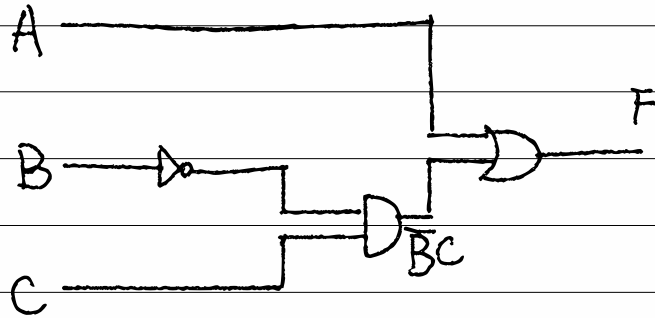


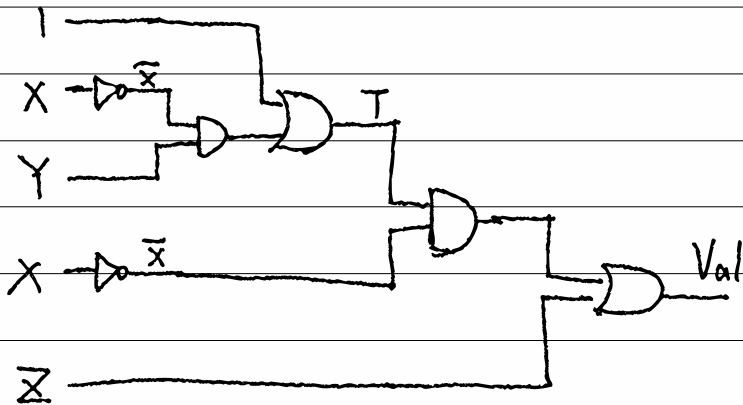
HW2

Q1.

test Mod:



Big Mod.



Q2.

$$a). F = \overline{((A \oplus D)C + B)} (\bar{A}B + \bar{C}D)$$

subfunction: $A \oplus D = A\bar{D} + \bar{A}D$

$$(A \oplus D)C = AC\bar{D} + \bar{A}CD$$

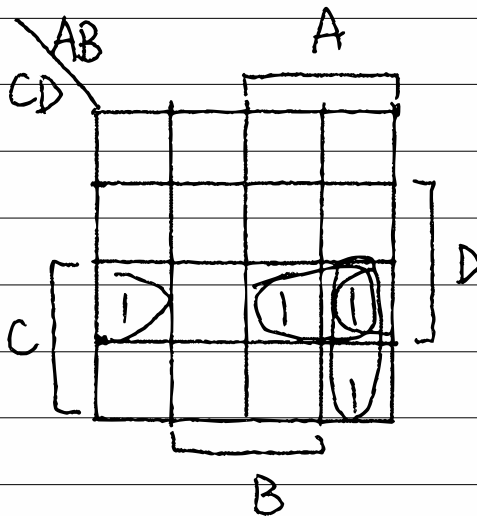
create a truth table:

A	B	C	D	$(A \oplus D)C$	$\overline{(A \oplus D)C + B}$	$\bar{A}B + \bar{C}D$	F
0	0	0	0	0	1	1	0
0	0	0	1	0	1	1	0
0	0	1	0	0	1	1	0
0	0	1	1	1	0	0	1
0	1	0	0	0	1	1	0
0	1	0	1	0	1	1	0
0	1	1	0	0	1	1	0
0	1	1	1	1	1	1	0
1	0	0	0	0	1	1	0
1	0	0	1	0	1	1	0
1	0	1	0	1	0	1	1
1	0	1	1	0	1	0	1
1	1	0	0	0	1	1	0

