LAB 1

Develop a Java program that prints all real solutions to the quadratic equation $ax^2 + bx + c = 0$. Read in a, b, c and use the quadratic formula. If the discriminate $b^2 - 4ac$ is negative, display a message stating that there are no real solutions.

```
import java.util.*;
import java.util.Scanner;
class quadeqn
{
public static void main(String ss[]) {
    float a, b, c;
    float x1, x2, D;
    Scanner xx = new Scanner(System.in);
    System.out.println("Enter the value of a, b and c");
    a = xx.nextInt();
    b = xx.nextInt();
    c = xx.nextInt();
    D = ((b*b) - (4*a*c));
    if(D==0)
    {
      x1 =(-b/(2*a));
      x2 = x1;
      System.out.println("Roots are real and equal
        \n The roots of the equation are : "+x1+" and "+x2);
    }
    else if(D>0)
    {
      x1 = (float)((-b) + Math.sqrt(D))/(2*a);
      x2 = (float)((-b) - Math.sqrt(D))/(2*a);
```

```
        System.out.println("Roots are real and distinct
            \n The roots of the equation are : "+x1+" and "+x2);

        }
        else
        System.out.println("There are no real solutions");
    }
```

```
C:\Users\Acer\Documents\JAVA>javac Lab1.java

C:\Users\Acer\Documents\JAVA>java quadeqn
Enter the value of a,b and c
1
3
-4
Roots are real and distinct
The roots of the equation are : 1.0 and -4.0

C:\Users\Acer\Documents\JAVA>java quadeqn
Enter the value of a,b and c
1
-18
81
Roots are real and equal
The roots of the equation are : 9.0 and 9.0

C:\Users\Acer\Documents\JAVA>java quadeqn
Enter the value of a,b and c
4
5
6
There are no real solutions

C:\Users\Acer\Documents\JAVA>
```

