CSE1007 – Java Programming

LAB Assignment 2

Submitted by: -

Shivam Tayal (18BIT0271)

Program Based on Method Overloading

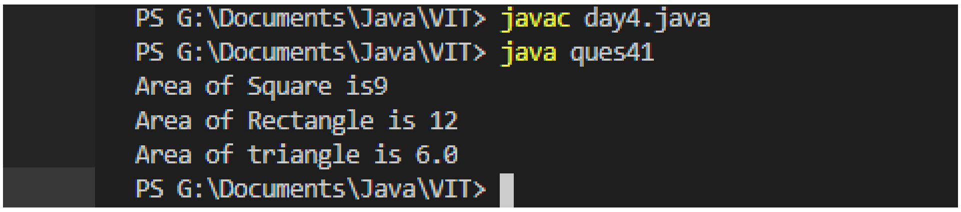
Ques 1: -

Write a Java program that displays area of different Figures (Rectangle, Square, Triangle) using the method overloading.

Code:

```
class Area
{
    Area(int x)
    {
        System.out.println("Area of Square is" + (x*x));
    }
    Area(int x, int y)
    {
        System.out.println("Area of Rectangle is "+ (x*y));
    }
    Area(double a, double b, double c)
    {
        double p = (a+b+c)/2;
        System.out.println("Area of triangle is "+(Math.sqrt(p*(p-a)*(p-b)*(p-
c))));
    }
}
class ques41
{
    public static void main(String[] args) {
        new Area(3);
        new Area(3,4);
        new Area(4,3,5);
    }
}
```

Output:

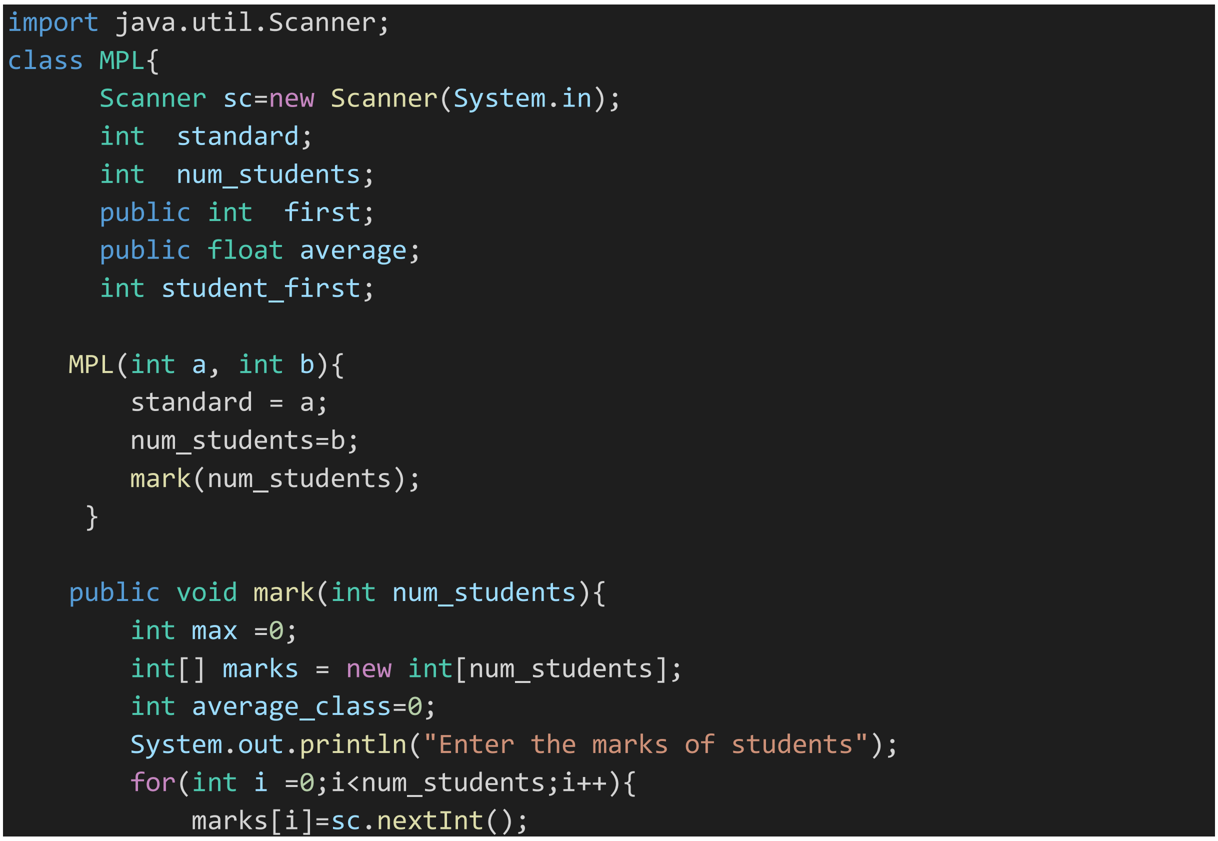


```
PS G:\Documents\Java\VIT> javac day4.java
PS G:\Documents\Java\VIT> java ques41
Area of Square is9
Area of Rectangle is 12
Area of triangle is 6.0
PS G:\Documents\Java\VIT>
```

