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CSE 1007

JAVA Programming

DIGITAL ASSIGNMENT - 1

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Arrays

Q1) Havertz has gone shopping with his 5-year old son. They have bought N items so far. The items are numbered from 1 to N, and the item i weighs W_i grams. Havertz's son insists on helping his father in carrying the items. He wants his dad to give him a few items. Havertz does not want to burden his son. But he won't stop bothering him unless he is given a few items to carry. So Havertz decides to give him some items. Obviously, Havertz wants to give the kid less weight to carry. However, his son is a smart kid. To avoid being given the bare minimum weight to carry, he suggests that the items are split into two groups, and one group contains exactly K items. Havertz will carry the heavier group, and his son will carry the other group. Help Havertz in deciding which items should the son take. Your task will be simple. Tell Havertz, the maximum possible difference between the weight carried by him and the weight carried by the kid.

Ans1)

Sample Test Cases:

Test-1:

5 2
8 4 5 2 10

Expected Output:

17

Test-2:

8 3
1 1 1 1 1 1 1 1

Expected Output:

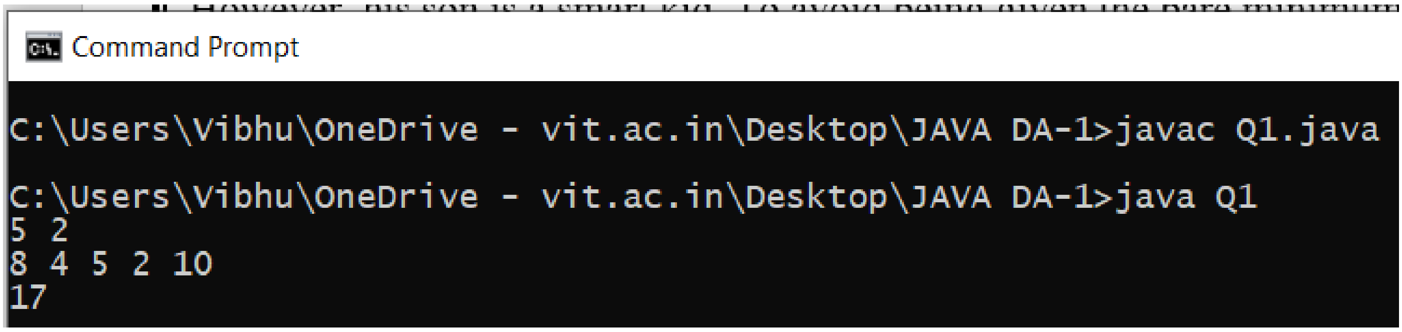
2

Code:

```
import java.util.*;

public class Q1{
    static int sum(int arr[],int end)
    {
        int res=0;
        for(int i=0;i<end;i++)
        {
            res+=arr[i];
        }
        return res;
    }

    static int maxDiff(int w[],int n,int k)
    {
        Arrays.sort(w);
        if(k<=n/2)
        {
            return sum(w,n)-2*sum(w,k);
        }
        return sum(w,n)-2*sum(w,n-k);
    }
    public static void main(String args[]){
            int n,k;
            Scanner s=new Scanner(System.in);
            n=s.nextInt();
            k=s.nextInt();
            int[] w=new int[n];
            for(int i=0;i<n;i++)
            {
                w[i]=s.nextInt();
            }
            System.out.print(maxDiff(w,n,k)+"\n");
    }
}
```

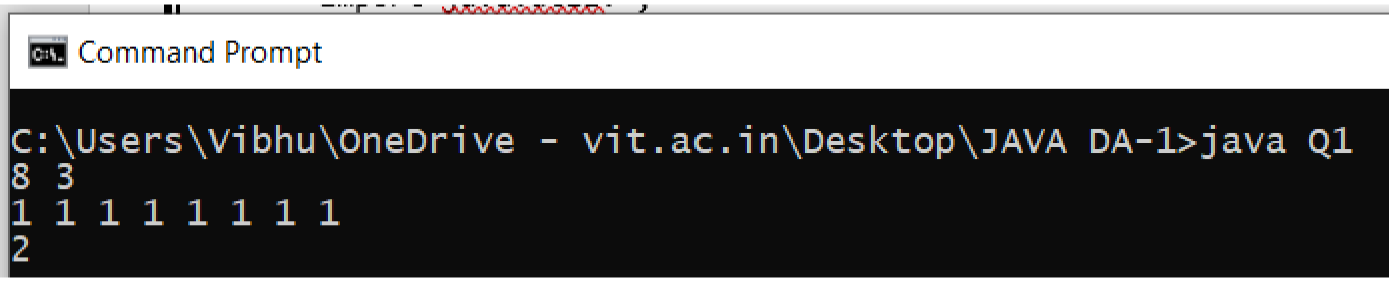
<u>OUTPUT:</u>

Test-1:



```
C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>javac Q1.java

C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>java Q1
5 2
8 4 5 2 10
17
```

Test-2:



```
C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>java Q1
8 3
1 1 1 1 1 1 1 1
2
```

<u>Strings</u>

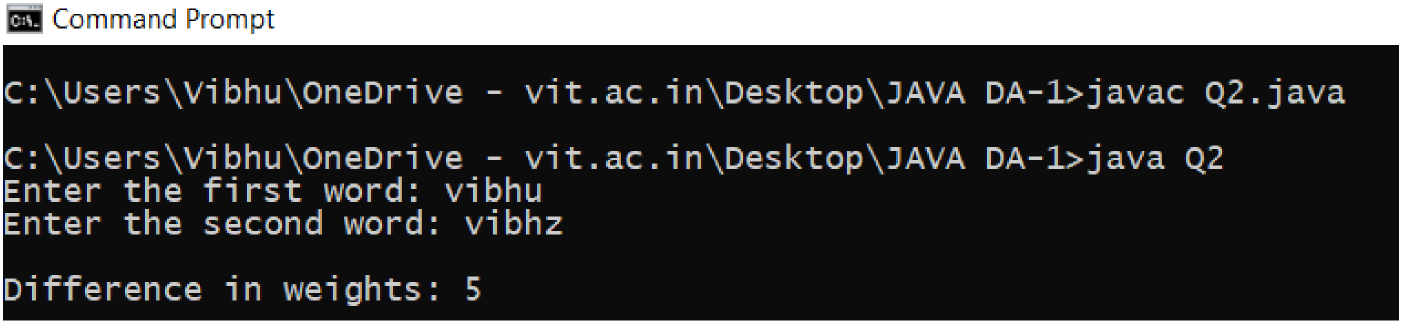
Q2) Let the user input 2 words. Assume that each letter has a value attached to it. This value is based on alphabetical order (a=1, b=2, c=3…). Calculate the word weight by adding the numeric value corresponding to each alphabet. Write a java program to tell how similar two words are based on this word weight.

Ans 2)

<u>Code:</u>

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

public class Q2{

    static int weight(String s1){
        int sum=0;
        for(int i=0;i<s1.length();i++){
            char c=s1.charAt(i);
            sum+=c-'a'+1;
        }
        return sum;
    }
    public static void main(String args[]){
        Scanner s=new Scanner(System.in);
        System.out.print("Enter the first word: ");
        String s1=s.nextLine();
        System.out.print("Enter the second word: ");
        String s2=s.nextLine();
        System.out.println("\nDifference in weights: "+Math.abs(weight(s1
)-weight(s2)));
    }
}
```

OUTPUT:



```
C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>javac Q2.java

C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>java Q2
Enter the first word: vibhu
Enter the second word: vibhz

Difference in weights: 5
```

Inheritance

Q3) Create a class Medicine containing attributes like manufacture date, expiry date, etc which are common to all medicines. Create 2 subclasses of medicine called "HighDoseMedicine" and "MildMedicine" which will inherit from the main class. Give these subclasses attributes that are suitable to their type. Like for Mild Medicine you could give an attribute telling weather it's allopathic or ayurvedic, etc.

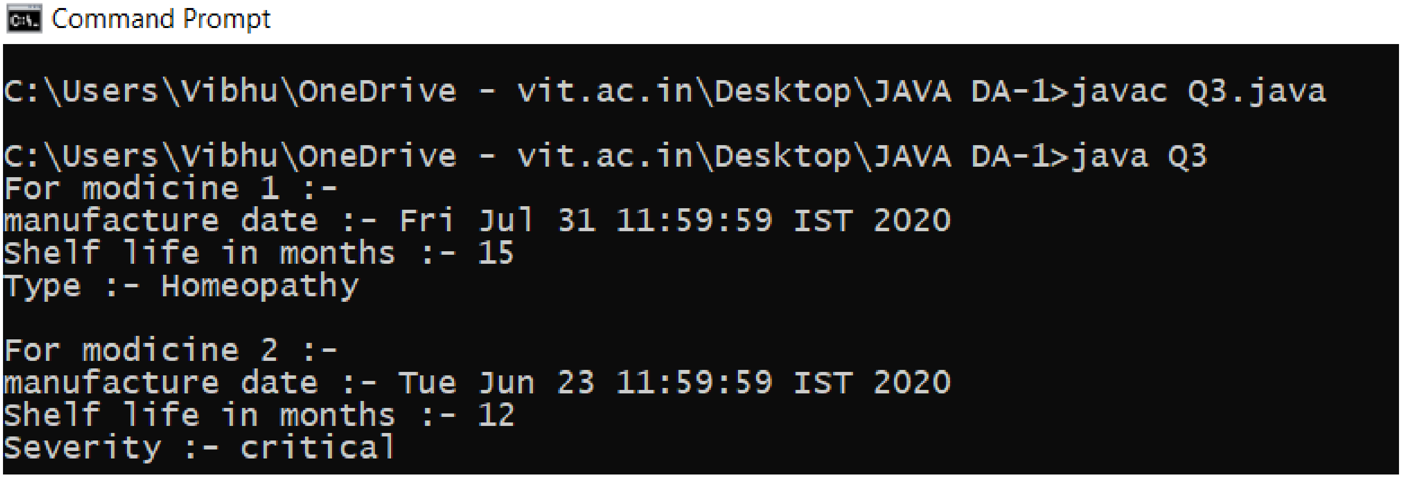
Ans 3)

Sample Test Cases:

Code:

```
import java.util.*;
class Medicine {
    Date manufactureDate;
    int shelfMonthDuration;
}
class MildMedicine extends Medicine{
    String typeMedicine;
    public void setDate(Date manufactureDate){
        this.manufactureDate = manufactureDate;
    }
    public void setDuration(int shelfMonthDuration){
        this.shelfMonthDuration = shelfMonthDuration;
    }
    public void setType(String typeMedicine){
        this.typeMedicine = typeMedicine;
    }
    public void show(){
        System.out.println("manufacture date :- "+manufactureDate);
        System.out.println("Shelf life in months :- "+shelfMonthDuration)
;
        System.out.println("Type :- "+typeMedicine);
    }
}
class HighDoseMedicine extends Medicine{
    String emergencyLevel; // critical,severe,high
    public void setDate(Date manufactureDate){
        this.manufactureDate = manufactureDate;
    }
    public void setDuration(int shelfMonthDuration){
        this.shelfMonthDuration = shelfMonthDuration;
    }
    public void setEmergeny(String emergencyLevel){
        this.emergencyLevel = emergencyLevel;
    }
    public void show(){
        System.out.println("manufacture date :- "+manufactureDate);
        System.out.println("Shelf life in months :- "+shelfMonthDuration)
;
        System.out.println("Severity :- "+emergencyLevel);
    }
}
public class Q3{
    public static void main(String args[]){
        MildMedicine medicine1 = new MildMedicine();
        HighDoseMedicine medicine2 = new HighDoseMedicine();
        Calendar calendar1 = Calendar.getInstance();
        calendar1.set(2020, 06, 29, 59, 59, 59);
        Date date1 = calendar1.getTime();
        medicine1.setDate(date1);
        medicine1.setDuration(15);
        medicine1.setType("Homeopathy");
        Calendar calendar2 = Calendar.getInstance();
        calendar2.set(2020, 05, 21, 59, 59, 59);
        Date date2 = calendar2.getTime();
        medicine2.setDate(date2);
        medicine2.setDuration(12);
        medicine2.setEmergeny("critical");
        System.out.println("For modicine 1 :- ");
        medicine1.show();
        System.out.println("");
        System.out.println("For modicine 2 :- ");
        medicine2.show();
    }
}
```

OUTPUT:



```
C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>javac Q3.java

C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>java Q3
For modicine 1 :-
manufacture date :- Fri Jul 31 11:59:59 IST 2020
Shelf life in months :- 15
Type :- Homeopathy

For modicine 2 :-
manufacture date :- Tue Jun 23 11:59:59 IST 2020
Shelf life in months :- 12
Severity :- critical
```

Interface and Abstract Class

Q4) Create an abstract class "EdenHazard" and write appropriate methods for goals, freekicks, penalties and games in classes Chelsea, Real Madrid and Belgium.

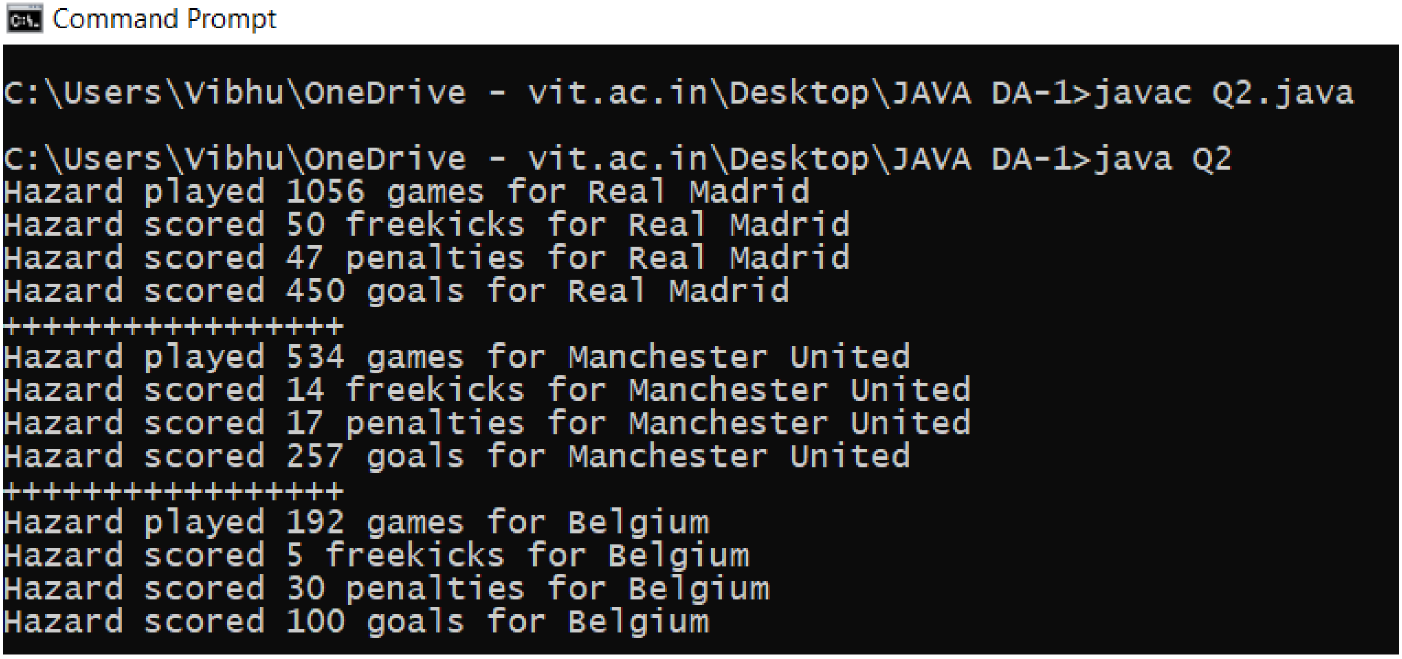
Ans 4)

Code:

```
abstract class EdenHazard{
    abstract void goals();
    abstract void freekicks();
    abstract void penalties();
    abstract void games();
}
class RealMadrid extends EdenHazard{
    int a,b,c,d;
    RealMadrid(int a, int b,int c,int d){
    this.a =a;
    this.b =b;
    this.c =c;
    this.d=d;
    }
    void goals(){
        System.out.println("Hazard scored "+a+" goals for Real Madrid");
    }
    void freekicks(){
        System.out.println("Hazard scored "+b+" freekicks for Real Madrid
");
    }
    void penalties(){
        System.out.println("Hazard scored "+c+" penalties for Real Madrid
");
    }
    void games(){
        System.out.println("Hazard played "+d+" games for Real Madrid");
    }
}
class Chelsea extends EdenHazard{
    int a,b,c,d;
    Chelsea(int a, int b,int c,int d){
    this.a =a;
    this.b =b;
    this.c =c;
    this.d=d;
    }
    void goals(){
        System.out.println("Hazard scored "+a+" goals for Manchester Unit
ed");
    }
    void freekicks(){
        System.out.println("Hazard scored "+b+" freekicks for Manchester 
United");
    }
    void penalties(){
        System.out.println("Hazard scored "+c+" penalties for Manchester 
United");
    }
    void games(){
        System.out.println("Hazard played "+d+" games for Manchester Unit
ed");
    }
}
class Belgium extends EdenHazard{
    int a,b,c,d;
    Belgium(int a, int b,int c,int d){
    this.a =a;
    this.b =b;
    this.c =c;
    this.d=d;
    }
    void goals(){
        System.out.println("Hazard scored "+a+" goals for Belgium");
    }
    void freekicks(){
        System.out.println("Hazard scored "+b+" freekicks for Belgium");
    }
    void penalties(){
        System.out.println("Hazard scored "+c+" penalties for Belgium");
    }
    void games(){
        System.out.println("Hazard played "+d+" games for Belgium");
    }
}
public class Q2 {
    public static void main(String[] args) {
    RealMadrid a1 = new RealMadrid(450, 50, 47, 1056);
    a1.games();
    a1.freekicks();
    a1.penalties();
    a1.goals();
```

```
            System.out.println("+++++++++++++++++");
            Chelsea a2 = new Chelsea(257, 14, 17, 534);
            a2.games();
            a2.freekicks();
            a2.penalties();
            a2.goals();
            System.out.println("+++++++++++++++++");
            Belgium a3 = new Belgium(100, 5, 30, 192);
            a3.games();
            a3.freekicks();
            a3.penalties();
            a3.goals();
            }
        }
```

OUTPUT:



```
C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>javac Q2.java

C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>java Q2
Hazard played 1056 games for Real Madrid
Hazard scored 50 freekicks for Real Madrid
Hazard scored 47 penalties for Real Madrid
Hazard scored 450 goals for Real Madrid
+++++++++++++++++
Hazard played 534 games for Manchester United
Hazard scored 14 freekicks for Manchester United
Hazard scored 17 penalties for Manchester United
Hazard scored 257 goals for Manchester United
+++++++++++++++++
Hazard played 192 games for Belgium
Hazard scored 5 freekicks for Belgium
Hazard scored 30 penalties for Belgium
Hazard scored 100 goals for Belgium
```

Packages

Q5) Create a java package called "MyOffice" which will have different files containing classes for different designations such that all classes inherit from one base class which will have basic properties shared for all employees irrespective of their designation.

Ans 5)

Code:

Employee.java