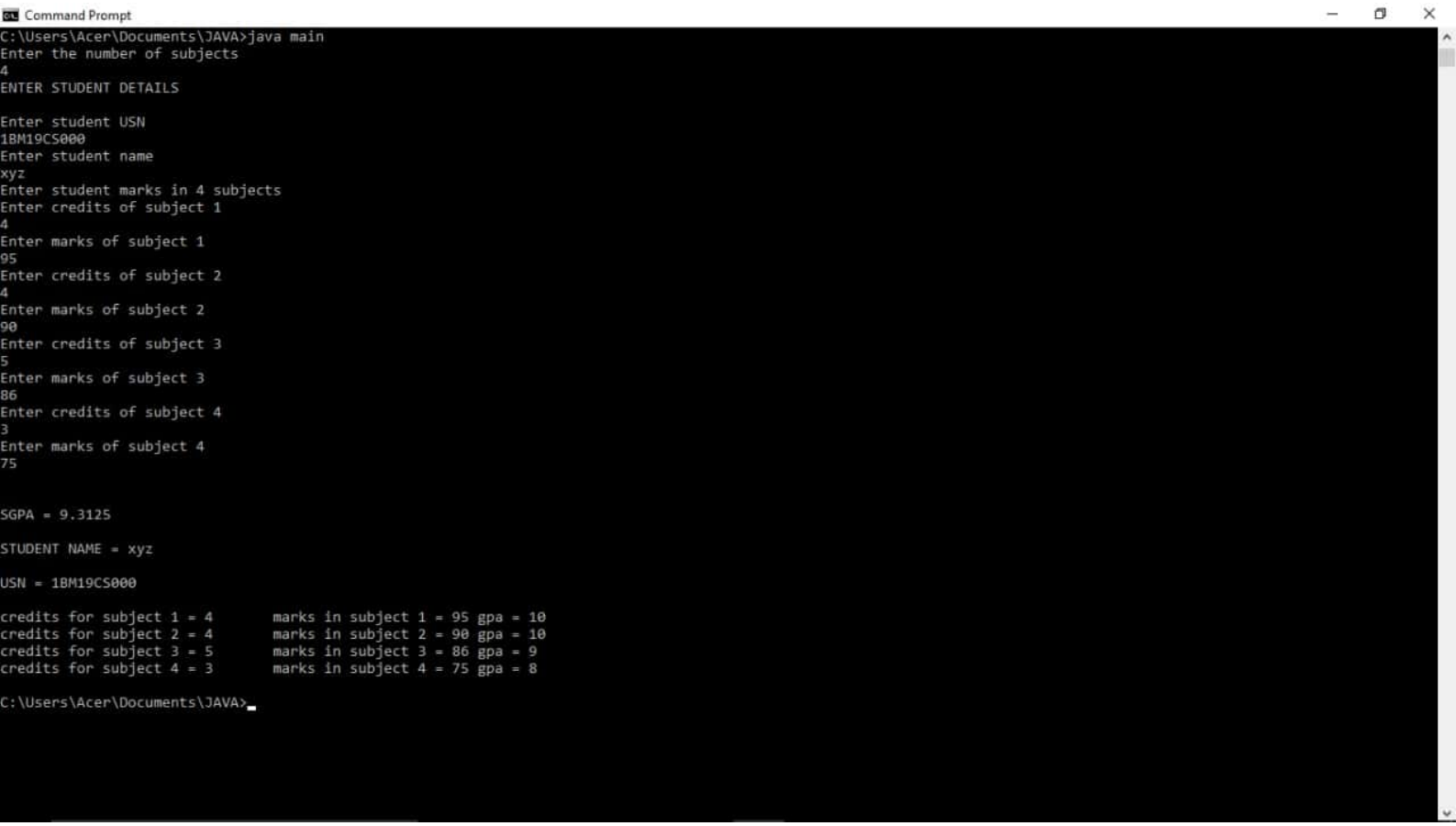
LAB 2

Develop a Java program to create a class student with the member usn, name, an array credits and an array marks. Include methods to accept and display details and a method to calculate SGPA of a student.

```
import java.util.*;
import java.util.Scanner;
class student
{
   String usn;
   String name;
   int credits[];
   int marks[];
   int gpa[];
   int i,n;
   void accept()
   {
     Scanner xx = new Scanner(System.in);
     System.out.println("Enter the number of subjects");
     n = xx.nextInt();
     credits = new int[n];
     marks = new int[n];
     gpa = new int[n];
     System.out.println("ENTER STUDENT DETAILS\n");
     System.out.println("Enter student USN");
     usn = xx.next();
     System.out.println("Enter student name");
     name = xx.next();
     System.out.println("Enter student marks in" 5 subjects
                        + n + "subjects");
     for(i=0; i<n; i++)
     {
```

```
        System.out.println("Enter credits of subject" + (i+1));
        Credits[i] = xx.nextInt();
        System.out.println("Enter marks of subject" + (i+1));
        marks[i] = xx.nextInt();
    }
}
void display()
{
System.out.println("\n STUDENT NAME = " + name);
System.out.println("\n USN = " + usn + "\n");
for(i=0; i<n; i++)
System.out.println("credits for subject" + (i+1) + " = " +
        credits[i] + "\t" + "marks in subject" + (i+1) + " = " +
                marks[i] + "\t" + "gpa = " + gpa[i]);
}
void calcsgpa()
{
  int totalcredits = 0;
  int totalmarks = 0;
  float sgpa;
  for(i=0; i<n; i++)
  totalcredits = totalcredits + credits[i];
  for(i=0; i<n; i++)
  {
    if(marks[i] >= 90 && marks[i] <= 100)
      gpa[i] = 10;
    if marks[
    else if(marks[i] >= 80 && marks[i] < 90)
      gpa[i] = 9;
    else if(marks[i] >= 70 && marks[i] < 80)
      gpa[i] = 8;
```

```
else if (marks[i] >= 60 && marks[i] < 70)
    gpa[i] = 7;
else if (marks[i] >= 50 && marks[i] < 60)
    gpa[i] = 5;
else if (marks[i] >= 40 && marks[i] < 50)
    gpa[i] = 4;
else
    gpa[i] = 0;
}
for (i = 0; i < n; i++)
{
  totalmarks = totalmarks + (credits[i] * gpa[i]);
}
sgpa = (float) totalmarks / totalcredits;
System.out.println("\n\n SGPA = " + sgpa);
}
class main
{
  public static void main (String [] args)
  {
    Student s1 = new Student();
    s1.accept();
    s1.calcsgpa();
    s1.display();
  }
}
```



