ASSIGNMENT:-2

QUESTION:-1

```
import java.util.Scanner;
class calc{
    double a;
    double b;
    calc()
    {

    }
    calc(double x)
    {
        a=x;
    }
    calc(double x,double y){
        a=x;
        b=y;
    }
    void add()
      {
        System.out.println("Addition = "+(a+b));
     }
     void sub()
        {
        System.out.println("Subtraction = "+(a-b));
        }
     void mul()
        {
        System.out.println("Multiplication = "+(a*b));
         }
     void div()
         {
            System.out.println("Division = "+(a/b));
          }
     void log10(){
         System.out.println("Log("+a+") = "+Math.log10(a));
     }
     void loge(){
         System.out.println("Ln("+a+") = "+Math.log(a));
     }
     void sqr(){
         System.out.println("Square of a = "+(a*a));
     }
     void cube(){
         System.out.println("Cube of "+a+" = " +(a*a*a));
     }
     void sqrt(){
         System.out.println("Square root of "+a+" = "+Math.sqrt(a));
     }
     void cbrt(){
         System.out.println("Cube root of "+a+" = "+Math.cbrt(a));
     }
     void exp(){
         System.out.println("e to the power "+a+" = "+Math.exp(a));
     }
     void pow(){
         System.out.println(a+" to the power "+b+" = "+Math.pow(a,b));
     }
     void trigo(){
         System.out.println("1:Sine\n2:Cosine\n3:Tangent\n4:Hyperbolic Sine\n5:Hyperbolic
         Cosine\n6:Hyperbolic Tangent\n7:Sine inverse\n8:Cosine inverse\n9:Tangent
         inverse\n");
         System.out.println("\nEnter your choice");
         Scanner sc=new Scanner(System.in);
         switch(sc.nextInt()){
             case 1:System.out.println("Sin("+(int)a+") = "+Math.sin(Math.PI/180*a));
                     break;
```

```
            case 2:System.out.println("Cos("+(int)a+") = "+Math.cos(Math.PI/180*a));
                   break;
            case 3:System.out.println("tan("+(int)a+") = "+Math.tan(Math.PI/180*a));
                   break;
            case 4:System.out.println("sinh("+(int)a+") = "+Math.sinh(Math.PI/180*a));
                   break;
            case 5:System.out.println("cosh("+(int)a+") = "+Math.cosh(Math.PI/180*a));
                   break;
            case 6:System.out.println("tanh("+(int)a+") = "+Math.tanh(Math.PI/180*a));
                   break;
            case 7:System.out.println("asin("+(int)a+") = "+180/Math.PI*Math.asin(a));
                   break;
            case 8:System.out.println("acos("+(int)a+") = "+180/Math.PI*Math.acos(a));
                   break;
            case 9:System.out.println("atan("+(int)a+") = "+180/Math.PI*Math.atan(a));
                   break;
        }
    }
        void fact(){
            int f=1;
            for(int i=(int)a;i>0;i--){
                f*=i;
            }
            System.out.println("Factorial of "+a+" = "+f);
        }
        void inverse(){
            System.out.println("inverse of "+a+" = "+(1/a));
        }
        void abs(){
            System.out.println("Absolute value of "+a+" = "+Math.abs(a));
        }
        void Max(){
            System.out.println("Maximum = "+Math.max(a, b));
        }
        void Min(){
            System.out.println("Minimum = "+Math.min(a, b));
        }
        void Mod(){
            System.out.println("Modulus = "+a%b);
        }
}
public class ab24510_A2_1 extends calc {
    public static void main(String[] args) {
        System.out.println(".......Operations in Calculator........\n");

        System.out.println("1:Addition\n2:Subtraction\n3:Multiplication\n4:Division\n5:Logorit
        hm with base 10\n6:Logorithm with base e\n7:Square\n8:Cube\n9:Square root\n10:Cube
        root\n11:Exponent(e^x)\n12:Power(a^b)\n13:Trigonometric
        ratios\n14:factorial\n15:Inverse(1/x)\n16:Absolute value\n17:Maximum of
        two\n18:Minimum of two\n19:Modulus");
        System.out.println("\nEnter your choice");
        Scanner sc=new Scanner(System.in);
        switch(sc.nextInt())
        {
            case 1: System.out.println("Enter two numbers");
                    calc obj=new calc(sc.nextDouble(),sc.nextDouble());
                    obj.add();
                    break;
