HW2

1. 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.
   (a) x'y'z+xy'z+xyz+x'yz,
   (b) (y'z+xw')(xw+y'z).
2. Find the complement of F=(x+y'+z')(y+z)(x'+z); then show that FF'=0 and F+F'=1.
3. Use DeMorgan's theorem to remove the complement outside the braces:
   (a) ((x+w')y+wy'z+xz(x+y))',
   (b) ((x(y+z)+y'z(x+w))',
   (c) (x(y'+y(z+w))',
   (d) (xy+y(x+z))'.
4. We can perform logical operations on strings of bits by considering each pair of corresponding bits separately (called ***bitwise*** operation). Given two eight-bit strings A=11000101 and B=01010101, evaluate the eight-bit result after the following logical operations:
   (a) AND,
   (b) XNOR,
   (c) NOT A.
5. List the truth table of the function F=x'y+xy'+yz', and implement the function
   (a) with AND, OR, and inverter gates,
   (b) with AND and inverter gates,
   (c) with OR and inverter gates.
6. Obtain the truth table of function F=x'yz'+w'y+wyz' and express it in sum-of-minterms and product-of-maxterms forms.
7. For the Boolean function F=x'y'z+xy'z+xyz+x'yz,
   (a) Obtain the truth table of F.
   (b) Draw the logic diagram for F.
   (c) Use Boolean algebra to simplify the function F to a new function, G, with minimum number of literals.
   (d) Obtain the truth table of G and show it is the same as that of F.
   (e) Draw the logic diagram for G and compare the number of literals and gates with those of F.

8. Convert F to the other normal form and standard forms of sum of products and product of sums.

$$F(A, B, C, D) = \sum (0, 1, 3, 5, 7, 9, 13, 14, 15)$$

9. Feedback: your feedbacks are very valuable that I will adjust the pace of the class and load of the assignments accordingly. Any comments to the classes so far?