A	B	C	D	$(A \oplus D)C$	$\overline{(A \oplus D)C} + B$	$\bar{A}B + \bar{C}D$	F
1	1	0	1	0	1	1	0
1	1	1	0	1	1	1	0
1	1	1	1	0	1	0	1

$$F = \bar{A}\bar{B}cD + A\bar{B}c\bar{D} + A\bar{B}cD + ABCD$$

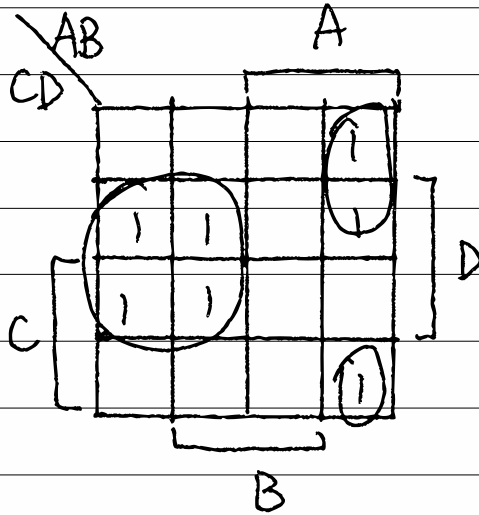
k-map



$$F = ACD + \bar{B}CD + \bar{A}\bar{B}C$$

Q2 b)

$$\begin{aligned} F &= \bar{A}\bar{B}CD + \bar{C}D(\bar{A}+\bar{B}) + A\bar{B}(\bar{C}+\bar{D}) + \bar{A}BCD \\ &= \bar{A}\bar{B}CD + \bar{A}\bar{C}D + \bar{B}\bar{C}D + A\bar{B}\bar{C} + A\bar{B}\bar{D} + \bar{A}BCD \end{aligned}$$



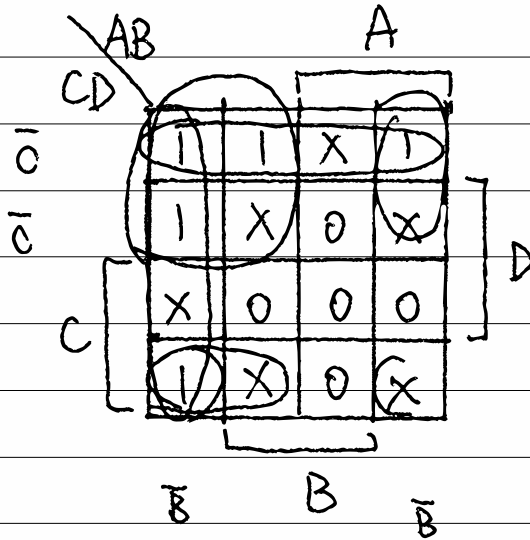
$$F = \bar{A}D + \bar{A}\bar{B}\bar{C} + A\bar{B}C\bar{D}$$

Q3. a. 4-input minority gate
the truth table :

A	B	C	D	Output	
0	0	0	0	1	
0	0	0	1	1	16
0	0	1	0	1	
0	0	1	1	X	
0	1	0	0	1	
0	1	0	1	X	
0	1	1	0	X	
0	1	1	1	0	
1	0	0	0	1	
1	0	0	1	X	
1	0	1	0	X	
1	0	1	1	0	
1	1	0	0	X	
1	1	0	1	0	
1	1	1	0	0	
1	1	1	1	0	

$$\overline{A}\overline{B}\overline{C}\overline{D} \quad \overline{A}B\overline{C}\overline{D} \quad A\overline{B}\overline{C}\overline{D} \quad A\overline{B}C\overline{D}$$

$$\overline{A} \quad A$$



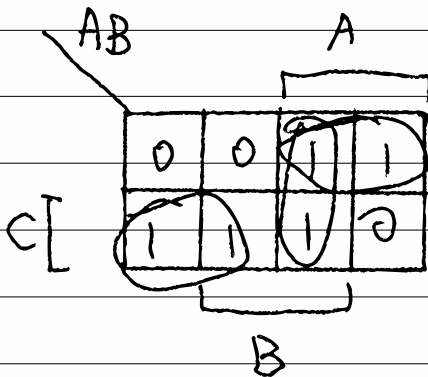
$$\overline{B} + \overline{C} + \overline{A}\overline{C} + A\overline{B}\overline{C} + \overline{A}C\overline{D} + \overline{B}\overline{C}\overline{D}$$

