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Question-1:

X Y Z	YZ	(X+Y)	(X+Z)	X+YZ	(X+Y).(X+Z)
0 0 0	0	0	0	0	0
0 0 1	0	0	1	0	0
0 1 0	0	1	0	0	0
0 1 1	1	1	1	1	1
1 0 0	0	1	1	1	1
1 0 1	1	1	1	1	1
1 1 0	0	1	1	1	1
1 1 1	1	1	1	1	1

They are same.

Question-2:

$F = (a+b+c').(a'b'+c)$

$F = a.(a'b'+c) + b.(a'b'+c) + c'(a'b'+c)$

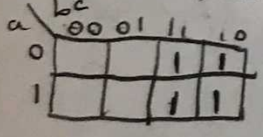
$F = \underbrace{a.a'}_{0}b' + ac + b.a'b' + bc + c'a'b' + \underbrace{c'c}_{0}$

$F = \underbrace{0.b'}_{0} + ac + \underbrace{b.b'}_{0}a' + bc + c'a'b' + \underbrace{0}_{0}$

$F = ac + bc + a'b'c'$

$= ac + bc + a'b'c'$

Question3 : $F = a'bc + abc' + abc + a'bc'$



4 blocks near to each other then the answer is since a and c are rotating the final form is $F = b$

Question 4: $F = a + a'(b'c + de)$

$F = \underbrace{a}_{M_1} + \underbrace{a'b'c}_{M_2} + \underbrace{a'de}_{M_3}$

$F' = (a + a'b'c + a'de)'$

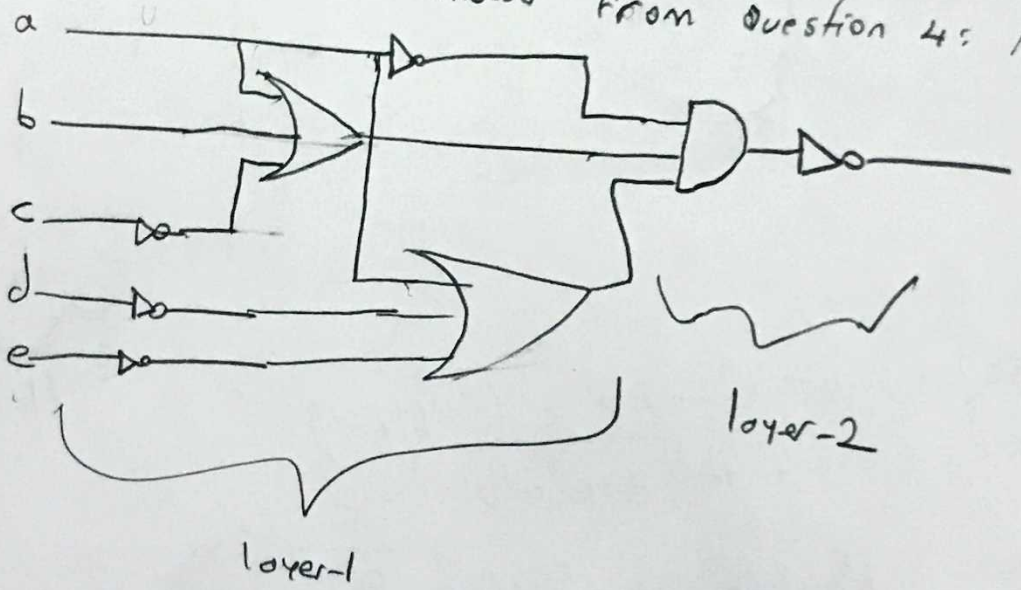
$F' = \underbrace{a'}_{M_1} \cdot \underbrace{(a'b'c)'}_{M_2} \cdot \underbrace{(a'de)'}_{M_3}$

$F' = \underbrace{a'}_{M_1} \cdot \underbrace{(a+b+c')}_{M_2} \cdot \underbrace{(a+d'+e')}_{M_3}$

Product of Max terms.