            case 2: System.out.println("Enter two numbers");
                    obj=new calc(sc.nextDouble(),sc.nextDouble());
                    obj.sub();
                    break;
            case 3: System.out.println("Enter two numbers");
                     obj=new calc(sc.nextDouble(),sc.nextDouble());
                    obj.mul();
                    break;
            case 4: System.out.println("Enter two numbers");
                    obj=new calc(sc.nextDouble(),sc.nextDouble());
                    obj.div();
                    break;
             case 5: System.out.println("Enter any number");
```

```
                    obj=new calc(sc.nextDouble());
                    obj.log10();
                       break;
            case 6: System.out.println("Enter any number");
                    obj=new calc(sc.nextDouble());
                       obj.loge();
                       break;
            case 7: System.out.println("Enter any numbers");
                    obj=new calc(sc.nextDouble());
                    obj.sqr();
                    break;
            case 8: System.out.println("Enter any number");
                    obj=new calc(sc.nextDouble());
                    obj.cube();
                    break;
            case 9: System.out.println("Enter any number");
                    obj=new calc(sc.nextDouble());
                    obj.sqrt();
                    break;
            case 10: System.out.println("Enter any number");
                    obj=new calc(sc.nextDouble());
                    obj.cbrt();
                    break;
            case 11: System.out.println("Enter any number");
                    obj=new calc(sc.nextDouble());
                    obj.exp();
                    break;
            case 12: System.out.println("Enter two numbers");
                    obj=new calc(sc.nextDouble(),sc.nextDouble());
                    obj.pow();
                    break;
            case 13: System.out.println("Enter any angle");
                    obj=new calc(sc.nextDouble());
                    obj.trigo();
                    break;
            case 14: System.out.println("Enter any number");
                    obj=new calc(sc.nextDouble());
                    obj.fact();
                    break;
            case 15: System.out.println("Enter any number");
                    obj=new calc(sc.nextDouble());
                    obj.inverse();
                    break;
            case 16: System.out.println("Enter any number");
                     obj=new calc(sc.nextInt());
                     obj.abs();
                     break;
            case 17: System.out.println("Enter two numbers");
                     obj=new calc(sc.nextInt(),sc.nextInt());
                     obj.Max();
                     break;
            case 18: System.out.println("Enter two numbers");
                     obj=new calc(sc.nextInt(),sc.nextInt());
                     obj.Min();
                     break;
            case 19: System.out.println("Enter two numbers");
                     obj=new calc(sc.nextInt(),sc.nextInt());
                     obj.Mod();
                     break;
            default:
                System.out.println("Invalid choice");
        }
    }
}
```

QUESTION:-2

```
import java.util.Scanner;
class Prime{
    void num(int n){
        int i;
        for(i=2;i<n;i++){
            if(n%i==0)
                break;
        }
        if(i==n){
        System.out.print(n+"  ");
        }
    }
}

class ab24510_A2_2{
    public static void main(String argd[]){
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter number of prime numbers in the series");
        int n=sc.nextInt();
        Prime p=new Prime();
        System.out.println("Prime numbers upto "+n+" are:");
        for(int i=2;i<=n;i++)
        p.num(i);
    }
}
```

QUESTION:-3

```
import java.util.Iterator;
import java.util.Scanner;
import java.util.TreeSet;

class three{
   static TreeSet<String> ts=new TreeSet<>();
    int tmp;
    int tmp1;
    int tmp2;
    int arr[]=new int [3];
    three(int a,int b,int c,int tmp,int tmp1,int tmp2){
        arr[0]=a;
