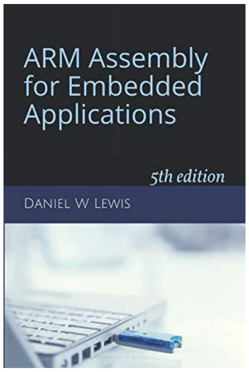


Programming Lab 9A

Solving Quadratics Using Hardware Floating-Point

Topics: Floating-point instructions

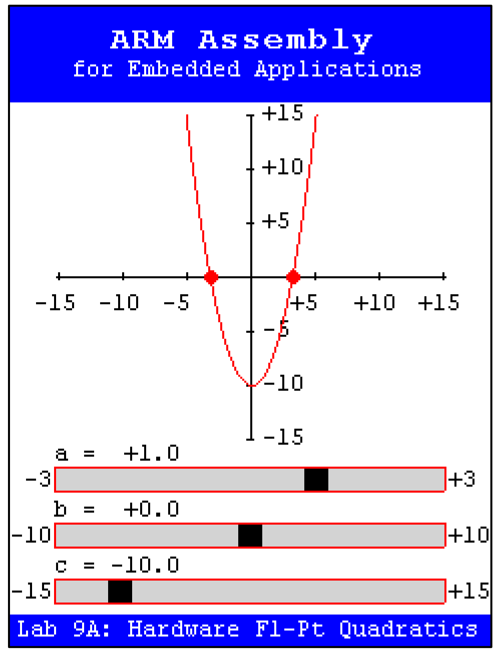
Prerequisite Reading: Chapters 1-9

Revised: January 21, 2021

Click to download Lab9A-Main.c

Background: This assignment is very similar to Lab 5A except that (1) it uses floating-point instructions instead of integer instructions, and (2) the function used in Lab 5A to compute the integer square root is no longer needed since you can use the `VSQRT.F32` instruction instead.

Assignment: The main program will compile and run without writing any assembly. However, your task is to create equivalent replacements in assembly language for the following four functions found in the C main program. The original C versions have been defined as "weak" so that the linker will automatically replace them in the executable image by those you create in assembly; you do not need to remove the C versions. This allows you to create and test your assembly language functions one at a time.



`float Root1(float a, float b, float c) ;`

Computes the root given by $\frac{-b+\sqrt{Discriminant(a,b,c)}}{2a}$

`float Root2(float a, float b, float c) ;`

Computes the root given by $\frac{-b-\sqrt{Discriminant(a,b,c)}}{2a}$

`float Quadratic(float x, float a, float b, float c) ;`

Computes the quadratic, $ax^2 + bx + c$
Most efficient implementation: $c + x(b + ax)$

`float Discriminant(float a, float b, float c) ;`

Computes the value of the discriminant, $b^2 - 4ac$
Functions Root1 and Root2 should call this function.

Test your code with the main program. If your code is correct, the display should look similar to the image shown, the sliders can be used to vary the coefficient values, and pressing the blue pushbutton will restore the initial conditions. Otherwise, incorrect return values will cause an error message to be displayed as white text on a red background and the program will be halted.