

# Homework Assignment #1 – Number Representations

CDA 3100, Computer Organization I

The purpose of this assignment is to let you be familiar and become comfortable with binary representations which are used heavily in computer organization.

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**Problem 1 (30 points, 10 points each)** Convert the following decimal numbers into (a) 8-bit, (b) 16-bit, and (c) 32-bit binary numbers. For negative numbers, use the 2's complement. State "overflow" if a number cannot be represented correctly.

- 1)  $45_{\text{ten}}$
- 2)  $-81_{\text{ten}}$
- 3)  $-3,000_{\text{ten}}$

**Problem 2 (30 points, 10 points each)** What decimal number does each of the following two's complement binary number represent?

- 1)  $1111\ 1111\ 1111\ 1111\ 1111\ 1111\ 1011\ 1101_{\text{two}}$
- 2)  $1111\ 1111\ 1111\ 1111\ 1111\ 1111\ 1101\ 1001_{\text{two}}$
- 3)  $0111\ 1111\ 1111\ 1111\ 1111\ 1111\ 1011\ 1111_{\text{two}}$

**Problem 3 (40 points, sub-problem 3 is 20 points, others 10 points each)** Show the IEEE 754 binary representation for the following floating-point numbers in single and double precision. Give your results in hexadecimal format.

- 1)  $19_{\text{ten}}$
- 2)  $2.375_{\text{ten}}$
- 3)  $-0.3_{\text{ten}}$