# Laboratory 6

# Subroutines

**Concepts:**

* Writing subroutines in assembly
* Passing parameters by reference and by value using the stack

**Objectives:**

* Write a subroutine in assembly that performs a given function and call it several times from a main program with different sets of parameters.

**Files Needed:**

* None

**Assignment**

Write a subroutine in assembly that solves for the real roots of a second order equation using the quadratic formula.

The subroutine must meet the following requirements.

1. Inputs a, b, and c are all 8-bit signed numbers passed by value by the caller in that order, followed by the 16-bit address for the result. Parameters are passed on the stack. I.e. a is the first value pushed on the stack, b is the next value pushed on the stack, etc.
2. The subroutine must return a one-byte error code and the two roots by reference on the stack. I.e., to hold the result, the caller pushes the address of five bytes worth of space. The first byte is the error code, the second and third bytes are the first root, and the fourth and fifth bytes are the second root.
3. If the equation has two real solutions, the subroutine must return them as 16-bit signed numbers and the error code must be $00 to indicate success.
4. If the equation does not have real roots (i.e. the term under the radical is negative), or if input a is 0 (which would result in a divide-by-0 error), the subroutine must write $FF to the error code. There is no requirement for the other outputs in this case.
5. The subroutine must not use any specific memory locations for temporary storage. It must use the stack.

Write a main program that calls the subroutine at least twice with completely different sets of inputs and a different address for the returned data data.

**Deliverables/Scoring:**

Successful demonstration of the program is required for acceptance of the lab report, then

* 10 points - Compliance with posted lab report guidelines.
* 45 points – Working subroutine that must accept the arguments as required above
* 45 points – Main program that call the subroutine multiple times using the required parameter passing convention.

Submit the deliverables according to the lab report guidelines posted on Blackboard.