- [CPSC 275: Introduction to Computer Systems](#)

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Fall 2025

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Homework 5

NOTE: You are not required to hand in the following exercises, but you are strongly encouraged to complete them to strengthen your understanding of the concepts covered in class.

1. Unlike *sign-magnitude* and *two's complement* representations we discussed in class, *one's complement* representation expresses negative integers by inverting every bit (the bitwise NOT) of their positive counterparts. Construct a table of the 3-bit one's complement integer representation. Do you notice any issues with this representation?

2. Assuming $w = 4$, assign a numeric value in decimal to each possible hexadecimal digit, assuming it is an unsigned number.
   A. `0x0`
   B. `0x5`
   C. `0xD`
   D. `0xF`

3. Repeat Exercise 2, assuming each number is in two's complement representation.

4. Convert the following numbers from decimal to binary, assuming 7-bit two's complement binary representation:
   A. 29
   B. -29
   C. What is the range of integers that can be represented, both in binary and in decimal?

5. Convert the following numbers from binary to decimal, assuming 7-bit two's complement binary representation:
   A. `1010101`
   B. `1000000`

6. What decimal value does the 8-bit binary number `10110100` have if:
   A. It is interpreted as an unsigned number?
   B. It is on a computer using signed-magnitude representation?

C. It is on a computer using one's complement representation?
D. It is on a computer using two's complement representation?

- **Welcome: Sean**

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