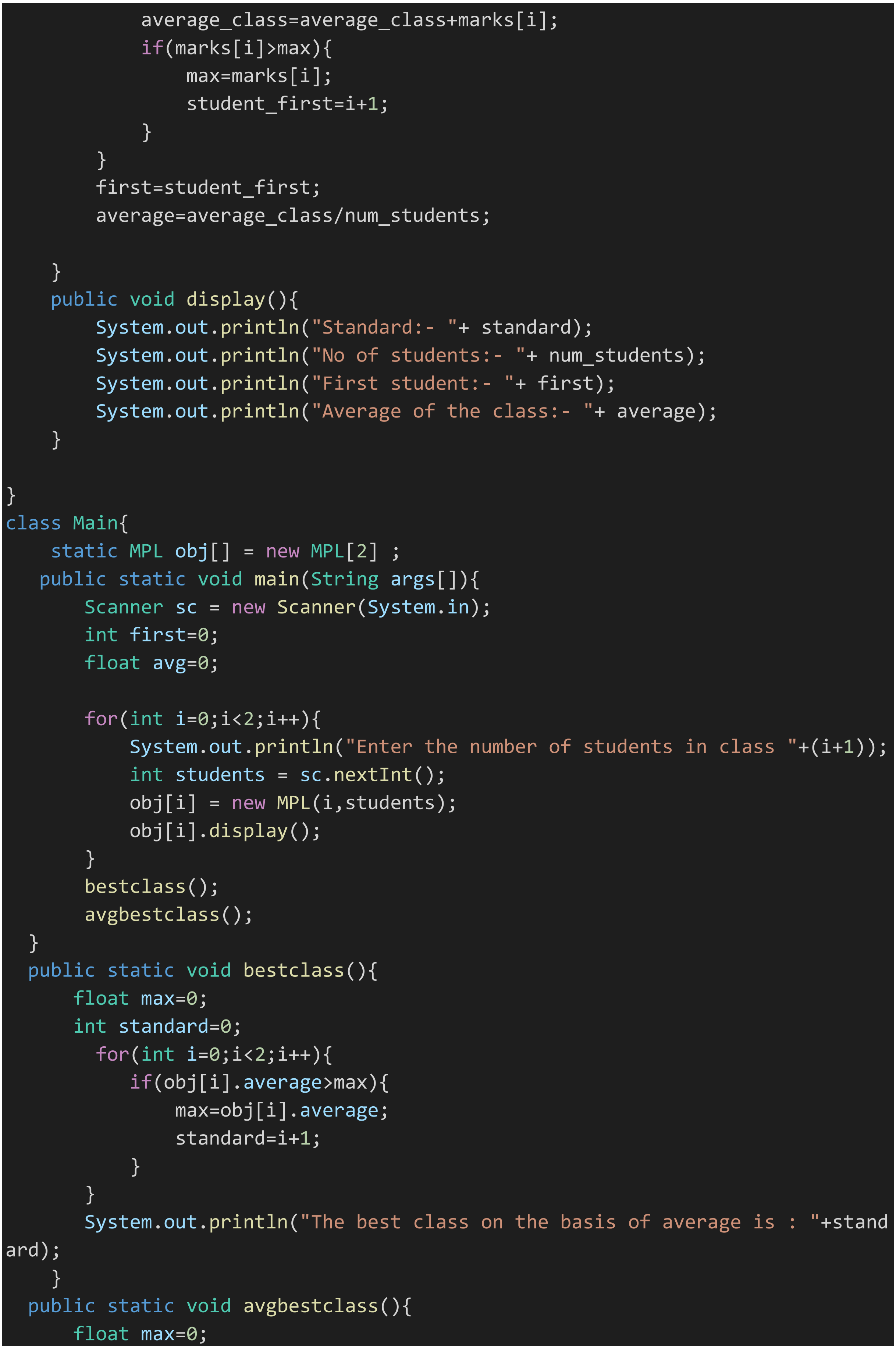
Ques 2: -

In a school, students of all classes from std I to X appear for the MathPremierLeague examination. Define a class MPL which stores the details of the marks scored by each class. It should contain the following 4 data members: Standard, number of students, marks[] array to store the scores of all the students of the class in MPL exam. Define a parameterized constructor which receives the values for the first two data members from the main() method. Create a Form within the constructor, read the marks of all students and hence find the first mark. Define a method findBestClass() to display the standard which has secured the highest mark. Overload this method to display the standard with the highest class average. The marks array should be declared dynamically based on the strength of the class.

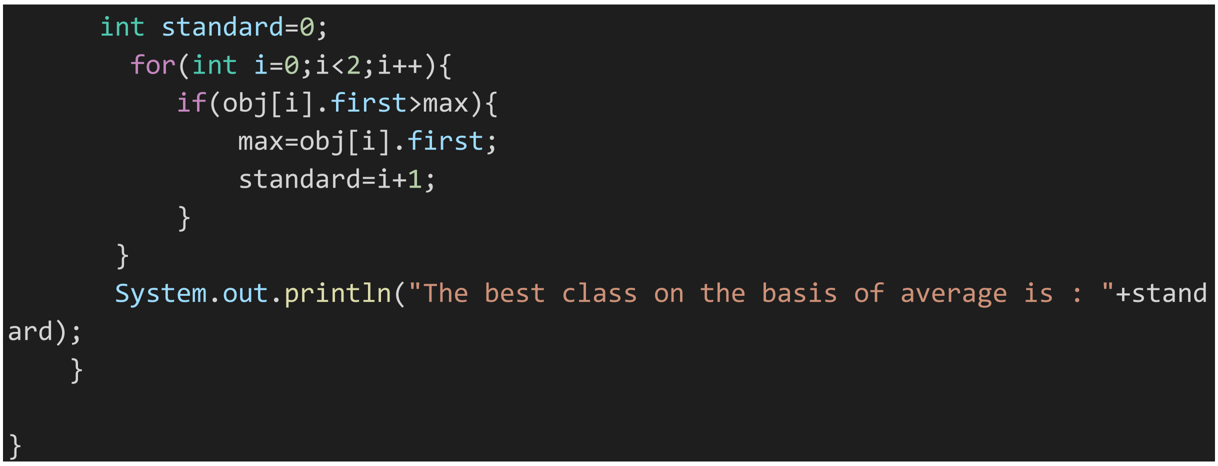
Code:



```
import java.util.Scanner;
class MPL{
      Scanner sc=new Scanner(System.in);
      int  standard;
      int  num_students;
      public int  first;
      public float average;
      int student_first;

    MPL(int a, int b){
        standard = a;
        num_students=b;
        mark(num_students);
     }

    public void mark(int num_students){
        int max =0;
        int[] marks = new int[num_students];
        int average_class=0;
        System.out.println("Enter the marks of students");
        for(int i =0;i<num_students;i++){
            marks[i]=sc.nextInt();
```

