

**ShanghaiTech University**

**EE 115B: Digital Circuits**

**Fall 2022**

**Homework 2**

**Total: 100 Points**

**Assigned: September 27, 2022. Due: October 11, 2022.**

1. Build a truth table for the following function. (20 points.)

$$Y = A \oplus B \oplus C$$

2. Prove the following relationship using Boolean algebra. (20 points.)

$$(A \odot B)' = A \oplus B$$

3. Derive the standard SOP and POS expressions for the following function. Write the results in two forms: (a) explicit expressions with minterms/maxterms (e.g.,  $Y = ABC$ ) and (b) compact expressions with indexes of minterms/maxterms (e.g.,  $Y = \sum m(7)$  for  $Y = ABC$ ). (40 points.)

$$Y(A, B, C) = (A + \bar{C})(\bar{A} + B)$$

4. Determine the standard SOP expression and the equivalent standard POS expression for the truth table below. Write your results in both the explicit and compact forms illustrated in Problem 3. (20 points.)

Inputs			Output
A	B	C	Y
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	0