# Computer Science 304
# Computer Organization
# Spring 2025
# Assignment 4

**Due: beginning of class, Thursday, 3/6/2025**

Answer the following questions and submit solutions by the due date. Show your work for full credit. All submissions must be completely your own work.

1. [9 points] Translate the following unsigned binary numbers into their base 10 equivalents. Use fractions in lowest terms to represent values on the right-hand side of the binary point.
   a. `1100011.110`
   b. `11011.0101`
   c. `0.0011101`

2. [9 points] Translate the following decimal numbers into their binary equivalents using a binary point.
   a. $67\frac{9}{16}$
   b. $208\frac{29}{128}$
   c. $\frac{115}{512}$

3. [9 points] Using the IEEE single precision floating point format, convert the following decimal values into binary strings.
   a. 818.5
   b. -111.625 (hint: convert the fractional value to eighths)
   c. $-207.4375 \times 2^{-137}$ (hint: convert the fractional value to sixteenths)

4. [9 points] Using the IEEE single precision floating point format, convert the following binary strings into decimal values. First, show the value in binary (e.g., $-1.11 \times 2^5$), then show it in scientific notation (with powers of 10) and round decimals to the nearest hundredth.
   a. `1 10001010 01010..0`
   b. `0 01111001 10110..0`
   c. `1 00011110 00101..0`

5. [14 points] Assuming a 13-bit IEEE binary string for floating point representation, with 1 bit for the sign, 5 bits for the exp, and 7 bits for the frac, show the IEEE format, and the normalized binary representation (e.g., $1.11 \times 2^5$) for each of the following (similar to Slide 26 in the Chapter 2 Floating Point notes).
   a. Smallest Positive Normalized Value
   b. Largest Positive Normalized Value
   c. Zero (both kinds)
   d. Smallest Positive Denormalized Value
   e. Largest Positive Denormalized Value
   f. `1.0`
   g. `-∞` (negative infinity)