Programming Assignment 1: Quadratic Equation Verification with Complex Number Operations Report

Introduction:

The presented program is a quadratic equation solver implemented in C. It accepts coefficients a, b, and c for a quadratic equation of the form ax^2 + bx + c = 0, calculates the roots, and verifies their correctness.

Functionality:

1. Input: The program prompts the user to input the coefficients a, b, and c.

2. Calculation: It computes the discriminant to determine the nature of the roots (real or complex). Depending on the discriminant's value, it calculates the roots using appropriate formulas.

3. Output: The program prints the input quadratic equation and its roots. It ensures proper formatting, handling both real and complex roots.

4. Verification: After calculating the roots, the program verifies their correctness by substituting them back into the quadratic equation and checking if the result is close to zero.

Code Overview:

1. User Input: The program uses `scanf` to read coefficients a, b, and c entered by the user.

2. Root Calculation: It calculates the discriminant using the formula `b^2 - 4ac` to determine the root type. If the discriminant is non-negative, real roots are computed using the quadratic formula. Otherwise, complex roots are calculated.

3. Printing Equation and Roots: The quadratic equation, along with its roots, is printed using proper formatting. The coefficients are printed only if they are non-zero, and the imaginary part of complex roots is indicated by appending "i" after the value.

4. Verification: The roots are verified by substituting them back into the quadratic equation and checking if the result is close to zero. This ensures the correctness of the computed roots.

Conclusion:

The quadratic equation solver successfully handles various scenarios, providing accurate roots for both real and complex quadratic equations. Its modular design and clear output make it an effective tool for solving and verifying quadratic equations in the realm of real and complex numbers.