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CSE 1007

JAVA Programming

LAB ASSESSMENT - 2

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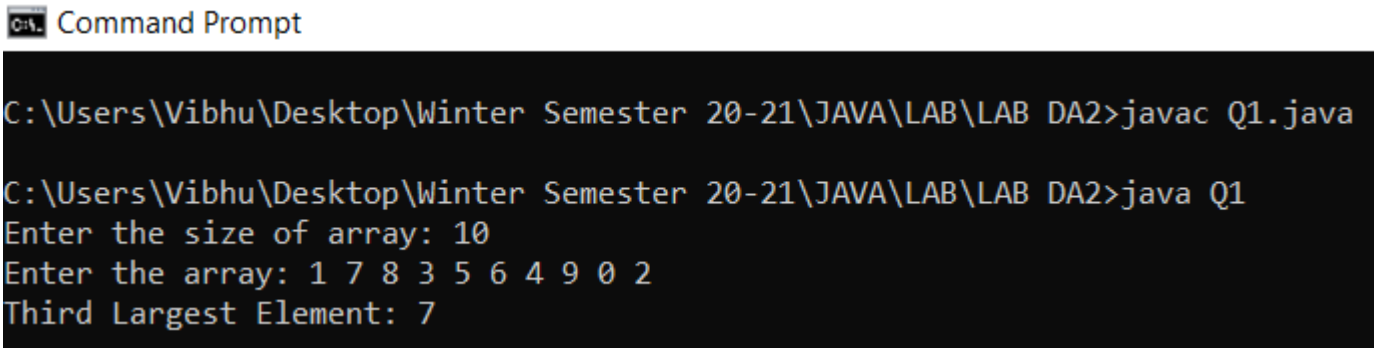
Q1) Write a Java program to print the third largest number in an array.

Ans 1)

CODE:

```
import java.util.Scanner;
public class Q1
{
    public static int getThirdLargest(int[] a, int total)
    {
        int temp;
        for (int i = 0; i < total; i++)
        {
            for (int j = i + 1; j < total; j++)
            {
                if (a[i] > a[j])
                {
                    temp = a[i];
                    a[i] = a[j];
                    a[j] = temp;
                }
            }
        }
    return a[total-3];
    }
    public static void main(String args[])
    {
        System.out.print("Enter the size of array: ");
        int n;
        Scanner s=new Scanner(System.in);
        n=s.nextInt();
        int[] a=new int[n];
        System.out.print("Enter the array: ");
        for(int i=0;i<n;i++)
        {
            a[i]=s.nextInt();
        }
        System.out.println("Third Largest Element: "+getThirdLargest(a,n));
    }
}
```

OUTPUT:



Q2) Read the following details of ‘n’ students using Scanner class methods and display the same.

- **Registration number (String)**
- **Name (String that may contain first name, middle name and last name) .**
- **CGPA (Floating point number)**
- **Programme Name(String)**
- **School Name (String with multiple words)**
- **Proctor Name (String that may contain first, middle and last names).**

Ans 2)

CODE:

```
import java.util.Scanner;

public class Q2
{
    private static final String[] Registration = null;

    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        System.out.println("Input-\n");
        System.out.print("No of students: ");
        int n = sc.nextInt();
        System.out.println("");
        String[] Registration = new String[n];
        String[] Name = new String[n];
        float[] cgpa = new float[n];
        String[] Prog = new String[n];
        String[] School = new String[n];
        String[] Proc = new String[n];
        int i;
        for (i = 0; i < n; i++)
        {
            System.out.println("Enter details of Student["+(i+1)+"]: ");
            System.out.print("Roll No: ");
            Registration[i] = sc.next();
            System.out.print("Name: ");
            Name[i] = sc.next();
            System.out.print("Cgpa: ");
            cgpa[i] = sc.nextFloat();
            System.out.print("Program Name: ");
            Prog[i] = sc.next();
            System.out.print("School Name: ");
            School[i] = sc.next();
            System.out.print("Proctor Name: ");
            Proc[i] = sc.next();
            System.out.print("\n");
        }
        System.out.println("\n\nPrinting-\n");
        for (i = 0; i < n; i++)
        {
            System.out.println("Details of Student["+(i+1)+"]: ");
            System.out.println("Registration number = " + Registration[i]);
            System.out.println("Name = " + Name[i]);
            System.out.println("Cgpa = " + cgpa[i]);
            System.out.println("Program Name = " + Prog[i]);
            System.out.println("School Name = " + School[i]);
            System.out.println("Proctor Name = " + Proc[i]);
```

```
                System.out.print("\n");
            }
        }
    }
```

OUTPUT:

Command Prompt

```
C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>javac Q2.java

C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>java Q2
Input-

No of students: 2

Enter details of Student[1]:
Roll No: 19BCE0215
Name: Vibhu
Cgpa: 9.5
Program Name: CSE(Core)
School Name: SCOPE
Proctor Name: Ruby

Enter details of Student[2]:
Roll No: 19BCI0001
Name: Bhavya
Cgpa: 9.8
Program Name: IT
School Name: SITE
Proctor Name: Anuradha



Printing-

Details of Student[1]:
Registration number = 19BCE0215
Name = Vibhu
Cgpa = 9.5
Program Name = CSE(Core)
School Name = SCOPE
Proctor Name = Ruby

Details of Student[2]:
Registration number = 19BCI0001
Name = Bhavya
Cgpa = 9.8
Program Name = IT
School Name = SITE
Proctor Name = Anuradha
```

Q3) Write a Java program to sort an array of positive integers of a given array, in the sorted array the value of the first element should be maximum, second value should be minimum value, third should be second maximum, fourth second be second minimum and so on.

