CS & IT ENGINEERING

Minimization

K Map

Lecture No. 03

By- CHANDAN SIR

01 K map

02 questions

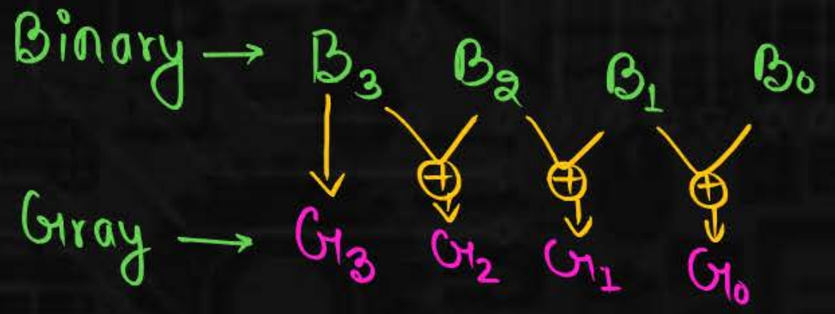
03 DISCUSSION

K Map - Basics

Minimization by K-Map

→ Based on gray code.

→ Gray code

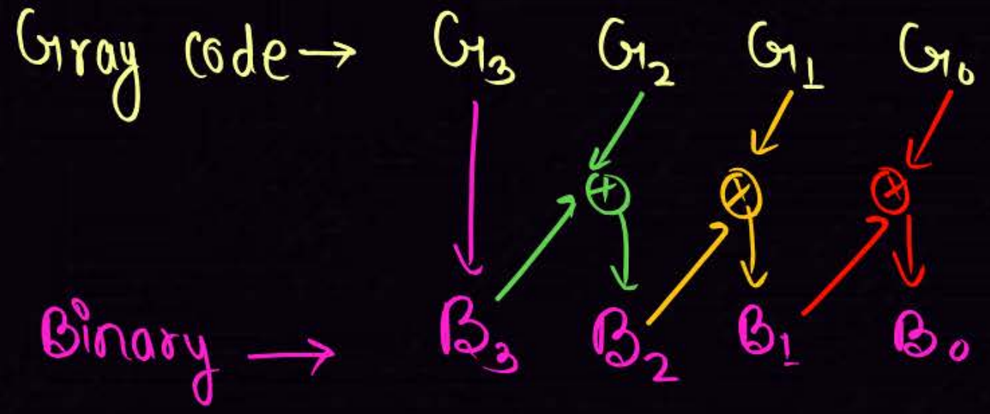


Ex. Binary → 1 0 1 1 0 0 0 1 0

Gray → 1 1 1 0 1 0 0 1 1

Ex Binary → 1 1 1 0 0 1

Gray → 1 0 0 1 0 1



Gray → 1 1 0 0 1 1 0 0

Binary → 1 0 0 0 1 0 0 0 ✓

Ex. Gray code → 1 1 0 1 0 1

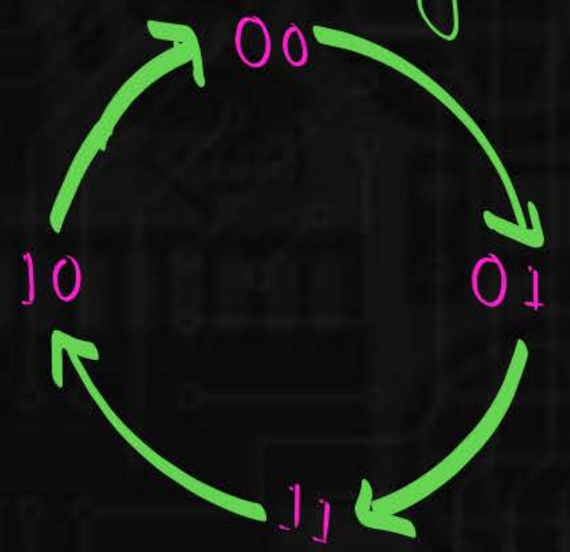
Binary → 1 0 0 1 1 0

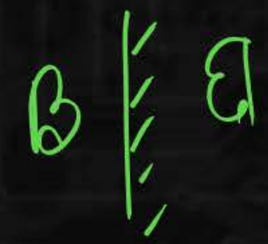
K Map - Basics

Gray Code → This is a code in which successive numbers are differ by one bit.

