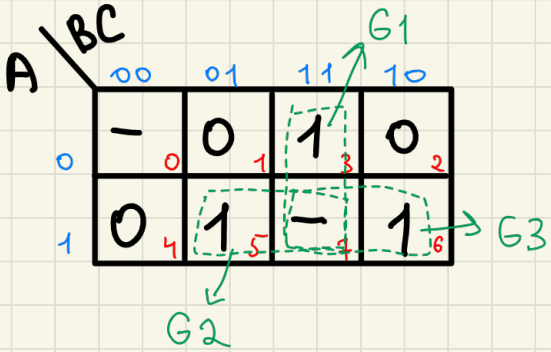
LAB 4

Question 1.

a)

$$F(A,B,C) = \Sigma m\,(3,5,6)$$

$$d(A,B,C) = \Sigma m\,(0,7)$$



$G1 = BC$ $G2 = AC$ $G3 = AB$

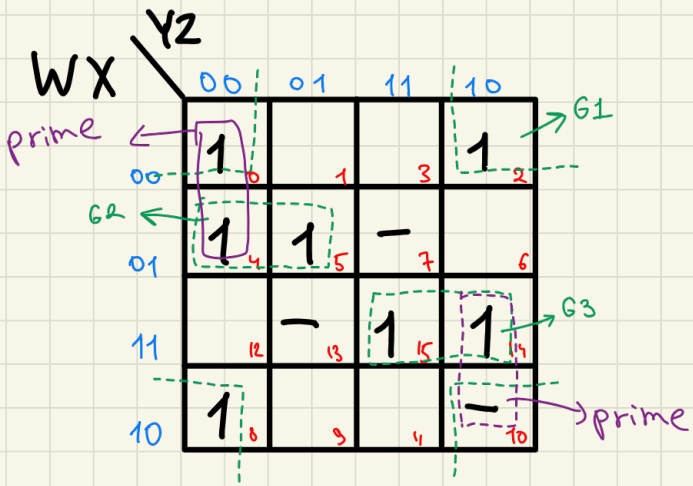
Prime implicants: BC, AC, AB

Essential prime implicants: BC, AC, AB

$$F = BC + AC + AB$$

b) $F(W,X,Y,Z) = \Sigma m(0,2,4,5,8,14,15)$

$d(W,X,Y,Z) = \Sigma m(7,10,13)$



$G1 = X'Z'$ $G2 = W'XY'$ $G3 = WXY$

Prime Implicants: $X'Z', W'XY', WXY, W'Y'Z', WYZ'$

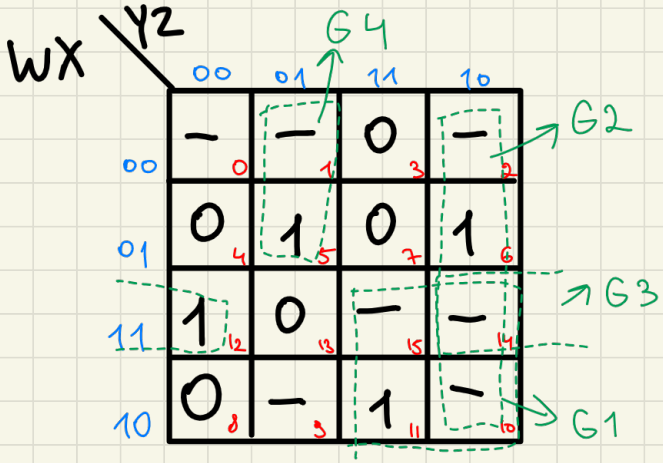
Essential prime imp: $X'Z', W'XY', WXY$

$$F = X'Z' + W'XY' + WXY$$

Question 2.

