1. Experimental tasks and requirements:

1) Write a function to calculate the root of a quadratic equation in one variable.

The input parameters of the function are the three coefficients of the quadratic equation $ax^2+bx+c=0$: a,b,c . The output of the function is the number of roots of the equation (2 for 2 roots, 1 for two identical roots, 0 for no root), and the value of the root.

Note: Judging whether the function has roots and the number of roots according to the discriminant formula; make correct handling for non-quadratic equations.

2) Write a function that outputs a quadratic equation in one variable and its roots. Require:

Output on the console: the parameters of the equation, the result of the solution (the number of roots, and each root) according to the function defined above; each line outputs the solution result of one equation.

3) In the main function, test the function. Require:

A. Output your name and student number in the main function (output on the same line, and change the line after the output) .

B. Read in a set of parameters from the console and test the functions defined above;

C. Test the function defined above using the test case below;

Test case:

a = 1.0, b = -2.0, c = 1.0;

a = 1.0, b = 1.0, c = 1.0;

a = 2.0, b = -7.0, c = 3.0;

a = 0.0, b = -1.0; c = 2.0;

a = 0.0, b = 0.0; c = 2.0;

2. Paste the screenshot of the program running result below. (If the executable file cannot be generated due to grammatical errors, there will be no running results, and the screenshot will not be pasted)

```
Please input three coefficients in the linear equation in two unknowns: Ax^2 + Bx + C = 0
Input A: 1.0
Input B: -2.0
Input C: 1.0

Result:
The number of real roots is: 1
The three coefficients are:    A:1   B:-2    C:1
The equation you input is :   (1)x^2+(-2)x+(1)=0
The equation has only one real root: x = 1


Please input three coefficients in the linear equation in two unknowns: Ax^2 + Bx + C = 0
Input A: 1.0
Input B: 1.0
Input C: 1.0

Result:
The number of real roots is: 0
The three coefficients are:    A:1   B:1    C:1
The equation you input is :   (1)x^2+(1)x+(1)=0
The equation has no real root,and its imaginary roots are : x1 = -0.5 + 0.866025i,  x2 = -0.5 - 0.866025i


Please input three coefficients in the linear equation in two unknowns: Ax^2 + Bx + C = 0
Input A: 2.0
Input B: -7.0
Input C: 3.0

Result:
The number of real roots is: 2
The three coefficients are:    A:2   B:-7    C:3
The equation you input is :   (2)x^2+(-7)x+(3)=0
The equation has two fifferent real roots: x1 = 3 x2 = 0.5


Please input three coefficients in the linear equation in two unknowns: Ax^2 + Bx + C = 0
Input A: 0.0
Input B: -1.0
Input C: 2.0
Error! The 'A' you input is 0 ! Please re-input!


Please input three coefficients in the linear equation in two unknowns: Ax^2 + Bx + C = 0
Input A: 0.0
Input B: 0.0
Input C: 2.0
Wrong! The equation isn't tenable! Please re-input!
```

3. your finished source file below . (Insert method: first place the cursor at the beginning of the next paragraph of this paragraph, then select Insert->Object->Text in the file in the menu bar, and select the source file you wrote in the pop-up dialog box)

```cpp
#include <iostream>
#include <cmath>
using namespace std;
#define ERROR -1
#define WRONG -2


struct solution //the solution including 3 factors
{
    int NumSolution; //the number of the real root
    float x1; //the first real root(or the first imaginary root)
    float x2;              //the second real root(or the second imaginary root)
};

struct     solution     CalEquation(float     a,     float     b,     float     c);
```

```c
//calculate the solutions
int OutputSolution(float a, float b, float c, struct solution result);    //output
the solutions

struct solution CalEquation(float a, float b, float c)
{
    struct solution result;                    //record the solution and return it
later
    if (a == 0 && b != 0)                               //when a is 0,output "ERROR"
in the OutPutSolution()
    {
        result.NumSolution = ERROR;
        return result;
    }
    if (a == 0 && b == 0 && c != 0)          //when inputed wrong that the equation
isn't tenable
    {
        result.NumSolution = WRONG;
        return result;
    }

    float discriminant = pow(b, 2) - 4 * a * c; //the discriminant(delta)

    if (discriminant > 0)
    {
        result.x1 = (-b + sqrt(discriminant)) / (2 * a);
        result.x2 = (-b - sqrt(discriminant)) / (2 * a);
        result.NumSolution = 2;             //record that there are 2 real roots
    }
    else if (discriminant == 0)
    {
        result.x1 = -b / (2 * a);
        result.NumSolution = 1;             //record that there are 1 real root
    }
    else if (discriminant < 0)
    {
        result.x1 = -b / (2 * a);
        result.x2 = sqrt(-discriminant) / (2 * a);
        result.NumSolution = 0;                //record that there are no real root
    }
    return result;
}

int OutputSolution(float a, float b, float c, struct solution result)
{
    if (result.NumSolution == ERROR)    //when inputed wrong that a is 0
    {
```