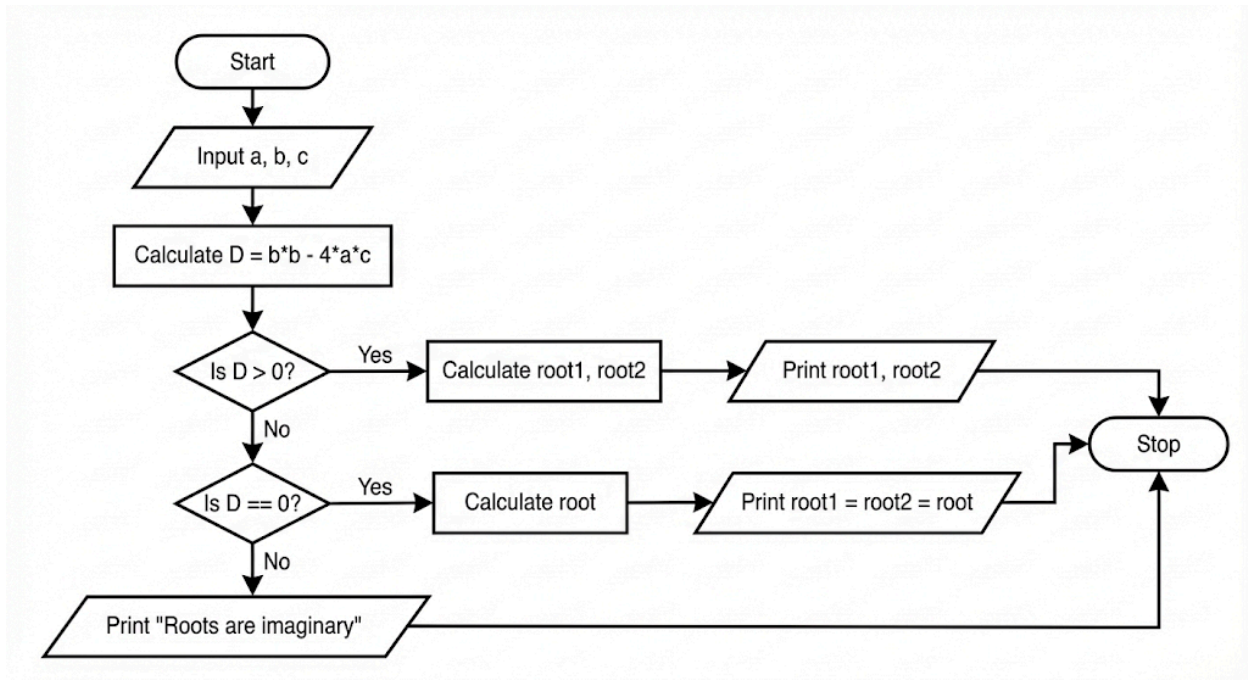# Experiment - 2.1.1. Roots of a Quadratic Equation

1. Aim

To design and implement a Python program that finds the roots of a quadratic equation $ax^2 + bx + c = 0$ using the quadratic formula. The program determines the nature of the roots (real and distinct, real and equal, or imaginary) based on the discriminant and formats $D = b^2 - 4ac$ the results to two decimal places.

2. Pseudocode

1. **START**
2. **READ** three space-separated integers a, b, and c.
3. **CALCULATE** the discriminant: $D = b^2 - 4ac$.
4. **IF** $D > 0$:
   - Calculate $root1 = \frac{-b+\sqrt{D}}{2a}$
   - Calculate $root2 = \frac{-b-\sqrt{D}}{2a}$
   - **PRINT** "root1 = [value]" and "root2 = [value]" formatted to 2 decimal places.
5. **ELSE IF** $D == 0$:
   - Calculate $root = \frac{-b}{2a}$
   - **PRINT** "root1 = root2 = [value]" formatted to 2 decimal places.
6. **ELSE** (if $D < 0$):
   - **PRINT** "Roots are imaginary".
7. **END**

3. Flowchart

4. Python Program

Program to find the roots of a quadratic equation
Input: Space-separated coefficients a, b, and c
Output: Roots formatted to 2 decimal places or nature of roots

import math

Taking coefficients as input
a, b, c = map(int, input().split())

# Calculating the discriminant
D = b*b - 4*a*c

if D > 0:
    # Real and different roots
    sqrt_D = D ** 0.5
    root1 = (-b + sqrt_D) / (2 * a)
    root2 = (-b - sqrt_D) / (2 * a)
    print(f"root1 = {root1:.2f}")
    print(f"root2 = {root2:.2f}")

elif D == 0:

```
    # Real and same roots
    root = -b / (2 * a)
    print(f"root1 = root2 = {root:.2f}")

else:
    # Imaginary roots
    print("Roots are imaginary")
```

5. Experiment Screenshot