        arr[1]=b;
        arr[2]=c;
        this.tmp=tmp;
        this.tmp1=tmp1;
        this.tmp2=tmp2;
    }

    three() {
    }

    void combOfThree()
    {
        String a;
        for(int i=0;i<3;i++){
            int temp=arr[1];
            arr[1]=arr[2];
            arr[2]=temp;
           a=""+tmp+tmp1+tmp2;
            for(int j=0;j<arr.length;j++){
            a+=arr[j];
            }
            ts.add(a);
            temp=arr[0];
            arr[0]=arr[1];
```

```
            arr[1]=temp;
             a=""+tmp+tmp1+tmp2;
            for(int j=0;j<arr.length;j++){
            a+=arr[j];
            }
            ts.add(a);
         }
    }
        void display(){
            int c=0;
         Iterator<String> it=ts.iterator();
         while(it.hasNext()){
             System.out.println(""+it.next());
             c++;
         }
            System.out.println("COUNT = "+c);
        }
}
public class ab24510_A2_3{
    public static void main(String[] args) {
        Scanner sc=new Scanner(System.in);
        int a[]=new int [7];
        System.out.println("Enter 6 digit number");
        String s=sc.next();
        for(int i=0;i<6;i++){
            a[i]=s.charAt(i)-48;
        }
    for(int f=1;f<7;f++){
        int tmp=a[0];
      for(int k=1;k<6;k++){
        int tmp1=a[1];
          for(int i=3;i<7;i++){
             int tmp2=a[2];
            three obj=new three(a[3],a[4],a[5],tmp,tmp1,tmp2);
            obj.combOfThree();
            if(i==6)
                break;
                a[2]=a[i];
                a[i]=tmp2;
            //    System.out.println("\n\n");
            }
          //System.out.println("\n\n");
          int x=a[2];
          a[2]=a[1];
          a[1]=x;
        }
          //System.out.println("\n\n");
      int y=a[f];
      a[f]=a[0];
      a[0]=y;
    }
        System.out.println(".........All possible Combinations are:...........");
   new three().display();
    }
  }
```

QUESTION:-4

```
import java.util.Scanner;
class Matrix{
    static int count=0;
    int M;
    int N;
    Matrix(int m,int n)
    {
        M=m;
        N=n;
```

```
    }
    void creatMatrix(int arr[][]){
    Scanner sc=new Scanner(System.in);
    for(int i=0;i<M;i++){
            for(int j=0;j<N;j++)
            {
                arr[i][j]=sc.nextInt();
            }
        }
    }
    void Display(int arr[][])
    {
        for(int x[]:arr)
        {
            for(int a:x)
                System.out.print(a+"  ");
            System.out.println();
        }
    }
    void Spiral(int arr[][],int x,int y)
    {
        for(int j=y;j<N-x;j++)
        {   if(count>=M*N)
                break;
            System.out.print(arr[x][j]+"  ");
            count++;
        }
        for(int j=x+1;j<M-y;j++)
        {   if(count>=M*N)
                break;;
            System.out.print(arr[j][N-x-1]+"  ");
            count++;
        }
        for(int j=N-y-2;j>=x;j--)
        {   if(count>=M*N)
                break;
            System.out.print(arr[M-x-1][j]+"  ");
            count++;
        }
        for(int j=M-x-2;j>y;j--)
        {   if(count>=M*N)
                return;
            System.out.print(arr[j][x]+"  ");
            count++;
        }

    }
}
class ab24510_A2_4{
    public static void main(String arg[]){
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter Number of Rows(M) & Column(N) of Matrix");
        int m=sc.nextInt();
        int n=sc.nextInt();
        Matrix mat=new Matrix(m,n);
        int arr[][]=new int[m][n];
        System.out.println("\nEnter All the Elements");
        mat.creatMatrix(arr);
        System.out.println("Matrix Represented as:");
        mat.Display(arr);
        System.out.println("\nElements in Spiral order are :\n");
        for(int i=0;;i++){
            if(mat.count<m*n)
        mat.Spiral(arr,i,i);
            else
                break;
        }
    }
}
```

QUESTION:-5

```
import java.util.Scanner;
class Matrix{
   double res[][];
    Matrix(){

    }
    void PrintMatrix(double a[][],double x){
        try{
            int r=a.length;
        int c=a[0].length;
       System.out.println("Matrix is:");
