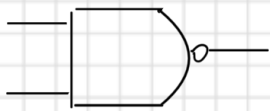


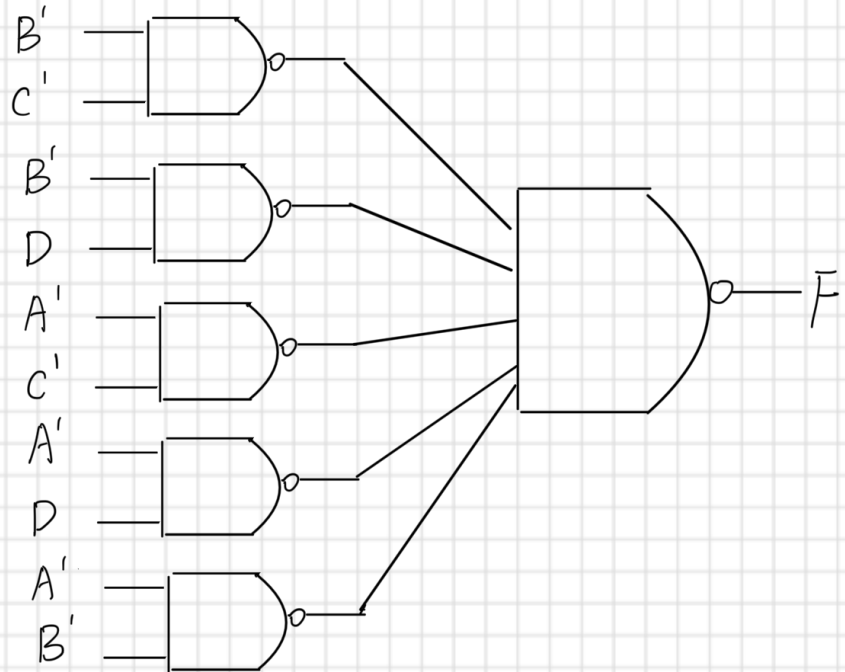
# Digital logic Ass 2 12310401 王子恒.

1. AB

CD	00	01	11	10
00	X	1	X	1
01	1	X	1	0
11	0	0	0	0
10	1	1	1	0



$$\begin{aligned}
 a) F &= B'C' + B'D + A'C' + A'D + A'B' \\
 &= ((B'C' + B'D + A'C' + A'D + A'B'))' \\
 &= ((B'C')'(B'D)'(A'C')'(A'D)'(A'B'))'
 \end{aligned}$$

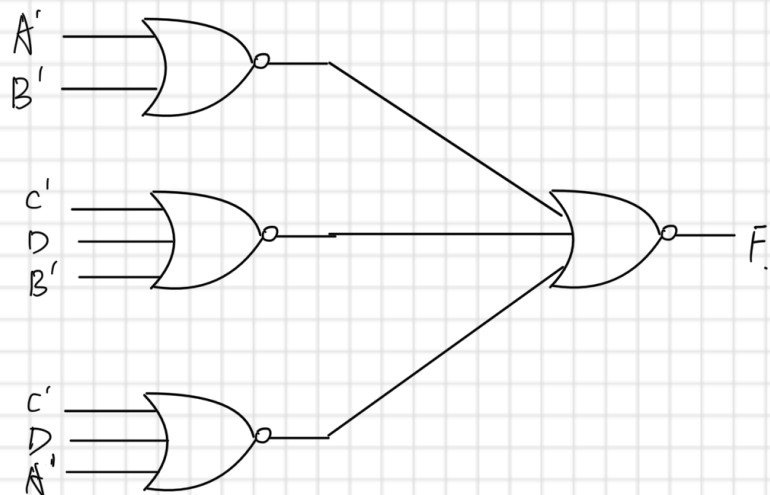


AB

CD	00	01	11	10
00	X	1	X	1
01	1	X	1	0
11	0	0	0	0
10	1	1	1	0



$$\begin{aligned}
 b) F &= (A' + B')(C' + D + B')(C' + D + A') \\
 &= ((A' + B') + (C' + D + B') + (C' + D + A'))'
 \end{aligned}$$



