CS 207 Digital Logic - Spring 2020
Assignment 1

Deadline: Friday, Mar. 20

Write down your answer to the questions on a new sheet with **detailed** procedures.

1. (0.5 points) Convert the decimal number 247.8 to base 3, base 4, base 5, base 11, and base 16.
2. (0.3 points) Find the 10's complement of $(349)_{11}$.
3. (0.3 points) For the function $F = AB'C' + AB$, find the logic value of F under the conditions
   (a) $A = 1$, $B = 0$, $C = 1$,
   (b) $A = 0$, $B = 1$, $C = 1$, and
   (c) $A = 0$, $B = 0$, $C = 0$.
4. (0.6 points) Simplify the following three-variable Boolean functions algebraically
   (a) $F = \sum(1, 2, 5, 6)$,
   (b) $F = \sum(0, 1, 2, 3, 7)$, and
   (c) $F = \sum(3, 5, 6, 7)$.
5. (0.6 points) Using a Karnaugh map, simplify the following functions
   (a) $F(A, B, C, D) = \sum(0, 2, 3, 6, 7, 8, 10, 11, 12, 15)$,
   (b) $F(A, B, C, D) = \sum(1, 7, 9, 10, 12, 13, 14, 15) + d(4, 5, 8)$, and
   (c) $F(W, X, Y, Z) = \prod(0, 2, 6, 11, 13, 15) + d(1, 9, 10, 14)$.
6. (0.4 points) With the use of maps, find the simplest sum-of-products form of the function $F = fg$, where $f = abc' + c'd + a'cd' + b'cd'$ and $g = (a + b + c' + d')(b' + c' + d)(a' + c + d')$.
7. (0.3 points) Obtain the sum of the products expression for $F = \sum(1, 4, 7, 8, 9, 11) + d(0, 3, 5)$ and implement it with
   (a) NAND gates only, and
   (b) NOR gates only.