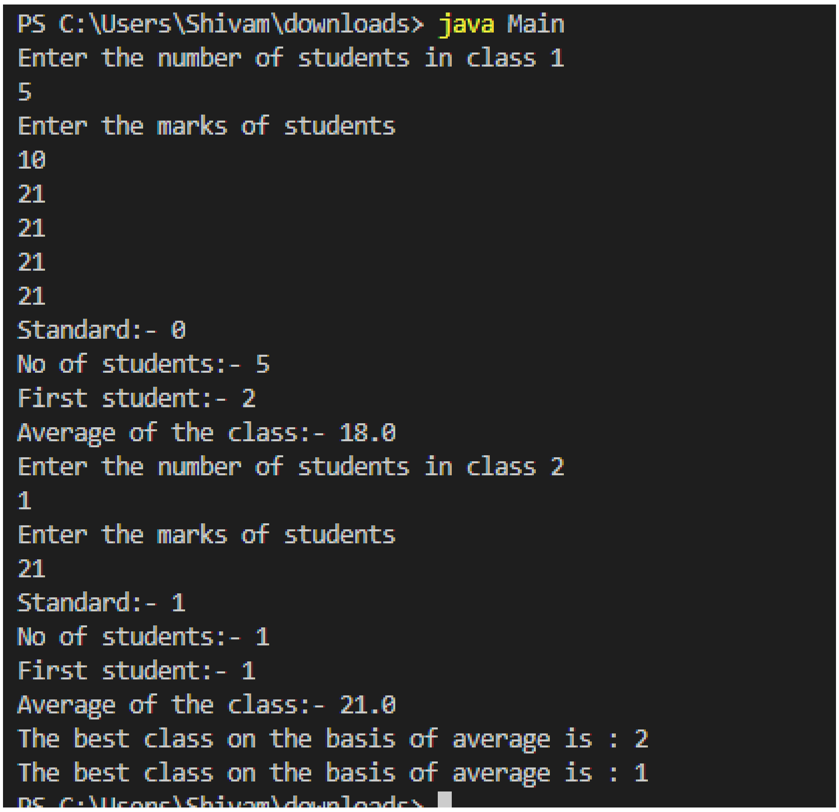


```java
            average_class=average_class+marks[i];
            if(marks[i]>max){
                max=marks[i];
                student_first=i+1;
            }
        }
        first=student_first;
        average=average_class/num_students;

    }
    public void display(){
        System.out.println("Standard:- "+ standard);
        System.out.println("No of students:- "+ num_students);
        System.out.println("First student:- "+ first);
        System.out.println("Average of the class:- "+ average);
    }

}
class Main{
    static MPL obj[] = new MPL[2] ;
   public static void main(String args[]){
       Scanner sc = new Scanner(System.in);
       int first=0;
       float avg=0;

       for(int i=0;i<2;i++){
           System.out.println("Enter the number of students in class "+(i+1));
           int students = sc.nextInt();
           obj[i] = new MPL(i,students);
           obj[i].display();
       }
       bestclass();
       avgbestclass();
  }
  public static void bestclass(){
      float max=0;
      int standard=0;
        for(int i=0;i<2;i++){
           if(obj[i].average>max){
               max=obj[i].average;
               standard=i+1;
           }
       }
       System.out.println("The best class on the basis of average is : "+stand
ard);
    }
  public static void avgbestclass(){
      float max=0;
```



```
      int standard=0;
        for(int i=0;i<2;i++){
            if(obj[i].first>max){
                max=obj[i].first;
                standard=i+1;
            }
        }
        System.out.println("The best class on the basis of average is : "+stand
ard);
    }

}
```

Output:



```
PS C:\Users\Shivam\downloads> java Main
Enter the number of students in class 1
5
Enter the marks of students
10
21
21
21
21
Standard:- 0
No of students:- 5
First student:- 2
Average of the class:- 18.0
Enter the number of students in class 2
1
Enter the marks of students
21
Standard:- 1
No of students:- 1
First student:- 1
Average of the class:- 21.0
The best class on the basis of average is : 2
The best class on the basis of average is : 1
PS C:\Users\Shivam\downloads>
```