2. a)  $T_1 = B'C$

$T_2 = A'B$

$T_3 = A + T_1 = A + B'C$

$T_4 = T_2 \oplus D = (A'B) \oplus D$

$F_1 = T_3 + T_4 = A + B'C + (A'B) \oplus D$

$F_2 = T_2 + D' = A'B + D'$

b)

A	B	C	D	$T_1$	$T_2$	$T_3$	$T_4$	$F_1$	$F_2$
0	0	0	0	0	0	0	0	0	1
0	0	0	1	0	0	0	1	1	0
0	0	1	0	1	0	1	0	1	1
0	0	1	1	1	0	1	1	1	0
0	1	0	0	0	1	0	1	1	1
0	1	0	1	0	1	0	0	0	1
0	1	1	0	0	1	0	1	1	1
0	1	1	1	0	1	0	0	0	1
1	0	0	0	0	0	1	0	1	1
1	0	0	1	0	0	1	1	1	0
1	0	1	0	1	0	1	0	1	1
1	0	1	1	1	0	1	1	1	0
1	1	0	0	0	0	1	0	1	1
1	1	0	1	0	0	1	1	1	0
1	1	1	0	0	0	1	0	1	1
1	1	1	1	0	0	1	1	1	0

3. (a) Truth table:

A	B	C	$F_1$	$F_2$	$F_3$
0	0	0	0	1	0
0	0	1	0	1	1
0	1	0	1	0	0
0	1	1	0	1	0
1	0	0	0	1	1
1	0	1	1	0	0
1	1	0	1	0	1
1	1	1	1	1	0

b) K-map

$\bar{F}_1$

BC	00	01	11	10
A=0	0	0	0	1
A=1	0	0	1	1

$$\begin{aligned} \bar{F}_1 &= (B+C)(A+C') \\ &= ((B+C)' + (A+C'))' \end{aligned}$$

$F_2$

BC	00	01	11	10
A=0	1	1	1	0
A=1	1	0	1	0

$$F_2 = (B'+C)(A'+B+C')$$

$$= ((B'+C)' + (A'+B+C')')$$

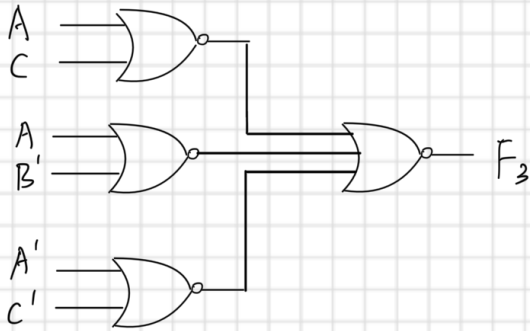
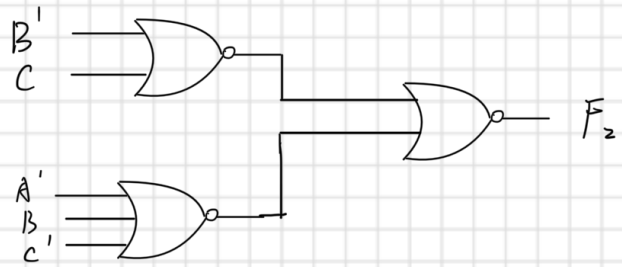
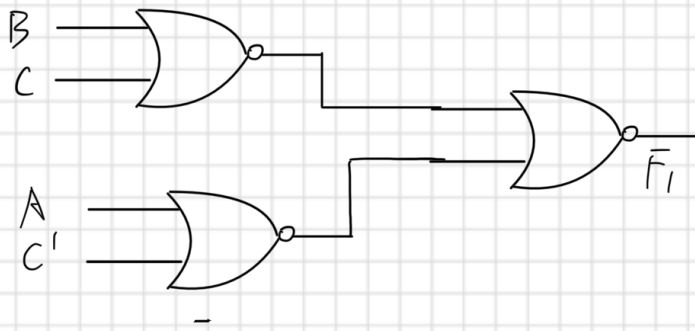
$F_3$

BC	00	01	11	10
A=0	0	1	0	0
A=1	1	0	0	1

$$\bar{F}_3 = (A+C)(A+B')(A'+C')$$

$$= ((A+C)' + (A+B')' + (A'+C')')$$

c) logic diagram.



