HW2 (50 Points Total) **CSC 376 Computer Organization**

Submit HW2 in PDF format.
Please name as follows: Start with your UIS user ID and add HW2.
Mine is mdavi03sHW2

Problem 1: (8 points) Show work

Represent each of the following decimal numbers in each of the following binary representations using 8-bits:

1. Signed magnitude 2. One's complement 3. Two's complement

A. 82
B. -17
C. Add the two's complement of A and B above and then convert the result to decimal.

Problem 2: (7 points) Show work

Using the 14-bit floating point model, what is the Signed Magnitude Representation -normalized & biased for: -100.375

A. What is the representation of the Sign?
B. What is the representation of the Exponent?
C. What is the representation of the Significant?
D. What is the entire 14-bit representation?

Problem 3: (8 points) Show work

Complete the chart below for the following questions for the Pep/8 machine language instructions given. Each Instruction starts from the Original Content **(i.e. each instruction is independent and is not based on the previous instruction).** You will need to jump ahead to Chapter 6 to determine (D) for one of the instructions.

A: Accumulator **X:** Index Register
Mem[0A3F]: Contents of Memory 0A3F **Mem[2A41]:** Contents of Memory 0A41

A. What does the instruction do? (Do)
B. Which register does it specify? (Register)
C. Which addressing mode does it specify? (Mode)
D. Given the original content, what is the content after the execution of the following instructions:

	Do	Register	Mode	A	X	Mem[0A3C]	Mem[2A42]
Original Content				10B6	FE25	0A41	0A3F
Instruction							
792A42							
E12A42							
A90A3C							
C22A42							

Problem 4: (7 points)(Show your work)

Determine the output of the following machine-language program by running it in Pep/8. The left column in each part is the memory address of the first byte on the line:

Address	Instruction	Description
0000	C1000C	
0003	18	
0004	F1000B	
0007	51000B	
000A	00	
000B	00	
000C	FFDA	

A. Submit the code with comments describing each line.
B. What is the output of the program?
C. The instruction at address 0003 is a unary instruction. What does that mean?
D. What is the instruction at 0003 doing? Give the binary value of the accumulator before and after the command.

Problem 5: (10 points)

Write a machine-language program to output your first name on the output device. Write it in a format suitable for the loader and execute it on the PEP/8 simulator. You may only use instructions in Fig 4.6. You shall submit

A. A written algorithm
B. Your commented program similar to the Machine Language (hex) of Fig 4.35
C. The hexadecimal program suitable for the Pep/8 loader.(Cut & paste the text into your document so I can check your code)
D. A screenshot of your program output screen

Problem 6: (10 points)

Write a machine-language program to add the three numbers 6, -7 and 4 and output the sum on the output device. Note-the inputs can be hard coded in data storage at the end of your code. The accumulator holds 16 bits so use 16 bit Two's Complement for the -7 and do not use the subtract instruction. Write it in a format suitable for the loader and execute it on the PEP/8 simulator. You may only use instructions in Fig 4.6. (Use the Fig 4.6 revised found with the HW2 assignment) You shall submit:

A. A written algorithm
B. Your commented program similar to the Machine Language (hex) of Fig 4.35
C. The hexadecimal program suitable for the Pep/8 loader. (Cut & paste the text into your document so I can check your code)
D. A screenshot of your program output screen
E. Explain the range of numbers that this will work correctly