```
public class Employee {
    int age;
    int salary;
    String Designation;
}
```

President.java

```
public class President extends Employee{
    int age;
    int salary;
    String Designation;
    int numberOfDepartments;
    public void setAge(int age){
        this.age = age;
    }
    public void setSalary(int salary){
        this.salary = salary;
    }
    public void setDesignation(String Designation){
        this.Designation = Designation;
    }
    public void setNumberOfDepartments(int numberOfDepartments){
        this.numberOfDepartments = numberOfDepartments;
    }
    public void show(){
        System.out.println("Age :- "+age);
        System.out.println("Salary :- "+salary);
        System.out.println("Designation :- "+Designation);
        System.out.println("Number of departments :- "+numberOfDepartment
s);
    }
}
```

Manager.java

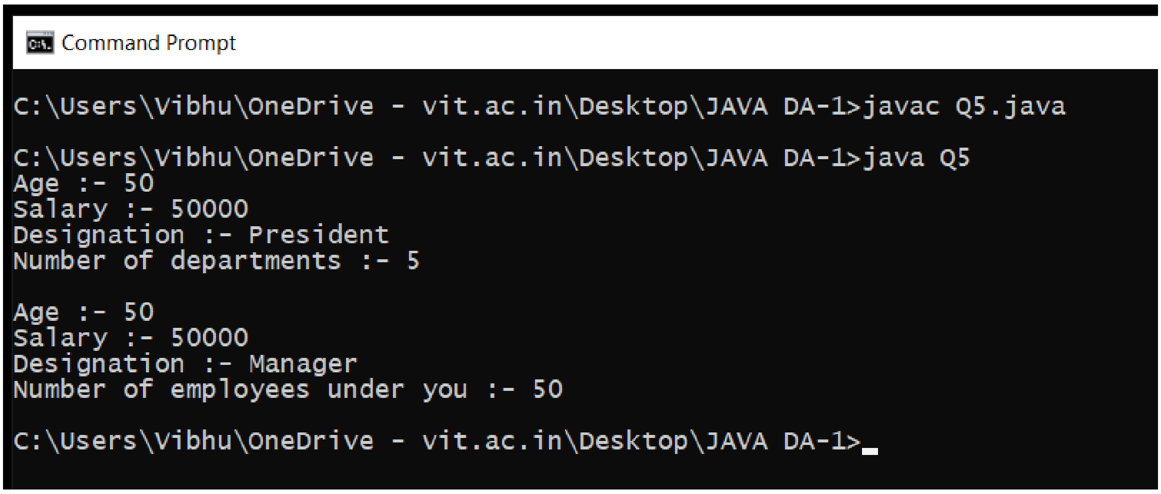
```
public class Manager extends Employee{
    int employeesWorkingUnder;
    public void setAge(int age){
        this.age = age;
    }
    public void setSalary(int salary){
        this.salary = salary;
    }
    public void setDesignation(String Designation){
        this.Designation = Designation;
    }
    public void setEmployeesWorkingUnder(int employeesWorkingUnder){
        this.employeesWorkingUnder = employeesWorkingUnder;
    }
    public void show(){
        System.out.println("Age :- "+age);
        System.out.println("Salary :- "+salary);
        System.out.println("Designation :- "+Designation);
        System.out.println("Number of employees under you :- "+employeesW
orkingUnder);
```

```
    }

}
```

Q5.java

```
public class Q5 {
    public static void main(String[] args) throws Exception{
        President p = new President();
        p.setAge(50);
        p.setDesignation("President");
        p.setSalary(50000);
        p.setNumberOfDepartments(5);
        p.show();
        System.out.println();
        Manager m = new Manager();
        m.setAge(50);
        m.setDesignation("Manager");
        m.setSalary(50000);
        m.setEmployeesWorkingUnder(50);
        m.show();

    }
}
```

<u>OUTPUT:</u>



```
C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>javac Q5.java

C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>java Q5
Age :- 50
Salary :- 50000
Designation :- President
Number of departments :- 5

Age :- 50
Salary :- 50000
Designation :- Manager
Number of employees under you :- 50

C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>
```

<u>User Defined Exception</u>

Q6) Write a Java Program to create a Class AccountDetails that maintains a bank account balance. Its constructors and methods throw a NegativeAmountException if there is an attempt to make the balance negative, deposit a negative amount and withdraw a negative amount. Class AccountDetails supports two constructors- creating a new bank account with an empty balance and creating a new bank account with a positive balance.

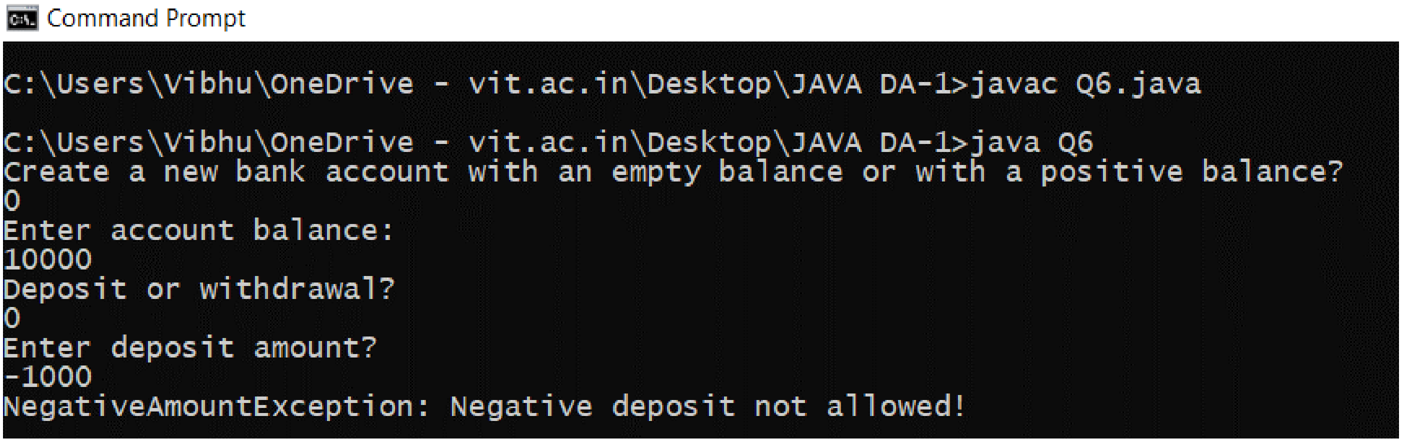
Ans 6)

<u>Code:</u>

```
import java.io.*;
import java.util.*;
class NegativeAmountException extends Exception {
    NegativeAmountException(String s) {
        super(s);
    }
}
public class Q6 {
    int accbal;
    void deposit(int dep)throws NegativeAmountException {
        if (dep < 0)
            throw new NegativeAmountException("Negative deposit not allow
ed!");
            else
            accbal += dep;
        }
        void withdraw(int with)throws NegativeAmountException {
            if (with < 0 || accbal - with < 0)
                throw new NegativeAmountException("Negative withdrawal no
t allowed!");
            else          accbal -= with;
        }
        Q6() {
            accbal = 0;
        }
        Q6(int bal)throws NegativeAmountException  {
            if (bal < 0)
                throw new NegativeAmountException("Negative balance not a
llowed!");
            else
                accbal = bal;
        }
    public static void main(String []args) {
        try {
            Scanner sc = new Scanner(System.in);
            System.out.println("Create a new bank account with an empty b
alance or with a positive balance?");
            int n = sc.nextInt();
            if (n == 1) {
                Q6 acc = new Q6();
                System.out.println("Deposit or withdrawal?");

                int i = sc.nextInt();
                if (i == 0) {
                    System.out.println("Enter deposit amount?");

                    int dep = sc.nextInt();
                    acc.deposit(dep);
                    System.out.println("Balance = " + acc.accbal);

                } else {
```

```
                System.out.println("Enter withdrawal amount?");

                int with = sc.nextInt();
                acc.withdraw(with);
                System.out.println("Balance = " + acc.accbal);

            }
            } else if (n == 0) {
                System.out.println("Enter account balance:");

                int bal = sc.nextInt();
                Q6 acc = new Q6(bal);
                System.out.println("Deposit or withdrawal?");

                int i = sc.nextInt();
                if (i == 0) {
                    System.out.println("Enter deposit amount?");

                    int dep = sc.nextInt();
                    acc.deposit(dep);
                    System.out.println("Balance = " + acc.accbal);

                } else {
                    System.out.println("Enter withdrawal amount?");

                    int with = sc.nextInt();
                    acc.withdraw(with);
                    System.out.println("Balance = " + acc.accbal);

                }
            }
        } catch (NegativeAmountException e) {
            System.out.println(e);
        }
    }
}
```

OUTPUT:



```
C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>javac Q6.java

C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>java Q6
Create a new bank account with an empty balance or with a positive balance?
0
Enter account balance:
10000
Deposit or withdrawal?
0
Enter deposit amount?
-1000
NegativeAmountException: Negative deposit not allowed!
```

Multithreading

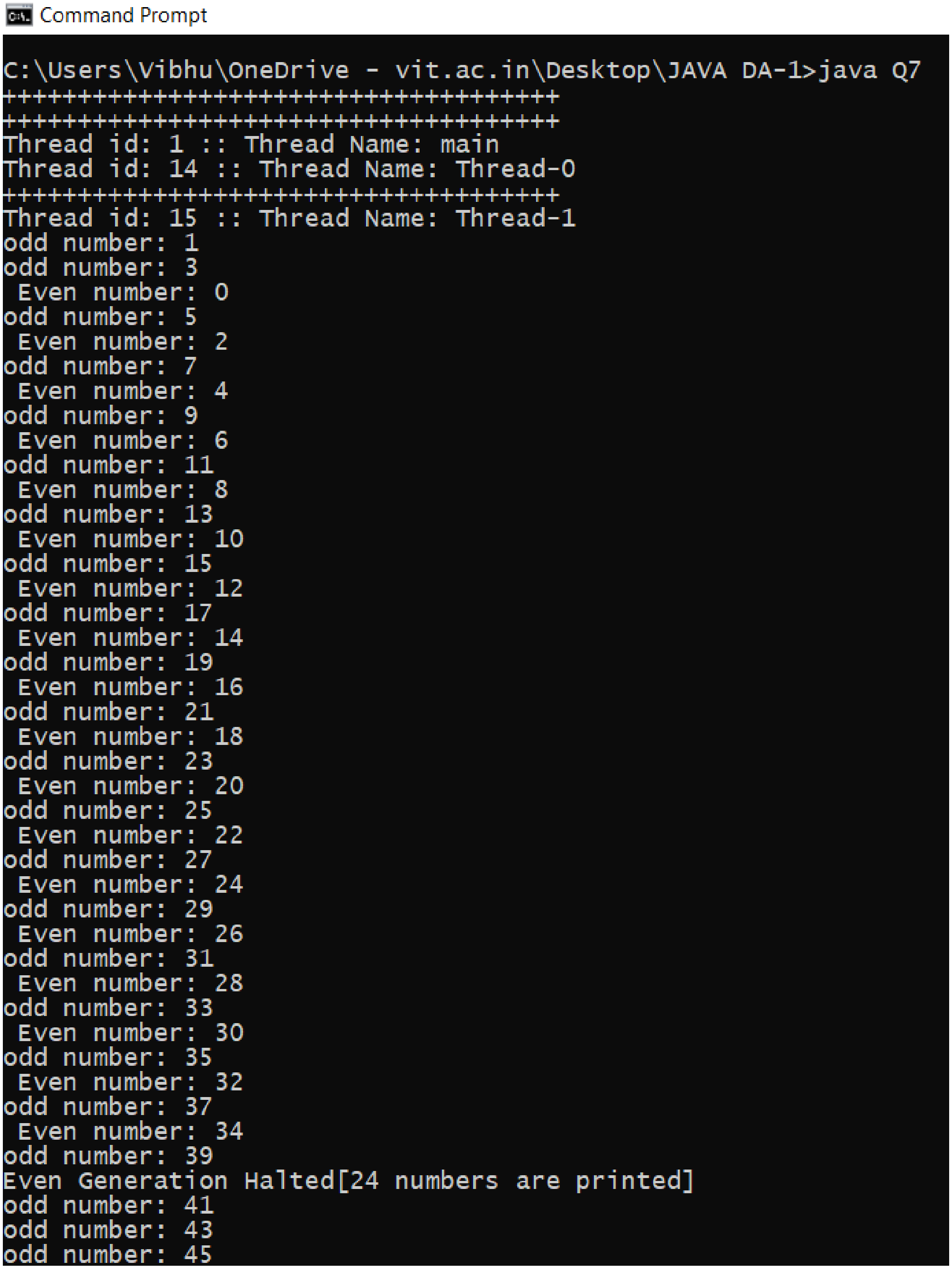
Q7) Write a Java program that creates two threads to print even numbers till 36. After even numbers till 36 have been printed then create a new thread that prints odd numbers from 1 to 45. Print the numbers in such a way that it is visible that which thread is printing those numbers, give thread ID and thread name.

Ans 7)

Code:

```
class Even{
    private int c=0,n=0;
    synchronized void display(){
        for(int i=0;i<=36;i++){
            if(n==36)
            try{
                System.out.println("Even Generation Halted[36 numbers are
 printed]");
                Thread.sleep(5000);
            }catch(InterruptedException e){
                System.out.println("Caught interrupted exception");
            }
            System.out.println(" Even number: "+c);
            c = c+2;
            n= n+2;
        }
    }
}
class Odd{
    int n=1;
    synchronized void display(){
        for(int i=1;i<=45;i= i+2)
        {
            System.out.println("odd number: "+i );
        }
    }
}
class OddThread implements Runnable{
    Thread t;
    Odd p1;
    OddThread(){
        t=new Thread(this);
        t.setPriority(Thread.NORM_PRIORITY);
        t.start();
    }
    static void dispt(){
        Thread t2 = Thread.currentThread();
        System.out.println("+++++++++++++++++++++++++++++++++++++");
        System.out.println("Thread id: "+t2.getId()+" :: Thread Name: "+t
2.getName());
    }
    public void run(){
    p1=new Odd();
    dispt();
    p1.display();
    }
}
class EvenThread implements Runnable{
    Thread t2;
    Even f;
    EvenThread(){
    t2=new Thread(this);
    t2.setPriority(9);
    t2.start();
    dispt();
    }
    static void dispt(){
        Thread t2 = Thread.currentThread();
        System.out.println("+++++++++++++++++++++++++++++++++++++");
        System.out.println("Thread id: "+t2.getId()+" :: Thread Name: "+t
2.getName());
    }
    public void run(){
        f=new Even();
        dispt();
        f.display();
    }
}
class Q7{
    public static void main(String args[]){
        EvenThread ft=new EvenThread();
        OddThread pt=new OddThread();
    }
}
```

OUTPUT:



```
C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>java Q7
+++++++++++++++++++++++++++++++++++++
+++++++++++++++++++++++++++++++++++++
Thread id: 1 :: Thread Name: main
Thread id: 14 :: Thread Name: Thread-0
+++++++++++++++++++++++++++++++++++++
Thread id: 15 :: Thread Name: Thread-1
odd number: 1
odd number: 3
 Even number: 0
odd number: 5
 Even number: 2
odd number: 7
 Even number: 4
odd number: 9
 Even number: 6
odd number: 11
 Even number: 8
odd number: 13
 Even number: 10
odd number: 15
 Even number: 12
odd number: 17
 Even number: 14
odd number: 19
 Even number: 16
odd number: 21
 Even number: 18
odd number: 23
 Even number: 20
odd number: 25
 Even number: 22
odd number: 27
 Even number: 24
odd number: 29
 Even number: 26
odd number: 31
 Even number: 28
odd number: 33
 Even number: 30
odd number: 35
 Even number: 32
odd number: 37
 Even number: 34
odd number: 39
Even Generation Halted[24 numbers are printed]
odd number: 41
odd number: 43
odd number: 45
```

<u>File Handling</u>

Q8) Mason is working in a big firm called 'Big Apple' and you have been assigned a simple task to copy some data from one file to another. But since it is a big IT company and Mason is an intern, he wants to prove himself that he can do this task without opening the files manually, rather, he decides that he will write a Java Program to automate the job for him. Help Mason do his job in order to impress his boss and coworkers at 'Big Apple'.

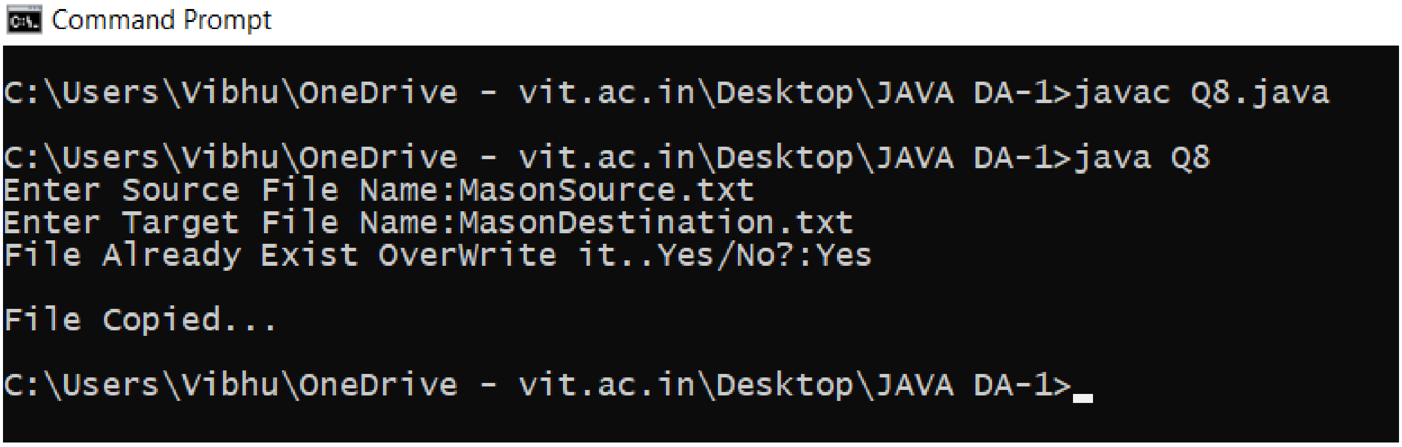
Ans 8)

<u>Code:</u>

```
import java.io.File;
import java.io.FileInputStream;
import java.io.FileOutputStream;
import java.io.IOException;
import java.util.Scanner;
```

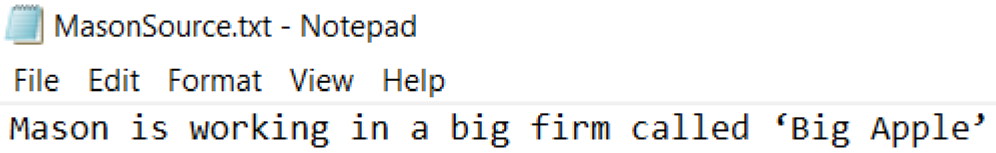
```
public class Q8 {

    public static void main(String[] args) {
        try
        {
            boolean create=true;
            Scanner KB=new Scanner(System.in);

