**Student Name:**

**CMSC 311 Computer Organization**

**LAB 5: Assembly Language programming Using LC-3 Simulator**

**Instructor:** Dr. Cang Ye **Email:** [cye@vcu.edu](mailto:cye@vcu.edu) Office & Hours: E2240, TR 12-1 PM

**TA:** Lingqiu Jin **Email:** [jinl@mymail.vcu.edu](mailto:jinl@mymail.vcu.edu) Office & Hours: E2264, MW 2-3 PM

**Assignment**:

Write an LC-3 assembly language program that searches for even numbers in memory locations ranging from address A to address B (inclusive). Set R0 to the number of even numbers that are found. Your solution should use an iterative construct like the examples in the lecture. To test the program, let A to be the first available memory location after your code and let B=A+9.

**Instructions:**

1. Your lab report is due no later than the date of the next class. Your lab report (in pdf format) should include your assembly code and a screenshot. Submit both your lab report and source codes in separate files via blackboard. Please comment your code to make it easy to understand.

2. The screenshot should show both your assembly code and simulation result. The code should start at address x3000. All register information, the assembly code, and the input data should be visible on the screenshot.

3. Grading policy: lab report 20%, source code 80%.

**Source code**

.ORIG X3000 ;start the program at x3000

AND R0,R0,#0 ;clear R0 to store the result

LD R1, #-10 ;load r1 with the first address location

LD R4, #-11 ; load r4 with the first address

LD R5, #-11 ;load r5 with the first address

NOT R4,R4 ; change sign of r4

ADD R4, R4, #2 ;add r2 to r4 to calculate the loop

ADD R2, R4, R5 ;add r4 and r5 to calculate the loop

BRZ #7 ;if the R2 become 0 we more to HALT

LDR R3,R1,#0 ;load R3 with number in R1 address

AND R3,R3,#1 ; R3 = 0 if even, 1 if odd

BRnp #1 ;if odd, skip counter increment

ADD R0,R0,#1 ;even number increase counter

ADD R1,R1,#1 ;increase data pointer

ADD R2,R2,#-1 ;decrease loop count

BRNZP #-8 ;unconditional branch to start of loop

HALT

.END

In this program. I the counter will be stored in R2. Before running program. We will have to specify the start and end location addresses of the locations that hold the numbers. At x2FF8 for the beginning and x2FF9 for the last number. Also in this program, zeros will be treated as even number.