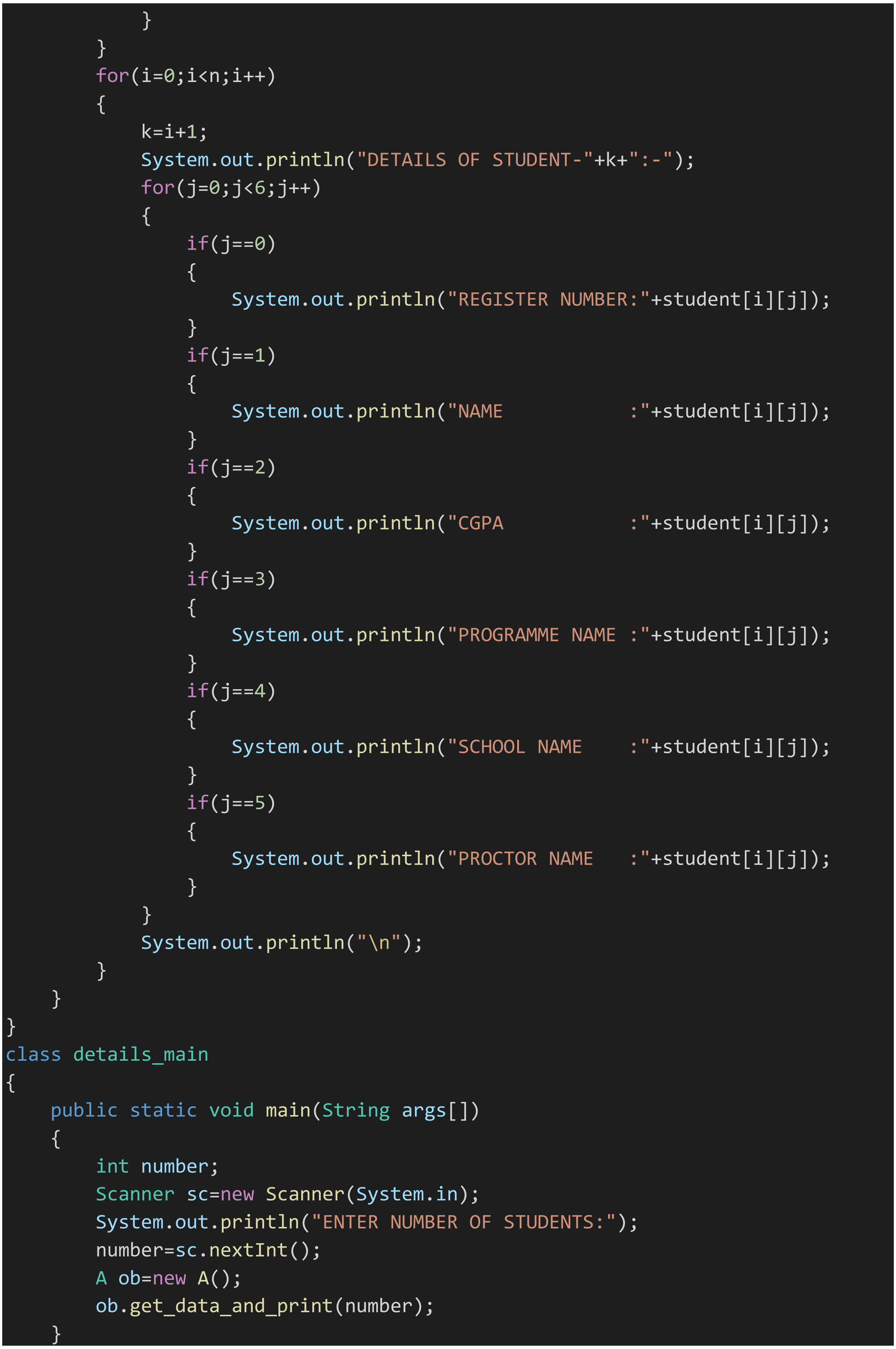
Ques 3: -

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)

Code:

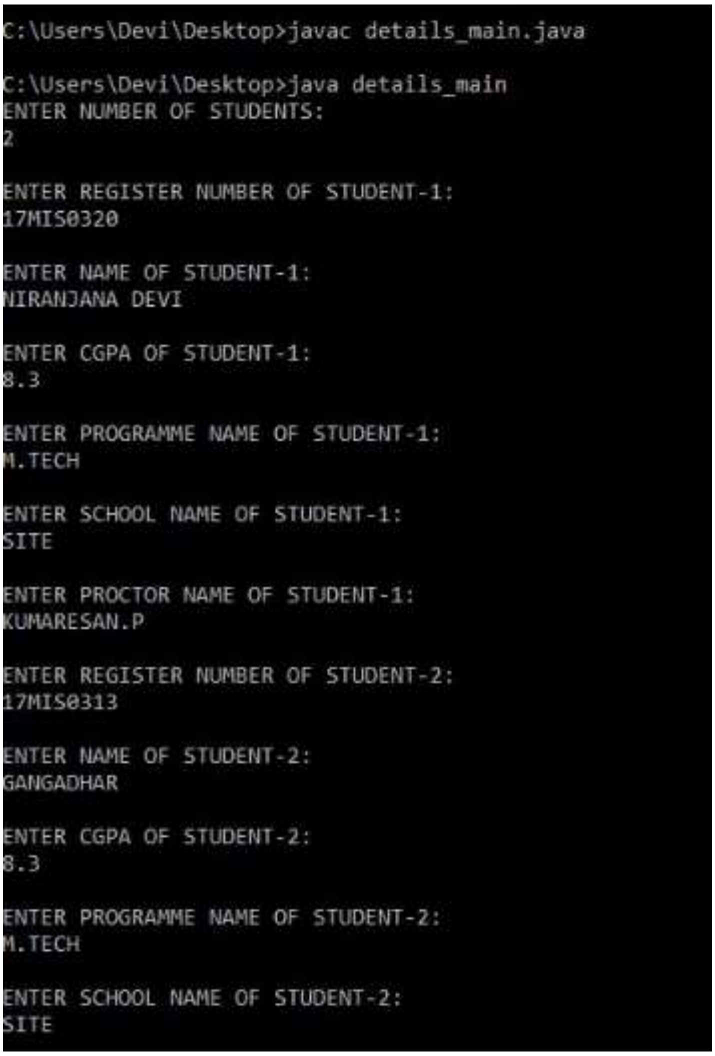
```
import java.io.*;
import java.util.*;
class A
{
    int i,j,k;
    void get_data_and_print(int n)
    {
        Scanner s=new Scanner(System.in);
        String[][] student=new String[n][6];
        for(i=0;i<n;i++)
        {
            k=i+1;
            for(j=0;j<6;j++)
            {
                if(j==0)
                {
                    System.out.println("\nENTER REGISTER NUMBER OF STUDENT-
"+k+":");
                    student[i][j]=s.nextLine();
                }
                if(j==1)
                {
                    System.out.println("\nENTER NAME OF STUDENT-"+k+":");
                    student[i][j]=s.nextLine();
                }
                if(j==2)
                {
                    System.out.println("\nENTER CGPA OF STUDENT-"+k+":");
                    student[i][j]=s.nextLine();
                }
                if(j==3)
                {
                    System.out.println("\nENTER PROGRAMME NAME OF STUDENT-
"+k+":");
                    student[i][j]=s.nextLine();
                }
                if(j==4)
                {
                    System.out.println("\nENTER SCHOOL NAME OF STUDENT-
"+k+":");
                    student[i][j]=s.nextLine();
                }
                if(j==5)
                {
                    System.out.println("\nENTER PROCTOR NAME OF STUDENT-
"+k+":");
                    student[i][j]=s.nextLine();
                }
```



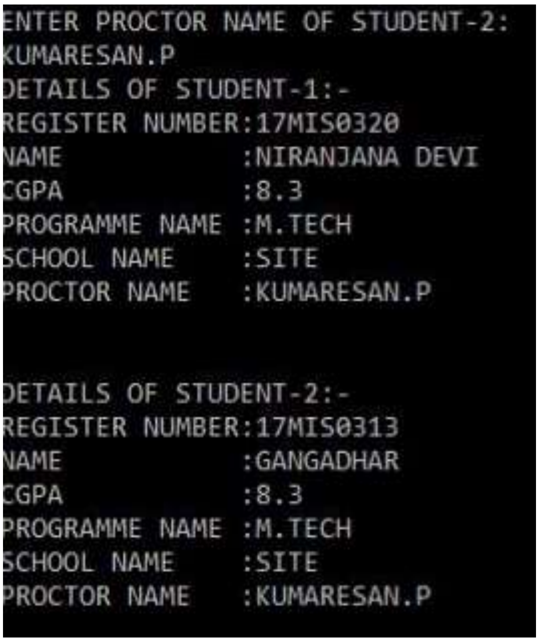
```
            }
        }
        for(i=0;i<n;i++)
        {
            k=i+1;
            System.out.println("DETAILS OF STUDENT-"+k+":-");
            for(j=0;j<6;j++)
            {
                if(j==0)
                {
                    System.out.println("REGISTER NUMBER:"+student[i][j]);
                }
                if(j==1)
                {
                    System.out.println("NAME           :"+student[i][j]);
                }
                if(j==2)
                {
                    System.out.println("CGPA           :"+student[i][j]);
                }
                if(j==3)
                {
                    System.out.println("PROGRAMME NAME :"+student[i][j]);
                }
                if(j==4)
                {
                    System.out.println("SCHOOL NAME    :"+student[i][j]);
                }
                if(j==5)
                {
                    System.out.println("PROCTOR NAME   :"+student[i][j]);
                }
            }
            System.out.println("\n");
        }
    }
}
class details_main
{
    public static void main(String args[])
    {
        int number;
        Scanner sc=new Scanner(System.in);
        System.out.println("ENTER NUMBER OF STUDENTS:");
        number=sc.nextInt();
        A ob=new A();
        ob.get_data_and_print(number);
    }
```

```
}

details_main.java
Displaying details_main.java.
```

