Vivian Do 09/16

-7 - Brown

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## **CSC 3210**

## Computer Organization and Programming Assignment #1

## Fall 2021

Due on 09/16/2021, 11:59 PM Eastern Time (US and Canada)

Objective: Learn some core concepts closely relating to assembly language.

## **Total 15 points**

- 1. (1 point) Why is assembly language not usually used when writing large application programs?

  assembly language has a minimal formal structure that has to be forced
  to be used by programmers on different levels of experience, and office wakes
  keeping the code alive hard.
- 2. (1 point) Assume that you have three 8-bit storages (registers) named A, B, and C to store binary numbers. Register A contains 10100111 and register B contains 11110110. Compute A+B and store the value in C register. What is the content of register, C after the computation?

Show the computation in details with carries.

(A) 10100111

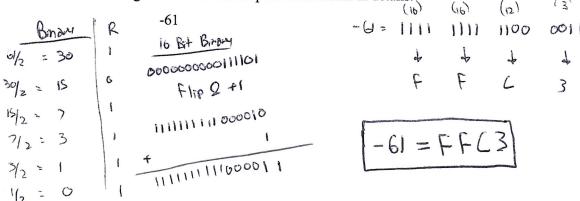
(B)  $\frac{1}{1}$  1110110

(C = 0110011101

3. (2 points) Assume that you have 4-bit storage to store the numbers. Calculate the following operations using two's complement method. (assuming 4-bit register is used)

[Hint: Perform the computation in binary system, then convert it back to decimal]  $\frac{\beta_{\text{mary}}}{-7 = 1001}$   $\frac{-7 = 1001}{-7 = 1001}$   $\frac{1100}{-7 = 1001}$   $\frac{1100}{-6 + 9 - 0 + 0}$ 

- 4. (1 point) What is the binary representation of the following hexadecimal numbers? Show the conversion in details.
- $4AE7F98AO \rightarrow 4 10 14 7 15 1 8 10 0$  4=0100 7=011 8=1000 Potting if together  $10=1010 15=1111 10=1010 \rightarrow (4) (10) (11) (7) (15) (9) (8) (10) (11)$  14=1110 9=1001 0=0000 Potting if together 14=1110 9=1001 0=0000 Potting if together
- 5. (2 points) What is the 16-bit hexadecimal representation of the following signed decimal integer? Show all the steps of conversion in details.



8 Pils = 27-26-22- 24-53-55- 51-50

- 6. (2 points) What is the decimal representation of each of the following signed binary numbers?
  - a. (1 point) 11110101

b. (1 point) 10110101

128 6 32 16 6 4 2

7. (2 point) Evaluate the following Hexadecimal expression. All the numbers are hexadecimal.

Show all the steps of computation and the carries.

8. (1 point) Is it possible to store -19 in a 4-bit storage. If your answer is YES, then show how to store -19 in 4-bit register. If your Answer is No, Explain why.

No, it is not possible to store - 19 in a 4-bit storage for -19, you need at least 6 bits to be stored. Out of the fear bits, one of the bits is used as a sign; the other three are represented as 2°3 = 8 numbers.

9. (1 point) What is the smallest decimal value you can represent, using a 125-bit signed integer?

You can write the number in exponent form.

Smallest defined number in 125-bit signed integer =  $\begin{bmatrix} -2^{124} \end{bmatrix}$ consider  $\begin{bmatrix} -2^{n-1} & to & -2^{n-1}-1 \end{bmatrix}$  as the range

10. (2 points) What is the Boolean expression for P? n = 125, so  $-2^{(125-1)} = -2^{124}$ 

X	у	Z	P
0 -	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	1

Design a circuit that can produce output P for inputs x, y, and z as expressed in the table above.

 $P = (X \land Z) \lor (7X \land 1) \land (X \text{ and } Z) \text{ or } (\text{not } X \text{ and } Y) \text{ and } Y \text{ and } Y \text{ and } Y)$ X and Z (x and 2)

Or

(not x and y and)

not 2