2.1.1 Roots of a quadratic equation

A) Algorithm

1: Start

2: Read the coefficients a, b, and c

3: Calculate the discriminant

$$D = b^2 - 4ac$$

4: Check the value of D

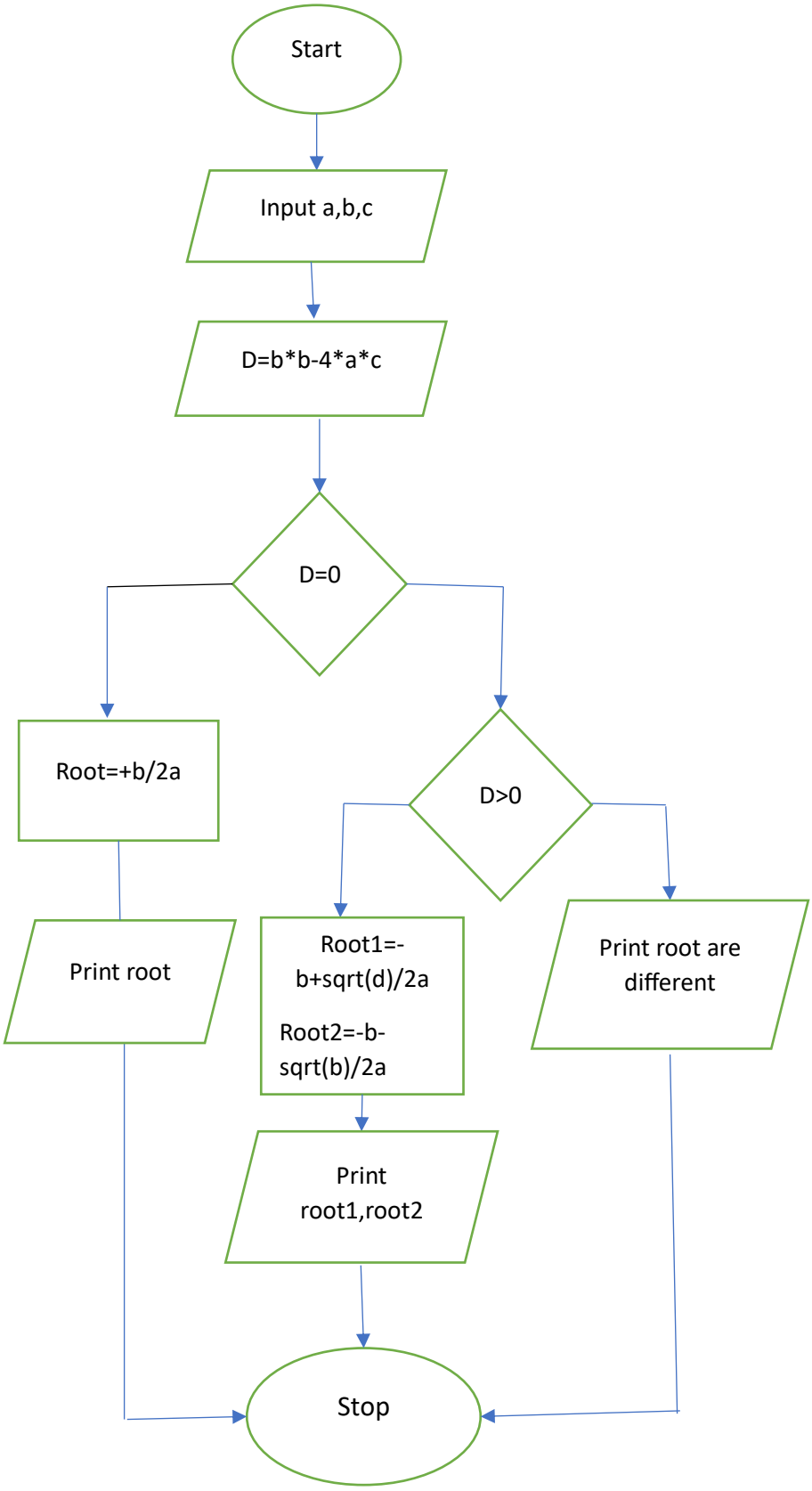
- **If D > 0**
    - Calculate
    - $root1 = \frac{-b+\sqrt{D}}{2a}$
    - $root2 = \frac{-b-\sqrt{D}}{2a}$
    - Display root1 and root2 (real and different)
- **Else if D = 0**
    - Calculate
    - $root = \frac{-b}{2a}$
    - Display root1 = root2 = root (real and equal)
- **Else (D < 0)**
    - Calculate
    - $real = \frac{-b}{2a}$
    - $imag = \frac{\sqrt{-D}}{2a}$
    - Display
      root1 = real + imag i
      root2 = real - imag i (imaginary roots)