Output:



```
C:\Users\Devi\Desktop>javac details_main.java

C:\Users\Devi\Desktop>java details_main
ENTER NUMBER OF STUDENTS:
2

ENTER REGISTER NUMBER OF STUDENT-1:
17MIS0320

ENTER NAME OF STUDENT-1:
NIRANJANA DEVI

ENTER CGPA OF STUDENT-1:
8.3

ENTER PROGRAMME NAME OF STUDENT-1:
M.TECH

ENTER SCHOOL NAME OF STUDENT-1:
SITE

ENTER PROCTOR NAME OF STUDENT-1:
KUMARESAN.P

ENTER REGISTER NUMBER OF STUDENT-2:
17MIS0313

ENTER NAME OF STUDENT-2:
GANGADHAR

ENTER CGPA OF STUDENT-2:
8.3

ENTER PROGRAMME NAME OF STUDENT-2:
M.TECH

ENTER SCHOOL NAME OF STUDENT-2:
SITE
```



```
ENTER PROCTOR NAME OF STUDENT-2:
KUMARESAN.P
DETAILS OF STUDENT-1:-
REGISTER NUMBER:17MIS0320
NAME           :NIRANJANA DEVI
CGPA           :8.3
PROGRAMME NAME :M.TECH
SCHOOL NAME    :SITE
PROCTOR NAME   :KUMARESAN.P


DETAILS OF STUDENT-2:-
REGISTER NUMBER:17MIS0313
NAME           :GANGADHAR
CGPA           :8.3
PROGRAMME NAME :M.TECH
SCHOOL NAME    :SITE
PROCTOR NAME   :KUMARESAN.P
```

