Logic Circuit Design Homework #01			
Due date	Mar. 25th, 2024	Instructor	Yoo, Younghwan
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1. The Babylonians developed the *sexagesimal* (base 60) number system about 4000 years ago. How many bits of information is conveyed with one sexagesimal digit? How do you write the number 4000_{10} in sexagesimal?

60진법에서 한자리에 60_{10}가지, 즉 111100_2의 정보를 저장할 수 있으므로 6비트의 정보를 저장할 수 있다.

$4000_{10} = 1 \times 60^2 + 6 \times 60 + 40 \times 1 = 1:6:40_{60}$

2. Convert the following two's complement binary numbers to decimal.

    (a) 1110_2 → 0010_2

    (b) 100011_2 → 011101_2

    (c) 01001110_2 → 10110010_2

    (d) 10110101_2 → 01001011_2

3. Convert the following decimal numbers to 8-bit two's complement numbers or indicate that the decimal number would overflow the range.

    (a) 24 → $0001\ 1000_2$

    (b) -59 → $1100\ 0101_2$

    (c) 128 → OVERFLOW
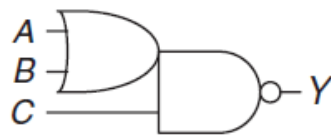
    (d) -150 → OVERFLOW

4. Perform the following additions of two's complement binary numbers. Indicate whether the sum overflows a 4-bit result.

   (a) $1001_2 + 0100_2 \rightarrow 1101_2$

   (b) $1101_2 + 1011_2 \rightarrow 1\ 1000_2$ <<< OVERFLOW

5. Complete a truth table for the following three-input *OR-AND-INVERT* (*OAI*) gate.

A	B	C	Y
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0