LAB3

Create a class Book which contains four members: name, author, price, num_pages. Include a constructor to set the values for the members. Include methods to set and get the details of the objects. Include a toString() method that could display the complete details of the book. Develop a Java program to create n book objects.

```
import java.util.Scanner
class Book
{
 String name;
 String author;
 float price;
 int num_pages;
 Scanner ss = new Scanner (System.in);
 Book()
 {
   name = " ";
   author = " ";
   price = 0.0f;
   num_pages = 0;
 }
 void accept()
 {
 System.out.println("Enter the book NAME :");
 name = ss.next();
 System.out.println("Enter the AUTHOR of the book:");
 author = ss.next();
 System.out.println("Enter the PRICE of the book:");
 price = ss.nextFloat();
 System.out.println("Enter the NUMBER OF PAGES in the book:");
 num_page = ss.nextInt();

 }
 public String toString()
 {
 return (name + "\t\t" + author + "\t\t Rs." + price + "\t\t\t"
                                                  num_pages);
}  }
```

```
class Bookmain
{
  public static void main(String[] args)
  {
    Scanner ss = new Scanner(System.in);
    System.out.println("\n Enter the number of books: ");
    int n = ss.nextInt();
    Book b[] = new Book[n];
    for(int i=0; i<n; i++)
    {
      b[i] = new Book();
      System.out.println("\n ENTER THE DETAILS OF BOOK"
                         +(i+1)+"\n");
      b[i].accept();
      System.out.println("\n\n");
    }
    System.out.println("<-----DETAILS OF ALL BOOKS----->\n");
    System.out.println("\n NAME\t\t AUTHOR\t\t PRICE
                       \t\t NUMBER OF PAGES\n");
    for(int i=0; i<n; i++)
    {
      System.out.println(b[i]);
    }
  }
}
```

```
C:\Users\Acer\Documents\JAVA>javac Lab3.java

C:\Users\Acer\Documents\JAVA>java Booksmain

Enter the number of books :
                                        2

ENTER THE DETAILS OF BOOK 1

Enter the book NAME :
xxx
Enter the AUTHOR of the book :
xyz
Enter the PRICE of the book :
500
Enter the NUMBER OF PAGES in the book :
120



ENTER THE DETAILS OF BOOK 2

Enter the book NAME :
yyy
Enter the AUTHOR of the book :
abc
Enter the PRICE of the book :
800
Enter the NUMBER OF PAGES in the book :
300


<---------------DETAILS OF ALL BOOKS--------------->

NAME            AUTHOR          PRICE           NUMBER OF PAGES

xxx             xyz             Rs.500.0                120
yyy             abc             Rs.800.0                300

C:\Users\Acer\Documents\JAVA>
```

LAB 4

Develop a Java program to create a class Bank that maintains two kinds of account for its customers, one called saving account and the other current account. The saving account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed. Create a class Account that stores customer name, account number and type of account. From this derive the classes cur-acct and sav-acct to make them more specific to their requirements.

Include the necessary methods in order to achieve the following tasks:

- Accept deposit from customer and update the balance.
- Display the balance.
- Compute and deposit interest
- Permit withdrawal and update the balance
- Check for the minimum balance, impose penalty if necessary and update the balance

```
import java.util.*;
import java.util.Scanner;
class Account
{
 Scanner xx = new Scanner(System.in);
 String customer_name, type_of_account;
 long account_number;
 double balance = 5000;
 void accept()
 {
  System.out.println("Enter customer name");
  customer_name = xx.next();
  System.out.println("Enter Account number");
  account_number = xx.nextLong();
 }
```

```
void deposit()
{
int dep;
System.out.println("Enter the amount to be deposited");
dep = xx.nextInt();
balance += dep;
System.out.println("Balance = " + balance);
}
void withdrawal()
{
int withdra;
System.out.println("Enter the amount to be withdrawn");
withdra = xx.nextInt();
balance = withdra;
System.out.println("Balance = " + balance);
}
}
class CurrAct extends Account
{
void penalty()
{
if (balance < 2000)
{
balance -= 100;
System.out.println("Penalty of 100 Rs is taken for maintain-
ing less balance");
System.out.println("Balance = " + balance);
}
}
class SavAct extends Account
{
void interest()
{
double i;
i = balance * 0.02;
balance += i;
System.out.println("Interest = " + i);
System.out.println("Total Balance = " + balance);
}}
```

```
class Bank
{
public static void main(String args[])
{
Scanner xx = new Scanner(System.in);
CurrAct c = new CurrAct();
SavAct s = new SavAct();
for(;;)
{
System.out.println("Enter your choice\n1. Saving account
                    \n2. current account");
int choice = xx.nextInt();
if(choice==1)
{
s.Accept();
System.out.println("Enter your choice\n1. Deposite\n2. Withdrawl");
int n = xx.nextInt();
switch(n)
{ case 1: s.deposit();
          s.interest();
          break;
  case 2: s.withdrawal();
          break;
  default: System.out.println("entered wrong option");
}
}
if(choice==2)
{
c.Accept();
System.out.println("Enter your choice\n1. Deposite\n2.
                    withdrawl");
int n = xx.nextInt();
```

```
switch(n)
{
case 1: c.deposit();
        break;
case 2: c.withdrawal();
        E.penalty();
        break;
default: System.out.println("entered wrong option");
}
}
}
}
}
```

```
Enter customer name
xyz
Enter Account number
123
Enter your choice
1. Deposite
2. Withdraw
1
Enter the amount to be deposited
1000
Balance=7120.0
Intrest=142.4
Total Balance=7262.4
Enter your choice
1.Saving account
2.current account
2
Enter customer name
abc
Enter Account number
456
Enter your choice
1. Deposite
2.Withdrawl
2
Enter the amount to be withdrawn
3500
Balance=500.0
Penalty of 100 Rs is taken for maintaining less balance
Balance=400.0
Enter your choice
1.Saving account
2.current account
1
Enter customer name
pqr
Enter Account number
789
Enter your choice
1. Deposite
2. Withdraw
2
Enter the amount to be withdrawn
1000
Balance=6262.4
Enter your choice
```

LAB 5

Develop a Java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and Circle such that each one of the class extends the class Shape. Each one of the classes contains only the method printArea() that prints the area of the given shape.

```
import java.util.Scanner;
abstract class shape
{
  Double a,b;
  abstract void printArea();
}
class Rectangle extends shape
{
   Double x,y;
   Rectangle(Double a, Double b)
   { x=a; y=b; }
   void printArea()
   {
     System.out.println("Area of the Rectangle=" + (x*y));
   }
}
class Triangle extends shape
{
 Double x,y;
 Triangle(Double a, Double b)
 { x=a; y=b; }
 void printArea()
 {
  System.out.println("Area of the Triangle=" + (0.5*x*y));
 }
}
```

```
class Circle extends Shape
{
    Double r;
    Circle (Double a)
    { r = a; }
    void printArea()
    {
        System.out.println("Area of the Circle = "+(3.14*r*r));
    }
}
class abstractarea{
    public static void main (String[] args)
    {
        Scanner xx = new Scanner(System.in);
        Double w, x, y, z, p;
        System.out.println("Enter length and width of
                            rectangle");
        w = xx.nextDouble();
        x = xx.nextDouble();
        Rectangle R = new Rectangle(w, x);
        R.printArea();
        System.out.println("Enter height and base of triangle");
        y = xx.nextDouble();
        z = xx.nextDouble();
        Triangle t = new Triangle(y, z);
        t.printArea();
        System.out.println("Enter the radius of Circle");
        p = xx.nextDouble();
        Circle c = new Circle(p);
        c.printArea();
    }
}
```

```
C:\Users\Acer\Documents\JAVA>javac Lab5.java

C:\Users\Acer\Documents\JAVA>java abstractarea
Enter length and width of rectangle
5
6
Area of the Rectangle = 30.0
Enter height and base of triangle
2
3
Area of the Triangle = 3.0
Enter the radius of circle
7
Area of the Circle = 153.86

C:\Users\Acer\Documents\JAVA>
```