

EECS1010 Logic Design  
Homework 2

Spring 2023

Due: **2:20pm on March 23<sup>rd</sup>, 2023** (before the class starts). No late homework.

For each question, please write down the thinking/calculation process. No credit will be given if only answer without process is provided.

1. Write the truth table of the following Boolean functions and express each function in sum-of-minterms and product-of-maxterms. (22%)

(a)  $(x + y'z')(w + xy')$

(b)  $w'x'y + wyz + (wx'z' + x'yz)'$

2. What are the literal cost and gate input cost of the following Boolean function? (16%)

(a)  $(x + y'z')(w + xy')$

(b)  $w'xy + (z' + x'y')$

3. Consider the following truth table.

x	y	z	F(x,y,z)	G(x,y,z)
0	0	0	1	0
0	0	1	0	1
0	1	0	1	0
0	1	1	1	1
1	0	0	1	1
1	0	1	0	0
1	1	0	0	1
1	1	1	1	0

(a) Write their corresponding Boolean expression of F and G in sum-of-minterms and product-of-maxterms. (16%)

(b) Draw the logic diagrams of F and G using only NAND and NOT gates. (16%)

4. Convert F to the other normal form and standard forms of sum-of-products and product-of-sums.  $F(x, y, z) = \sum(2, 3, 5, 7)$  (14%)

5. Implement the function F.  $F(x, y, z) = x'y + xy' + xz$ . Draw the logic diagram.

(a) Use AND and NOT gates only. (8%)

(b) Use OR and NOT gates only. (8%)