2.1.1. Roots of a Quadratic Equation

ALGORITHM:

1. **Start**
2. **Read** three integers a, b, and c (coefficients of the quadratic equation).
3. **Compute** the discriminant
$$D = b^2 - 4ac$$

4. **If** D > 0:
   - Calculate
   $$root1 = \frac{-b + \sqrt{D}}{2a}$$
   $$root2 = \frac{-b - \sqrt{D}}{2a}$$

   - Print both roots up to **2 decimal places**.
5. **Else if** D == 0:
   - Calculate
   $$root = \frac{-b}{2a}$$

   - Print the single root twice (same value).
6. **Else** (D < 0):
   - Calculate real part
   $$real = \frac{-b}{2a}$$
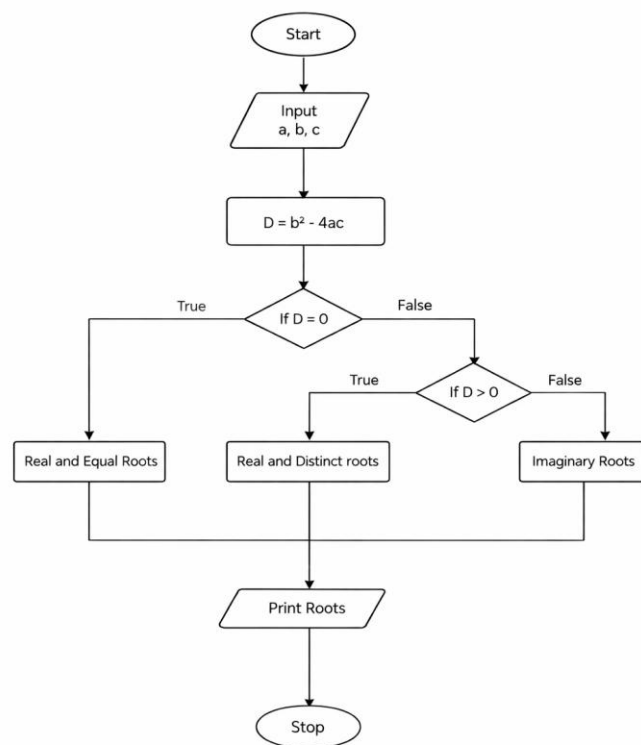
   - Calculate imaginary part
   $$imag = \frac{\sqrt{-D}}{2a}$$

   - Print both complex roots.
7. **Stop**

FLOWCHART:

CODE:

```
import math
a, b, c = map(int, input().split())
d = b*b - 4*a*c
if d > 0:
    root1 = (-b + math.sqrt(d)) / (2*a)
    root2 = (-b - math.sqrt(d)) / (2*a)
    print(f"root1 = {root1:.2f}")
    print(f"root2 = {root2:.2f}")
```

```python
elif d == 0:
  root = -b / (2*a)
    print(f"root1 = root2 = {root:.2f}")
else:
    real = -b / (2*a)
    imag = math.sqrt(-d) / (2*a)
    print(f"root1 = {real:.2f}+{imag:.2f}i")
    print(f"root2 = {real:.2f}-{imag:.2f}i")
```

CODETANTRA:

2.1.1. Roots of a Quadratic Equation   `00:35` A ☾ ☑ ⦿ —

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

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:

Sample Test Cases   +

🐍 quadratic...   ⦿ ▶ Submit

```python
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    elif d == 0:
10       root = -b / (2*a)
11       print(f"root1 = root2 = {root:.2f}")
12   else:
13       real = -b / (2*a)
14       imag = math.sqrt(-d) / (2*a)
15       print(f"root1 = {real:.2f}+{imag:.2f}i")
16       print(f"root2 = {real:.2f}-{imag:.2f}i")
17
18
```

▶ Terminal   ⊞ Test cases

‹ Prev   Reset   Submit   Next ›

2.1.1. Roots of a Quadratic Equation   `00:35` A ☾ ☑ ⦿ —

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Output Format:
- If roots are real and different, print:

Sample Test Cases   +

🐍 quadratic...   ⦿ ▶ Submit

```python
1    import math
2    a, b, c = map(int, input().split())
3    d = b*b - 4*a*c
4    if d > 0:
```

Average time	Maximum time	✓ 3 out of 3 shown test case(s) passed
0.008 s	0.013 s	
8.00 ms	13.00 ms	✓ 3 out of 3 hidden test case(s) passed

✓ **Test case 1** `13 ms`   🐞 Debug ≡ ⊞ ⌃

Expected output   Actual output

`1 -5 6`   `1 -5 6`

`root1 = 3.00`   `root1 = 3.00`
`root2 = 2.00`   `root2 = 2.00`

✓ **Test case 2** `13 ms`   ⌄

▶ Terminal   ⊞ Test cases

‹ Prev   Reset   Submit   Next ›