square and triangle derived from TwoDim and sphere and cube derived from ThreeDim. Write a program to determinethe area of various shapes.

```java
import java.util.Scanner;

abstract class Shape
{
abstract void getdata();
}


class TwoDim extends Shape
{
float l,b;
void getdata()
{
Scanner c=new Scanner(System.in);
System.out.println("Enter the length:");
l=c.nextFloat();
System.out.println("Enter the breadth:");
b=c.nextFloat();
}
}
class Square extends TwoDim
{
void area()


{
float a=l*b;
System.out.println("The area of square is : "+a);
}
}
```

```java
class Triangle extends TwoDim
{
void area()
{
float a=0.5f*l*b;
System.out.println("The area of triangle is: "+a);
}
}


class ThreeDim extends Shape
{

float v;
void getdata()
{
Scanner c=new Scanner(System.in);
System.out.println("Enter the value:");
v=c.nextFloat();
}
}

class Sphere extends ThreeDim
{
final float pi=3.14f;

final float s=1.333f;
void area()
{
float a=s*pi*v*v*v;
System.out.println("The area of Sphere is :"+a);
```

```java
        }

}

class Cube extends ThreeDim

{

void area()

{

float a=v*v*v;

System.out.println("The area of cube is :"+a);

}

}


class Abstract

{

public static void main(String args[])

{

Square sq=new Square();

System.out.println("Enter the following data of Square:");

sq.getdata();

sq.area();

Triangle t=new Triangle();

System.out.println("Enter the following data of Triangle:");

t.getdata();

t.area();

Sphere sp=new Sphere();


System.out.println("Enter radius of Sphere:");

sp.getdata();

sp.area();

Cube c=new Cube();
```

System.out.println("Enter the side of Cube:");

c.getdata();

c.area();

}

}

16. Create an interface volume with member variable pi and methods readdata () and dispvolume (). Create two classes sphere and cylinder to implement this interface. Write a Java program to find the volume.

```java
import java.*;

import java.util.Scanner;

interface vol1

{

final static float pi=3.14F;

void readdata();

double dispvolume();

}

class sphere implements vol1{

float r;

public void readdata()

{

Scanner scan=new Scanner(System.in);

System.out.println("enter the radius:");

r=scan.nextFloat();

}

public double dispvolume()

{

return(1.33*pi*r*r*r);

}

}

class cylinder implements vol1
```

```java
{
float rr,h;

public void readdata()
{
Scanner scan1=new Scanner(System.in);

System.out.println("enter the radius:");

rr=scan1.nextFloat();

System.out.println("enter the height:");

h=scan1.nextFloat();
}

public double dispvolume()
{
return(pi*rr*rr*h);
}
}

class volume1
{
public static void main(String args[])
{
sphere s=new sphere();

vol1 vv;

vv=s;

System.out.println("the volume of sphere are:");

vv.readdata();

System.out.println("volume="+vv.dispvolume());

cylinder c=new cylinder();

vv=c;

System.out.println("the volume of cylinder are:");

vv.readdata();

System.out.println("volume="+vv.dispvolume());
}
```

}

17. Write a multi thread java program for displaying odd numbers and even numbers up to a limit (Hint: Implement thread using Runnable interface).

```java
import java. lang.*;

public class OddEvenThread

 {

        public static void main(String[] args) {

                Runnable r1 = new Runnable12(true);

                Runnable r2 = new Runnable12(false);

                Thread t1 = new Thread(r1);

                Thread t2 = new Thread(r2);

                t1.start();

                t2.start();

        }

}


class Runnable12 implements Runnable {

        private boolean isOdd;


        Runnable12(boolean isOdd) {

                this.isOdd = isOdd;

        }


        public void run() {

                if (isOdd) {

                        for (int i = 1; i <= 11; i += 2) {

                                System.out.println(i);

                        }

                } else {

                        for (int i = 0; i < 11; i += 2) {
```

```
                    System.out.println(i);

               }

          }

     }

}
```

18. Create a class Account to deposit and withdraw money from a bank. Create a user defined exception "MinBalExp" to be invoked when the withdrawal amountis greater than balance.

```java
import java.util.Scanner;

import java.lang.*;

class UserDefinedException2

{

     public static void main(String args[])

     {

          Account acct = new Account();

          System.out.println("Current balance : " + acct.balance());

          System.out.println("Withdrawing 200");

          acct.withdraw(200);

          System.out.println("Current balance : " + acct.balance());

          acct.withdraw(1000);

   }

}

 class Account

{

private int balance = 1000;

public int balance()

{

return balance;

}
```

```java
public void withdraw(int amount) throws NotSufficientFundException
{
if (amount > balance)
{
throw new NotSufficientFundException( String.format("Current balance %d is less than requested amount %d", balance, amount));
}
balance = balance - amount;
}
public void deposit(int amount)
{
if (amount <= 0)
{
throw new IllegalArgumentException( String.format("Invalid deposit amount %s", amount));
}
}
}
class NotSufficientFundException extends RuntimeException
{
private String message;
public NotSufficientFundException(String message)
{
this.message = message;
}
public NotSufficientFundException(Throwable cause, String message)
{
super(cause);
this.message = message;
}
public String getMessage()
```

```
{

 return message;

 }

 }
```

19. Write an applet to display a rectangle with specified coordinate and colour passed as parameter from the HTML file.

```
RectanglesDrawing.Java
import java.applet.*;
import java.awt.*;
public class RectanglesDrawing extends Applet
{

public void paint(Graphics g)
{
g.setColor(Color.red);
g.drawRect(50,80,150,100);
g.setColor(Color.magenta);
g.fillRect(230,80,150,100);

}
}
```

```
RectangelsDrawing.html
<html>
<head> Rectangle Filling
<title> Applet</title></head>
<body>

<applet code="RectanglesDrawing.class" width="400" height="300">

</applet>
</body>
</html>
```

20. Create an AWT application to add, remove items in a list box.

```
import java.awt.*;

import java.awt.event.*;

import javax.swing.*;

  public class Books extends JFrame {


    private DefaultListModel Books;
```

```java
private JList list;

public Books()
    {
    super( "Favorite books" );
    Books = new DefaultListModel();
    Books.addElement( "c programming" );
    Books.addElement( "java programming" );
    Books.addElement( "php programming" );
    Books.addElement( "network" );
    Books.addElement( "fundamentals" );
    list = new JList( Books );
    list.setSelectionMode(
    ListSelectionModel.SINGLE_SELECTION );
    JButton addButton = new JButton( "Add books" );
    addButton.addActionListener(
        new ActionListener() {

        public void actionPerformed( ActionEvent event )
          {
          String name = JOptionPane.showInputDialog(
          Books.this, "Enter Name" );
          Books.addElement( name );
        }
      }
      );

    JButton removeButton =
    new JButton( "Remove Selected books" );
    removeButton.addActionListener(
        new ActionListener() {
```

```java
        public void actionPerformed( ActionEvent event )

            {

            Books.removeElement(

            list.getSelectedValue() );

            }

        }

        );

        JPanel inputPanel = new JPanel();

        inputPanel.add( addButton );

        inputPanel.add( removeButton );

        Container container = getContentPane();

        container.add( list, BorderLayout.CENTER );

        container.add( inputPanel, BorderLayout.NORTH );

        setDefaultCloseOperation( EXIT_ON_CLOSE );

        setSize( 400, 300 );

        setVisible( true );


    }


    public static void main( String args[] )

    {

    new Books();

    }

}
```

21. Create a database table employee (id, name, design, and dept.) and insert some records. Write a Java program to list the employee details using JDBC.