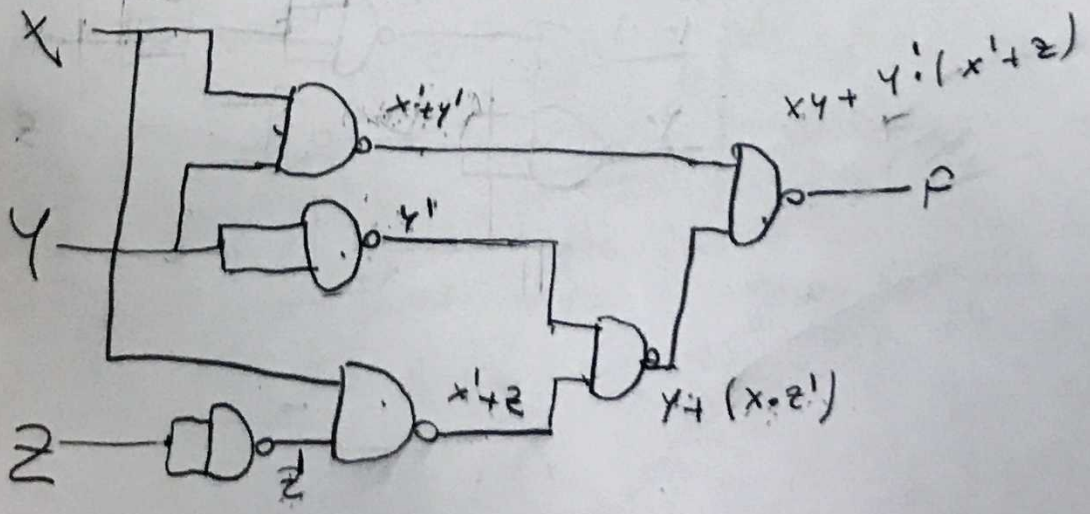
Question 5:

Since if we directly draw it is 4 layers we will use our answer from question 4: And also need to insert inverter.



Question-6: $f = xy + x'y' + y'z$

$F = xy + y'(x'+z)$



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Question-7:

a b c	a'+b	a'+c	(a'+b)·(a'+c)
0 0 0	1	1	1
0 0 1	1	1	1
0 1 0	1	1	1
0 1 1	1	1	1
1 0 0	0	0	0
1 0 1	1	1	1
1 1 0	1	0	0
1 1 1	1	1	1

F=1

Sum of minterms: $a'b'c' + a'b'c + a'bc' + a'bc + abc$ (m0, m1, m2, m3, m7)

$\sum(m_0, m_1, m_2, m_3, m_7)$

Product of maxterms:

$$\sum(M_4, M_5, M_2)' = \Pi(4,5,6)$$
$$= M_4 \cdot M_5 \cdot M_6$$
$$= (a'+b+c) \cdot (a'+b+c') \cdot (a'+b'+c)$$

Question-8:

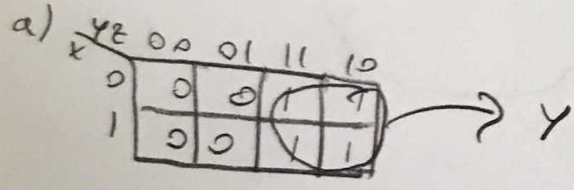
$$F(x,y,z) = \sum(1,3,5) = \Pi(0,2,4,6,7)$$

x y z	F
0 0 0	0
0 0 1	1
0 1 0	0
0 1 1	1
1 0 0	0
1 0 1	1
1 1 0	0
1 1 1	0

$$= (x+y+z) \cdot (x+y'+z) \cdot (x'+y+z) \cdot (x'+y'+z) \cdot (x'+y'+z')$$

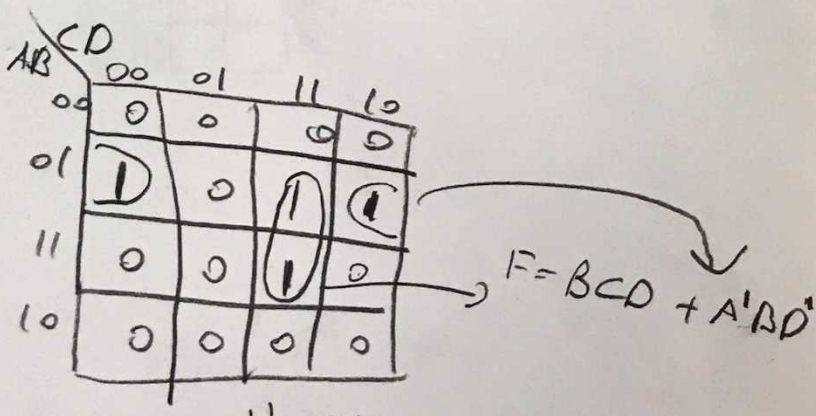
Question-9:

a)



