CS102 Lab-01

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Q1) Mathematical Concepts

Code:

```
/**********************************************************************************
Name: Snehal Nalawade ; Roll no : 202151160
**********************************************************************************/
 import java.util.Scanner;
public class Main



{
 public static int division (int a,int b)
 {
     int c = a/b;
    return c;
}
public static int lcm(int a,int b)
{
    int k=gcd(a,b); int ans= (a*b)/k;
    return ans;
}
public static int power(int a,int b)
{
    int product =1;
    for(int i=1;i<=b;i++)
    product*=a;
    return product;
```

```
}
public static int max(int [] a)
{
    int max = 0;

    for(int i=0; i<a.length; i++ ) {
      if(a[i]>max) {
        max = a[i];
      }
    }
    return max;
  }
 public static int min(int [] a) {
    int min = a[0];

    for(int i = 0; i<a.length; i++ ) {
      if(a[i]<min) {
        min = a[i];
      }
    }
    return min;
  }

public static int abs(int a)
{
   int k=0;
   if(a>=0)
   k=a;
   if(a<0)
   k=k+a;
   return k;

}
```

```
public static int factorial(int a)
{
    int prod=1;
    for(int i=1;i<=a;i++)
    prod*=i;
    return prod;
}
public static int sum(int [] a)
{
    int sum=0;
    for( int i=0;i<a.length;i++)
    sum+=a[i];
    return sum;

}
public static int sumOfDigits(int a)
{
    int sum=0;
    while (a!=0)
    {
      int rem=a%10;
      sum+= rem;
      a/=10;
    }
    return sum;
}
public static int isPrime(int a )
{
    int c=0;
      for(int i=1; i<=a;i++)
```

```
      if(a%i!=0)
      c++;
      if(c==2)
      return 1;
      else
      return 0;

}
public static int  isLeapYear( int a)
{
    int k=0;
    if(a%4==0 && a%100!=0)
    k=1;
    if(a%4==0 && a%400==0)
    k=1;
    return k;
}
public static int isPalindrome(int a)
{
    int b=a; int rev=0;
    while (a!=0)
    {
        int rem =a%10;
        rev= rev*10 + rem;
        a=a/10;

    }
    if(rev==b)
    return 1;
    else
```

```
    return 0;
}
public static int isArmstrong(int a)
{
    int nodig=0; int b=a; int c=a;
    while (a!=0)
    {

      nodig+=1;
      a/=10;
    }
    int sum=0;
    while(b!=0)
    {
       int rem = b%10;
       sum+= power(rem,nodig);
       b/=10;
    }
    if(sum==c)
    return 1;
    else
    return 0;
}
public static int ArithmeticSequenceSum(int a, int d, int n)
{
    int sum=0;
    sum= a + (n-1)*d;
    return sum;

}
```

```
public static double GeometricSequenceSum(int a, int r)
{

    double sum= a/(1-r);
    return sum;
}
public static int gcd (int a , int b)
 { int flag=1;
   for(int i=1;i<=a||i<=b;i++)
   if(a%i==0 && b%i==0)
   flag =i;
   return flag;

 }
 public static void main(String args[])
 {
  Scanner sc = new Scanner (System.in);
  int x=sc.nextInt();
  int y= sc.nextInt();
  int k =lcm(x,y);
  System.out.println(k);
 }
}
```

Result:

```
160
161   }
162   public static void main(String args[])
163   {
164    Scanner sc = new Scanner (System.in);
165    //int x=sc.nextInt();
166    int y= sc.nextInt();
167    int k =isArmstrong(y);
168    System.out.println(k);
169   }
170  }
171
172
173
174
175
```

```
153
1
```

```
161   }
162   public static void main(String args[])
163   {
164    Scanner sc = new Scanner (System.in);
165    //int x=sc.nextInt();
166    int y= sc.nextInt();
167    int k =isPalindrome(y);
168    System.out.println(k);
169   }
170  }
171
172
173
174
175
```

```
1331
1
```

Note: Here the output 1 represents true or correct.