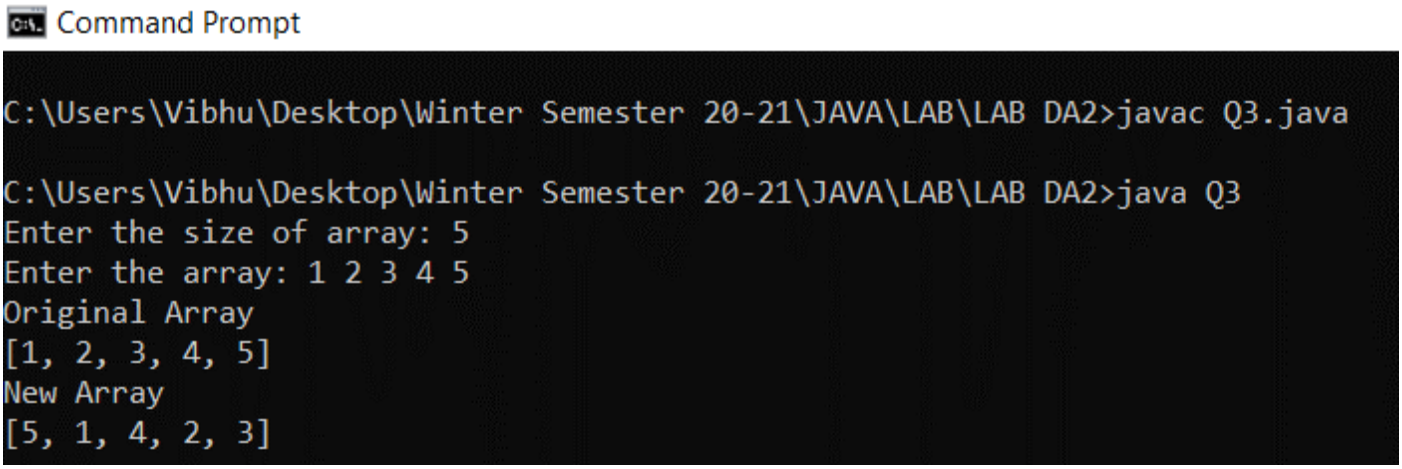
Ans 3)

CODE:

```
import java.util.*;

public class Q3
{
     static int[] rearrange(int[] new_arra, int n)
    {
        int temp[] = new int[n];
        int small_num = 0, large_num = n-1;
        boolean flag = true;
        for (int i=0; i < n; i++)
        {
            if (flag)
                temp[i] = new_arra[large_num--];
            else
                temp[i] = new_arra[small_num++];
            flag = !flag;
        }
        return temp;
    }
    public static void main(String[] args)
    {
        System.out.print("Enter the size of array: ");
        int n;
        Scanner s=new Scanner(System.in);
        n=s.nextInt();
        int[] nums=new int[n];
        System.out.print("Enter the array: ");
        for(int i=0;i<n;i++)
        {
            nums[i]=s.nextInt();
        }
        int result[];
        System.out.println("Original Array ");
        System.out.println(Arrays.toString(nums));
        result = rearrange(nums,nums.length);
        System.out.println("New Array ");
        System.out.println(Arrays.toString(result));

    }
}
```


Vibhu Kumar Singh (19BCE0215)

OUTPUT:



Q4) Write a Java program to separate even and odd numbers of a given array of integers. Put all even numbers first, and then odd numbers.

Ans 4)

CODE:

```
import java.util.*;
public class Q4
{
     public static void main (String[] args)
     {
        // int nums[] = {20, 12, 23, 17, 7, 8, 10, 2, 1, 0};
        System.out.print("Enter the size of array: ");
        int n;
        Scanner s=new Scanner(System.in);
        n=s.nextInt();
        int[] nums=new int[n];
        System.out.print("Enter the array: ");
        for(int i=0;i<n;i++)
        {
            nums[i]=s.nextInt();
        }
        int result[];
        System.out.println("Original Array ");
        System.out.println(Arrays.toString(nums));

        result = separate_odd_even(nums);

        System.out.print("Array after separation ");
        System.out.println(Arrays.toString(result));
    }

    static int [] separate_odd_even(int arr[])
    {
        int left_side = 0, right_side = arr.length - 1;
        while (left_side < right_side)
        {
            while (arr[left_side]%2 == 0 && left_side < right_side)
                left_side++;

            while (arr[right_side]%2 == 1 && left_side < right_side)
```

```
                right_side--;

            if (left_side < right_side)
            {
                int temp = arr[left_side];
                arr[left_side] = arr[right_side];
                arr[right_side] = temp;
                left_side++;
                right_side--;
            }
        }
        return arr;
    }
}
```

OUTPUT:

Command Prompt

```
C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>javac Q4.java

C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>java Q4
Enter the size of array: 6
Enter the array: 1 2 3 4 5 6
Original Array
[1, 2, 3, 4, 5, 6]
Array after separation [6, 2, 4, 3, 5, 1]
```

Q5) Write a Java program to convert a binary number to decimal number and to decimal number to binary number.

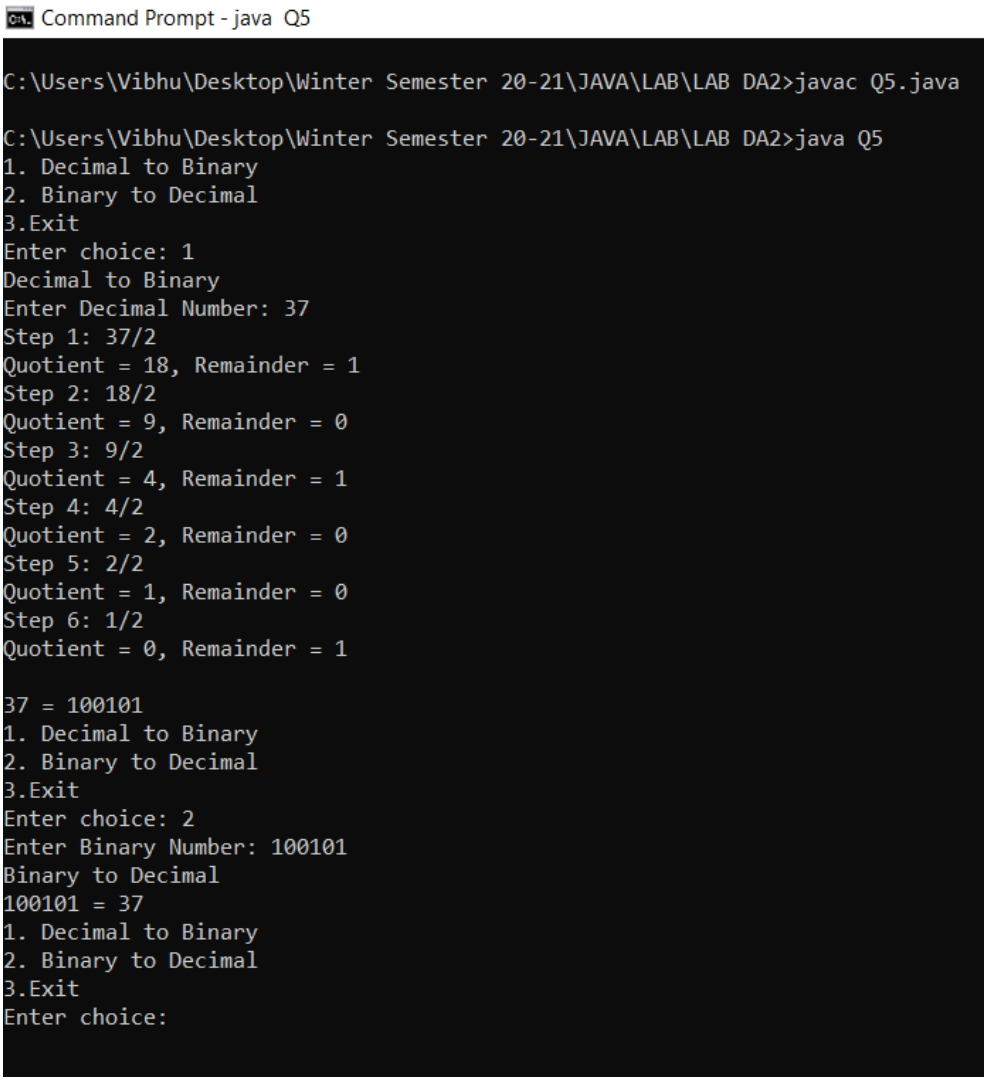
Ans 5)

