Aim:

Write a C program to find the roots and nature of the roots of a quadratic equation, given its coefficients.

Input Format:

The program prompts the user with:

```
Enter coefficients a, b and c: <a> <b> <c>
```

- Input consists of three float values (a, b, and c) separated by spaces.

Output Format:

The output depends on the discriminant value $D = b^2 - 4ac$, with the following possibilities:
- If the roots are real and different (discriminant > 0):

```
root1 = <value1> and root2 = <value2>
```

- If the roots are real and the same (discriminant == 0):

```
root1 = root2 = <value>
```

- If the roots are complex (discriminant < 0):

```
root1 = <real>+<imag>i and root2 = <real>-<imag>i
```

where all the roots are float values formatted to two decimals.

Hint : Use formula $x = (-b \pm \sqrt{(b^2 - 4ac)})/(2a)$ for finding the roots of quadratic equation

Source Code:

quad.c

```c
// Type Content here...
#include<stdio.h>
#include<math.h>
int main(){
    double a,b,c;
    double discriminant;
    double root1, root2;
    double realPart, imagPart;
    printf("Enter coefficients a, b and c: ");
    scanf("%lf %lf %lf",&a,&b,&c);
    discriminant = b * b - 4 *a*c;
    if(discriminant > 0){
        root1 = (-b + sqrt(discriminant))/(2*a);
        root2 = (-b - sqrt(discriminant))/(2*a);
        printf("root1 = %.2lf and root2 = %.2lf\n",root1,root2);
    }
    else if(discriminant == 0){
        root1  = -b/(2*a);
        printf("root1 = root2 = %.2lf\n",root1);
```

```
    }else{
        realPart = -b /(2*a);
        imagPart = sqrt(-discriminant)/(2*a);
        printf("root1 = %.2lf+%.2lfi and root2 = %.2lf-%.2lfi\n",realPart,imagPart,real
Part,imagPart);
    }
    return 0;
}
```

Execution Results - All test cases have succeeded!

Test Case - 1
User Output
Enter coefficients a, b and c: 3 7 9
root1 = -1.17+1.28i and root2 = -1.17-1.28i

Test Case - 2
User Output
Enter coefficients a, b and c: 8 8 6
root1 = -0.50+0.71i and root2 = -0.50-0.71i

Test Case - 3
User Output
Enter coefficients a, b and c: 1 5 6
root1 = -2.00 and root2 = -3.00

Test Case - 4
User Output
Enter coefficients a, b and c: 1 2 5
root1 = -1.00+2.00i and root2 = -1.00-2.00i

Test Case - 5
User Output
Enter coefficients a, b and c: 1 4 4
root1 = root2 = -2.00