Q2) Array Problems

1.Linear Search (return an index of element if found otherwise return -1)

2. Reverse the array

3. Find maximum absolute difference.

Code:

```
/*************************************************************************
****

 Name : Snehal Nalawade ; Roll No: 202151160;

*************************************************************************
****/

import java.util.Scanner;

public class Main

{

   public static int linearsearch(int [] a, int k)

   {

      int index=-1;

      for (int i=0; i<a.length;i++)
```

```
    {
        if(a[i]== k)
        index=i;

    }
    return index;

}
public static void reversearray(int [] a)
{
    int [] b = new int[a.length];
    for(int i=0;i<a.length;i++)
    {
        b[i]= a[(a.length)-(i+1)];
    }
    for(int i=0; i<b.length;i++)
    System.out.print(" "+b[i]+" ");

}
public static int  maxabsdiff(int [] a)
{
    int max=a[0]; int min = a[0];
    for (int i=0;i<a.length;i++)
    {
        if(a[i]>max)
        max=a[i];
        if(a[i]<min)
        min=a[i];

    }
    int sum = max-min;
    return sum;
```

```
    }

        public static void main(String[] args) {
                Scanner sc= new Scanner(System.in);
                int [] x= new int[]{1,2,3,4,5,6,7,8,9,99};
                int y = sc.nextInt();
                 int i =linearsearch(x,y);

                 System.out.println(i);
                int  l=  maxabsdiff(x);
                System.out.println(l);
                reversearray(x);

        }
}
```

Result:

```
45
46      public static void main(String[] args) {
47          Scanner sc= new Scanner(System.in);
48          int [] x= new int[]{1,2,3,4,5,6,7,8,9,99};
49          int y = sc.nextInt();
50           int i =linearsearch(x,y);
51           System.out.println(i);
52           int l=  maxabsdiff(x);
53          System.out.println(l);
54          reversearray(x);
55
56      }
57  }
58
59
```

input

```
99
9
98
 99  9  8  7  6  5  4  3  2  1

...Program finished with exit code 0
Press ENTER to exit console.
```

Q3) Matrix Problems

Code:

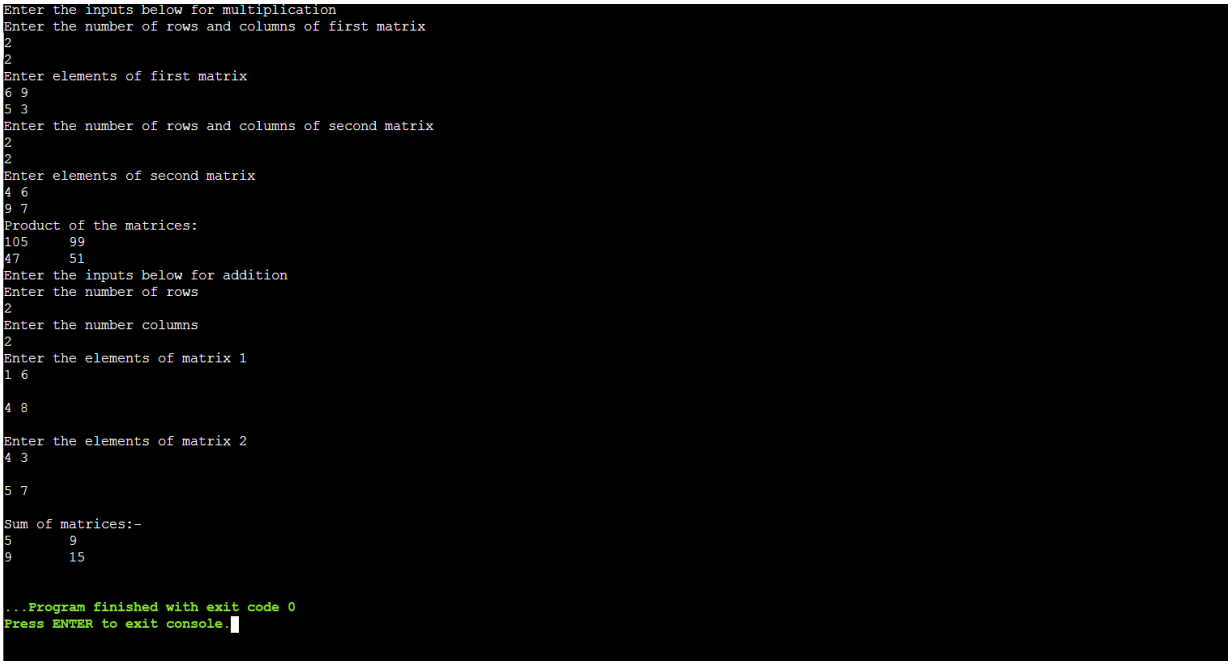
```
/*************************************************************************
****
 Name : Snehal Nalawade ; ROll no : 202151160
*************************************************************************
****/
import java.util.Scanner;

public class Main
{
   public static void addmatrix()
   {
      int row, col,i,j;
Scanner in = new Scanner(System.in);