Decimal	Binary	Gray Code
0	0 0	0 0
1	0 1	0 1
2	1 0	1 1
3	1 1	1 0

→ unity hamming distance code.
→ Cylic code
→ Reflecting code



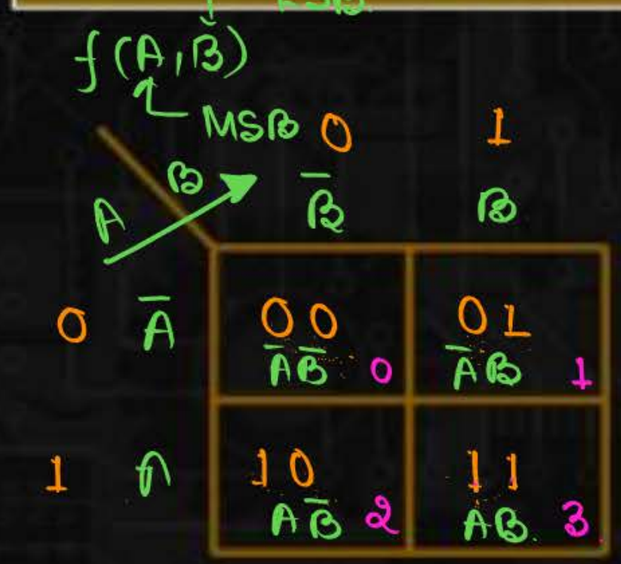


K Map - Basics

Gray Code

Decimal	Binary	Gray Code
0	0 0 0	0 0 0
1	0 0 1	0 0 1
2	0 1 0	0 1 1
3	0 1 1	0 1 0
4	1 0 0	1 1 0
5	1 0 1	1 1 1
6	1 1 0	1 0 1
7	1 1 1	1 0 0

K Map - Basics


f(A,B)
LSB
MSB
0
1
A
B
$\bar{B}$
B
0
$\bar{A}$
00
$\bar{A}\bar{B}$ 0
01
$\bar{A}B$ 1
1
A
10
$A\bar{B}$ 2
11
AB 3


f(A,B,C)
A
BC
$\bar{B}\bar{C}$
00
$\bar{B}C$
01
BC
11
$B\bar{C}$
10
$\bar{A}$ 0
000 0
001 1
011 3
010 2
A 1
100 4
101 5
111 7
110 6

K Map - Basics

$f(A, B, C, D)$

K Map - Basics

16 group = 2^4 → 4 Variables minimized.

8 group = 2^3 → 3 Variables minimized.

4 group = 2^2 → 2 Variables minimized.

2 group = 2^1 → 1 Variable minimized.

1 group = 2^0 → 0 Variable minimized.

$f(A,B) = \bar{A}B + A\bar{B} + AB$

Variables

K Map - Basics

Rule of Minimization

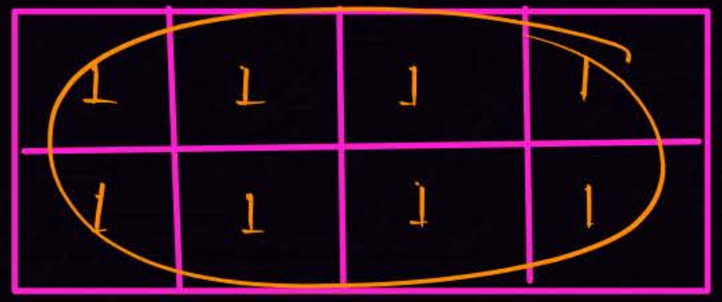
CJ Baba Rule

→ form Less number of group and bigger group.

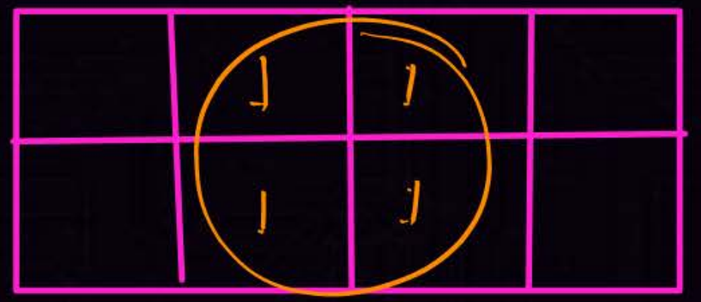
Less number → terms will minimized

bigger group → Variable will minimized.