CODE:

```
import java.util.*;
class Q5
{
    public static void main(String[] args)
    {
        while(true)
        {
            System.out.print("1. Decimal to Binary\n2. Binary to Decimal\n3.Exit\nEn
ter choice: ");
            int n;
            Scanner s=new Scanner(System.in);
            n=s.nextInt();
            switch(n)
            {
                case 1:
                    DecimalToBinary();
                    break;
                case 2:
                    BinaryToDecimal();
                    break;
```

```
                case 3:
                    System.exit(0);
                    break;
            }
        }

    }

    public static void DecimalToBinary()
    {
        int num;
        System.out.println("Decimal to Binary");
        System.out.print("Enter Decimal Number: ");
        Scanner s=new Scanner(System.in);
        num=s.nextInt();
        long binary = convertDecimalToBinary(num);
        System.out.println("\n" + num + " = " + binary);
    }
    public static long convertDecimalToBinary(int n)
    {
        long binaryNumber = 0;
        int remainder, i = 1, step = 1;
        while (n!=0)
        {
            remainder = n % 2;
            System.out.println("Step " + step++ + ": " + n + "/2");
            System.out.println("Quotient = " + n/2 + ", Remainder = " + remainder);
            n /= 2;
            binaryNumber += remainder * i;
            i *= 10;
        }
        return binaryNumber;
    }

    public static void BinaryToDecimal()
    {
        // long num = 110110111;
        System.out.print("Enter Binary Number: ");
        Scanner s=new Scanner(System.in);
        long num = s.nextLong();
        int decimal = convertBinaryToDecimal(num);
        System.out.println("Binary to Decimal");
        System.out.println(num + " = " + decimal);
    }

    public static int convertBinaryToDecimal(long num)
    {
        int decimalNumber = 0, i = 0;
        long remainder;

        while (num != 0)
        {
            remainder = num % 10;
            num /= 10;
            decimalNumber += remainder * Math.pow(2, i);
            ++i;
        }
        return decimalNumber;
    }
}
```

OUTPUT:



Q6) Write a Java program to test if the first and the last element of an array of integers are same. The length of the array must be greater than or equal to 2.

Test Data: array = 50, -20, 0, 30, 40, 60, 10

Sample Output: *False*

Ans 6)

CODE:

```
import java.util.*;
 public class Q6
 {
    public static void main(String[] args)
    {
        System.out.print("Enter the size of array: ");
        int n;
        Scanner s=new Scanner(System.in);
        n=s.nextInt();
```

```
            int[] nums=new int[n];
            System.out.print("Enter the array: ");
            for(int i=0;i<n;i++)
            {
                nums[i]=s.nextInt();
            }
            System.out.println (nums.length >= 2 && nums[0] ==  nums[nums.length-1]);
        }
    }
```

OUTPUT:

Command Prompt

```
C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>javac Q6.java

C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>java Q6
Enter the size of array: 5
Enter the array: 1 0 5 6 1
true
```

Q7) Write a Java program to test if the first and the last element of two array of integers are same. The length of the array must be greater than or equal to 2.

Test Data: array1 = 50, -20, 0, 30, 40, 60, 12 array2 = 45, 20, 10, 20, 30, 50, 11

Sample Output: *False*

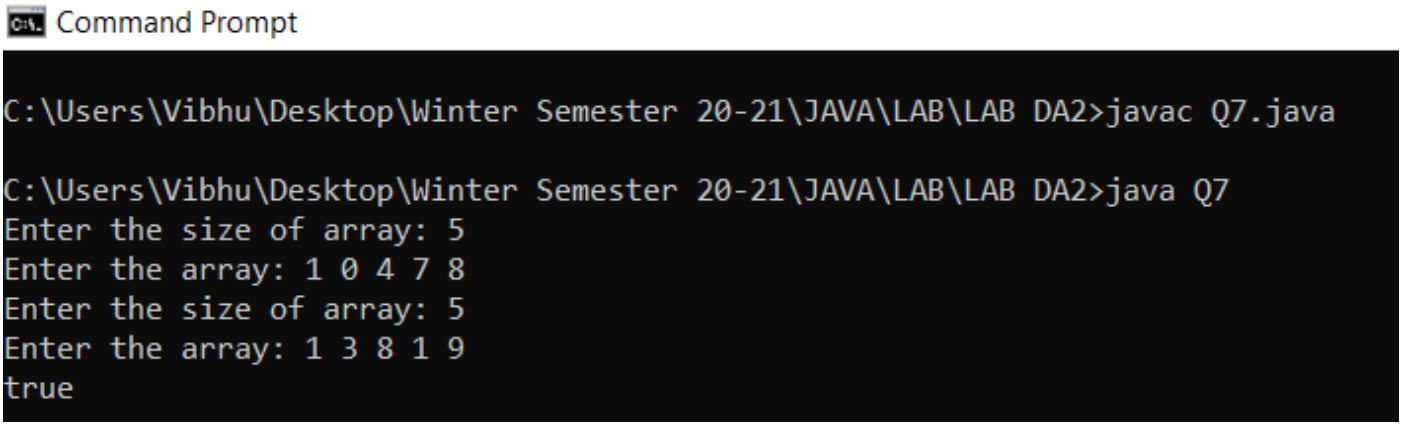
Ans 7)

CODE:

```
import java.util.*;
public class Q7
{
    public static void main(String[] args)
    {
        System.out.print("Enter the size of array: ");
        int n;
        Scanner s=new Scanner(System.in);
        n=s.nextInt();
        int[] num_array1=new int[n];
        System.out.print("Enter the array: ");
        for(int i=0;i<n;i++)
        {
            num_array1[i]=s.nextInt();
        }
        System.out.print("Enter the size of array: ");
        int n1;
        n1=s.nextInt();
        int[] num_array2=new int[n1];
        System.out.print("Enter the array: ");
        for(int i=0;i<n1;i++)
        {
```

```
            num_array2[i]=s.nextInt();
        }
        if(num_array1.length>=2 && num_array2.length>=2)
        {
            System.out.println(num_array1[0] == num_array2[0] || num_array1[num_arra
y1.length-1] == num_array2[num_array2.length-1]);
        }
        else
        {
            System.out.println("Array lengths less than 2.");
        }
    }
}
```

