Date

Assignment 2

1、 a) $T_1 = (A'T_2)'$ $\quad T_2 = (A'D)'$ $\quad T_3 = A' + BC$

$F = T_1 T_3$ $\quad G = (T_2 T_3)'$

b) $F = (A'T_2)'(A'+BC)$

$= (A + T_2')(A'+BC)$

$= (A + A'D)(A'+BC)$

$= AA' + ABC + A'D + A'DBC$

$= 0 + ABC \cancel{+ ABCD} + A'D(1+BC)$

$\cancel{= ABC + ABCD + A'BCD \; A'D}$

$\cancel{= ABC + BCD}$ $\boxed{= ABC + A'D}$

$G = T_2' + T_3'$

$= A'D + (A'+BC)'$

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

$\boxed{= AB' + AC' + A'D}$

(c)

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

No.
Date

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

2. a)

A_3	A_2	A_1	A_0	P	D
0	0	0	0	0	1
0	0	0	1	0	0
0	0	1	0	1	0
0	0	1	1	1	1
0	1	0	0	0	0
0	1	0	1	1	0
0	1	1	0	0	1
0	1	1	1	1	0
1	0	0	0	0	0
1	0	0	1	0	1
1	0	1	0	0	0
1	0	1	1	1	0
1	1	0	0	0	1
1	1	0	1	1	0
1	1	1	0	0	0
1	1	1	1	0	1

b) P

$A_3A_2 \backslash A_1A_0$				
			1	1
		1	1	
		1		
			1	

$P = A_2A_1'A_0 + A_2'A_1A_0 + A_3'A_1A_0 + A_3'A_2'A_1$

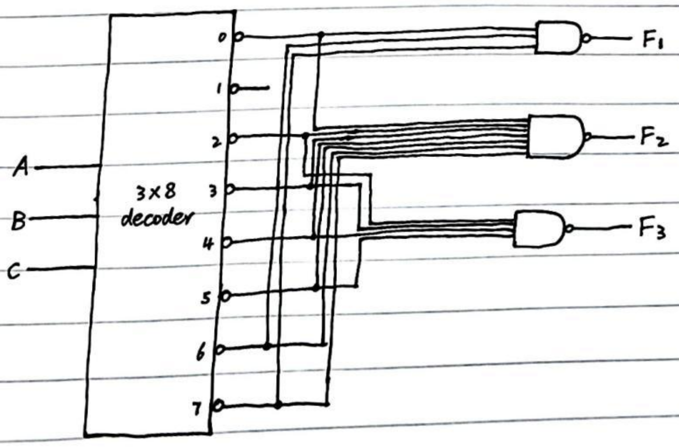
$A_3A_2 \backslash A_1A_0$				
	1		1	
				1
	1		1	
		1		

$D = A_3'A_2'A_1'A_0' + A_3'A_2'A_1A_0 + A_3'A_2A_1A_0' + A_3A_2A_1'A_0' + A_3A_2A_1A_0 + A_3A_2'A_1'A_0$

3. $F_1 = AB + A'B'C' = \Sigma(0, 6, 7) = (m_0' \cdot m_6' \cdot m_7')'$

$F_2 = A + B + C' = \Sigma(0, 2, 3, 4, 5, 6, 7) = (m_0'm_2'm_3'm_4'm_5'm_6'm_7')'$

$F_3 = A'B + AB' = \Sigma(2, 3, 4, 5) = (m_2'm_3'm_4'm_5')'$

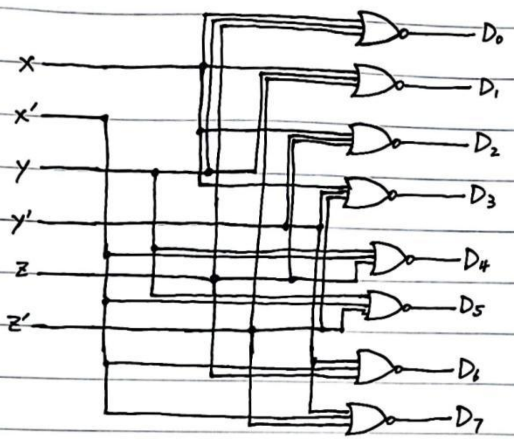


4. $D_0 = x'y'z' = (x+y+z)'$ $\quad D_1 = x'y'z = (x+y+z')'$

$D_2 = x'yz' = (x+y'+z)'$ $\quad D_3 = x'yz = (x+y'+z')'$

$D_4 = xy'z' = (x'+y+z)'$ $\quad D_5 = xy'z = (x'+y+z')'$

$D_6 = xyz' = (x'+y'+z)'$ $\quad D_7 = xyz = (x'+y'+z')'$



5. a)