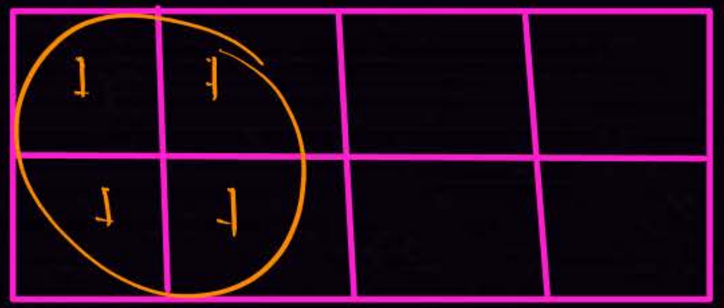
Octa (8 group)



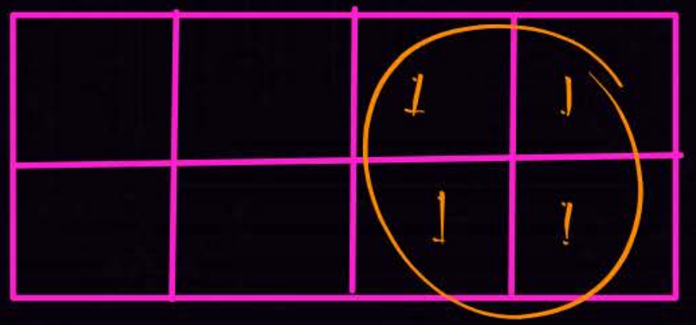
Quad



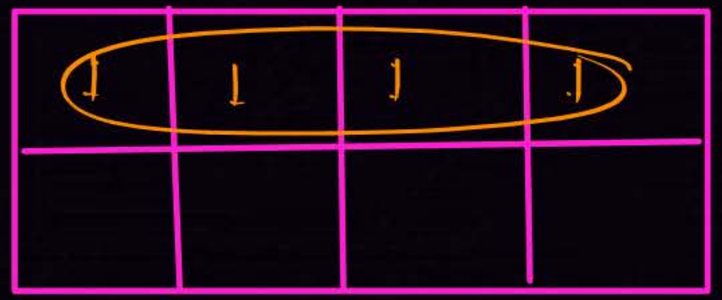
Quad (4 group)