OUTPUT:



Q8) Write a Java program to create a new array of length 2 from two arrays of integers with three elements and the new array will contain the first and last elements from the two arrays

Test Data: array1 = 50, -20, 0
array2 = 5, -50, 10

Sample Output: Array1: [50, -20, 0]
Array2: [5, -50, 10]
New Array: [50, 10]

Ans 8)

CODE:

```
import java.util.Arrays;
public class Q8
{
    public static void main(String[] args)
    {
        int[] array1 = {50, -20, 0};
        int[] array2 = {5, -50, 10};
        System.out.println("Array1: "+Arrays.toString(array1));
        System.out.println("Array2: "+Arrays.toString(array2));
        int[] array_new = {array1[0], array2[2]};
        System.out.println("New Array: "+Arrays.toString(array_new));
    }
```

```
}
```

OUTPUT:

Command Prompt

```
C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>javac Q8.java

C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>java Q8
Array1: [50, -20, 0]
Array2: [5, -50, 10]
New Array: [50, 10]
```

Q9) Write a Java program to test that a given array of integers of length 2 contains a 4 or a 7.

Sample Output: Original Array: [5, 7]
true

Ans 9)

CODE:

```
import java.util.*;
public class Q9
{
    public static void main(String[] args)
    {
        Scanner s=new Scanner(System.in);
        System.out.print("Enter the array: ");
        int [] nums=new int[2];
        for(int i=0;i<2;i++)
        {
            nums[i]=s.nextInt();
        }
        if(nums[0] == 4 || nums[0] == 7)
            System.out.println("True");
        else
        System.out.println(nums[1] == 4 || nums[1] == 7);
    }
}
```

OUTPUT:

Command Prompt

```
C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>javac Q9.java

C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>java Q9
Enter the array: 1 7
true
```

Q10) Write a Java program to rotate an array (length 3) of integers in left direction.

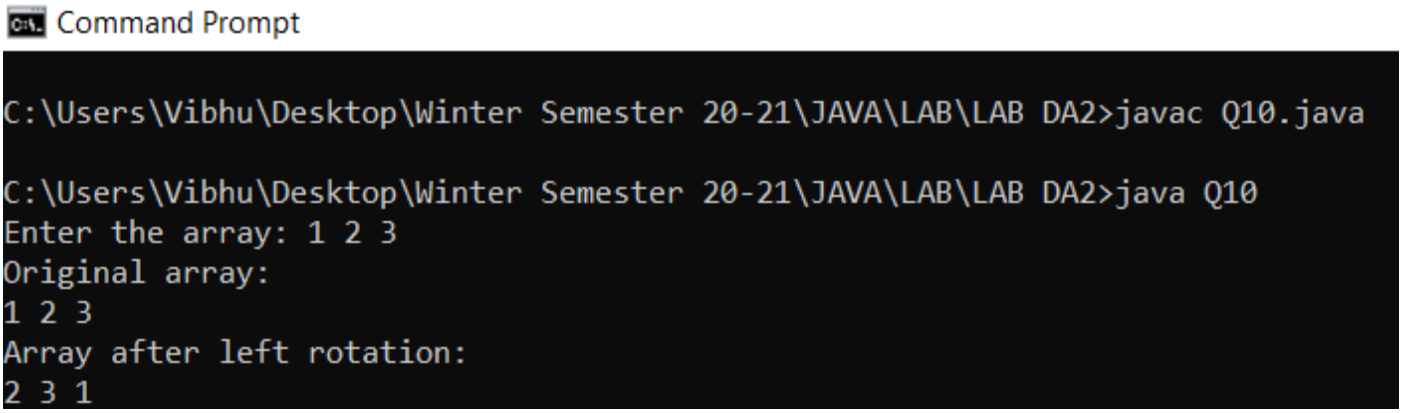
Sample Output: Original Array: [20, 30, 40]
Rotated Array: [30, 40, 20]

Ans 10)

CODE:

```
import java.util.*;
class Q10
{
    public static void main(String[] args)
    {
        Scanner s=new Scanner(System.in);
        int[] arr=new int[3];
        System.out.print("Enter the array: ");
        for(int i=0;i<3;i++)
        {
            arr[i]=s.nextInt();
        }
        // int [] arr = new int [] {1, 2, 3, 4, 5};
        int n = 1;
        System.out.println("Original array: ");
        for (int i = 0; i < arr.length; i++) {
            System.out.print(arr[i] + " ");
        }
        for(int i = 0; i < n; i++)
        {
            int j, first;
            first = arr[0];
            for(j = 0; j < arr.length-1; j++)
            {
                arr[j] = arr[j+1];
            }
            arr[j] = first;
        }
        System.out.println();
        System.out.println("Array after left rotation: ");
        for(int i = 0; i<3; i++)
        {
            System.out.print(arr[i] + " ");
        }
    }
}
```

OUTPUT:



Q11) Write a Java program to get the larger value between first and last element of an array (length 3) of integers.

Sample Output: Original Array: [20, 30, 40]
Larger value between first and last element: 40

Ans 11)

CODE:

```
import java.util.*;
public class Q11
{
    public static void main(String args[])
    {
        Scanner s=new Scanner(System.in);
        int[] arr=new int[3];
        System.out.print("Enter the array: ");
        for(int i=0;i<3;i++)
        {
            arr[i]=s.nextInt();
        }
        if(arr[0]<arr[2])
        {
            System.out.print("Larger value between 1st and last element is: "+arr[2]
);
        }
        else
        {
            System.out.print("Larger value between 1st and last element is: "+arr[0]
);
        }
    }
}
```

OUTPUT:

Command Prompt

```
C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>javac Q11.java

C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>java Q11
Enter the array: 7 27 8
Larger value between 1st and last element is: 8
```

Q12) Write a Java program to swap the first and last elements of an array (length must be at least 1) and create a new array.

Sample Output: Original Array: [20, 30, 40]
New array after swapping the first and last elements: [40, 30, 20]

Ans 12)

CODE:

```
import java.util.*;
public class Q12
{
    public static void main(String args[])
    {
        Scanner s=new Scanner(System.in);
        int[] arr=new int[3];
        System.out.print("Enter the array: ");
        for(int i=0;i<3;i++)
        {
            arr[i]=s.nextInt();
        }
        int temp;
        temp=arr[0];
        arr[0]=arr[2];
        arr[2]=temp;
        System.out.print("Resulting array: ");
        for(int i=0;i<3;i++)
        {
            System.out.print(arr[i]+" ");
        }
    }
}
```

OUTPUT:

Command Prompt

```
C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>javac Q12.java

C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>java Q12
Enter the array: 20 30 40
Resulting array: 40 30 20
```

Q13) Write a Java program to find the largest element between first, last, and middle values from an array of integers (even length).

