

### PROBLEM 2.1.1

#### Flowchart



#### Algorithm

##### Start

**Input:** Read three integers (a, b, and c) from a single line of input.

**Calculate Discriminant:** Compute D using the formula:  $D = b^2 - 4ac$

- **If  $D > 0$  (Real and Different):**
  - Calculate  $\text{root1} = \frac{-b + \sqrt{D}}{2a}$
  - Calculate  $\text{root2} = \frac{-b - \sqrt{D}}{2a}$
  - Print both roots.
- **If  $D = 0$  (Real and Same):**
  - Calculate the single root:  $\text{root} = \frac{-b}{2a}$
  - Print that  $\text{root1} = \text{root2}$  equals this value.
- **If  $D < 0$  (Imaginary/Complex):**
  - Calculate the **Real Part**:  $\frac{-b}{2a}$
  - Calculate the **Imaginary Part**:  $\frac{\sqrt{-D}}{2a}$
  - Print the roots in the complex format (e.g.,  $\text{real} + \text{imaginary } i$ ).

**Formatting:** Ensure all printed values are formatted to exactly **two decimal places**.

##### Stop

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#### 2.1.1. Roots of a Quadratic Equation

Write a program to find the roots of a quadratic equation, given its coefficients a, b, and c. Use the quadratic formula:  $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

The discriminant  $D = b^2 - 4ac$  determines the nature of the roots:

- If  $D > 0$ : Roots are real and different
- If  $D = 0$ : Roots are real and the same
- If  $D < 0$ : Roots are imaginary

**Input Format:**

- Three space-separated integers representing the coefficients a, b, and c, respectively.

**Output Format:**

- If roots are real and different, print:

root1 = <Root1>

```

1 import math
2 a, b, c = map(int, input().split())
3 D = b * b - 4 * a * c
4 if D > 0:
5     root1 = (-b + math.sqrt(D)) / (2 * a)
6     root2 = (-b - math.sqrt(D)) / (2 * a)
7     print("Roots are real and different")
8     print("root1 = %.2f, root2 = %.2f" % (root1, root2))
9 elif D == 0:
10    root = -b / (2 * a)
11    print("Roots are real and the same")
12    print("root1 = root2 = %.2f" % root)
13 else:
14    real = -b / (2 * a)
15    img = math.sqrt(-D) / (2 * a)
16    print("Roots are imaginary")
17    print("root1 = %.2f + %.2fi, root2 = %.2f - %.2fi" % (real, img, real, img))
  
```

1 -5 6  
root1 = 3.00  
root2 = 2.00  
YOUR PROGRAM HAS ENDED

