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| **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 400010 in sexagesimal?

60진법에서 한자리에 60­10가지, 즉 1111002의 정보를 저장할 수 있으므로 6비트의 정보를 저장할 수 있다.

400010 = 1 × 602 + 6 × 60 + 40 × 1 = 1:6:4060

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

1. 11102 🡪 00102
2. 1000112 🡪 0111012
3. 010011102 🡪 101100102
4. 101101012 🡪 01001011­2

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

1. 24 🡪 0001 1000­2
2. -59 🡪 1100 01012
3. 128 🡪 OVERFLOW
4. -150 ­🡪 OVERFLOW

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

1. 10012 + 01002 🡪 11012
2. 11012 + 10112 🡪 1 10002 <<< 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 |