            System.out.print("Enter Source File Name:");
            String sfilename=KB.next();
            File srcfile=new File(sfilename);
            if(!srcfile.exists())
            {
                System.out.println("File Not Found..");
            }
            else
            {
                FileInputStream FI=new FileInputStream(sfilename);
                System.out.print("Enter Target File Name:");
                String tfilename=KB.next();
                File tfile=new File(tfilename);
                if(tfile.exists())
                {
                    System.out.print("File Already Exist OverWrite it..Ye
s/No?:");
                    String confirm=KB.next();
                    if(confirm.equalsIgnoreCase("yes"))
                    {
                        create=true;
                    }
                    else
                    {
                        create=false;
                    }
                }
                if(create)
                {
                    FileOutputStream FO=new FileOutputStream(tfilename);
                    int b;
                    //read content and write in another file
                    while((b=FI.read())!=-1)
                    {
                        FO.write(b);
                    }
                    System.out.println("\nFile Copied...");
                }
                FI.close();
            }
        }
        catch(IOException e)
        {
            System.out.println(e);
        }
    }
}
```

OUTPUT:



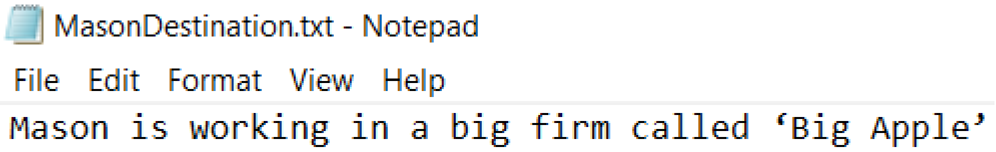
```
C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>javac Q8.java

C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>java Q8
Enter Source File Name:MasonSource.txt
Enter Target File Name:MasonDestination.txt
File Already Exist OverWrite it..Yes/No?:Yes

File Copied...

C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>_
```

MasonSouce.txt



```
Mason is working in a big firm called ‘Big Apple’
```

MasonDestination.txt



```
Mason is working in a big firm called ‘Big Apple’
```

List/Map/Set

Q9) Eden is teaching Java course on MS Teams. There are N students attending the course, numbered 1 through N. Before each lesson, Eden has to take attendance, i.e. call out the names of students one by one and mark which students are present. Each student has a first name and a last name. In order to save time, Eden wants to call out only the first names of students. However, whenever there are multiple students with the same first name, Eden has to call out the full names (both first and last names) of all these students. For each student that does not share the first name with any other student, Eden may still call out only this student's first name. Help Eden decide, for each student, whether he will call out this student's full name or only the first name.

Ans 9)

Sample Test Case:

Input:

1
4
hasan jaddouh

```
farhod khakimiyon
kerim kochekov
hasan khateeb
```

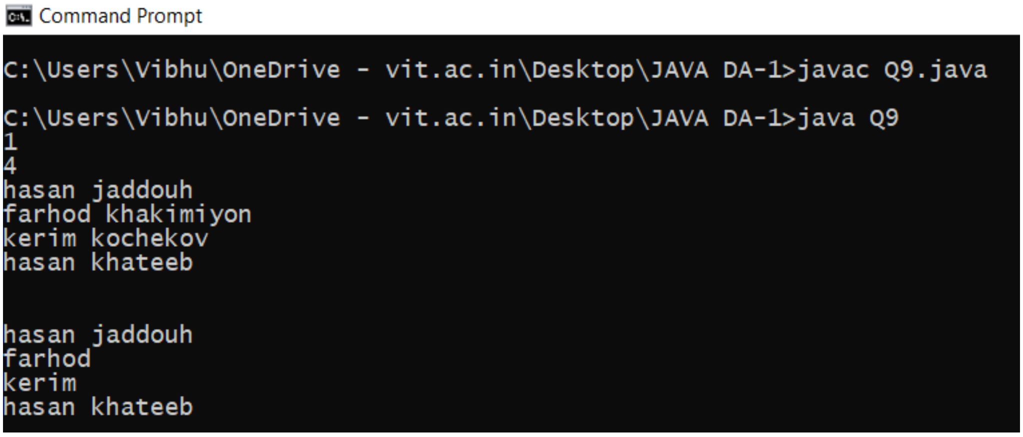
Expected Output:

```
hasan jaddouh
farhod
kerim
hasan khateeb
```

Code:

```
import java.util.*;

/* Name of the class has to be "Main" only if the class is public. */
class Person{
    String firstName;
    String lastName;
    public String getFirstName() {
        return firstName;
    }
    public void setFirstName(String firstName) {
        this.firstName = firstName;
    }
    public String getLastName() {
        return lastName;
    }
    public void setLastName(String lastName) {
        this.lastName = lastName;
    }
    public Person(String firstName, String lastName) {
        super();
        this.firstName = firstName;
        this.lastName = lastName;
    }

}
class Q9
{

    public static void main (String[] args) throws java.lang.Exception
    {

        Scanner sc = new Scanner(System.in);
        Integer T = sc.nextInt();// 1
        while (T-- > 0) {
            Integer N = sc.nextInt();// 4
            Map<String, Integer> frequencymap = new HashMap<String, Integ
er>();
            List<Person> list = new ArrayList<Person>();
            while (N-- > 0) {
                String firstName = sc.next();
                String lastName = sc.next();
                Person p = new Person(firstName, lastName);
                list.add(p);
            }
            for(Person p : list) {
                frequencymap.put(p.getFirstName(), frequencymap.getOrDefa
ult(p.getFirstName(),0)+1);
            }
            System.out.println("\n");
            for(Person p : list) {
                if(frequencymap.get(p.getFirstName())>1) {
                    System.out.println(p.getFirstName()+ " "+ p.getLastNa
me());
                }
                else {
                    System.out.println(p.getFirstName());
                }
            }
        }


    }
}
```

OUTPUT:



```
C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>javac Q9.java

C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>java Q9
1
4
hasan jaddouh
farhod khakimiyon
kerim kochekov
hasan khateeb


hasan jaddouh
farhod
kerim
hasan khateeb
```

Q10) Vibhu is learning Statistics, and he wants his fundamentals to be strong. But he is facing difficulty in preparing the Frequency Distribution table because as a beginner it is difficult for him to handle too much data. Vibhu wants you to help him in the preparation of the Frequency Distribution table for the raw data provided.

Ans 10)

<u>Sample Test Case:</u>

Input:

1

5

1 2 3 2 1

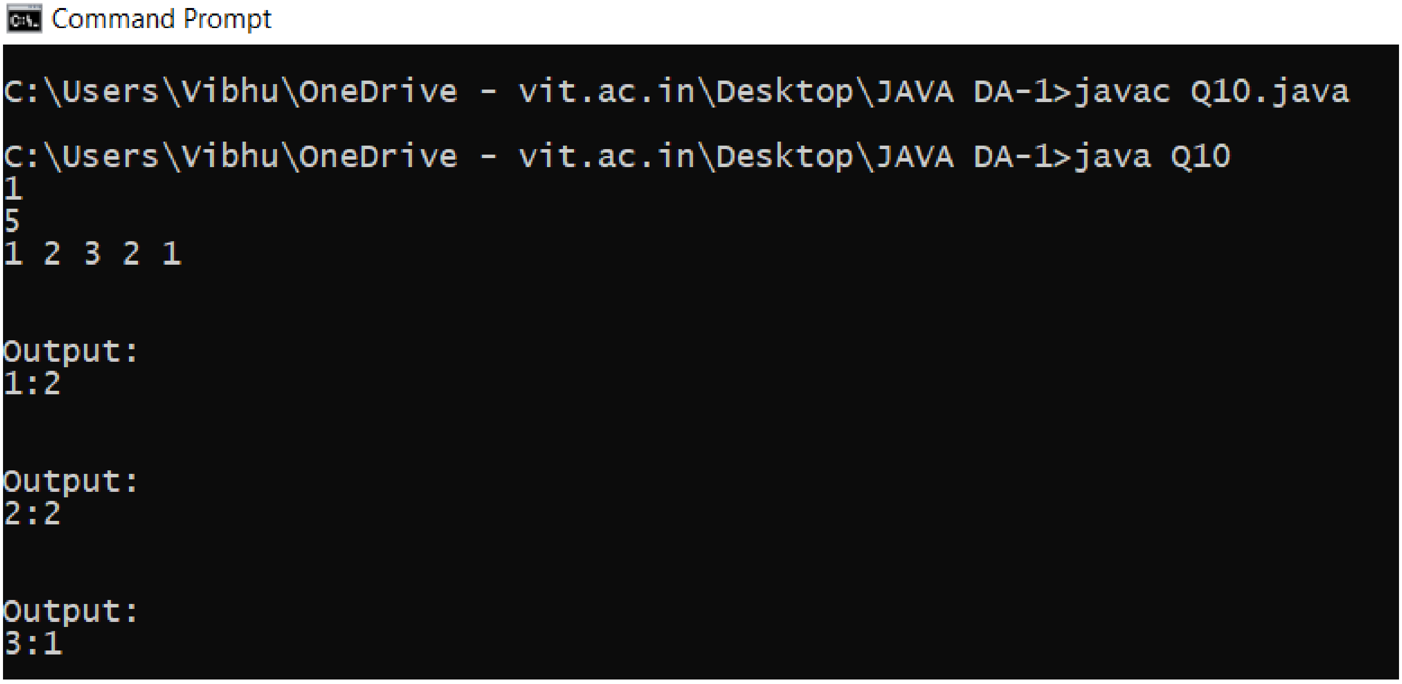
Expected Output:

1:2
2:2
3:1

Code:

