[CS M51A WINTER18] Quiz 1

- The quiz is closed book, and closed notes (30 minutes).
- Please show all your work and write legibly, otherwise no partial credit will be given.
- **This should strictly be your own work; any form of collaboration will be penalized.**

Discussion Section: _____

Name: _____

Student ID (if available): _____

Quiz Problems (50 points total)

Problem 1 (15 points)

Find x, y, z such that the following conditions are satisfied and show all the steps of your work.

1. **(5 points)** $(3)_{10} \times (724)_9 = (x)_3$
2. **(5 points)** $(654)_{11} = (y)_5$
3. **(5 points)** $(33653337357)_8 = (z)_{16}$

Problem 2 (20 points)

Given the function F defined as

$$F(a, b, c) = a'bc + ab'c + abc' + abc$$

1. **(5 points)** Draw a truth table for the function F.
2. **(5 points)** Represent the function $F(a, b, c)$ using minterm and maxterm notations.
3. **(5 points)** Obtain the minimal sum of products form (SOP) for the function $F(a, b, c)$ by only using Boolean algebra postulates and theorems. Do not use a truth table. *(Hint: the minimal SOP of $\overline{F}$ has three product terms.)*
4. **(5 points)** Draw a diagram for the gate network that implements the minimal SOP of $F(a, b, c)$ using `AND`, `OR`, or `NOT` gates.

Problem 3 (15 points)

For the integer with decimal representation 1234,

- **(5 points)** Give the corresponding bit-vectors for the BCD code
- **(5 points)** Give the corresponding bit-vectors for the Excess-3 code.
- **(5 points)** From the Excess-3 code, invert every bit of the bit vectors. What is the number in decimal representation?