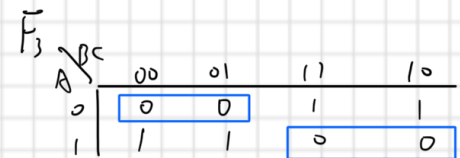
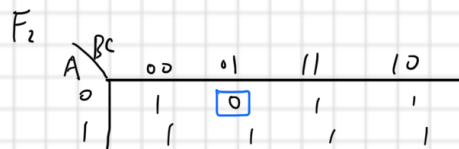
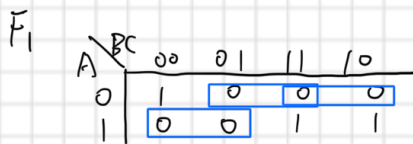
4.

	A	B	C	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>
0	0	0	0	1	1	0
1	0	0	1	0	0	0
2	0	1	0	0	1	1
3	0	1	1	0	1	1
4	1	0	0	0	1	1
5	1	0	1	0	1	1
6	1	1	0	1	1	0
7	1	1	1	1	1	0

$$F_1 = \Sigma(0, 6, 7)$$

$$F_2 = \Sigma(0, 2, 3, 4, 5, 6, 7)$$

$$F_3 = \Sigma(2, 3, 4, 5)$$



$$\begin{aligned} F_1 &= (A + C')(A + B')(A' + B) \\ &= ((A + C')' + (A + B')' + (A' + B)')' \\ &= (A'C + A'B + AB')' \end{aligned}$$

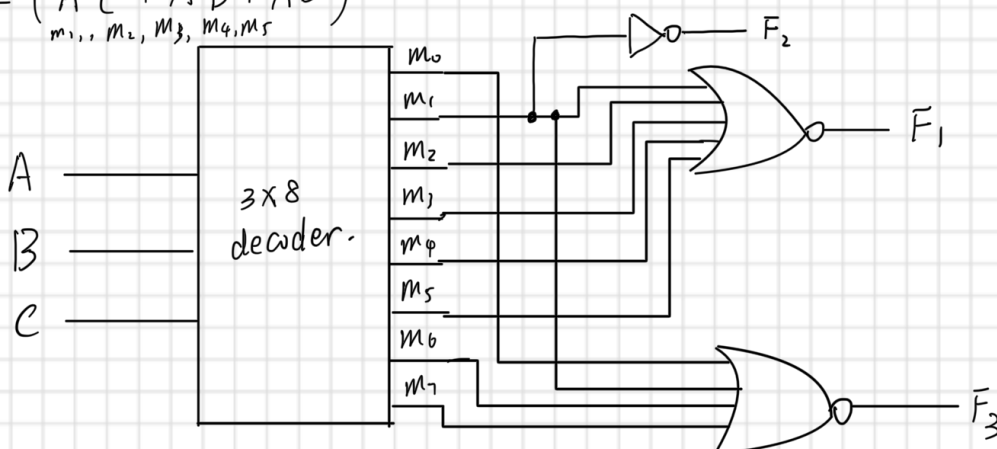
$m_1, m_2, m_3, m_4, m_5$

$$\begin{aligned} F_2 &= A + B + C' \\ &= (A'B'C)' \end{aligned}$$

$m_1$

$$\begin{aligned} F_3 &= (A + B)(A' + B') \\ &= ((A + B)' + (A' + B')')' \\ &= (A'B' + AB)' \end{aligned}$$

$m_0, m_1$      $m_6, m_7$



5, (1)

	A	B	C	D	F
0	0	0	0	0	0
0	0	0	0	1	1
0	0	0	1	0	0
0	0	0	1	1	0
0	0	1	0	0	0
0	0	1	0	1	0
0	0	1	1	0	1
0	0	1	1	1	0
1	0	0	0	0	1
1	0	0	0	1	1
1	0	0	1	0	1
1	0	0	1	1	0
1	1	0	0	0	1
1	1	0	0	1	0
1	1	0	1	0	1
1	1	0	1	1	0
1	1	1	0	0	1
1	1	1	0	1	0
1	1	1	1	0	1
1	1	1	1	1	0

(2)

AB \ CD	00	01	11	10
00	0	1	0	0
01	0	0	1	1
11	1	0	1	1
10	0	1	1	1

$$F = B'C'D + ABD' + BC + AC$$

(c)