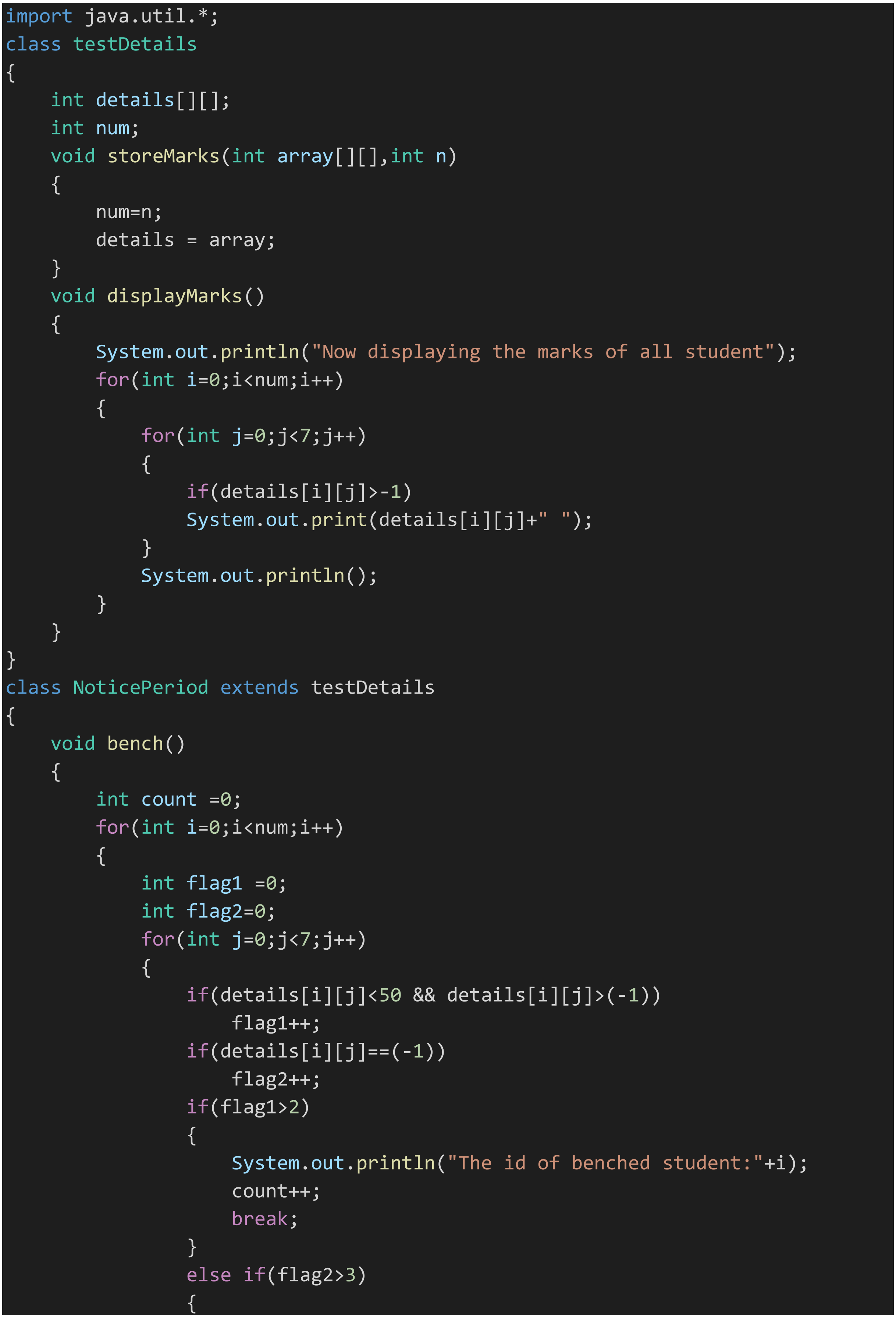
Inheritance

Ques 1: -

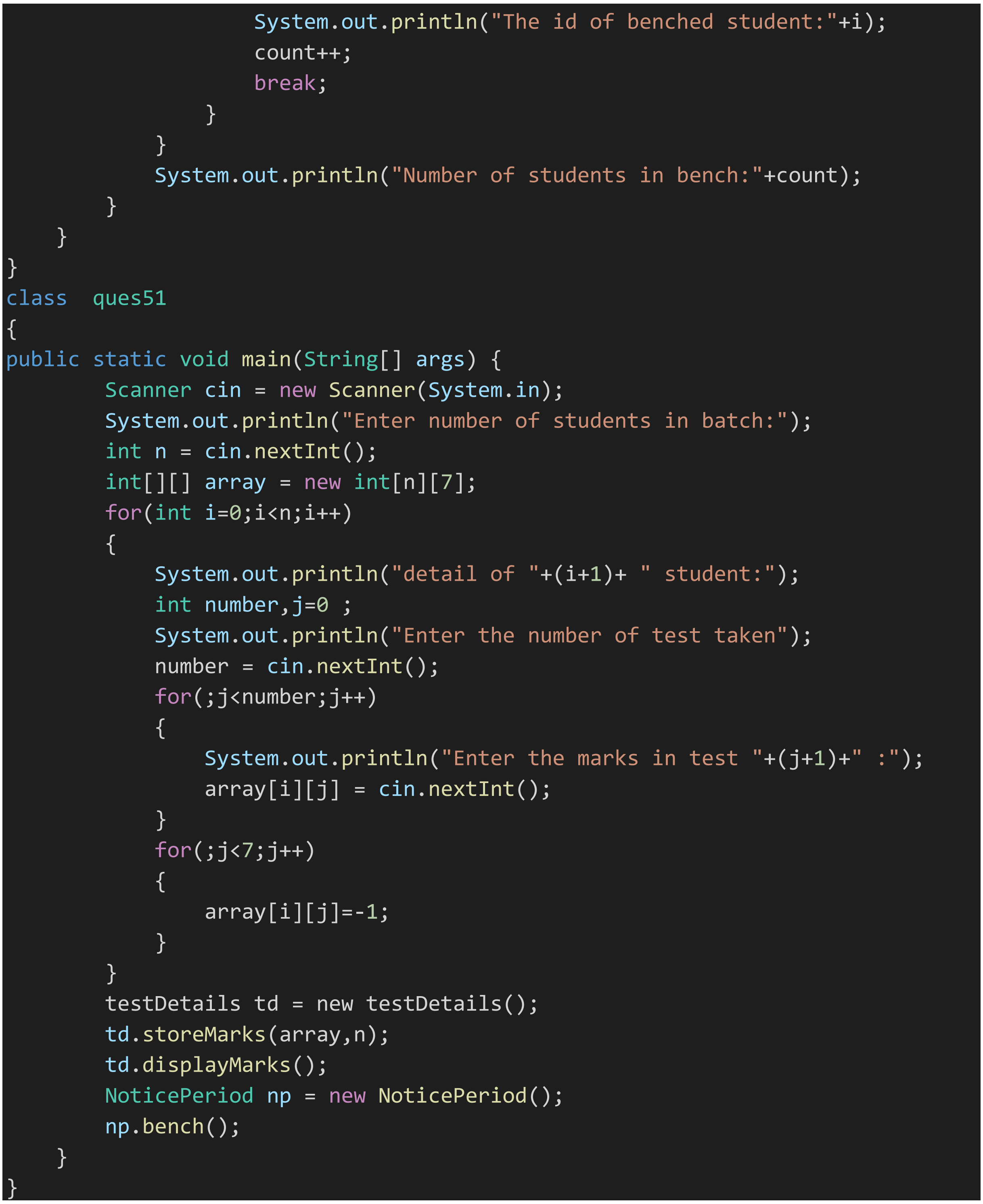
. A training centre conducts a total of 7 tests for its students. Students are allowed to skip few tests. Let there be 25 students in the batch. So in the main class for every student, read the number of tests taken and the marks scored in each test. A class ‘TestDetails’ should be defined with a 2D array of float type to store the marks of all the students. Define a method ‘storeMarks()’ that will receive the following details for every student from the main class and create in the 2D array, those many columns equal to the number of tests, so as to store the marks. There is no need to store the number of tests. Define another method ‘displayMarks()’ to print the details.

Also the training centre wishes to keep those students in notice period who have taken < 3 tests and those who have not scored ≥ 50 in at least 3 tests. Derive another class ‘NoticePeriod’ from ‘TestDetails’ that includes a method to count and print the number of students in bench. Also it should print the ID of those students assuming the row index of the array to be their ID. While checking do not proceed to check the marks in all tests, if the student has already scored more than 50 in 3 tests. Instantiate this class from the main class and do the required processing.

Code:

