Name _____

Due Date _____

Assignment

Solutions to the quadratic equation $Ax^2 + Bx + C = 0$ may be calculated using the quadratic formulas :

$$x = \frac{-B + \sqrt{B^2 - 4AC}}{2A} \quad \text{or} \quad x = \frac{-B - \sqrt{B^2 - 4AC}}{2A}$$

These formulas may be used, of course, only if the leading coefficient, A, is not zero. The number and type of solutions is determined by the value of the expression under the radical sign, $B^2 - 4AC$, known as the discriminant :

value of discriminant	number of solutions	kind of solutions
positive	2	real
zero	1	real
negative	2	imaginary

Your job is to write a program which will read the coefficients of a quadratic equation and, if the leading coefficient is non-zero, calculate and report the solutions. Since programming languages does not provide the *imaginary* type, you'll have to take appropriate steps to give imaginary results in the form shown. Just remember that every imaginary number is really determined by a pair of real numbers.

Several sample runs appear on the next page; user input appears in **bold type.** The "*I" which appears in the output is simply written where necessary; the actual calculations involve only real results. You are not required to duplicate this output, but you should provide all information shown.

Your output, for running the program several times, may appear something like this.

```
John Smith -

This program will provide solutions for an equation of the form
                        A*x^2 + B*x + C = 0,
where A, B and C are integers, and A is not equal to zero.

Enter A, B and C : 2 -5 -3
The two real solutions are        x =  3.0000E+00
                        and       x = -5.0000E-01

Press ENTER to terminate . . .
```

```
John Smith -

This program will provide solutions for an equation of the form
                        A*x^2 + B*x + C = 0,
where A, B and C are integers, and A is not equal to zero.

Enter A, B and C : 2 -5 4
The two imaginary solutions are  x =  1.2500E+00  + ( 6.6144E-01)*I
                         and     x =  1.2500E+00  - ( 6.6144E-01)*I

Press ENTER to terminate . . .
```

```
John Smith -

This program will provide solutions for an equation of the form
                        A*x^2 + B*x + C = 0,
where A, B and C are integers, and A is not equal to zero.

Enter A, B and C : 1 -8 16
The one real solution is          x =  4.0000E+00

Press ENTER to terminate . . .
```

```
John Smith -

This program will provide solutions for an equation of the form
                        A*x^2 + B*x + C = 0,
where A, B and C are integers, and A is not equal to zero.

Enter A, B and C : 0 3 8
No solutions will be calculated for a leading coefficient of 0!

Press ENTER to terminate . . .
```