Sample Output: Original Array: [20, 30, 40, 50, 67]
Largest element between first, last, and middle values: 67

Ans 13)

CODE:

```
import java.util.Arrays;
public class Q13
{
    public static void main(String[] args)
    {
        int[] array_nums = {20, 30, 40, 50, 67};
        System.out.println("Original Array: "+Arrays.toString(array_nums));
        int max_val = array_nums[0];
        if(max_val <= array_nums[array_nums.length-1])
            max_val = array_nums[array_nums.length-1];
        if(max_val <= array_nums[array_nums.length/2])
            max_val = array_nums[array_nums.length/2];
        System.out.println("Largest element between first, last, and middle values:
"+max_val);
    }
}
```

OUTPUT:

Command Prompt

```
C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>javac Q13.java

C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>java Q13
Original Array: [20, 30, 40, 50, 67]
Largest element between first, last, and middle values: 67
```

Q14) Write a Java program to multiply corresponding elements of two arrays of integers.

Sample Output: Array1: [1, 3, -5, 4]
Array2: [1, 4, -5, -2]
Result: 1 12 25 -8

Ans 14)

CODE:

```
import java.util.*;
public class Q14
{
    public static void main(String[] args){
    String result = "";
    int[] left_array = {1, 3, -5, 4};
    int[] right_array = {1, 4, -5, -2};
    System.out.println("\nArray1: "+Arrays.toString(left_array));
```

```
        System.out.println("\nArray2: "+Arrays.toString(right_array));
        for (int i = 0; i < left_array.length; i++)
        {
            int num1 = left_array[i];
            int num2 = right_array[i];
            result += Integer.toString(num1 * num2) + " ";
        }
        System.out.println("\nResult: "+result);
        }
    }
```

OUTPUT:

Command Prompt

```
C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>javac Q14.java

C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>java Q14

Array1: [1, 3, -5, 4]

Array2: [1, 4, -5, -2]

Result: 1 12 25 -8
```

Q15) Write a Java program to add two matrix.

Ans 15)

CODE:

```
import java.util.*;
public class Q15
{
    public static void main(String args[])
    {
        int n,m;
        Scanner s=new Scanner(System.in);
        System.out.print("Matrix Addition:\nEnter the number of rows: ");
        n=s.nextInt();
        System.out.print("Enter the number of columns: ");
        m=s.nextInt();
        int[][] mat1=new int[n][m];
        int[][] mat2=new int[n][m];
        System.out.print("\n\nEnter Matrix[1]: \n");
        for(int i=0;i<n;i++)
        {
            for(int j=0;j<m;j++)
            {
                mat1[i][j]=s.nextInt();
            }
        }
        System.out.print("\n\nEnter Matrix[2]: \n");
        for(int i=0;i<n;i++)
        {
            for(int j=0;j<m;j++)
            {
```

```
                    mat2[i][j]=s.nextInt();
                }
            }
            System.out.print("\nResult:\n");
            for(int i=0;i<n;i++)
            {
                for(int j=0;j<m;j++)
                {
                    System.out.print(mat1[i][j]+mat2[i][j]+" ");
                }
                System.out.println();
            }
        }
    }
```

OUTPUT:

Command Prompt

```
C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>javac Q15.java

C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>java Q15
Matrix Addition:
Enter the number of rows: 2
Enter the number of columns: 2


Enter Matrix[1]:
1 2
3 4


Enter Matrix[2]:
5 6
7 8

Result:
6 8
10 12
```

Q16) Write a Java program to multiply two matrix.

Ans 16)

CODE:

```
import java.util.Scanner;
class Q16
{
   public static void main(String args[])
   {
      int m, n, p, q, sum = 0, c, d, k;
      Scanner in = new Scanner(System.in);
      System.out.println("Enter the number of rows and columns of first matrix");
      m = in.nextInt();
```

```
        n = in.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] = in.nextInt();
        System.out.println("Enter the number of rows and columns of second matrix");
        p = in.nextInt();
        q = in.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] = in.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");
           }
        }
     }
  }
```


Vibhu Kumar Singh (19BCE0215)

OUTPUT:

Command Prompt

```
C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>javac Q16.java

C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>java Q16
Enter the number of rows and columns of first matrix
3 3
Enter elements of first matrix
1 2 3
1 1 1
1 0 3
Enter the number of rows and columns of second matrix
3 3
Enter elements of second matrix
0 1 0
3 2 1
0 0 0
Product of the matrices:
6       5       2
3       3       1
0       1       0
```

Q17) Write a Java program to Calculate diagonal element.

Ans 17)

CODE:

```
import java.util.Scanner;
class Q17
{
    static int MAX = 100;
    static void printPrincipalDiagonal(int mat[][], int n)
    {
        System.out.print("Principal Diagonal: ");
        for (int i = 0; i < n; i++) {
            for (int j = 0; j < n; j++)
            {
                if (i == j) {
                    System.out.print(mat[i][j] + ", ");
                }
            }
        }
        System.out.println("");
    }
    static void printSecondaryDiagonal(int mat[][], int n)
    {
        System.out.print("Secondary Diagonal: ");
        for (int i = 0; i < n; i++) {
            for (int j = 0; j < n; j++)
            {
                if ((i + j) == (n - 1)) {
                    System.out.print(mat[i][j] + ", ");
```

```
                    }
                }
            }
            System.out.println("");
        }
        public static void main(String args[])
        {
            System.out.print("Enter the dimensions of square matrix: ");
            int n;
            Scanner s=new Scanner(System.in);
            n=s.nextInt();
            int[][] a=new int[n][n];
            System.out.print("Enter the matrix: \n");
            for(int i=0;i<n;i++)
            {
                for(int j=0;j<n;j++)
                {
                    a[i][j]=s.nextInt();
                }
            }
            printPrincipalDiagonal(a, n);
            printSecondaryDiagonal(a, n);
        }
    }
```

OUTPUT:

Command Prompt

```
C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>javac Q17.java

C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>java Q17
Enter the dimensions of square matrix: 3
Enter the matrix:
1 2 3
4 5 6
7 8 9
Principal Diagonal: 1, 5, 9,
Secondary Diagonal: 3, 5, 7,
```

Q18) Write a Java Program to print this pattern for n lines:

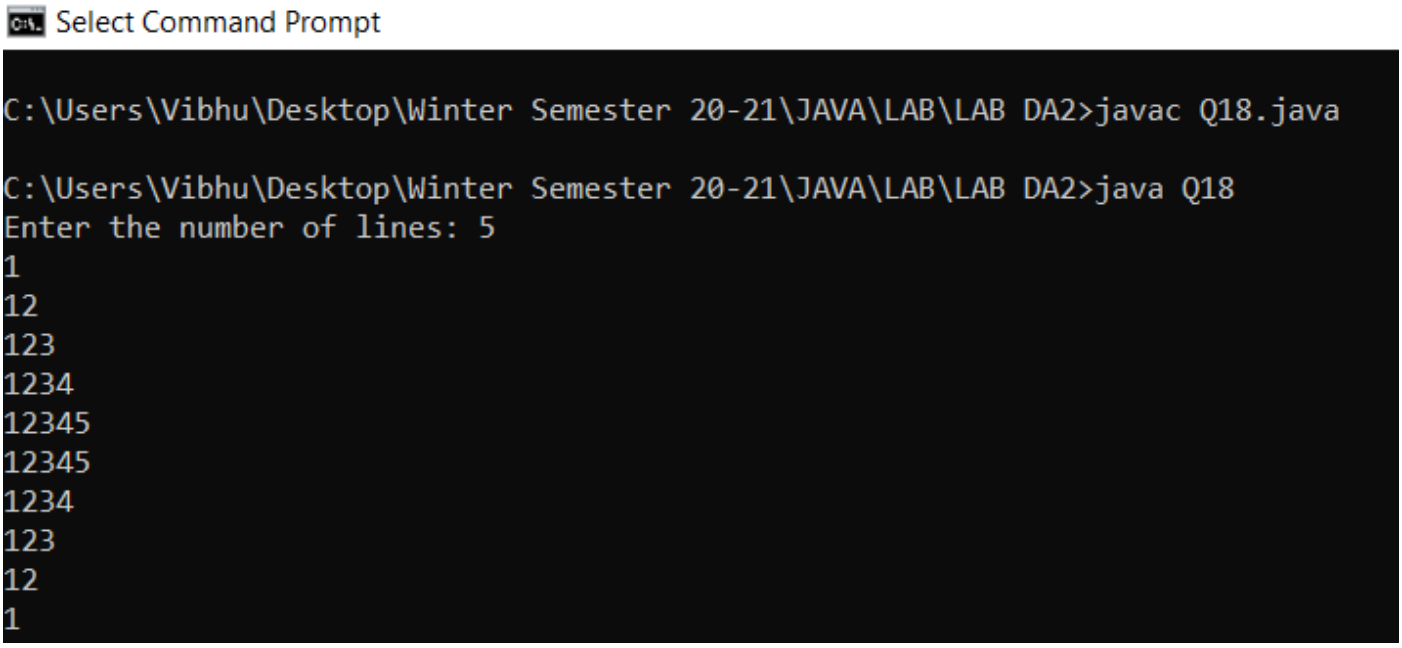
1
12
123
1234
1234
123
12
1

Ans 18)

CODE:

```
import java.util.Scanner;
class Q18
{
   public static void main(String args[])
   {
       Scanner s=new Scanner(System.in);
       System.out.print("Enter the number of lines: ");
       int n;
       n=s.nextInt();
       for(int i=1;i<=n;i++)
       {
           for(int j=1;j<=i;j++)
           {
                System.out.print(j);
           }
           System.out.println();
       }
       for(int i=n;i>=1;i--)
       {
           for(int j=1;j<=i;j++)
           {
                System.out.print(j);
           }
           System.out.println();
       }
   }
}
```

OUTPUT:



Q19) Write a program to demonstrate the knowledge of students in multidimensional arrays and looping constructs. Eg., If there are 4 batches in BTech - "CSE1007" course, read the count of the slow learners (who have scored <25) in each batch. Tutors should be assigned in the ratio of 1:4 (For every 4 slow learners, there should be one tutor). Determine the number of tutors for each batch. Create a 2-D jagged array with 4 rows to store the count of slow learners in the 4 batches. The number of columns in each row should be equal to the number of groups formed for that particular batch (Eg., If there are 23 slow learners in a batch, then there should be 6 tutors and in the jagged array, the corresponding row should store 4, 4, 4, 4, 4,3). Use for-each loop to traverse the array and print the details. Also print the number of batches in which all tutors have exactly 4 students.

Ans 19)

CODE:

```
import java.util.Scanner;
public class Q19
{
    public static void main(String[] args)
    {
        int i, j;
        double t;
        int arr[][] = new int[4][];
        Scanner sc = new Scanner(System.in);
        for(i = 0; i < arr.length; i++){
            System.out.print("Enter number of students for batch " + (i+1) + ": ");
            t = sc.nextDouble();
            arr[i] = new int[(int)Math.ceil(t/4)];
            for(j = 0; j < arr[i].length; j++)
            {
                if(t >= 4)
                    arr[i][j] = 4;
                else
                    arr[i][j] = (int)t;
                t = t - 4;
            }
        }
        sc.close();
        int cfour = 0;
        System.out.println("Contents of 2D Jagged Array");
        for (i = 0; i < arr.length; i++) {
            for (j = 0; j < arr[i].length; j++) {
                System.out.print(arr[i][j] + " ");
                if(arr[i][j] == 4)
                    cfour++;
            }
            System.out.println();
        }
        System.out.println("Number of tutors with 4 students are: " + cfour );
    }
}
```

OUTPUT:

Command Prompt

```
C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>javac Q19.java

C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>java Q19
Enter number of students for batch 1: 23
Enter number of students for batch 2: 6
Enter number of students for batch 3: 14
Enter number of students for batch 4: 7
Contents of 2D Jagged Array
4 4 4 4 4 3
4 2
4 4 4 2
4 3
Number of tutors with 4 students are: 10
```

Q20) There are 12 10 and 8 instructional days for a particular course before CAT-1, CAT-2 and Term-end examinations respectively. Declare a 2-dimensional jagged array with 3 rows to store the entire attendance details of a single student in that course, where in the first row must have 12 elements, second row- 10 elements and third row- 8 elements. Assuming the array elements contain any of the 2 values '1' / '0' denoting Present/Absent, Write a Java program to evaluate the attendance percentage for his CAT-1, CAT-2 and Term-end period (all the three terms taken together). Use enhanced-for loops to traverse the array.