System.out.println("Enter the inputs below for addition");

System.out.println("Enter the number of rows");
row = in.nextInt();

System.out.println("Enter the number columns");
col = in.nextInt();

int mat1[][] = new int[row][col];
int mat2[][] = new int[row][col];
int res[][] = new int[row][col];

System.out.println("Enter the elements of matrix 1");

for ( i= 0 ; i < row ; i++ )
{

for ( j= 0 ; j < col ;j++ )
```

```
mat1[i][j] = in.nextInt();

System.out.println();
}
System.out.println("Enter the elements of matrix 2");

for ( i= 0 ; i < row ; i++ )
{

for ( j= 0 ; j < col ;j++ )
mat2[i][j] = in.nextInt();

System.out.println();
}

for ( i= 0 ; i < row ; i++ )
for ( j= 0 ; j < col ;j++ )
res[i][j] = mat1[i][j] + mat2[i][j] ;

System.out.println("Sum of matrices:-");

for ( i= 0 ; i < row ; i++ )
{
for ( j= 0 ; j < col ;j++ )
System.out.print(res[i][j]+"\t");

System.out.println();
}


   }

  public static void multiplymatrix()
```

```
{
  int m, n, p, q, sum = 0, c, d, k;

  Scanner sc = new Scanner(System.in);
  System.out.println("Enter the inputs below for multiplication");

  System.out.println("Enter the number of rows and columns of first matrix");
  m = sc.nextInt();
  n = sc.nextInt();
  int first[][] = new int[m][n];

  System.out.println("Enter elements of first matrix");

  for (c = 0; c < m; c++)
    for (d = 0; d < n; d++)
      first[c][d] = sc.nextInt();

  System.out.println("Enter the number of rows and columns of second matrix");
  p = sc.nextInt();
  q = sc.nextInt();

  if (n != p)
    System.out.println("The matrices can't be multiplied with each other.");
  else
  {
    int second[][] = new int[p][q];
    int multiply[][] = new int[m][q];

    System.out.println("Enter elements of second matrix");

    for (c = 0; c < p; c++)
      for (d = 0; d < q; d++)
        second[c][d] = sc.nextInt();
```

```
      for (c = 0; c < m; c++)
      {
        for (d = 0; d < q; d++)
        {
          for (k = 0; k < p; k++)
          {
            sum = sum + first[c][k]*second[k][d];
          }

          multiply[c][d] = sum;
          sum = 0;
        }
      }

      System.out.println("Product of the matrices:");

      for (c = 0; c < m; c++)
      {
        for (d = 0; d < q; d++)
          System.out.print(multiply[c][d]+"\t");

        System.out.print("\n");
      }
    }
  }
  public static void main(String args[])
  {
     multiplymatrix();
     addmatrix();
  }
}
```