```
import java.util.*;

 class Q10 {
    public static void main(String[] args)throws Exception{
        Scanner sc=new Scanner(System.in);
        int t=sc.nextInt();
        while(t-->0){
            TreeMap<Long,Integer> tm=new TreeMap<Long,Integer>();
            int n=sc.nextInt();
            for(int i=0;i<n;i++){
                long x=sc.nextLong();
                if(tm.containsKey(x))
                    tm.put(x,tm.get(x)+1);
                else tm.put(x,1);
            }
            Set<Map.Entry<Long,Integer>> s=tm.entrySet();
            Iterator<Map.Entry<Long,Integer>> itr=s.iterator();
            while(itr.hasNext()){
                Map.Entry<Long,Integer>m= (Map.Entry<Long,Integer>)itr.ne
xt();
                System.out.println("\n\nOutput:\n"+m.getKey()+":"+m.getVa
lue());
            }
        }
    }
}
```

OUTPUT:



```
C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>javac Q10.java

C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>java Q10
1
5
1 2 3 2 1


Output:
1:2


Output:
2:2


Output:
3:1
```

Q11) Tom has quarrelled with Jerry recently. Now he doesn't want to have anything in common with him! Recently, they've received two collections of positive integers. Help Tom to identify the integers that are common with Jerry, so that he can throw them out. Write a Java program to output the minimum number of integers needed to be thrown away by Tom.

Ans 11)

<u>Sample Test Case:</u>

Input:

```
2
3 4
1 2 3
3 4 5 6
3 3
1 2 3
4 5 6
```

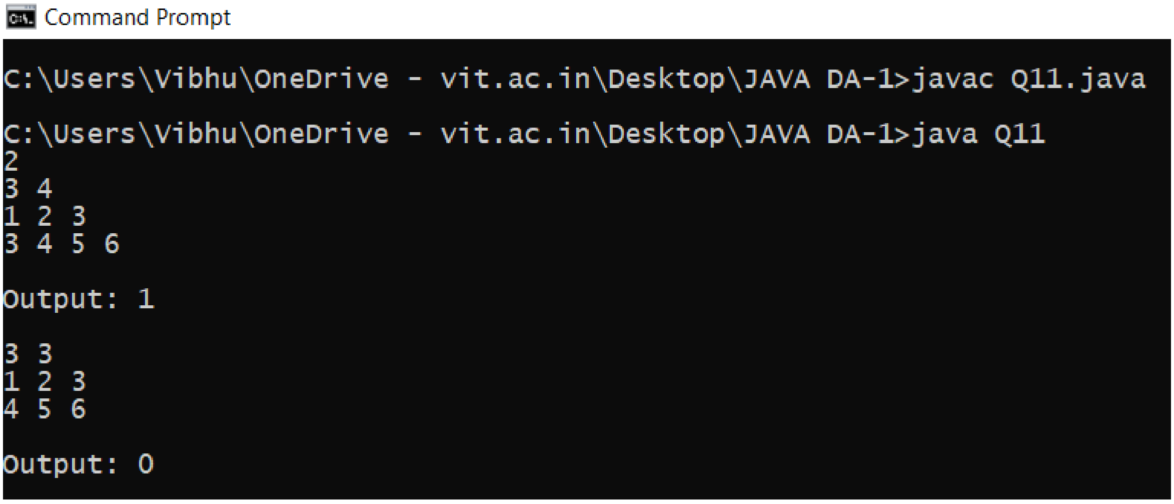
Expected Output:

```
1
0
```

<u>Code:</u>

```
import java.util.*;

class Q11
{
    public static void main (String[] args) throws java.lang.Exception
    {
        Scanner sc = new Scanner(System.in);
        int t = sc.nextInt();

        for(int c = 0; c<t; c++)
        {
            int N = sc.nextInt();
            int M = sc.nextInt();
            int arr1[] = new int[N];
            int arr2[] = new int[M];
            int count = 0;

            for(int i = 0; i<N; i++)
            {
                arr1[i] = sc.nextInt();
            }

            for(int i = 0; i<M; i++)
            {
                arr2[i] = sc.nextInt();
            }

            Arrays.sort(arr1);
            Arrays.sort(arr2);
            int i = 0,j = 0;

            while(i<N && j<M)
            {
                    if(arr1[i]<arr2[j])
                    {
                        i++;
                    }
                    else if(arr2[j]<arr1[i])
                    {
                        j++;
                    }
                    else
                    {
                        count++;
                        i++;
                        j++;
                    }
            }
            System.out.println("\n"+"Output: "+count+"\n");
        }
    }
}
```

OUTPUT:



```
C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>javac Q11.java

C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>java Q11
2
3 4
1 2 3
3 4 5 6

Output: 1

3 3
1 2 3
4 5 6

Output: 0
```

Generic Java class

Q12) Using method overloading write a function that calculates the area as well as volume of:

i) Cuboid

ii) Cylinder

iii) Cylinder

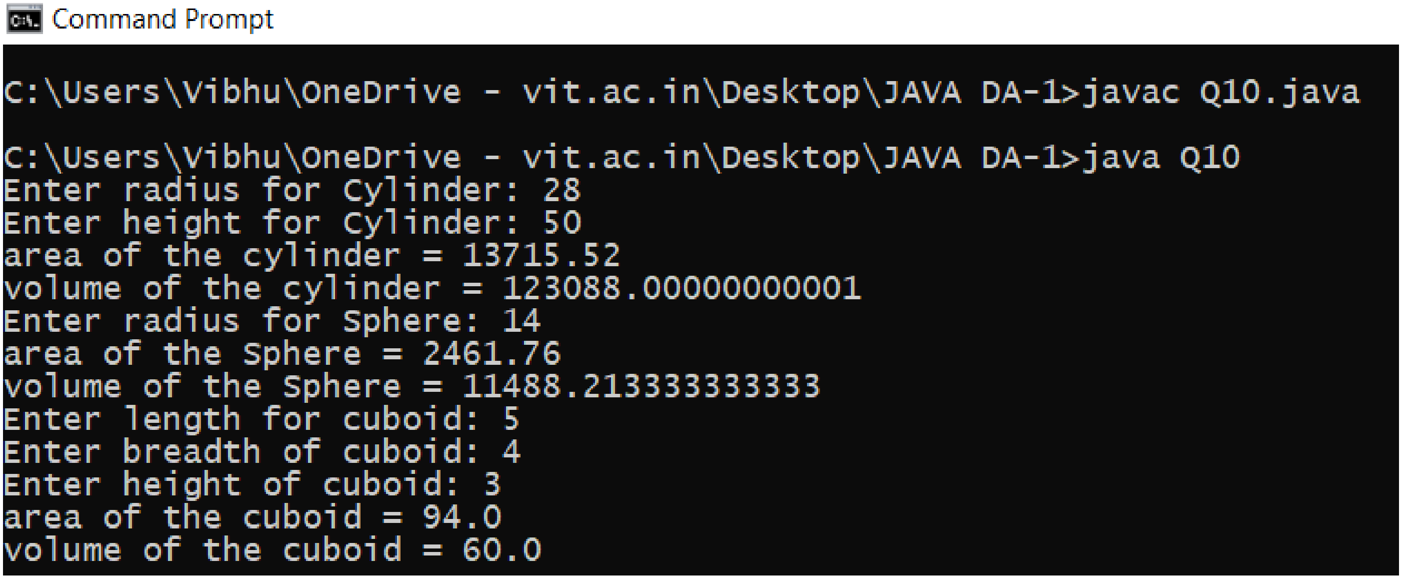
Create classes for each of the geometric shape which will store its attributes.

Ans 12)

Code:

```
import java.lang.invoke.VolatileCallSite;
import java.util.Scanner;
class Polymorphism{
    static double Area(double r , double h)
    {
        return 3.14*2*r*(r+h);
    }
    static double Area(double r){
        return 4*3.14*r*r;
    }
    static double Area(double l , double b, double h){
        return 2*(l*b+b*h+h*l);
    }
    static double Volume(double r, double h){
        return 3.14*r*r*h;
    }
    static double Volume(double r){
        return 4*3.14*r*r*r/3;
    }
    static double Volume(double l, double b, double h){
        return l*b*h;
    }
}
public class Q10 {
    static Scanner sc =new Scanner(System.in);
    static void display(double r, String a, String b){
        System.out.println(a+ " of the "+b+" = "+r);
    }
    public static void main(String[] args) {
        Polymorphism a1 = new Polymorphism();
        Polymorphism a2 = new Polymorphism();
        Polymorphism a3 = new Polymorphism();
        System.out.print("Enter radius for Cylinder: ");
        double r = sc.nextDouble();
        System.out.print("Enter height for Cylinder: ");
        double h = sc.nextDouble();
        double a;
        a = a1.Area(r,h);
        double v = a1.Volume(r, h);
        display(a, "area", "cylinder");
        display(v, "volume", "cylinder");
        System.out.print("Enter radius for Sphere: ");
        r = sc.nextDouble();
        a = a2.Area(r);
        v = a2.Volume(r);
        display(a, "area", "Sphere");
        display(v, "volume", "Sphere");
        System.out.print("Enter length for cuboid: ");
        double l = sc.nextDouble();
        System.out.print("Enter breadth of cuboid: ");
        double b = sc.nextDouble();
        System.out.print("Enter height of cuboid: ");
        h = sc.nextDouble();
        a = a2.Area(l,b,h);
        v = a2.Volume(l,b,h);
        display(a, "area", "cuboid");
        display(v, "volume", "cuboid");
    }
}
```

OUTPUT:



Command Prompt