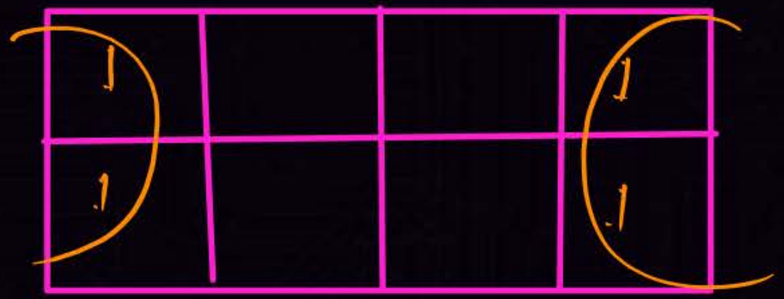
Quad



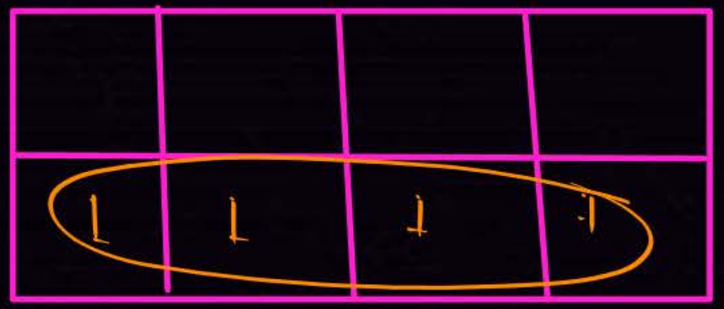
Quad

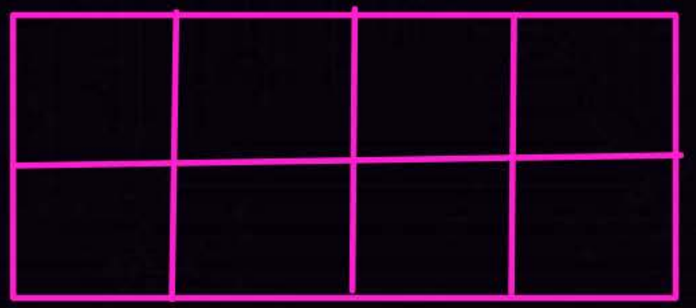


Quad

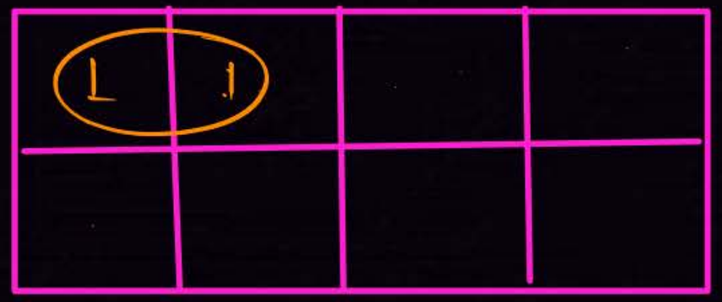


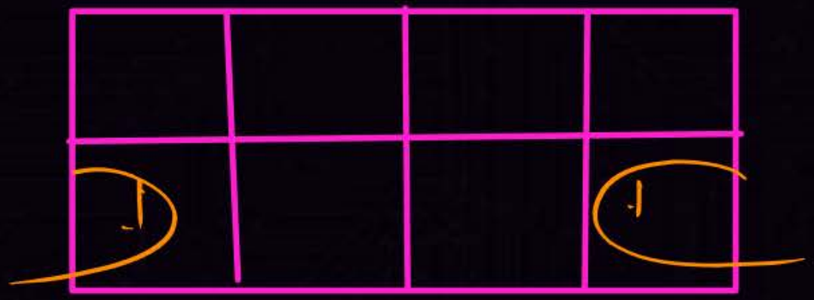
Quad

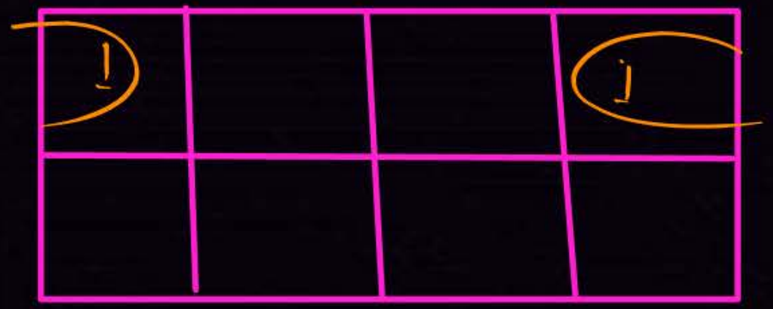


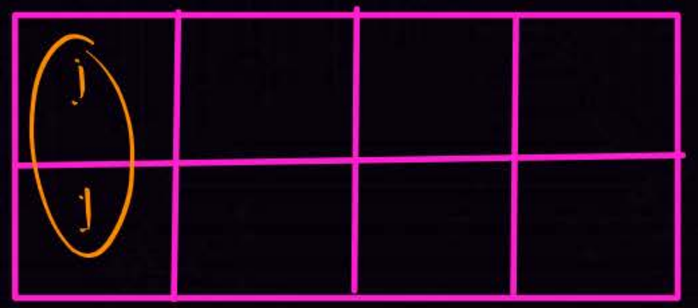


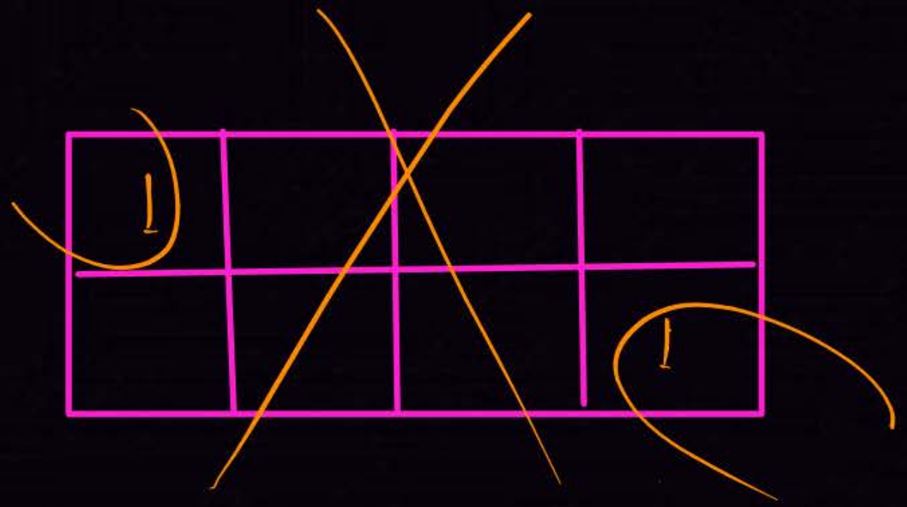
pair (2 group)

