HW2

1. Convert F to the other normal form and standard forms of sum of products and product of sums. (10%)
   $F(w,x,y,z) = \sum(0,1,4,5,7,11,13,14,15)$
2. Simplify the following Boolean expressions (do not use K-map) to a minimum number of literals. After simplification, draw the logic diagrams of the circuits that implement the original and simplified expressions, respectively. (10%)

   (a) x'y'z'+x'y'z+x'yz+xy'z'+xy'z,

   (b) (w+x)(w'+y+x').

3. Find the complement of F(w,x,y,z) = w'x'y+w'y'+x'yz+w'x'y; then show that FF'=0 and F+F'=1. (10%)
4. Use DeMorgan's theorem to remove the complement outside the braces. (12%)

   (a) ((x+w')'+w'y'z+(x+z)'(x+y))',

   (b) (x(yz'+y'z)'+wy(y'+x'z))',

   (c) (x+y)'+z'(x'+z)',

   (d) (xy'+z)'(w+y'z).

5. Implement the function F=x'+x(x+y')(y+z') using (15%)

   (a) AND, OR, and inverter gates,

   (b) AND and inverter gates,

   (c) OR and inverter gates.

6. For the function $F(w,x,y,z) = \prod(2,5,6,7,8,9,10,11,14)$
   (a) Obtain its truth table, (3%)
   (b) Express F in sum-of-minterms and product-of-maxterms forms, (6%)
   (c) Draw the logic diagram of F, (5%)
   (d) Use Boolean algebra to simplify the function F to a new function G, with minimum number of literals, (5%)
   (e) Obtain the truth table of G and compare it with that of F, (5%)
   (f) Draw the logic diagram of G and compare the number of literals of F and G. (5%)

7. For the Gray code with 4 code numbers ($g_3g_2g_1g_0$), use a 4-bit binary code ($b_3b_2b_1b_0$) as inputs
   (a) Derive the related truth table, (6%)
   (b) Find the logic functions for each g_i. (8%)
8. Feedback: your feedbacks are very valuable that I will adjust the class and the assignments accordingly. Any comments to the class so far?