Results:



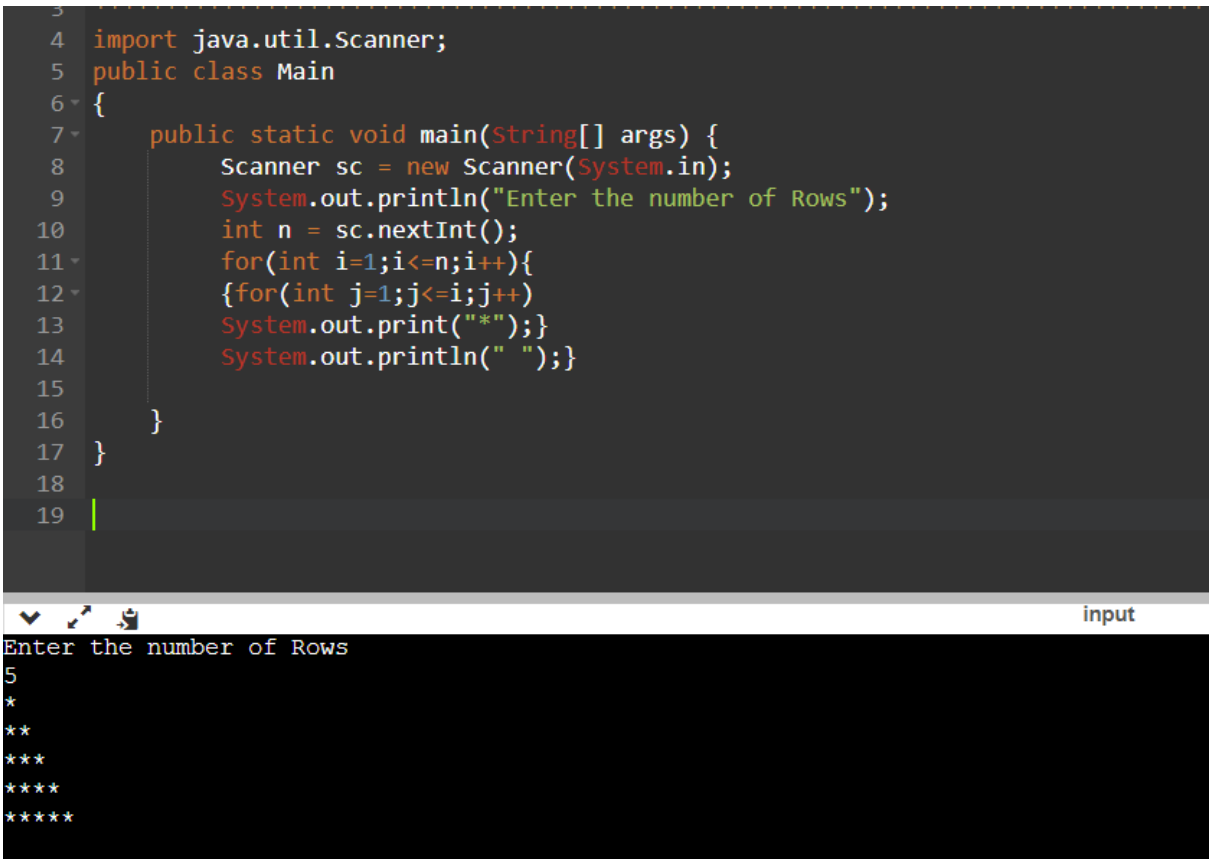
Q4) Pattern

Code:

```
/*************************************************************************
****

 Name : Snehal Nalawade ; Roll No : 202151160

*************************************************************************
****/

import java.util.Scanner;

public class Main
```

```
{
	public static void main(String[] args) {
		Scanner sc = new Scanner(System.in);
		System.out.println("Enter the number of Rows");
		int n = sc.nextInt();
		for(int i=1;i<=n;i++){
		{for(int j=1;j<=i;j++)
		System.out.print("*");}
		System.out.println(" ");}

	}
}
```

Result:



Q5) Strings

Code:

```
/*****************************************************************************
```

```
****
 Name : Snehal Nalawade ; Roll No: 202151160
**********************************************************************************
****/
import java.util.*;
public class Main
{
    static boolean isPalindrome(String s)
   {
      StringBuffer sb=new StringBuffer(s);
      sb.reverse();
      String s1=sb.toString();
      if(s1.equals(s))
      return true;
      return false;
   }
   static boolean  Numeric(String s)
   {
      for(int i=0;i<s.length();i++)
      {
         if(Character.isDigit(s.charAt(i))){
            continue;
         }
         else
         return false;
      }
      return true;
   }
   static boolean checkkEqualString(String s1,String s2)
   {
      if(s1.equals(s2))
      return true;
      return false;
```

```
}
static String sortString(String s)
{
    int l=s.length();
    int arr[]=new int[l];
    for(int i=0;i<l;i++)
    {
        arr[i]=s.charAt(i);
    }
    Arrays.sort(arr);
    String s1="";
    for(int i=0;i<l;i++)
    {
        s1+=(char)arr[i];
    }
    return s1;
}
static boolean checkAnagram(String s1,String s2)
{
    String s3=sortString(s1);
    String s4=sortString(s2);
    if(s3.equals(s4))
    return true;

    return false;
}
static int countCharacters(String s)
{
     int [] arr = new int[128]; Arrays.fill(arr, 0);
    int count=0;
    for(int i=0;i<s.length();i++)
    {
```

```
        char k= s.charAt(i);
        int b= (int)k;
        arr[b]++;
    }
    for(int i=0;i<128;i++)
    {
        if(arr[i]==1)
        count+=1;
    }
    return count;
}
static void conversion(int n)
{
    int temp=n;
    int bin=0,c=0;
    while(temp!=0){
        int rem=temp%2;
        bin=bin+(int)(Math.pow(10,c)*rem);
        c++;
        temp=temp/2;
    }
    System.out.println(bin);
    temp=bin;
    c=0;
    int deci=0;
    while(temp!=0){
        int rem=temp%10;
        deci=deci+(int)(Math.pow(2,c))*rem;
    }
    System.out.println(deci);
}

        public static void main(String[] args)
```

```
        {


        }
}
```

Result:

```
    public static void main(String[] args)
    {
     int k = countCharacters("HELLOWORLD");
     System.out.println(k);
    }
}
```

```
5
```

```
    public static void main(String[] args)
    {
     //int k = ;
     conversion(99);
     //System.out.println(k);
    }
}
```

```
1100011
```

```
    public static void main(String[] args)
    {
     boolean k = checkAnagram("tokyo","kyoto") ;

     System.out.println(k);
    }
}
```

```
true


...Program finished with exit code 0
Press ENTER to exit console.
```

Thank you