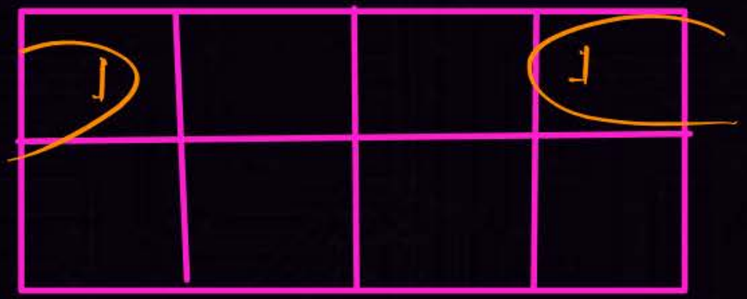


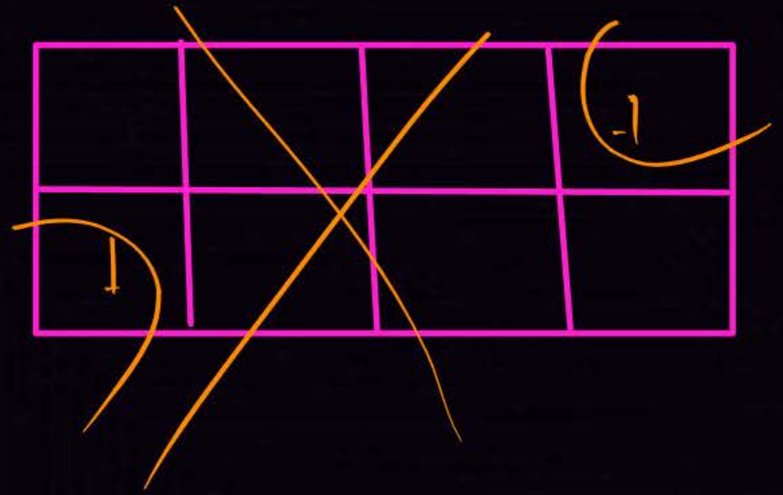


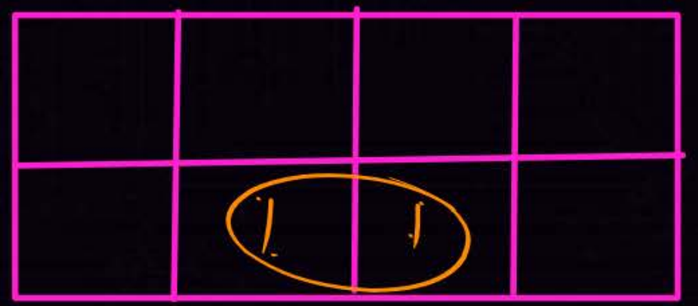




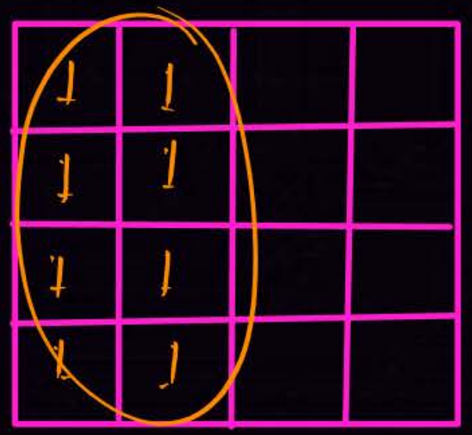

1
1

