

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.io.*;
import java.util.*;
import java.lang.*;
public class quadratic
{
    private static double a;
    private static double b;
    private static double c;
    public static void read()
    {
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter the Co-Efficient a");
        a=sc.nextDouble();
        System.out.println("Enter the Co-Efficient b");
        b=sc.nextDouble();
        System.out.println("Enter the Co-Efficient c");
        c=sc.nextDouble();
        System.out.println("THANK YOU FOR ENTERING THE CO-EFFICIENTS");
    }
    public static void calc()
    {
        read();
        double d=b*b-4*a*c;
        if(d>0)
        {
            System.out.println("ROOTS ARE REAL AND DISTINCT");
            System.out.println("FIRST ROOT IS " + (-b+Math.sqrt(d))/(2*a));
            System.out.println("FIRST ROOT IS " + (-b-Math.sqrt(d))/(2*a));
        }
        else if(d==0)
        {
            System.out.println("Roots are equal");
            System.out.println("ROOTS ARE " + (-b)/(2*a));
        }
        else
        {
            System.out.println("ROOTS ARE IMAGINARY");
            System.out.println("ROOTS ARE " + -b/(2*a) + "+" + "i" + (Math.sqrt(-d))/(2*a));
            System.out.println("ROOTS ARE " + -b/(2*a) + "-" + "i" + (Math.sqrt(-d))/(2*a));
        }
    }
}
```

```

}
}
public static void main(String[] args)
{
    calc();
}
}

```

output:

```

PROBLEMS 17 OUTPUT TERMINAL ... 1: Java Debug Console
/Contents/Home/bin/java -agentlib:jdwp=transport=dt_socket,server=n,suspend=y,address=localhost:5
6235 --enable-preview -XX:+ShowCodeDetailsInExceptionMessages -Dfile.encoding=UTF-8 -cp "/Users/a
dityaprakasha/Library/Application Support/Code/User/workspaceStorage/cfbc9c7f24e20b2c0e1ac38bf24b
d34d/redhat.java/jdt_ws/java_895310d3/bin" quadratic
Enter the Co-Effcient a
2
Enter the Co-Effcient b
3
Enter the Co-Effcient c
4
THANK YOU FOR ENTERRING THE CO-EFFICIENTS
ROOTS ARE IMAGINARY
ROOTS ARE -0.75+i1.1989578808281798
ROOTS ARE -0.75-i1.1989578808281798
bash-5.0$

```

2. Develop a Java program to create a class Student with members 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.Scanner;
class Student
{
    private String USN;
    private String name;
    private int n;
    private double SGPA = 0;
    private int totalCredits = 0;
    private int credits[];
    private double marks[];
    Scanner ss = new Scanner(System.in);

    void Details()

```

```

{
    System.out.println("Enter USN of the student");
    USN = ss.nextLine();
    System.out.println("Enter Name of the student");
    name = ss.nextLine();
    System.out.println("Enter no of subjects");
    n = ss.nextInt();
    credits = new int[n];
    marks = new double[n];
    System.out.println("**Enter details of the subjects:**");
    for(int i=0;i<n;i++)
    {
        System.out.println("Enter credits allotted to the subject "+(i+1));
        credits[i] = ss.nextInt();
        System.out.println("Enter marks in the subject "+(i+1));
        marks[i] = ss.nextInt();
        Calculate(credits[i],marks[i],i);
    }
}

void Calculate(int credit,double mark,int j)
{
    totalCredits = totalCredits + credit;
    if(mark>=90&&mark<=100)
        SGPA = SGPA + (10*credit);
    else if(mark>=80 && mark<=89)
        SGPA = SGPA + (9*credit);
    else if(mark>=70&&mark<=79)
        SGPA = SGPA + (8*credit);
    else if(mark>=60&&mark<=69)
        SGPA = SGPA + (7*credit);
    else if(mark>=50 && mark<=59)
        SGPA = SGPA + (6*credit);
    else if(mark>=40&&mark<=49)
        SGPA = SGPA + (5*credit);
    else
        System.out.println("Failed in Subject "+(j+1));
}

void Display()
{
    System.out.println("Details of the Student");
    System.out.println("USN: "+USN);
    System.out.println("Name :"+name);
    System.out.println("SGPA of Student "+(SGPA/totalCredits));
}

```

output:

```
bash-5.0$ /Library/Java/JavaVirtualMachines/jdk-15.jdk/Contents/Home/bin/java -agentlib:jdwp=transport=dt_socket,server=n,suspend=y,address=localhost:56291 --enable-preview -XX:+ShowCodeDetails InExceptionMessages -Dfile.encoding=UTF-8 -cp "/Users/adityaprakasha/Library/Application Support/Code/User/workspaceStorage/cfbc9c7f24e20b2c0e1ac38bf24bd34d/redhat.java/jdt_ws/java_895310d3/bin" Main
Enter USN of the student
1BM17CS088
Enter Name of the student
james bond
Enter no of subjects
3
*Enter details of the subjects:*
Enter credits allotted to the subject 1
3
Enter marks in the subject 1
86
Enter credits allotted to the subject 2
4
Enter marks in the subject 2
88
Enter credits allotted to the subject 3
3
Enter marks in the subject 3
90
Details of the Student
USN: 1BM17CS088
Name :james bond
SGPA of Student 9.3
bash-5.0$
```