Q4

$$a). F = \bar{B}(A \oplus C) + AB + \bar{A}BC$$

$$= \bar{B}(A\bar{C} + \bar{A}C) + AB + \bar{A}BC$$

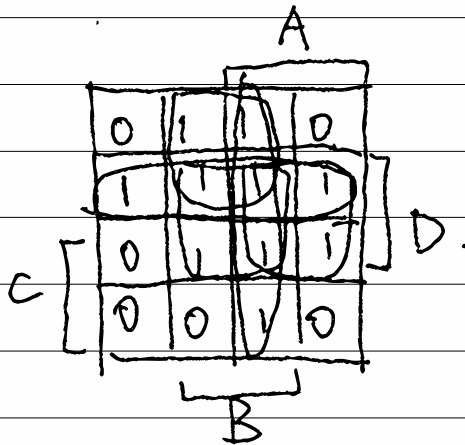
$$= A\bar{B}\bar{C} + \bar{A}\bar{B}C + AB + \bar{A}BC$$



$$F = \bar{A}C + AB + A\bar{C}$$

Q4

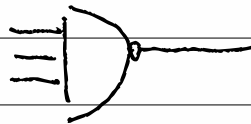
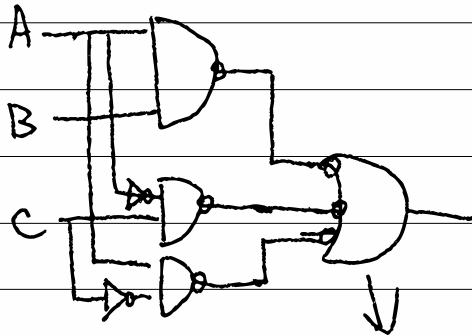
$$\begin{aligned} b). \quad F &= B\bar{C}\bar{D} + D + D(A+B) + \bar{C}\bar{D}(A+B) + AB\bar{D} \\ &= \bar{B}\bar{C} + BD + DA + DB + \bar{A}\bar{B}\bar{C}\bar{D} + AB\bar{D} \end{aligned}$$



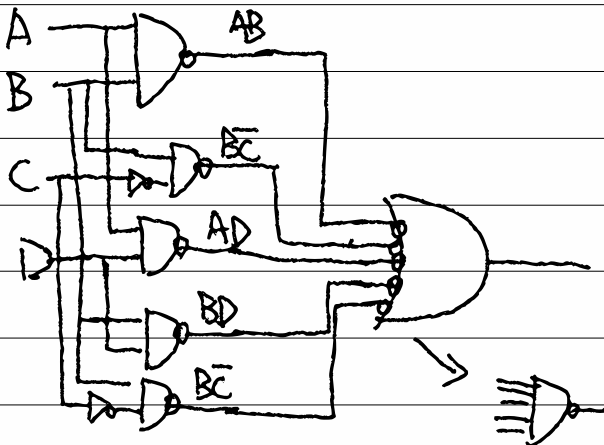
$$\bar{C}\bar{D} + \bar{B}\bar{C} + BD + AD + AB$$

Q5

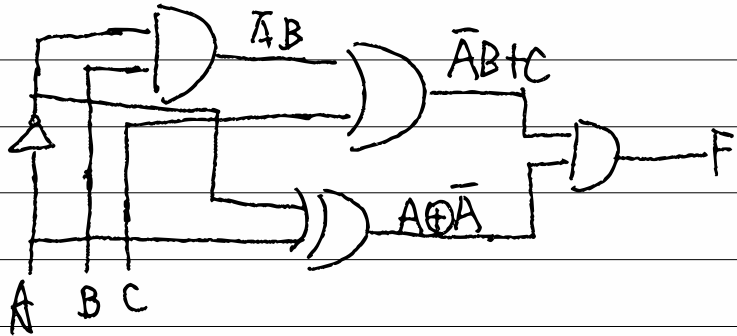
(a) $\bar{A}C + A\bar{C} + AB$



(b) $AB + AD + B\bar{C} + BD + \bar{C}D$



Q6.



$$F = (A \oplus \bar{A}) (\bar{A}B + C)$$