Ans 20)

CODE:

```
import java.util.Scanner;

public class Q20
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        int[][] arr = new int[3][];
        int x = 0, y = 0, z = 0;
        arr[0] = new int[12];
        arr[1] = new int[10];
        arr[2] = new int[8];
        int sum = 0;
        double p;
        System.out.println("CAT 1 attendance:");
        for (int i = 0; i < 12; i++)
        {
            arr[0][i] = sc.nextInt();
            x = x + arr[0][i];
        }
        System.out.println("CAT 2 attendance:");
        for (int i = 0; i < 10; i++) {
```

```
                arr[1][i] = sc.nextInt();
                y = y + arr[1][i];
            }
            System.out.println("term end attendance:");
            for (int i = 0; i < 8; i++)
            {
                arr[2][i] = sc.nextInt();
                z = z + arr[2][i];
            }
            System.out.println("attendence array: ");
            for (int i = 0; i < 3; i++) {
                for (int j = 0; j < arr[i].length; j++)
                {
                    System.out.print(arr[i][j] + " ");
                }
                System.out.print("\n");
            }
            sum =x+y+z;
            p =(double) (sum*100)/30;
            System.out.println("Present day:" +sum);
            System.out.println("Present days percentage: "+p);
        }
    }
```

OUTPUT:

Command Prompt

```
C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>javac Q20.java

C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>java Q20
CAT 1 attendance:
1 0 1 1 0 1 0 1 0 1 1 1
CAT 2 attendance:
1 1 1 1 1 1 1 0 0 0
term end attendance:
1 0 0 1 0 0 1 1
attendence array:
1 0 1 1 0 1 0 1 0 1 1 1
1 1 1 1 1 1 1 0 0 0
1 0 0 1 0 0 1 1
Present day:19
Present days percentage: 63.333333333333336
```

Q21) Write a Java program with class definition for 'Employee' with emp-name, emp-id, salary and joining-date and required methods as members of the class. Create an array of objects of 'emp' for 'n' number of employees in VIT. Write a Java program to display the emp-name and emp-id of employees who have salary less than INR100000 and sort the emp-name and display the Employee details based on salary in ascending order.

Ans 21)

CODE:

```
import java.util.Scanner;
import java.util.Arrays;
class emplo
{
    int salary;
    String name;
    String id;
    String DO;
    emplo(int a, String b,String c,String d)
    {
        this.salary = a;
        this.name =b;
        this.id =c;
        this.DO =d;
    }
    void disp()
    {
        System.out.print("Name: "+name+" id: "+id+" Date of joining: "+DO+" Salary:
"+salary);
        System.out.print("\n");
    }
}

public class Q21
{
    public static void main(String[] args)
    {
        Scanner sc =new Scanner(System.in);
        int n;int m;
        String a;
    String b;
    String c;
    int num=0;
        System.out.println("Number of students: ");
        n =sc.nextInt();
        emplo[] arr =new emplo[n];
        for(int i=0;i<n;i++)
        {
            System.out.println("Employee "+i+1+":");

            System.out.print("Name: ");
            a =sc.next();
            System.out.print("id: ");
            b =sc.next();
            System.out.print("Date of joining: ");
            c =sc.next();
        System.out.print("Salary: ");
            m =sc.nextInt();
```

```
                arr[i] =new emplo(m,a,b,c);
            }
            emplo[] arr2 = new emplo[n];
            for (int i=0;i<n;i++)
            {
                if(arr[i].salary<100000)
                {
                    arr2[num] = arr[i];
                    num++;
                }
            }
            for(int i=0;i<num;i++)
            {
                arr2[i].disp();
            }
        }
    }
```

OUTPUT:

Command Prompt

```
C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>javac Q21.java

C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>java Q21
Number of students:
3
Employee 1:
Name: Vibhu
id: 20201
Date of joining: 12/11/2000
Salary: 50000
Employee 2:
Name: Kumar
id: 20202
Date of joining: 11/3/1999
Salary: 45000
Employee 3:
Name: Singh
id: 20203
Date of joining: 1/1/2005
Salary: 95000
Name: Vibhu id: 20201 Date of joining: 12/11/2000 Salary: 50000
Name: Kumar id: 20202 Date of joining: 11/3/1999 Salary: 45000
Name: Singh id: 20203 Date of joining: 1/1/2005 Salary: 95000
```

Q22) Write a Java program to find the sum of the elements of a two dimensional array of integers and floating point numbers with method overloading.

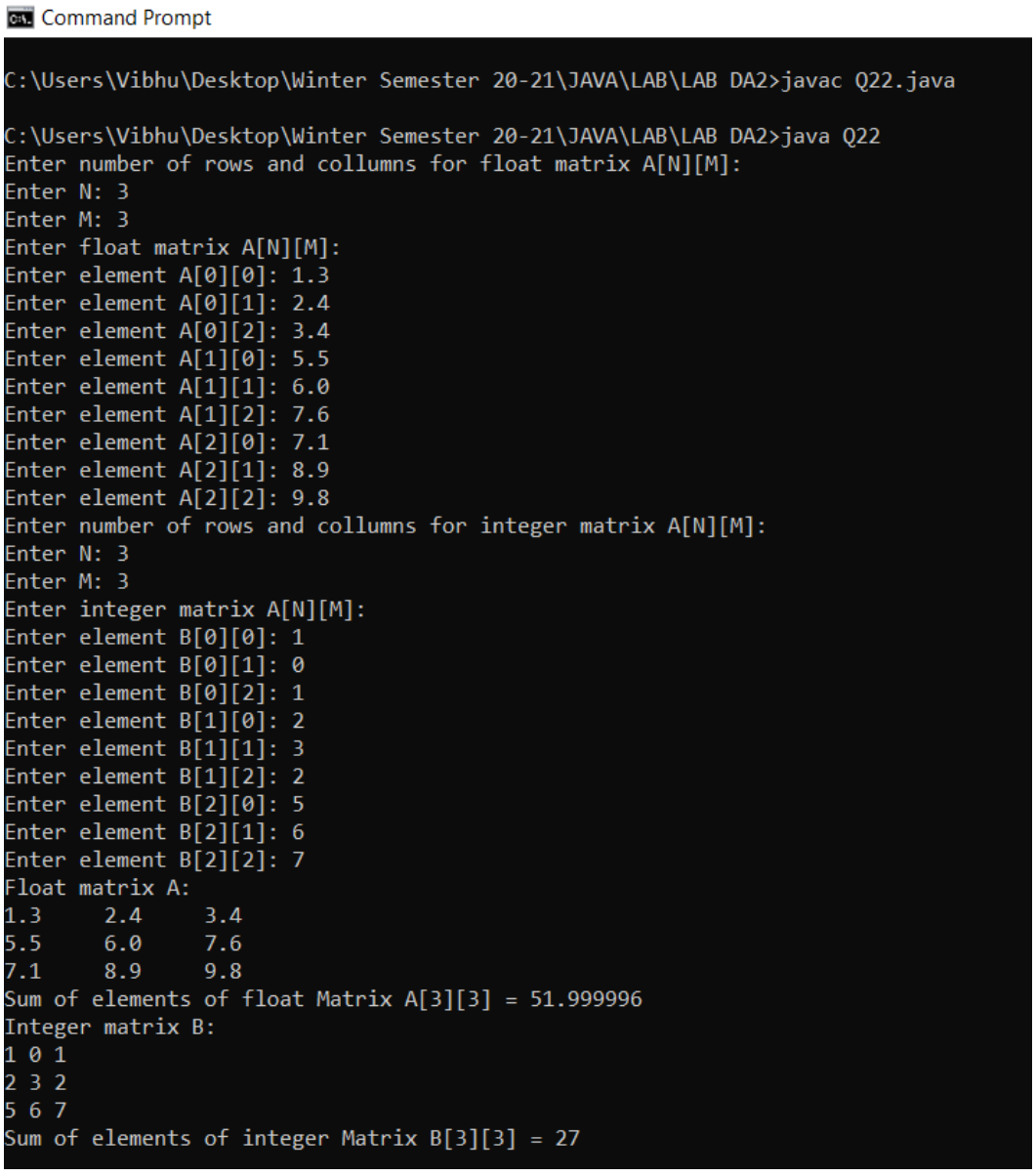
Ans 22)