a) $F(W,X,Y,Z) = \Sigma m(5,6,11,12)$

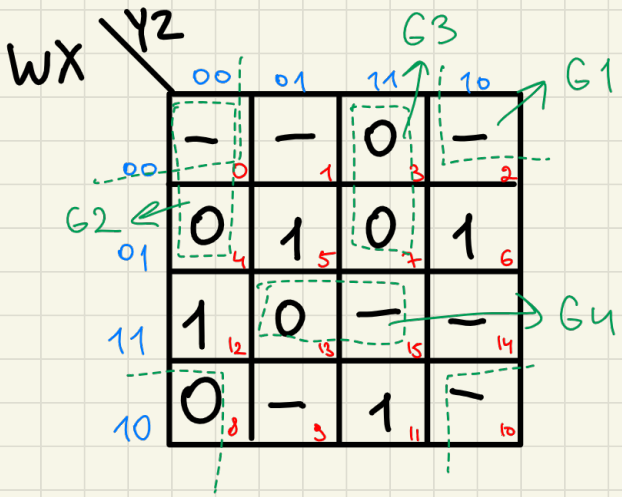
$$d(W,X,Y,Z) = \sum m(0,1,2,9,10,14,15)$$



$G1 = WY \quad G2 = YZ' \quad G3 = WXZ' \quad G4 = W'Y'Z$

$$F = WY + YZ' + WXZ' + W'Y'Z$$

b)



$G1 = X + Z \quad G2 = W + Y + Z$

$G3 = W + Y' + Z'$ $G4 = W' + X' + Z'$

$F = (X+Z)(W+Y+Z)(W+Y'+Z')(W'+X'+Z'$

Question 3

$T1 = B'C$ $T2 = A'B$ $T3 = A + T1$

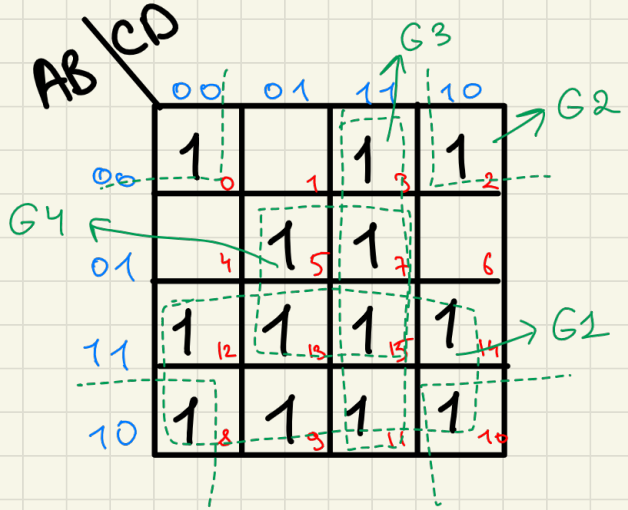
$T4 = D \oplus T2'$ $F = T3 + T4$ $G = D' + T2$

A	B	C	D	T1	T2	T3	T4	F	G
0	0	0	0	0	0	0	1	1	1
0	0	0	1	0	0	0	0	0	0
0	0	1	0	1	0	1	1	1	1
0	0	1	1	1	0	1	0	1	0
0	1	0	0	0	1	0	0	0	1
0	1	0	1	0	1	0	1	1	1
0	1	1	0	0	1	0	0	0	1
0	1	1	1	0	1	0	1	1	1
1	0	0	0	0	0	1	1	1	1
1	0	0	1	0	0	1	0	1	0
1	0	1	0	1	0	1	1	1	1
1	0	1	1	1	0	1	0	1	0
1	1	0	0	0	0	1	1	1	1
1	1	0	1	0	0	1	0	1	0
1	1	1	0	0	0	1	1	1	1
1	1	1	1	0	0	1	0	1	0