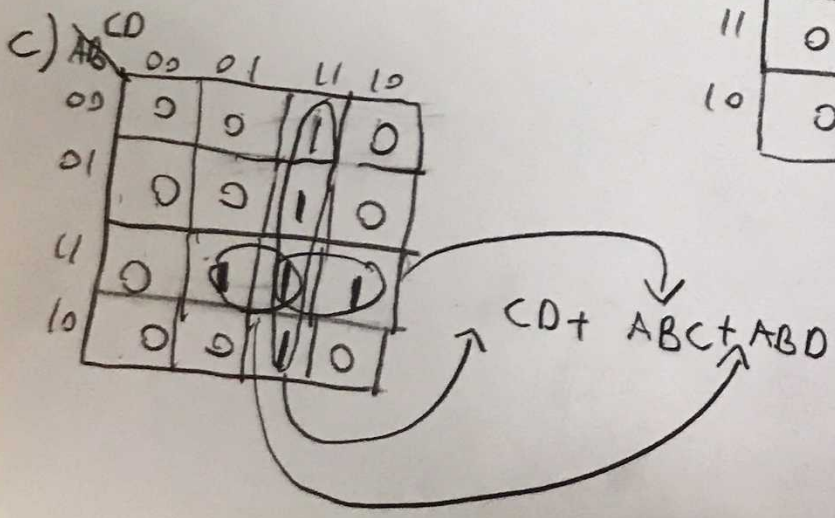
→ Y

b)



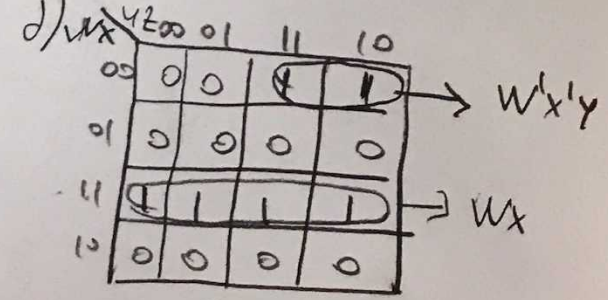
F = BCD + A'BD'

c)



CD + ABC + ABD

d)

