Programming Lab #4

Quadratics and Recursion

Prerequisite Reading: Chapters 1-5, 6.1-2
Revised: October 24, 2017

Create a single ARM Cortex-M4 assembly source code file containing five functions. (Note that functions $Root1$ and $Root2$ should both contain calls to functions $Discriminant$ and $SquareRoot$.) Functions $Discriminant$, $Root1$, $Root2$ and $Quadratic$ are called by a main program (download from <u>here</u>) that will test your functions for three test cases. All of the parameters and return values are of type int32_t:

1. $Discriminant(a, b, c) = b \times b - 4ac$

2. $Root1(a, b, c) = \dfrac{-b + SquareRoot(Discriminant(a,b,c))}{2a}$

3. $Root2(a, b, c) = \dfrac{-b - SquareRoot(Discriminant(a,b,c))}{2a}$

4. $Quadratic(x, a, b, c) = ax^2 + bx + c$

5. $SquareRoot(n) = \sqrt{n}$,

> where the square root is computed by the following algorithm to be converted into assembly:

```
int32_t SquareRoot(int32_t n)
    {
    int32_t smallCandidate, largeCandidate ;

    if (n < 2) return n ;

    // Recursive call:
    smallCandidate = 2 * SquareRoot(n / 4) ;
    largeCandidate = smallCandidate + 1 ;

    if (largeCandidate * largeCandidate > n)
        {
        return smallCandidate ;
        }

    return largeCandidate ;
    }
```

If your code is correct, the display should look like these images. Incorrect values will be displayed as white text on a red background.