5: Stop

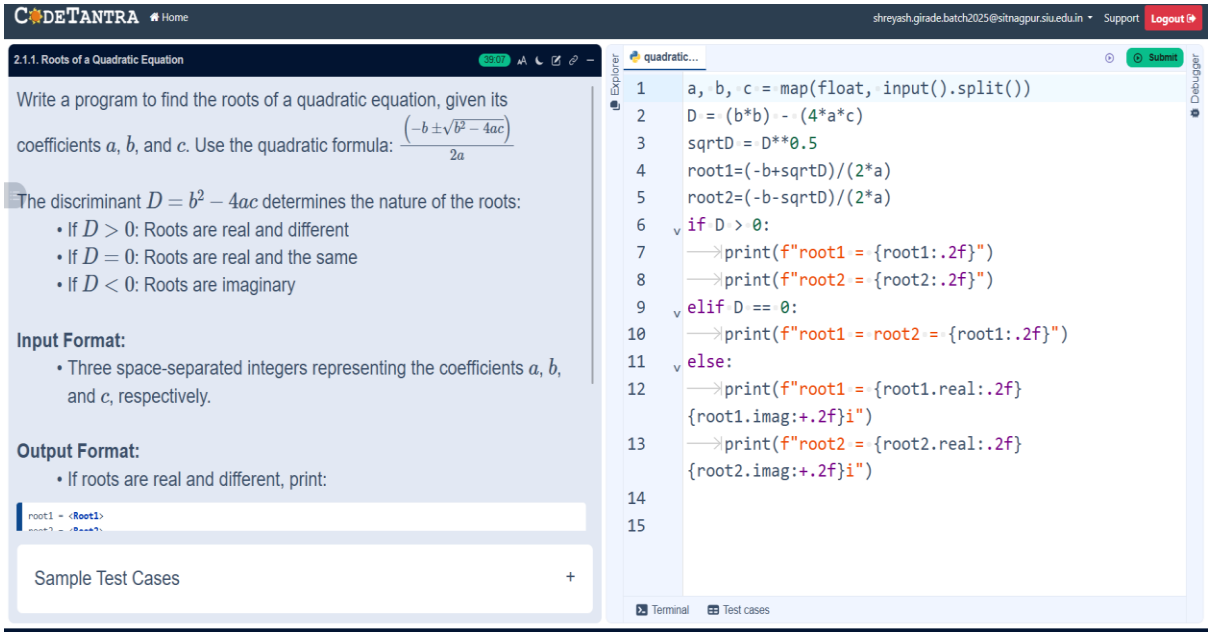
B) code

```
a, b, c = map(float, input().split())
D = b*b - 4*a*c
if D > 0:
    sqrtD = D ** 0.5
    root1 = (-b + sqrtD) / (2*a)
    root2 = (-b - sqrtD) / (2*a)
    print(f"root1 = {root1:.2f}")
    print(f"root2 = {root2:.2f}")
elif D == 0:
    root = -b / (2*a)
    print(f"root1 = root2 = {root:.2f}")
else:
    sqrtD = (-D) ** 0.5
    real = -b / (2*a)
    imag = sqrtD / (2*a)
    print(f"root1 = {real:.2f}+{imag:.2f}i")
    print(f"root2 = {real:.2f}-{imag:.2f}i")
```

C) Flowchart


Start
Input a,b,c
D=b*b-4*a*c
D=0
Root=+b/2a
D>0
Print root
Root1=-b+sqrt(d)/2a
Root2=-b-sqrt(b)/2a
Print root are different
Print root1,root2
Stop

D)output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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: $\frac{\left(-b \pm \sqrt{b^2 - 4ac}\right)}{2a}$
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>
Sample Test Cases
quadratic...
Submit
Explorer
Debugger
1 a, b, c = map(float, input().split())
2 D = (b*b) - (4*a*c)
3 sqrtD = D**0.5
4 root1=(-b+sqrtD)/(2*a)
5 root2=(-b-sqrtD)/(2*a)
6 if D > 0:
7 print(f"root1 = {root1:.2f}")
8 print(f"root2 = {root2:.2f}")
9 elif D == 0:
10 print(f"root1 = root2 = {root1:.2f}")
11 else:
12 print(f"root1 = {root1.real:.2f} {root1.imag:+.2f}i")
13 print(f"root2 = {root2.real:.2f} {root2.imag:+.2f}i")
14
15
Terminal
Test cases