LAB 06: Assembly Control Structures and Arrays…

Do a for loop

Then do an array sum

Then do find max

Then do max 3

X. Notice that the statements you wrote in #9c are the same as those that appeared in #9b. If they weren’t, go back and double check your work and understand why they should be. Those statements should start to make it apparent how you could implement a loop that can traverse an array. Using the idea of adding to the indirect address (e.g. like we did to R0 above), and the structure of a for loop from last class, write an assembly language program that is equivalent to the following high-level language program:

int[] a = {1, 2, 3, 4, 5};

int sum = 0;

for (int i=0; i<5; i++) {

sum = sum + a[i];

}

Be sure to assemble and run your program to be sure that it works.

Hint: The three statements question 9b (or c) will make up the body of the loop. But note, the program will be easier to write in assembly language if you rearrange them a little.

Give your assembly language program here as your answer.

**Putting it All Together:**

In class we have seen the following example several times:



In this section you will play the role of the compiler and translate this high-level language code into an equivalent assembly language program.

🏆 6. Let’s start by implementing and testing the max function. Then in the next question you’ll implement and test the max3 function.

a. Give an implementation of the max function that is side effect free.

b. Give a main function that reads two values from standard input, passes them to the max function and then prints the result to standard output. Be sure to combine this code with your implementation of max, assemble it and test it using the machine simulator to be sure it works.

🏆 7. Give an implementation of the max3 function that is side effect free. Hints:

* Have your max3 function call your max function twice. Each call is the same, push the arguments you want to pass, call the function, pop the arguments, and then use the return value in R14.
* Remember that R12 is modified by the CALL instruction. So, because max3 uses CALL, you will need to be sure to save and restore R12, just like any other register that max3 modifies. (See question #11 in Homework 18).

🏆 8. Write the main function that reads 3 values from standard input, passes them to the max3 function and then prints the result to standard output. Combine this code with your implementation of max3 and max, assemble it and test it using the machine simulator to be sure it works.