**CIS 350 – INFRASTRUCTURE TECHNOLOGIES**

**SMALL GROUP ACTIVITY #3**

Names of group

members: Brooklynn Taylor, Dylan Lasley, Jonathan McCarrick, Zoe Druen

**Topic**: Operation of the Computer, Assembler Language – The Little Man Computer (LMC)

Logistics

1. Get in touch with your group. (See Groups folder on Blackboard.)
2. Discuss and work **all** of the 2 assignments collectively with your group via E-mail, Discussion Forum, Blackboard Collaborate Ultra, and/or MS Teams. (Do not divide the work among group members.)
3. Choose a recorder to prepare the final copy (one per group) and submit it via the Blackboard Assignments/Small Group Activities folder.
4. Be sure all group members' names are on final copy. Do **not** add names of your group members who did not participate in the assignment or whose contribution was minimal.

# Assignment One

Write the LMC program that reads in four numbers (one at a time) and places them in memory locations 25, 26, 27, 28 symbolically denoted by variables *a*, *b*, *c,* and *d*, respectively, in the C# like program segment below. The LMC program should subtract the second number from the first number and add the third number and the fourth number to the difference (*e:=a-b-c+d*). Next, the program should store the result in memory location 29, symbolically denoted by variable *e*, and print it out. Write the LMC instructions in the mnemonic form. Note that your LMC program will actually implement the following statements written in the C# pseudocode below. The LMC instructions start at address 00.

int a, b, c, d, e;

read a, b, c, d;

e:=a-b-c+d;

print e;

address instruction

00 IN

01 STO 25

02 IN

03 STO 26

04 IN

05 STO 27

06 IN

07 STO 28

08 LDA 25

09 SUB 26

10 SUB 27

11 ADD 28

12 STO 29

13 OUT

14 HLT

….

….

….

25 DAT

26 DAT

27 DAT

28 DAT

29 DAT

What addresses represent the program area and the data area, respectively?

Program area: \_\_00-14\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Data area: \_\_25-29\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Assignment Two

Write an LMC program (one program) that reads in two numbers, stores them in memory locations 40 and 41, finds the **larger** of the two numbers, stores the larger number in memory location 42, and outputs the larger number. (Note that the program will be similar, not the same, to the one that finds the positive difference of two numbers that we discussed in the lecture notes for Chapter 6 recorded on Panopto. Note that the LMC instructions start at address 00. You may trace in your memory or on paper the program execution for the two scenarios below:

scenario 1: you enter 5 and 7; and

scenario 2: you enter 7 and 5.

In both cases, your program should output 7.

Does your program

Memory locations returns 7? Circle Yes or No!

Address Instruction 40 41 42

00 IN Scenario 1 5 7 **7** Yes/No

01 STO 40 Scenario 2 7 5 **7** Yes/No

02 IN

03 STO 41

04 SUB 40

05 BRP 08

06 LDA 40

07 BR 09

08 LDA 41

09 STO 42

10 OUT

11 HLT

…

…

Address

40 DAT

41 DAT

42 DAT

What range of addresses represents the program area? \_\_\_00-11\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What range of the addresses represents the data area? \_\_\_40-42\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_