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'yz+xy'z+xyz+xyz',
   (b) (x'y'+xw')(x'w+yz).
2. Use DeMorgan's theorem to remove the complement outside the braces:
   (a) ((x'+w)y+wyz+x'z(x+y))',
   (b) (x(y'+z)+y'z(x+w))',
   (c) (x(y+y'(z+w)))',
   (d) (xy'+y(x+z))'.
3. 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=11010101 and B=01110001, evaluate the eight-bit result after the following logical operations:
   (a) AND,
   (b) XNOR,
   (c) NOT A.
4. Obtain the truth table of function F=x'yz'+w'y+wyz' and express it in sum-of-minterms and product-of-maxterms forms.
5. 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.

