

## Problem Set #1 (Modified)

Date Assigned: Monday, February 2, 2015  
Date Due: Monday, February 9, 2015  
Points: 50

1) (8 pts) The textbook states: "Many computer manufacturers offer a family of computer models, all with the same architecture but with differences in organization."

- a) List 2 different computer models in the same family.
- b) List 3 differences in organization of the 2 different computer models you selected in a).
- c) Give Web references for each of the models listed in a) of where you found your information.

2) (13 pts) Given the memory contents of the IAS computer shown below:

Address	Contents
000	0100215000
001	1500011002
002	000000000A

- a) Show the assembly language code for the program starting at address 000.
- b) In general, what does this program do? Do not tell me what each instruction does or you will receive 0 credit for this part of the question. In general, this program does what?
- c) After fetching the left and right instructions at address 1, what are the hexadecimal values of each of the following registers: MBR, IBR, IR, PC, MAR?

3) (9 pts) Simplify each of the following Boolean expressions using the postulates and theorems we discussed in class. You do not need to identify the postulate or theorem being applied but only apply one postulate or theorem at a time as you simplify each expression.

- (a)  $(XY)'(X' + Y)(Y' + Y)$
- (a)  $(BE + C + F)C$
- (b)  $AB' + B + AC$

4) (20 pt) You are to write an IAS assembly language program to find the factorial of a value stored in a variable N. Your program is to start at address 0 and your data is to start at location 1A. Type up your program and show:

Address	Left Instruction	Right Instruction
0	01 00A LOAD M(A)	05 00B ADD M(B)

and so on.

There is a simulator called IASSim on each of the Windows machines in the CS lab in C:\Program Files\Architecture that you can type in your machine language code and test. There is an assembler and a high-level FORTRAN type of compiler that I don't want you to use. Before the assignment is due, you are to show me on the simulator that your program works correctly by changing values of N. Example, 0! is 1.

Note1: Please make sure your problem sets are typed, answered in order, and stapled together. This word document will be placed in CS430-01Public on grace.

Note2: A hard copy of your Problem Set Solution is due on the instructor's desk by 11:45am on the day the assignment is due. Also, place a copy of this solution (01lastname.doc) into the CS430 Drop by 11:45am on the day in which the assignment is due.

Note3: Please do your own work. I don't want you comparing answers as these problem sets are individual work.

### **Modification (2/4/15):**

- 1) Use the IASSim Assembler to write your assembly language program.
- 2) Save the program as factorial.txt
- 3) Make sure there is a variable called **n** and a variable called **fact** where n specifies the number you want to find the factorial of and fact will be the resulting factorial of the number. I will test values of n between 0 and 9 inclusive, so make sure error check to make sure the value is between 0 and 9.
- 4) Once you are finished with the program in 3, take a screen shot of your assembly language program and associated machine language code after running your program with 5 factorial. Copy the screen shot into your word document.
- 5) Create a folder punetid and place: a) the word document with all of your solutions typed up and b) the file factorial.txt. Then drop the punetid folder onto grace.
- 6) You do not have to meet with me for testing.