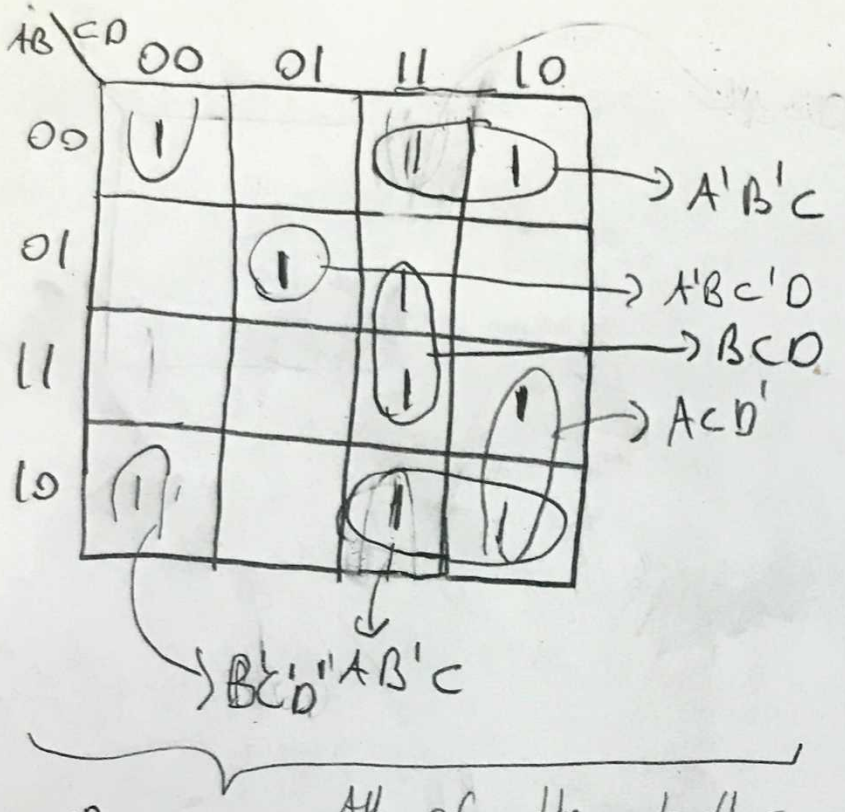


w'x'y

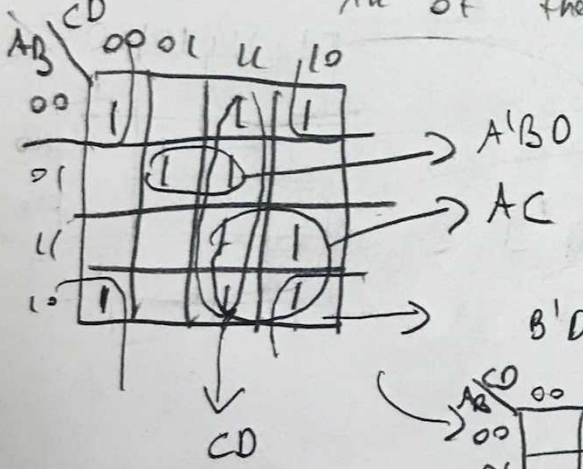
Wx

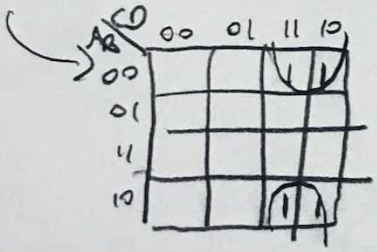
F = Wx + w'x'y

Question 10:



All of them together





$F = A'BD + AC + B'D' + CD$

or

$B'C$

instead of CD

$B'C$

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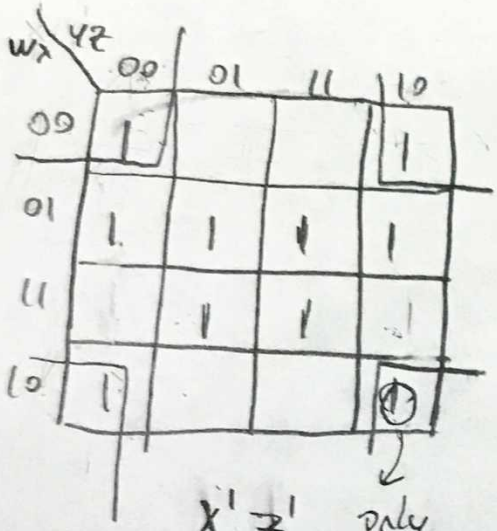
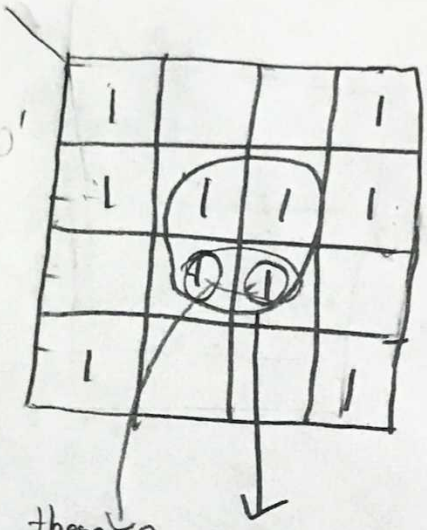
Question-11