        for(int i=0;i<r;i++){
            for(int j=0;j<c;j++)
                System.out.print("\t"+(float)(a[i][j]/x));
            System.out.println("");
        }
    }catch(Exception e){
            System.out.println(""+e);
    }
    }
    double[][] transpose(double a[][]){
        int m=a.length;
        int n=a[0].length;
        double tr[][]=new double[n][m];
        for(int i=0;i<n;i++){
            for(int j=0;j<m;j++)
                tr[i][j]=a[j][i];
            }
        return tr;
      }
    double determinant(double a[][],int n){
        double det=0;
        int sign=1,p=0,q=0;
        if(n==1)
            det=a[0][0];
        else{
            double b[][]=new double[n-1][n-1];
       for(int x=0;x<n;x++){
             p=0;
             q=0;
         for(int i=1;i<n;i++){
             for(int j=0;j<n;j++){
                 if(j!=x){
                     b[p][q++]=a[i][j];
                     if(q%(n-1)==0){
                         p++;
                         q=0;
                     }
                 }
             }
         }
         det=det+a[0][x]*determinant(b,n-1)*sign;
         sign=-sign;
       }
        }
        return det;
    }
     double[][] multiply(double m1[][],double m2[][]){
        int m1Row=m1.length;
        int m1Colm=m1[0].length;
        int m2Row=m2.length;
        int m2Colm=m2[0].length;
        if(m1Colm!=m2Row)
            throw new IllegalArgumentException("Matrix multiplication not possible match");
```

```
         res=new double[m1Row][m2Colm];
        for(int i=0;i<m1Row;i++){
            for(int j=0;j<m2Colm;j++){
                for(int k=0;k<m1Colm;k++){
                    res[i][j]+=m1[i][k]*m2[k][j];
                }
            }
        }
         return res;
    }
     double [][] Inverse(double arr[][]){
         int i1,j1,ii,jj;
         int n=arr.length;
         double det;
         double b[][]=new double[n][n];
         double temp[][]=new double[n][n];
         for(int j=0;j<n;j++){
             for(int i=0;i<n;i++){
                i1=0;
                for(ii=0;ii<n;ii++){
                    if(ii==i)
                        continue;
                    j1=0;
                    for(jj=0;jj<n;jj++){
                        if(jj==j)
                            continue;
                      temp[i1][j1]=arr[ii][jj];
                      j1++;
                    }
                    i1++;
                }
                det=determinant(temp, n-1);
                b[i][j]=Math.pow(-1.0,i+j+2.0)*det;

                    }
                }
         return b;
             }
}

public class ab24510_A2_5 {
    public static void main(String[] args) {
        int m,n;
        Matrix m1=new Matrix();
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter rows(m) and column(n) of matrix\n");
        m=sc.nextInt();
        n=sc.nextInt();
        int i,j;
         double a[][]=new double[m][n];
        System.out.println("Enter all elements:");
        for(i=0;i<m;i++){
            for(j=0;j<n;j++){
                a[i][j]=sc.nextInt();
                }
             }
        double x[][]=a;
        m1.PrintMatrix(x,1);

        double y[][]=m1.transpose(a);

    //   m1.PrintMatrix(y,1);
       if(m>n){
         double z[][]=m1.multiply(y,x);
      //  m1.PrintMatrix(z,1);
         double inv[][]=m1.Inverse(z);
        double det=m1.determinant(inv, inv.length);
         //System.out.println(""+m1.determinant(inv, inv.length));
         //System.out.println("Inverse of matrix is \n");
         //m1.PrintMatrix(inv,det);
         double res[][]=m1.multiply(inv,y);
```

```
            System.out.println("Inverse ");
         m1.PrintMatrix(res,1);
        }
        else{
            double z[][]=m1.multiply(x,y);
        // m1.PrintMatrix(z,1);
         double inv[][]=m1.Inverse(z);
        double det=m1.determinant(inv, inv.length);
     //   System.out.println(""+m1.determinant(inv, inv.length));
   //     System.out.println("Inverse of matrix is \n");
 //       m1.PrintMatrix(inv,1);
        double res[][]=m1.multiply(y,inv);
            System.out.println("Inverse ");
         m1.PrintMatrix(res,det);
    }
}
}
```