

Lab 10: Control Structures

(Due Wed Nov 4, 11:59 pm)

Note: Hand in your lab using Blackboard, using the digital dropbox. Be sure to Add and Send your file. Include comments that include your name and the assignment (Lab 10). Since this assignment is going out late, let's make it due later too.

A. Why?

Control structures are good to practice.

B. Outcomes

By the end of the activity you should

- Be able to write conditionals and loops in LC-3 assembler.
- Be able to traverse an array that ends with a sentinel value.
- Be able to read a sequence of values that ends with a sentinel value.

C. In-Lab Practice

(These were from the activity for Lecture 17 (Wed Oct 28)).

1. Sketch LC-3 assembler code for the following high-level pseudocode:

```
if (X >= 0 && X <= K) {
    ... True branch ...
}
else {
    ... False branch ...
}
```

2. Sketch LC-3 assembler code for the following high-level pseudocode:

```
while (Y >= 0 || Y <= K) {
    ... Loop body ...
}
```

D. Questions to Hand In

Remember, comment your program so that the TAs can understand it.

3. Write an LC-3 assembler program that:
 1. Assumes you've declared a list of values: You have a sequence of `.FILL` values terminated by a `.FILL` of 0, with some label on the first `.FILL`. E.g.


```
LIST .FILL #17
      .FILL x38
      .FILL x0
```

2. Use a loop to take go through the values and replace them by their negatives. (So above, we'd replace 17 by -17 , etc.) Stop when you find the zero.

4. Write an LC-3 assembler program that:
 1. Prompts the user for a letter A E I O U or Q to quit, then reads the letter.
 2. If the letter is A E I O or U, print the letter and print a message saying it's a vowel. (E.g. "A is a vowel"). If the letter is anything other than Q, print the letter and say it's not a vowel. Make your tests case-sensitive (so "A", not "a").
 3. If the letter was Q, then quit, otherwise loop back to step 1.
 4. If you want 4 points of extra credit, make the tests case-insensitive.
 5. If you want 4 points of extra credit beyond that, validate the input: See if it's a letter A-Z or a-z, and print a complaint if it isn't. E.g. (your program may vary)

```
Enter a letter A E I O U (upper or lower case), or Q/q to quit: (user types 8)
Bad input: You entered "8"
Enter a letter A E I O U (upper or lower case), or Q/q to quit:
```