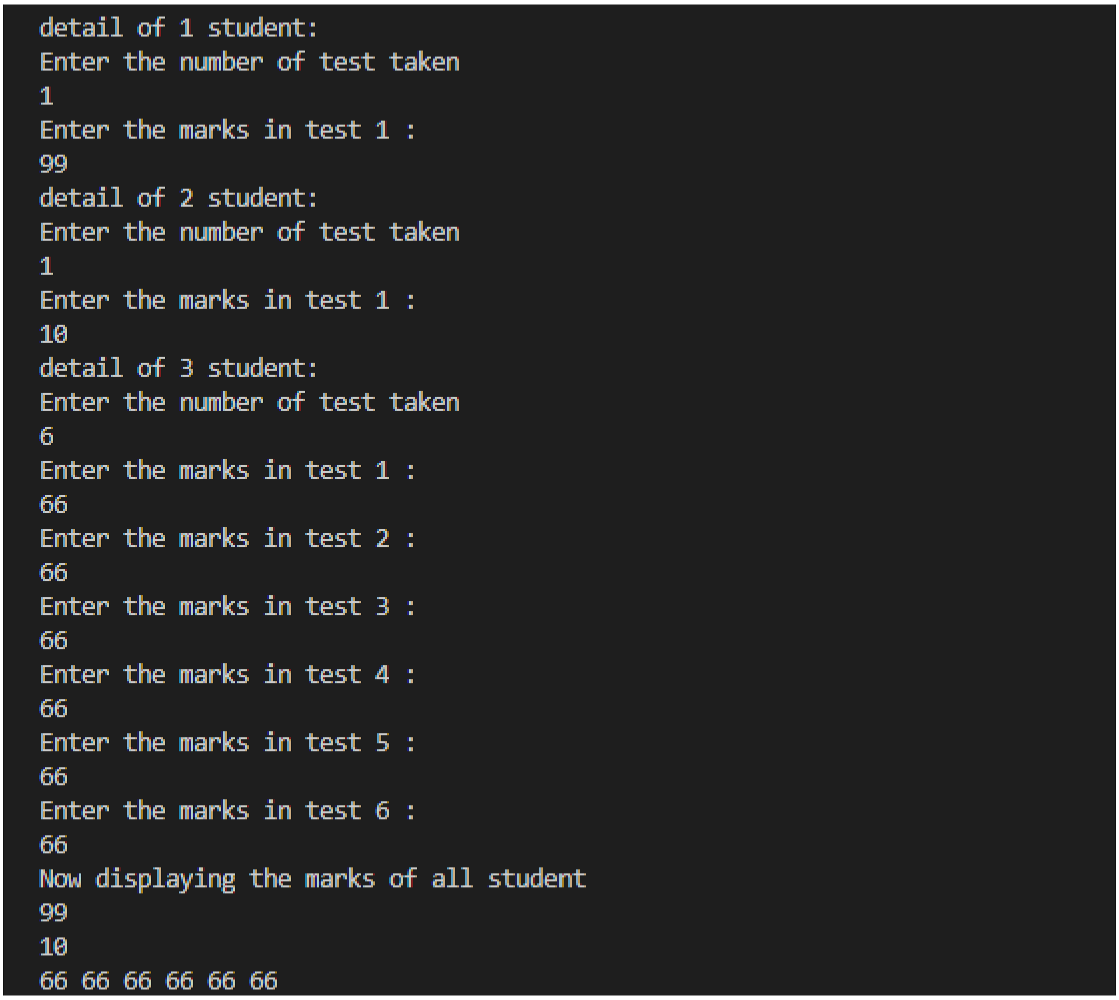


```
import java.util.*;
class testDetails
{
    int details[][];
    int num;
    void storeMarks(int array[][],int n)
    {
        num=n;
        details = array;
    }
    void displayMarks()
    {
        System.out.println("Now displaying the marks of all student");
        for(int i=0;i<num;i++)
        {
            for(int j=0;j<7;j++)
            {
                if(details[i][j]>-1)
                System.out.print(details[i][j]+" ");
            }
            System.out.println();
        }
    }
}
class NoticePeriod extends testDetails
{
    void bench()
    {
        int count =0;
        for(int i=0;i<num;i++)
        {
            int flag1 =0;
            int flag2=0;
            for(int j=0;j<7;j++)
            {
                if(details[i][j]<50 && details[i][j]>(-1))
                    flag1++;
                if(details[i][j]==(-1))
                    flag2++;
                if(flag1>2)
                {
                    System.out.println("The id of benched student:"+i);
                    count++;
                    break;
                }
                else if(flag2>3)
                {
```



```java
                    System.out.println("The id of benched student:"+i);
                    count++;
                    break;
                }
            }
            System.out.println("Number of students in bench:"+count);
        }
    }
}
class  ques51
{
public static void main(String[] args) {
        Scanner cin = new Scanner(System.in);
        System.out.println("Enter number of students in batch:");
        int n = cin.nextInt();
        int[][] array = new int[n][7];
        for(int i=0;i<n;i++)
        {
            System.out.println("detail of "+(i+1)+ " student:");
            int number,j=0 ;
            System.out.println("Enter the number of test taken");
            number = cin.nextInt();
            for(;j<number;j++)
            {
                System.out.println("Enter the marks in test "+(j+1)+" :");
                array[i][j] = cin.nextInt();
            }
            for(;j<7;j++)
            {
                array[i][j]=-1;
            }
        }
        testDetails td = new testDetails();
        td.storeMarks(array,n);
        td.displayMarks();
        NoticePeriod np = new NoticePeriod();
        np.bench();
    }
}
```

Output:



```
detail of 1 student:
Enter the number of test taken
1
Enter the marks in test 1 :
99
detail of 2 student:
Enter the number of test taken
1
Enter the marks in test 1 :
10
detail of 3 student:
Enter the number of test taken
6
Enter the marks in test 1 :
66
Enter the marks in test 2 :
66
Enter the marks in test 3 :
66
Enter the marks in test 4 :
66
Enter the marks in test 5 :
66
Enter the marks in test 6 :
66
Now displaying the marks of all student
99
10
66 66 66 66 66 66
```