```
C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>javac Q10.java

C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>java Q10
Enter radius for Cylinder: 28
Enter height for Cylinder: 50
area of the cylinder = 13715.52
volume of the cylinder = 123088.00000000001
Enter radius for Sphere: 14
area of the Sphere = 2461.76
volume of the Sphere = 11488.213333333333
Enter length for cuboid: 5
Enter breadth of cuboid: 4
Enter height of cuboid: 3
area of the cuboid = 94.0
volume of the cuboid = 60.0
```

Polymorphism

Q13) Write a java code that implements a functional interface that prints out that "Your pizza has been delivered" for your Pizza delivery app using the following 3 ways:

(i) Using Polymorphism

(ii) Using anonymous class implementation

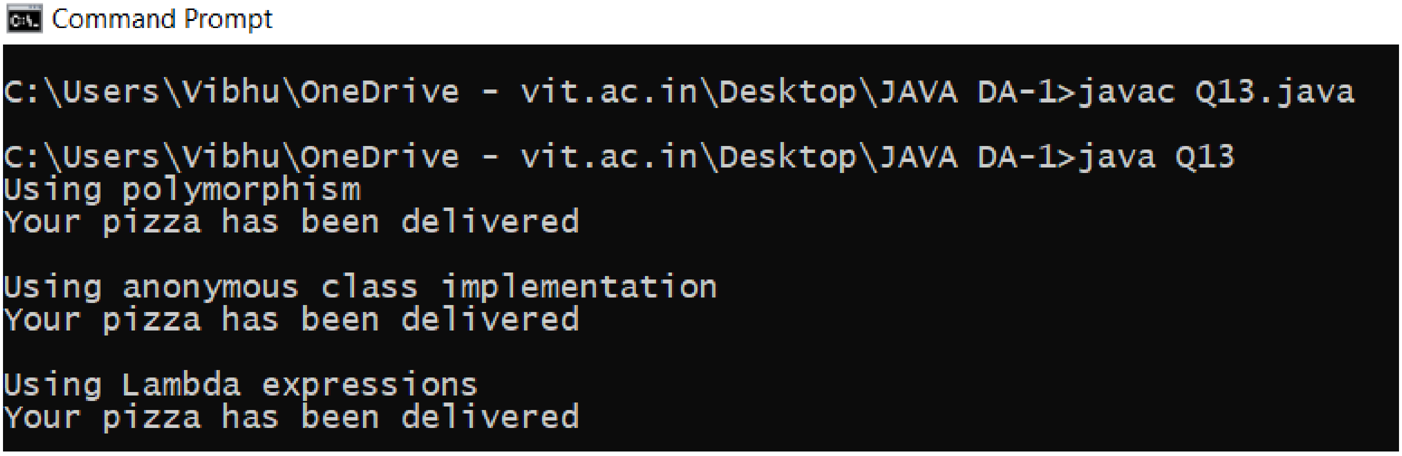
(iii) Using lambda expressions

Ans 13)

Code:

```
@FunctionalInterface
interface Pizza{
    void deliveryMessage();
}
class PizzaDelivery implements Pizza{
    public void deliveryMessage(){
        System.out.println("Your pizza has been delivered");
    }
}
public class Q13 {
public static void main(String[] args) {
    Pizza pizza = new PizzaDelivery(); // Polymorphic statement
    System.out.println("Using polymorphism");
    pizza.deliveryMessage();
    // Anonymous class implementation
    Pizza pizza1 = new Pizza(){
        @Override
        public void deliveryMessage(){
            System.out.println("Your pizza has been delivered");
        }
    };
    System.out.println("\nUsing anonymous class implementation");
    pizza1.deliveryMessage();
    // Using Lambda expressions
    Pizza pizza2 = () -> {
        System.out.println("Your pizza has been delivered");
    };
    System.out.println("\nUsing Lambda expressions");
    pizza2.deliveryMessage();
    }
}
```

OUTPUT:



```
C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>javac Q13.java

C:\Users\Vibhu\OneDrive - vit.ac.in\Desktop\JAVA DA-1>java Q13
Using polymorphism
Your pizza has been delivered

Using anonymous class implementation
Your pizza has been delivered

Using Lambda expressions
Your pizza has been delivered
```

JavaFX

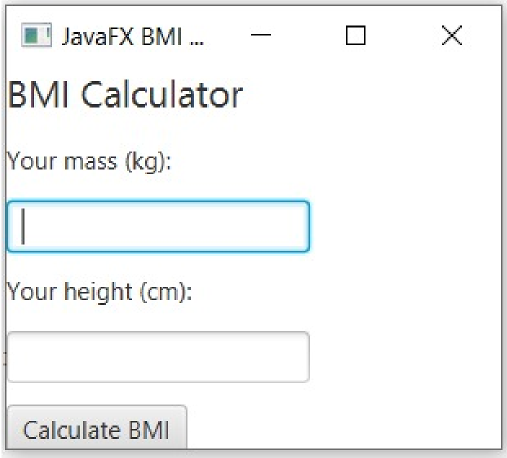
Q14) Rahul is a HR representative at a big corporate company, he is given a task to conduct a health checkup of all the workers in the company. But instead of doing all the work manually, he decides to make a JavaFX application to automate his task. Help Rahul to make a JavaFX program to calculate BMI of the workers.

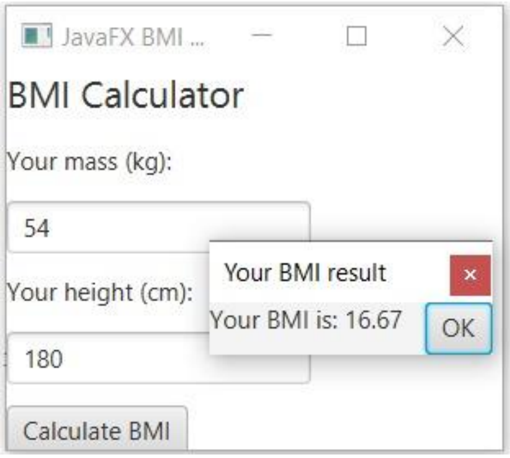
Ans 14)

Code:

```
import javafx.application.Application;
import javafx.event.ActionEvent;
import javafx.event.EventHandler;
import javafx.scene.Group;
import javafx.scene.Scene;
import javafx.scene.control.Button;
import javafx.scene.control.Label;
import javafx.scene.control.TextField;
import javafx.scene.layout.VBox;
import javafx.scene.text.Font;
import javafx.stage.Stage;
import javafx.geometry.Pos;
import javafx.scene.layout.HBox;
import javafx.stage.Modality;
import javafx.stage.StageStyle;

public class BMICalculatorFX extends Application {

    private Stage stage;
    private final TextField txtMass = new TextField();
    private final TextField txtHeight = new TextField();
    private final Button btnCalc = new Button("Calculate BMI");


    @Override
    public void start(Stage stage) throws Exception {
        this.stage = stage;

        VBox vbox = new VBox(10);

        Label lblTitle = new Label("BMI Calculator");
        lblTitle.setFont(Font.font(18));
        vbox.getChildren().add(lblTitle);

        vbox.getChildren().add(new Label("Your mass (kg):"));
        vbox.getChildren().add(txtMass);

        vbox.getChildren().add(new Label("Your height (cm):"));
        vbox.getChildren().add(txtHeight);

        vbox.getChildren().add(btnCalc);

        btnCalc.setOnAction(new EventHandler<ActionEvent>() {
            @Override
            public void handle(ActionEvent ev) {
                double mass;
                double height;
                try {
                    mass = Double.parseDouble(txtMass.getText());
                    height = Double.parseDouble(txtHeight.getText());
                } catch (NumberFormatException e) {
                    showMessage("Check your input.", "Error in number inp
ut");
                    return;
                }
                double result = calculateBMI(mass, height);
                showMessage("Your BMI is: " +
                    (Math.round(result*100.0)/100.0), "Your BMI result");
            }
        });

        Scene scene = new Scene(new Group(vbox));
        stage.setTitle("JavaFX BMI Calculator");
        stage.setScene(scene);
        stage.sizeToScene();
        stage.show();
    }

    protected double calculateBMI(double mass, double height) {
        return mass / Math.pow(height/100.0, 2.0);
    }


    public static void main(String[] args) {
        Application.launch(args);
    }

    public void showMessage(final String message, final String title) {
        final Stage dialog = new Stage(StageStyle.UTILITY);
        dialog.setTitle(title);
        dialog.setResizable(false);
        dialog.initModality(Modality.WINDOW_MODAL);
        dialog.initOwner(this.stage);