A	B	C	D	F	
0	0	0	0	0	F=D
0	0	0	1	1	
0	0	1	0	0	F=0
0	0	1	1	0	
0	1	0	0	0	F=0
0	1	0	1	0	
0	1	1	0	1	F=1
0	1	1	1	1	
1	0	0	0	0	F=D
1	0	0	1	1	
1	0	1	0	1	F=1
1	0	1	1	1	
1	1	0	0	1	F=D'
1	1	0	1	0	
1	1	1	0	1	F=1
1	1	1	1	1	

b)

AB \ CD				
		1		
			1	1
	1		1	1
		1	1	1

$F(A,B,C,D) = AC + BC + B'C'D + ABD'$

6. a)

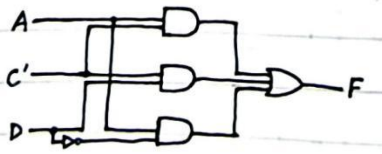
A	B	C	D	F
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	0
0	1	0	0	X
0	1	0	1	X
0	1	1	0	0
0	1	1	1	0
1	0	0	0	X
1	0	0	1	1
1	0	1	0	1
1	0	1	1	0
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	0

b) Simplify F by using K-map.

AB \ CD				
		1		
	X	X		
	1	1		1
	X	1		1

$F(A,B,C,D) = AC' + C'D + AD'$

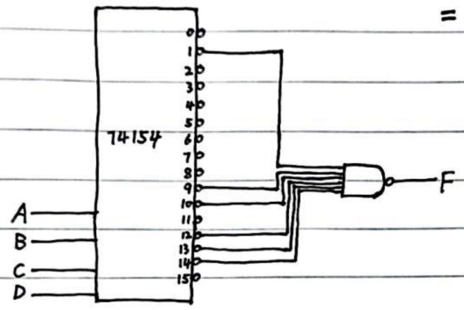
Logic diagram:



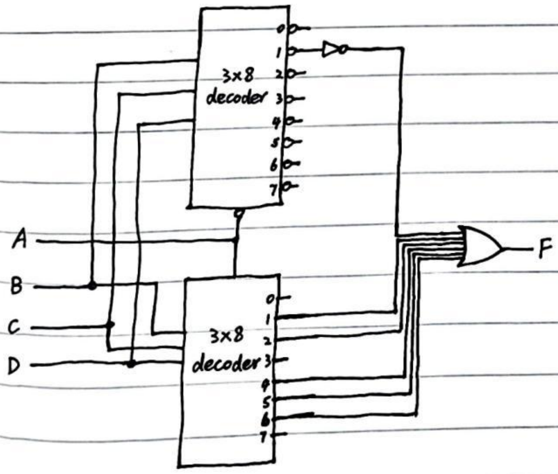
Date . .

c) In order to use less standard components and gates, we set $m_4 = m_5 = m_8 = 0$, then $F = \Sigma(1, 9, 10, 12, 13, 14)$

$= (m_1' m_9' m_{10}' m_{12}' m_{13}' m_{14}')'$

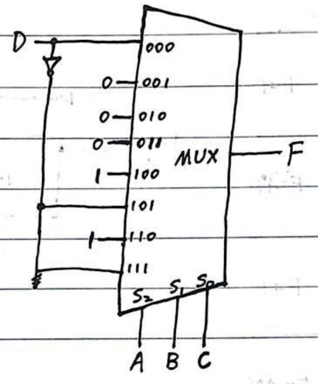


d) Take ~~$m_4 = m_5 = 0$, $m_8 = 1$~~ $m_4 = m_5 = m_8 = 0$, also take A to be enable.



e) From truth table, we can find the relation between F and D.

A	B	C	D	F	
0	0	0	0	0	F=D
			1	1	
0	0	1	0	0	F=0
			1	0	
0	1	0	0	X	F=0
			1	X	
0	1	1	0	0	F=0
			1	0	
1	0	0	0	X	F=1
			1	1	
1	0	1	0	1	F=D'
			1	0	
1	1	0	0	1	F=1
			1	1	
1	1	1	0	1	F=D'
			1	0	



(f) From the truth table, we found the relationship.

B	C	A	D	F	
0	0	0	0	0	F=D
		0	1	1	
		1	0	X	
		1	1	1	
0	1	0	0	0	F=AD'
		0	1	0	
		1	0	1	
		1	1	0	
1	0	0	0	X	F=1
		0	1	X	
		1	0	1	
		1	1	1	
1	1	0	0	0	F=AD'
		0	1	0	
		1	0	1	
		1	1	0