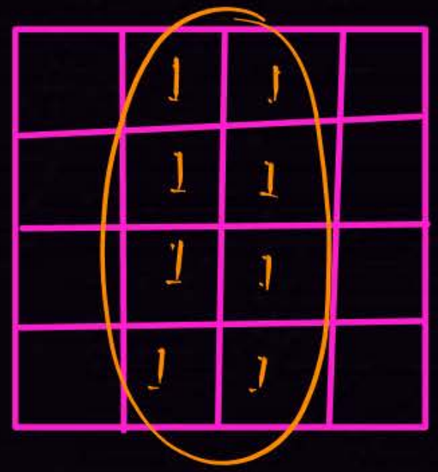

1
1

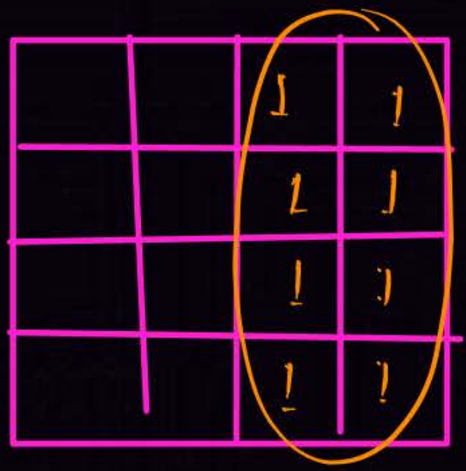

1
1

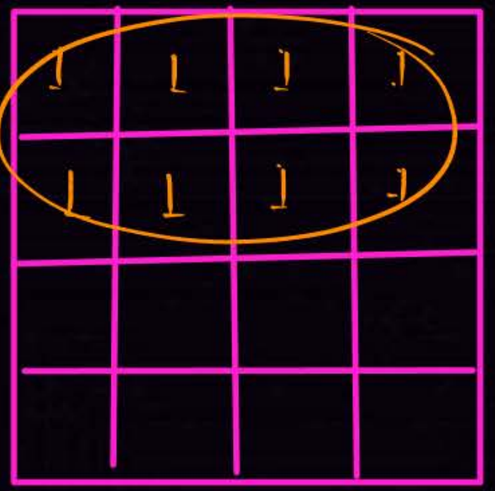

1
1

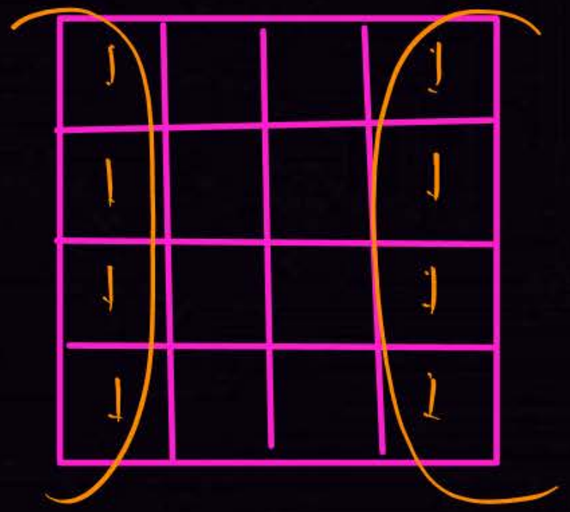
8 group