Question 4

k-map for F

$$F=\sum m(0,2,3,5,7,8,9,10,11,12,13,14,15)$$

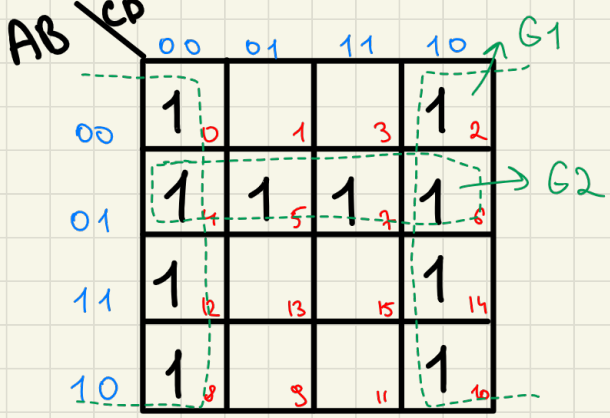


$G1 = A \quad G2 = B'D' \quad G3 = CD \quad G4 = BD$

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

k-map for G

$$G=\sum m(0,2,4,5,6,7,8,10,12,14)$$



$G1 = D'$ $\quad G2 = A'B$

$G = D' + A'B$

Question 5

$F = T3 + T4$ $\quad A + B'D' + CD + BD$

$4 + 4 + 1$

9 literals $\quad$ 8 literals

$G = D' + T2$ $\quad D' + A'B$

$1 + 2 + 1$

4 literals $\quad$ 4 literals.

for G

Ans: for F it is simpler, it is same

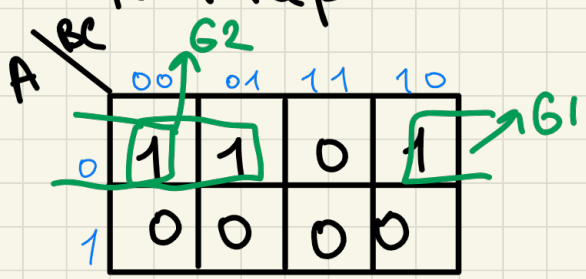
Question 6

a)