        VBox vbox = new VBox(2);
        HBox pane = new HBox(10);

        dialog.setScene(new Scene(vbox));
        vbox.setAlignment(Pos.CENTER);

        vbox.getChildren().add(pane);
        pane.getChildren().add(new Label(message));
        Button btn = new Button("OK");
        btn.setOnAction(new EventHandler<ActionEvent>() {
                @Override
                public void handle(ActionEvent e) {
                    dialog.close();
                }
            });
        pane.getChildren().add(btn);
        dialog.showAndWait();
    }
}
```

OUTPUT:





Your mass (kg): 54

Your height (cm): 180

Your BMI result

Your BMI is: 16.67

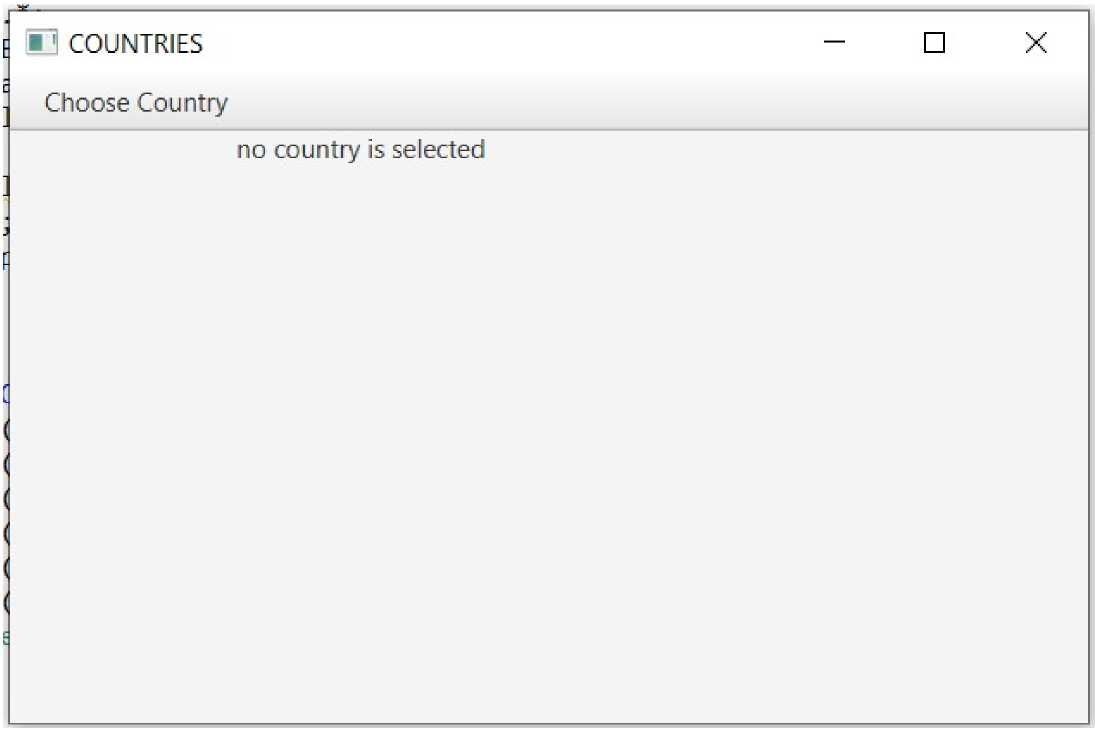
Q15) Write a program in JavaFX with a UI and a menu Bar with 6 menu options of country names which will display the capitals of the country on the user interface once chosen by the user.

Ans 15)

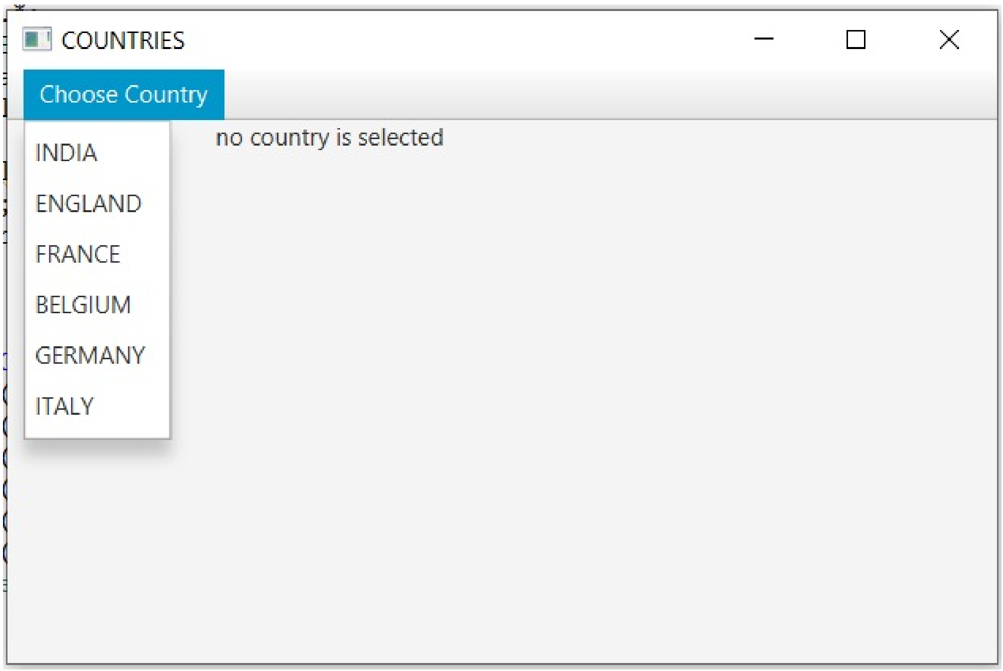
Code:

```
import javafx.application.Application;
import javafx.scene.Scene;
import javafx.scene.control.Button;
import javafx.scene.layout.*;
import javafx.event.ActionEvent;
import javafx.event.EventHandler;
import javafx.scene.control.*;
import javafx.stage.Stage;
import javafx.scene.control.Alert.AlertType;
import java.time.LocalDate;
public class one extends Application {
    public void start(Stage s)
    {
        s.setTitle("COUNTRIES");
        Menu m = new Menu("Choose Country");
        MenuItem m1 = new MenuItem("INDIA");
        MenuItem m2 = new MenuItem("ENGLAND");
        MenuItem m3 = new MenuItem("FRANCE");
        MenuItem m4 = new MenuItem("BELGIUM");
        MenuItem m5 = new MenuItem("GERMANY");
        MenuItem m6 = new MenuItem("ITALY");
        //MenuItem m7 = new MenuItem("JUVENTUS");
        m.getItems().add(m1);
        m.getItems().add(m2);
        m.getItems().add(m3);
        m.getItems().add(m4);
        m.getItems().add(m5);
        m.getItems().add(m6);
        //m.getItems().add(m7);
        Label l = new Label("\t\t\t\t"+ "no country is selected");
        String RM = "The Capital of India is: New Delhi";
        String MU = "The Capital of England is: London";
        String AS = "The Capital of France is: Paris";
        String CHE = "The Capital of Belgium is: Brussels";
        String FCB = "The Capital of Germany is: Berlin";
        String ACM = "The Capital of Italy is: Rome";
        EventHandler<ActionEvent> event = new EventHandler<ActionEvent>()
 {
            public void handle(ActionEvent e)
            {
                if(((MenuItem)e.getSource()).getText() == "INDIA")
                l.setText(RM);
                else if(((MenuItem)e.getSource()).getText() == "ENGLAND")
                l.setText(MU);
                else if(((MenuItem)e.getSource()).getText() == "FRANCE")
                l.setText(AS);
                else if(((MenuItem)e.getSource()).getText() == "BELGIUM")
                l.setText(CHE);
                else if(((MenuItem)e.getSource()).getText() == "GERMANY")
                l.setText(FCB);
                else if(((MenuItem)e.getSource()).getText() == "ITALY")
                l.setText(ACM);
            }
        };
        m1.setOnAction(event);
        m2.setOnAction(event);
        m3.setOnAction(event);
        m3.setOnAction(event);
        m4.setOnAction(event);
        m5.setOnAction(event);
        m6.setOnAction(event);
        MenuBar mb = new MenuBar();
        mb.getMenus().add(m);
        VBox vb = new VBox(mb, l);
        Scene sc = new Scene(vb, 500, 300);
        s.setScene(sc);
        s.show();
    }
    public static void main(String args[]){
        launch(args);
    }
}
```

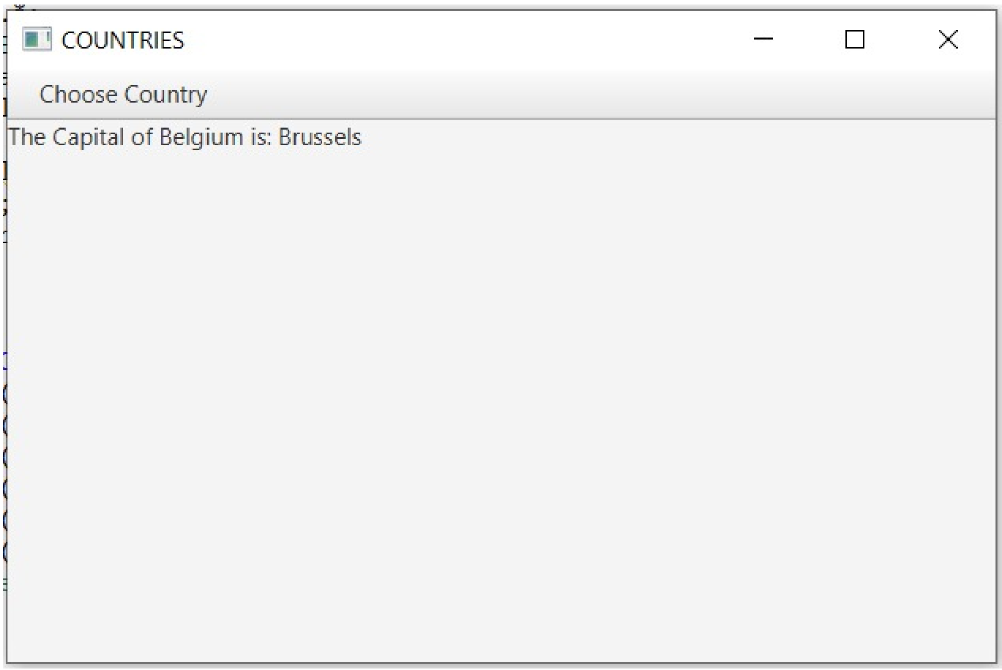
<u>OUTPUT:</u>



no country is selected



no country is selected



The Capital of Belgium is: Brussels