CSE222 Computer Architecture

Homework Set 06

(**Review**)

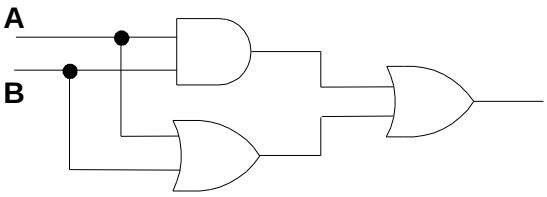
1. Logic Gates & Circuits
2. Circuits: Combinational Circuits, Sequential Circuits
3. Notations: Truth table, Boolean equations, Logic Diagram
4. Boolean equations: literals, complement, minterm, maxterm, SOP form, POS form
5. Boolean algebra & Boolean equation simplification
6. K-Map

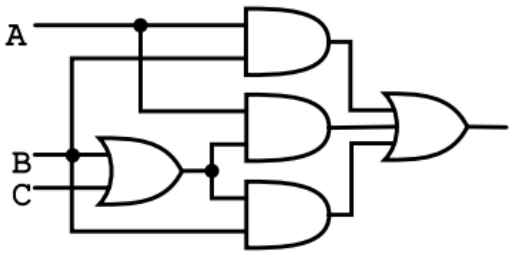
(**Exercise**)

1. Given below Boolean equations, draw truth tables and circuit diagrams
   a. $F = (A + B)(\overline{B} + C)$
   b. $F = \overline{AB} + BC$
   c. $F = C + B(A+\overline{C})$

2. Simplify the following Boolean Equations, and draw circuit diagrams:
   a. $F = \overline{A}B + \overline{A}(B+C) + B\overline{(B + C)}$
   b. $F = (A\overline{B}\ (C+BD) + \overline{A}\,\overline{B})\ C$
   c. $F = \overline{A}BC + A\overline{B}\,\overline{C} + \overline{A}\overline{B}\overline{C} + A\overline{B}C + ABC$

3. Describe the behavior of the following circuits with truth table and Boolean equations. Simply the Boolean equations if possible, and draw the simplified diagrams:





4. For truth tables as shown in below:
   a. Write Boolean equations in SOP (Sum-Of-Product) form, and draw diagram
   b. Write Boolean equations in POS (Product-Of-Sum) forms, and draw diagram
   c. Simplify Boolean equations, draw the simplified logic diagrams

A	B	C	F	minterm	maxterm
0	0	0	1		
0	0	1	1		
0	1	0	0		
0	1	1	0		
1	0	0	0		
1	0	1	0		
1	1	0	1		
1	1	1	1		

A	B	C	D	F	minterm	maxterm
0	0	0	0	1		
0	0	0	1	1		
0	0	1	0	1		
0	0	1	1	1		
0	1	0	0	0		
0	1	0	1	0		
0	1	1	0	0		
0	1	1	1	0		
1	0	0	0	1		
1	0	0	1	0		
1	0	1	0	1		
1	0	1	1	0		
1	1	0	0	0		
1	1	0	1	0		
1	1	1	0	1		
1	1	1	1	0		

5. Use K-Map to simplify the following Boolean equations, draw circuit diagrams after simplification

   (a) $Y = \overline{A}BC + \overline{A}B\overline{C}$

   (b) $Y = \overline{ABC} + A\overline{B}$

   (c) $Y = ABC\overline{D} + A\overline{B}CD + (\overline{A + B + C + D})$