

Student Name: **KEY SOLUTION** ID:

A data file named "data.txt" contains triplets of real numbers a, b, c. The triplet values are the coefficients of the quadratic equation: $ax^2 + bx + c$. Write a code that reads each triplet from the file, then calls a function that accepts the (a, b, c) values as input, and returns 1 and the roots if the corresponding quadratic equation has real roots, and zero if the quadratic equation has no roots. The output is saved to a new file whenever there are real roots.

Program run:

```
1.0  2.0  1.0
3.0 -2.0  1.0
3.0  5.7  2.0
1.0  5.0 -3.0
5.0  6.4  7.2
6.0 -7.3 80.4
8.0  6.5  6.0
```

```
(a,      b,      c)    ==> (x1,      x2)
(+1.00, +2.00, +1.00) ==> (-1.00, -1.00)
(+3.00, +5.70, +2.00) ==> (-0.46, -1.44)
(+1.00, +5.00, -3.00) ==> (+0.54, -5.54)
```

```
#include <stdio.h>
#include <math.h>
#include <stdlib.h>
int quadratic(double a, double b, double c, double *x1, double *x2);

int main(){
    double a,b,c, x1, x2;
    FILE *inFile, *outFile;

    inFile = fopen("data.txt", "r");
    if (inFile == NULL){
        printf("Error opening file !");
        exit(1);
    }
    outFile = fopen("Result.txt", "w");
    fprintf(outFile, "(a,  b,  c) ==> (x1,  x2)\n");
    while(fscanf(inFile, "%lf%lf%lf", &a,&b,&c) != EOF){
        if(quadratic(a, b, c, &x1, &x2)){
            fprintf(outFile, "(%.2f, %.2f, %.2f) ==> (%.2f, %.2f)\n", a,b,c,x1,x2);
            fprintf(stdout, "(%.2f, %.2f, %.2f) ==> (%.2f, %.2f)\n", a,b,c,x1,x2);
            // This line is optional
        }
    }
    fclose(inFile);
    fclose(outFile);
    return 0;
}

int quadratic(double a, double b, double c, double *x1, double *x2){

    if(b*b-4*a*c < 0)    // If delta < 0 no roots.. exit function with value 0
        return 0;
    *x1 = (-b+sqrt(b*b-4*a*c))/(2*a);
    *x2 = (-b-sqrt(b*b-4*a*c))/(2*a);
    return 1;
}
```