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

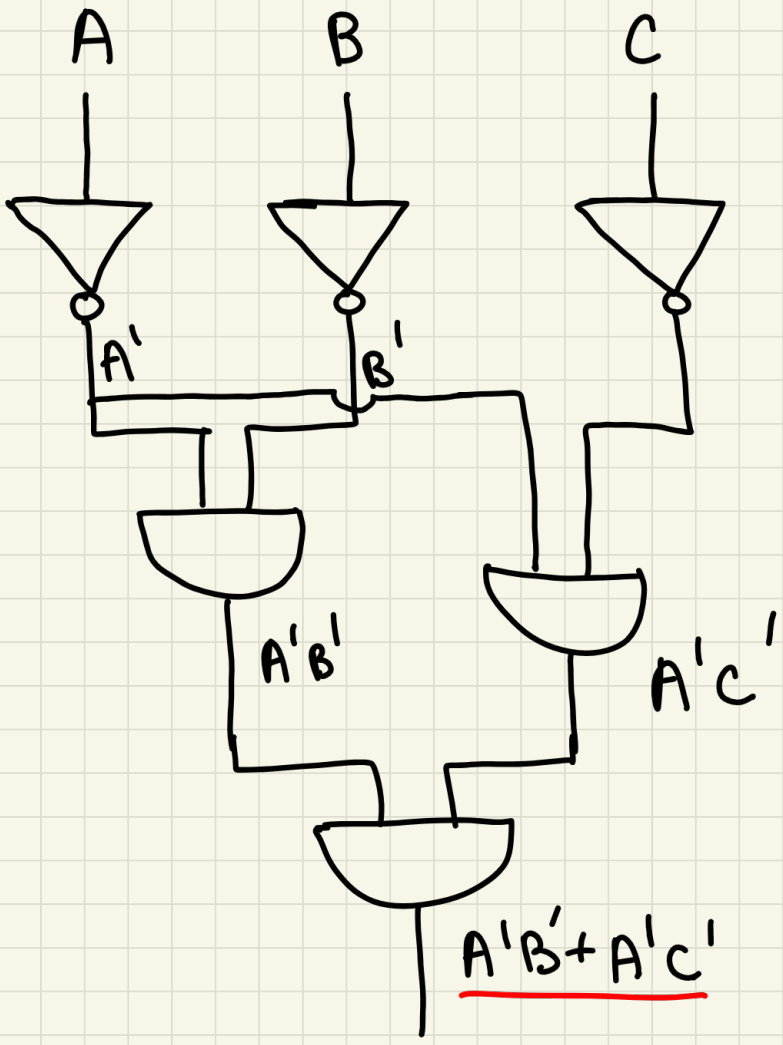
$$F = \sum m(0,1,2)$$

K-map



$$G1 = A'C' \qquad G2 = A'B'$$

$$F = A'C' + A'B'$$



b)

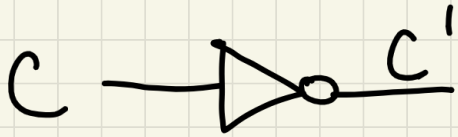
A	B	C	D	F
0	0	0	0	1
0	0	1	1	0
0	1	0	2	1
0	1	1	3	0
1	0	0	4	1
1	0	1	5	0
1	1	0	6	1
1	1	1	7	0

$$F = \Sigma m(0, 2, 4, 6)$$

k-map

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

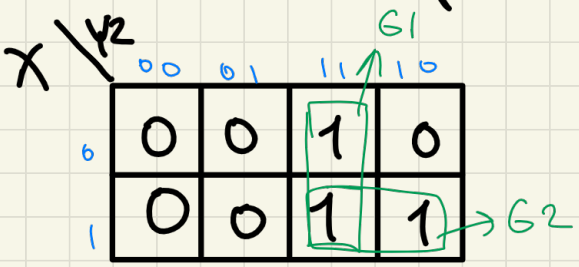
$$Group = C'$$



Question 7

X	Y	Z	D_{in}	D_{out}	A	B	C
0	0	0	0	1	0	0	1
0	0	1	1	2	0	1	0
0	1	0	2	3	0	1	1
0	1	1	3	4	1	0	0
1	0	0	4	2	1	0	1
1	0	1	5	3	1	1	0
1	1	0	6	4	1	1	1
1	1	1	7	5	1	0	1

