

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>
root2 = <Root2>
```

- If roots are the same, print:

```
root1 = root2 = <Root1>
```

- If roots are imaginary, print:

```
root1 = <RealPart>+<ImaginaryPart>i
root2 = <RealPart>-<ImaginaryPart>i
```

All values should be formatted to two decimal places.

quadratic...

```
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(f"root1 = {root1:.2f}")
8     print(f"root2 = {root2:.2f}")
9
10 elif D == 0:
11     root = -b / (2 * a)
12     print(f"root1 = root2 = {root:.2f}")
13
14 else:
15     real_part = -b / (2 * a)
16     imaginary_part = math.sqrt(-D) / (2 * a)
17     print(f"root1 = {real_part:.2f}+{imaginary_part:.2fi}")
18     print(f"root2 = {real_part:.2f}-{imaginary_part:.2fi}")

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

## 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., `real + imaginary i`).

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