a) $F(w,x,y,z) = \sum(0,2,4,5,6,7,8,10,13,15)$



$x'z'$ only covers this one

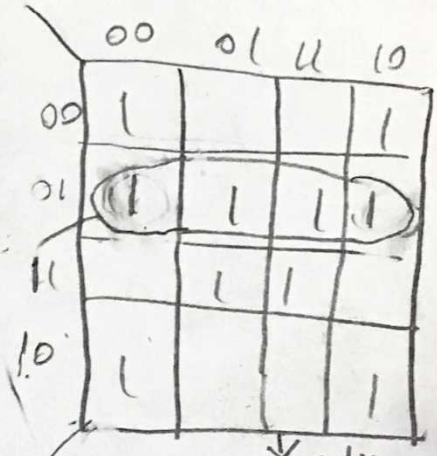
Essential Prime Implicant

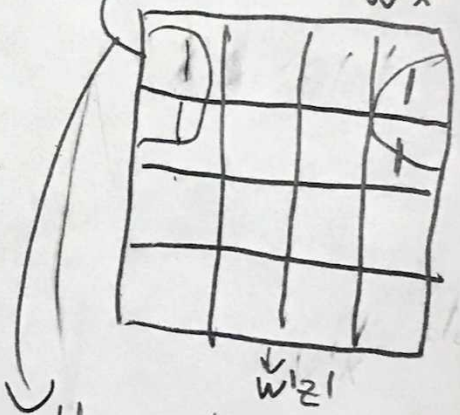


these 2 make

xz

Essential prime Implicant





these two are not essential

$F = x'z' + xz + w'x$

OR

$w'z'$

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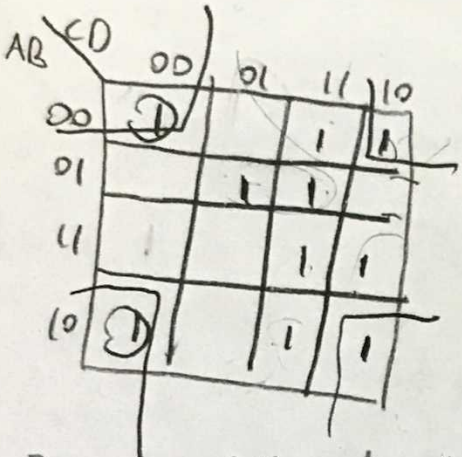
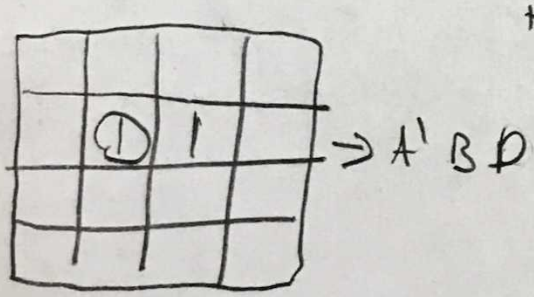
Question_11 B)

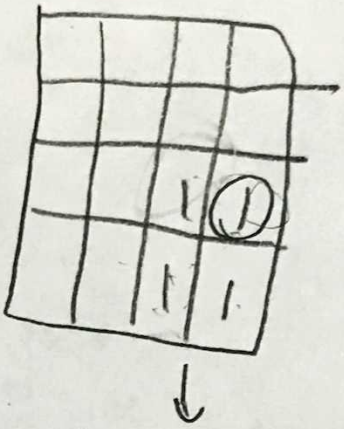


Because of the elements in circle this one is Essential Prime Implicant

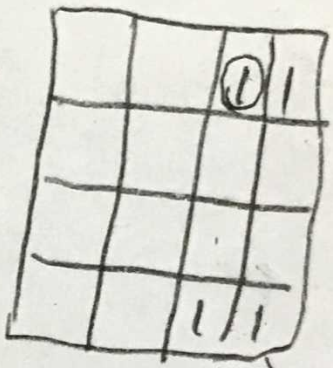
B'D'

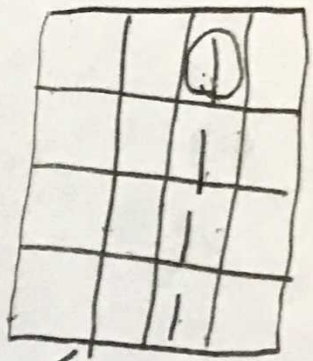


Because of the element in the circle this one is essential



Because of the element in circle this one is Essential
↓
AC





We need to take element in circle but we have two options so they are not essential.

$$F = B'D' + AC + A'BD + \begin{matrix} B'C \\ OR \\ CD \end{matrix}$$