Homework 2

Please work on the homework by yourself. Calculation/thinking process needs to be provided clearly.
Submit your homework electronically on eeclass website.
Due date: 10/26 (Tue), 23:59.

1. (16%) Write the truth table of the following Boolean functions and express each function in sum-of-minterms and product-of-maxterms.
   (a) (x + y'z')(w + xy')
   (b) w'x'y + wyz + wx'z' + x'yz
2. (12%) What are the literal cost and gate input cost of the following Boolean function?
   (a) (x + y'z')(w + xy')
   (b) w'x'y + (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) (14%) Write their corresponding Boolean expression F and G in sum-of-minterms and product-of-maxterms.
   (b) (10%) Draw the logic diagram using only NAND and NOT gates.
4. (12%) F = (x + y + z')(x + z)(y' + z). Find the complement of the function F, and find FF' and F + F'.
5. (12%) Use DeMorgan's theorem to remove the complement outside the braces.
   (a) ((x + w')y' + w'z + (yz)'(x+y+z))'
   (b) (x'y + y(x+z))'
6. (12%) Convert F to the other normal form and standard forms of sum-of-products and product-of-sums. $F(x, y, z) = \sum(2, 3, 5, 7)$
7. Implement the function F. F(x, y, z) = x'y + xy' + xz.
   (a) (6%) Use AND and NOT gates only.
   (b) (6%) Use NOR and NOT gates only.