CODE:

```
import java.util.Scanner;

public class Q22
{
    static int SumOfMatrix(int a[][],int n,int m)
    {
        int sum =0;
        for(int i=0;i<n;i++)
        {
            for(int j=0;j<m;j++)
            {
                sum = sum+a[i][j];
            }
        }
        return sum;
    }
    static float SumOfMatrix(float a[][],int n,int m)
    {
        float sum =0;
        for(int i=0;i<n;i++)
        {
            for(int j=0;j<m;j++)
            {
                sum = sum+a[i][j];
            }
        }
        return sum;
    }
    public static void main(String[] args)
    {
        Scanner sc =new Scanner(System.in);
        int n1,m1;
        System.out.println("Enter number of rows and collumns for float matrix A[N][
M]: ");
        System.out.print("Enter N: ");
        n1 = sc.nextInt();
        System.out.print("Enter M: ");
        m1 = sc.nextInt();
        float[][] A = new float[n1][m1];
        System.out.print("Enter float matrix A[N][M]:\n");
        for(int i=0;i<n1;i++){
            for(int j=0;j<m1;j++){
                System.out.print("Enter element A["+i+"]["+j+"]: ");
                A[i][j] = sc.nextFloat();
            }
        }
        int n2,m2;
        System.out.println("Enter number of rows and collumns for integer matrix A[N
][M]: ");
        System.out.print("Enter N: ");
        n2 = sc.nextInt();
        System.out.print("Enter M: ");
        m2 = sc.nextInt();
```

```
        int[][] B = new int[n2][m2];
        System.out.print("Enter integer matrix A[N][M]:\n");
        for(int i=0;i<n2;i++)
        {
            for(int j=0;j<m2;j++)
            {
                System.out.print("Enter element B["+i+"]["+j+"]: ");
                B[i][j] = sc.nextInt();
            }
        }
        System.out.print("Float matrix A:\n");
        for(int i=0;i<n1;i++){
            for(int j=0;j<m1;j++){
                System.out.print(A[i][j]+"\t");
            }
            System.out.print("\n");
        }
        float x = SumOfMatrix(A,n1,m1);
        System.out.println("Sum of elements of float Matrix A["+n1+"]["+m1+"] = "+x)
;
        System.out.print("Integer matrix B:\n");
        for(int i=0;i<n2;i++)
        {
            for(int j=0;j<m2;j++)
            {
                System.out.print(B[i][j]+" ");
            }
            System.out.print("\n");
        }
        int y = SumOfMatrix(B,n2,m2);
        System.out.println("Sum of elements of integer Matrix B["+n2+"]["+m2+"] = "+
y);
    }
}
```

OUTPUT:



Q23) Consider an example of declaring the examination result. Design three classes: Student, Exam and Result. The Student class has data members such as registration number, name etc. Create a class Exam by inheriting the student class. The Exam class adds data members representing the marks scored in six subjects. Derive class Result from the Exam class and it has own data members such as total_marks. Write an interactive program in Java to model this relationship.

Ans 23)

CODE:

```
import java.util.Scanner;

class Student
{
    String name;
    String reg;
```

```
    void disp()
    {
        System.out.println("NAME: "+name);
        System.out.println("REGISTRATION NUMBER: "+reg);
    }
}
class Exam extends Student
{
    int s1;
    int s2;
    int s3;
    int s4;
    int s5;
    int s6;
    void disp2()
    {
        super.disp();
        System.out.println("Subject1: "+s1);
        System.out.println("Subject2: "+s2);
        System.out.println("Subject3: "+s3);
        System.out.println("Subject4: "+s4);
        System.out.println("Subject5: "+s5);
        System.out.println("Subject6: "+s6);
    }
}
class Result extends Exam
{
    void disp3()
    {
        int t = super.s1+super.s2+super.s3+super.s4+super.s5+super.s6;
        super.disp2();
        System.out.println("Total marks: "+t);
    }
}
public class Q23
{
    public static void main(String[] args)
    {
        Scanner sc = new Scanner(System.in);
        Result A = new Result();
        System.out.print("Name: ");
        A.name = sc.next();
        System.out.print("Reg no: ");
        A.reg = sc.next();
        System.out.print("Marks in Subject1: ");
        A.s1 = sc.nextInt();
        System.out.print("Marks in Subject2: ");
        A.s2 = sc.nextInt();
        System.out.print("Marks in Subject3: ");
        A.s3 = sc.nextInt();
        System.out.print("Marks in subject4: ");
        A.s4 = sc.nextInt();
        System.out.print("Marks in Subject5: ");
        A.s6 = sc.nextInt();
        System.out.print("Marks in Subject6: ");
        A.s5 = sc.nextInt();
        System.out.println("++++++++++++++++++++++++");
        A.disp3();
    }
}
```

OUTPUT:

Command Prompt

```
C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>javac Q23.java

C:\Users\Vibhu\Desktop\Winter Semester 20-21\JAVA\LAB\LAB DA2>java Q23
Name: Vibhu
Reg no: 19BCE0215
Marks in Subject1: 75
Marks in Subject2: 76
Marks in Subject3: 77
Marks in subject4: 78
Marks in Subject5: 79
Marks in Subject6: 80
++++++++++++++++++++++++
NAME: Vibhu
REGISTRATION NUMBER: 19BCE0215
Subject1: 75
Subject2: 76
Subject3: 77
Subject4: 78
Subject5: 80
Subject6: 79
Total marks: 465
```