A k-map

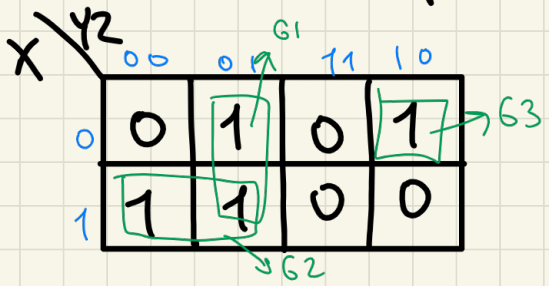


$G1 = Y2$

$G2 = XY$

$A = Y2 + XY$

B k-map



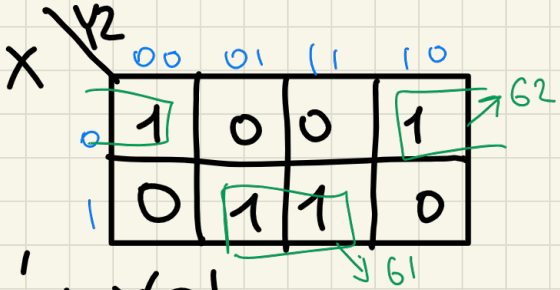
$G1 = Y'2$

$G2 = XY'$

$G3 = X'Y2'$

$B = Y'2 + XY' + X'Y2'$

C k-map

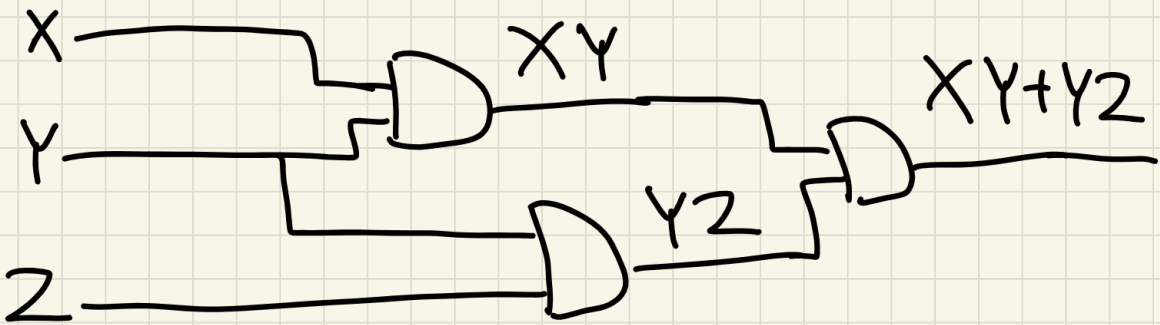


$G1 = X2$

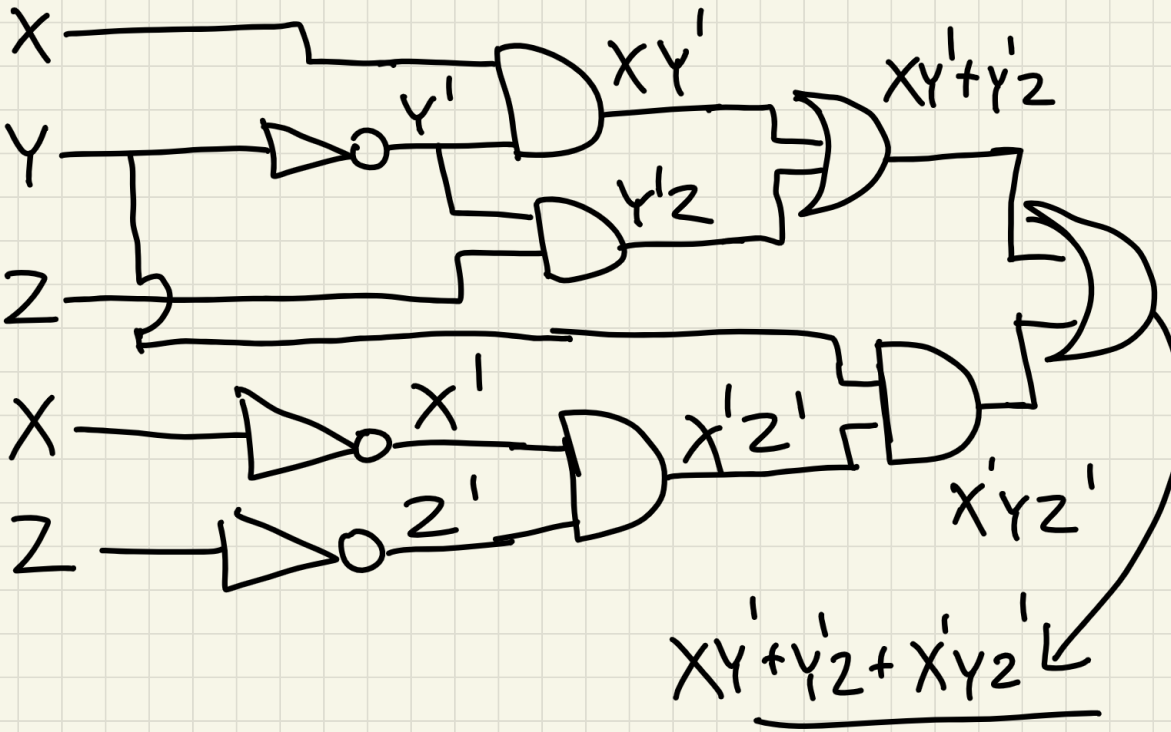
$G2 = X'2'$

$C = X2' + X'2'$

$A = XY + Y2$



$B = XY' + Y'2 + X'Y2'$



$$C = XZ + X'Z'$$