Ques 2: -

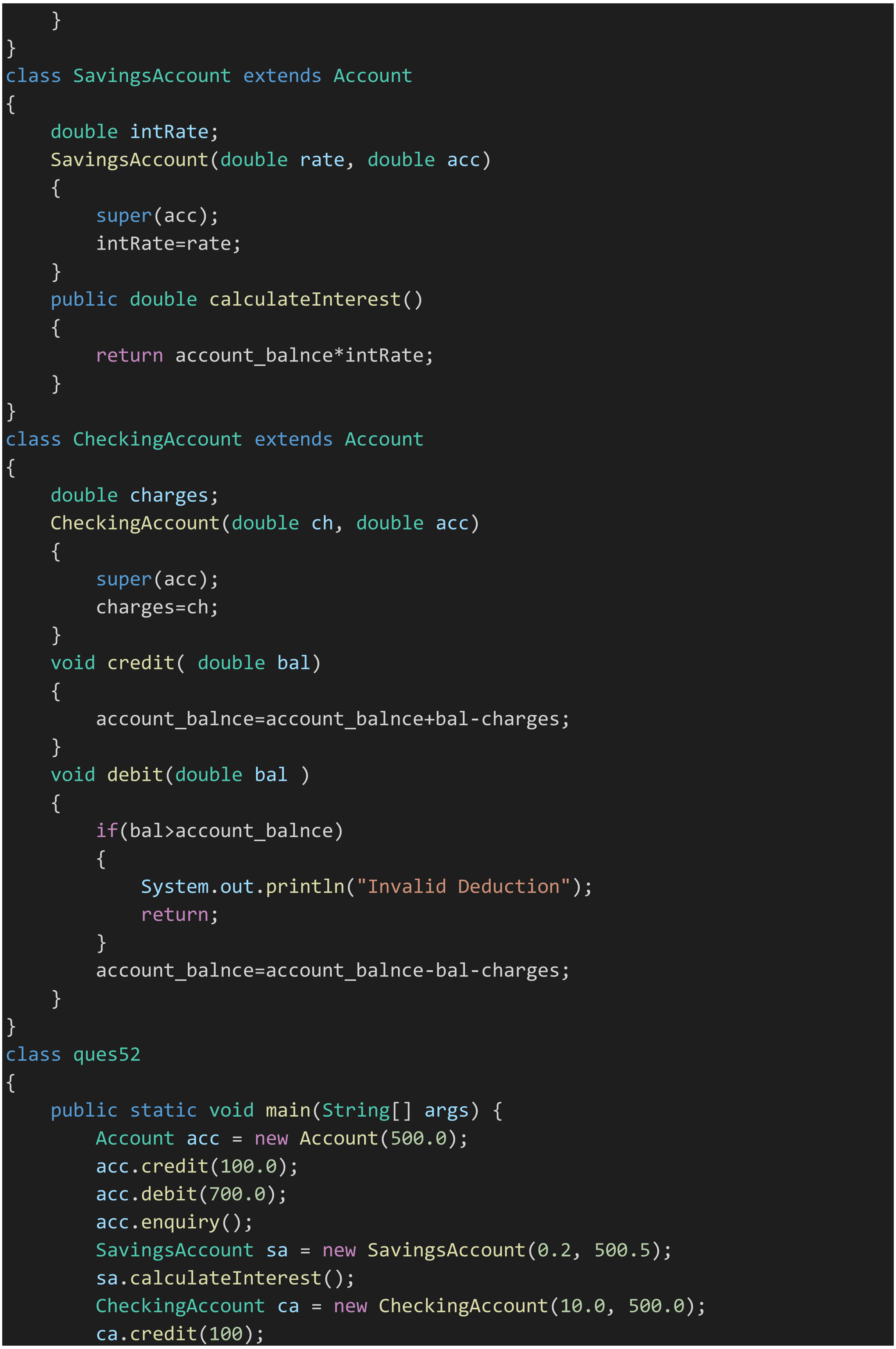
Create an inheritance hierarchy in java using following information given below that a bank might use to represent customers' bank accounts.

Base class Account should include one data member of type double to represent account balance. The class should provide constructor that receives an initial balance and uses it to initialize the data member.The constructor should validate the initial balance to ensure that it is greater than or equal to 0.If not the balance is set to 0.0 and the constructor should display an error message,indicating that the initial balance was invalid. The class also provides three member functions credit, debit(debit amount should not exceed the account balance) and enquiry.Derived class SavingsAccount should inherit the functionality of an Account, but also include data member of type double indicating the interest rate assigned to the Account. SavingsAccount constructor should receive the initial balance, as well as an initial value for SavingsAccount's interest rate. SavingsAccount should provide public member function calculateInterest that returns double indicating the amount of interest earned by an account.The method calculateInterest should determine this amount by multiplying the interest rate by the account balance.SavingsAccount function should inherit member functions credit,debit and enquiry without redefining them. Derived class

CheckingAccount should inherit the functionality of an Account, but also include data member of type double that represents the fee charged per transaction. CheckingAccount constructor should receive the initial balance, as well as parameter indicating fee amount. class CheckingAccount should redefine credit and debit function so that they subtract the fee from account balance whenever either transaction is performed. CheckingAccount's debit function should charge a fee only if the money is actually withdrawn (debit amount should not exceed the account balance).After defining the class hierarchy, write program that creates object of each class and tests their member functions. Add interest to SavingAccount object by first invoking its calculateInterest function, then passing the returned interest amount to object's credit function.

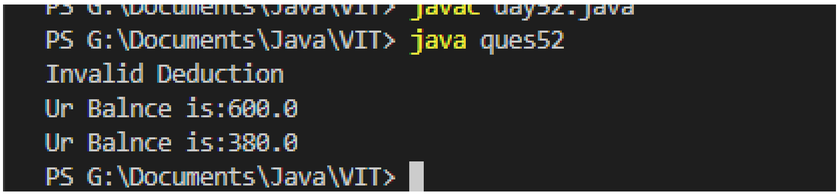
Code:

```
class Account
{
    double account_balnce;
    Account()
    {

    }
    Account( double bal)
    {
        if(bal>0)
            account_balnce=bal;
        else
        {
            account_balnce=0.0;
            System.out.println("The balance was illegal");
        }
    }
    void credit(double bal)
    {
        account_balnce+=bal;
    }
    void enquiry()
    {
        System.out.println("Ur Balnce is:"+account_balnce);
    }
    void debit(double bal)
    {
        if(bal>account_balnce)
        {
            System.out.println("Invalid Deduction");
            return;
        }
        account_balnce-=bal;
```



```
    }
}
class SavingsAccount extends Account
{
    double intRate;
    SavingsAccount(double rate, double acc)
    {
        super(acc);
        intRate=rate;
    }
    public double calculateInterest()
    {
        return account_balnce*intRate;
    }
}
class CheckingAccount extends Account
{
    double charges;
    CheckingAccount(double ch, double acc)
    {
        super(acc);
        charges=ch;
    }
    void credit( double bal)
    {
        account_balnce=account_balnce+bal-charges;
    }
    void debit(double bal )
    {
        if(bal>account_balnce)
        {
            System.out.println("Invalid Deduction");
            return;
        }
        account_balnce=account_balnce-bal-charges;
    }
}
class ques52
{
    public static void main(String[] args) {
        Account acc = new Account(500.0);
        acc.credit(100.0);
        acc.debit(700.0);
        acc.enquiry();
        SavingsAccount sa = new SavingsAccount(0.2, 500.5);
        sa.calculateInterest();
        CheckingAccount ca = new CheckingAccount(10.0, 500.0);
        ca.credit(100);
        ca.debit(200);
        ca.enquiry();
    }
}
```

Output:



```
PS G:\Documents\Java\VIT> javac day52.java
PS G:\Documents\Java\VIT> java ques52
Invalid Deduction
Ur Balnce is:600.0
Ur Balnce is:380.0
PS G:\Documents\Java\VIT>
```