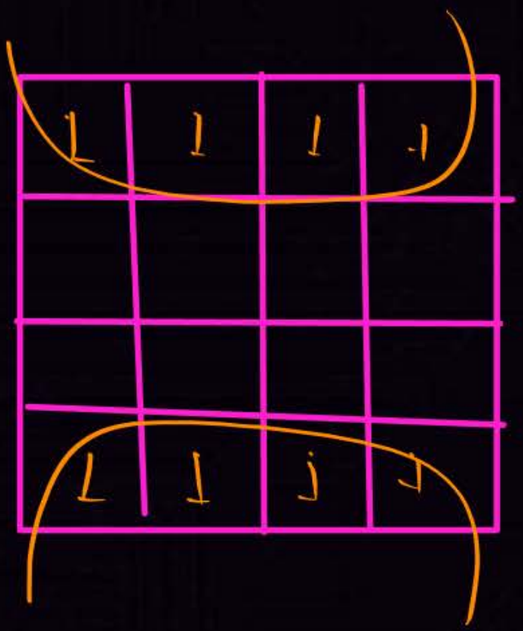




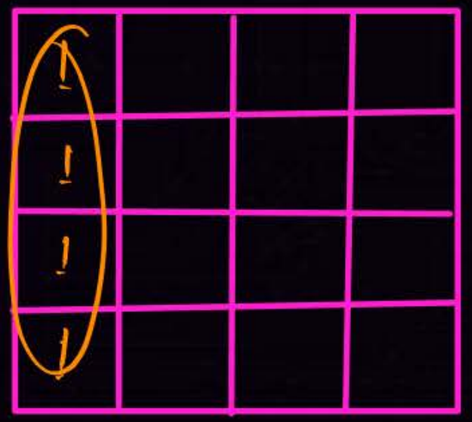


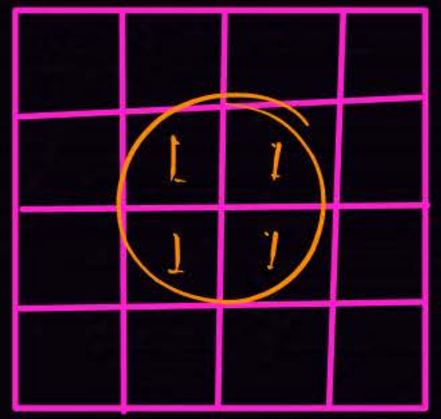


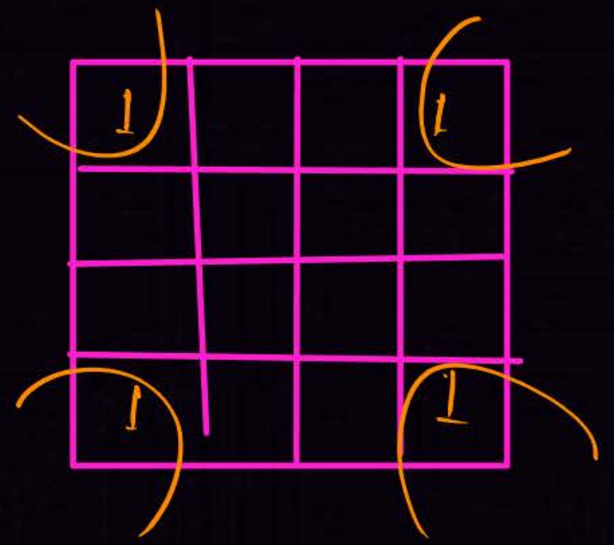


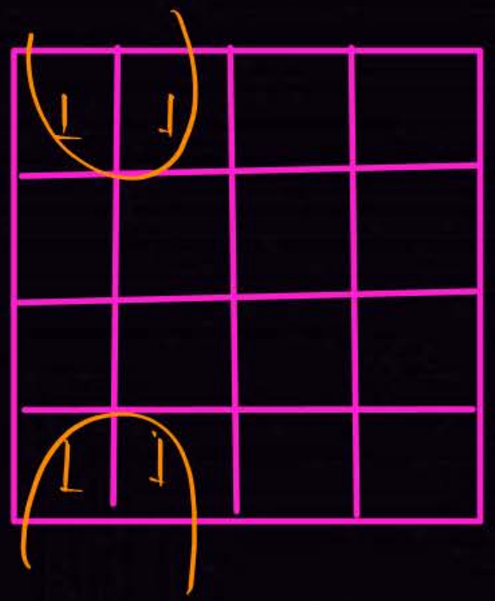


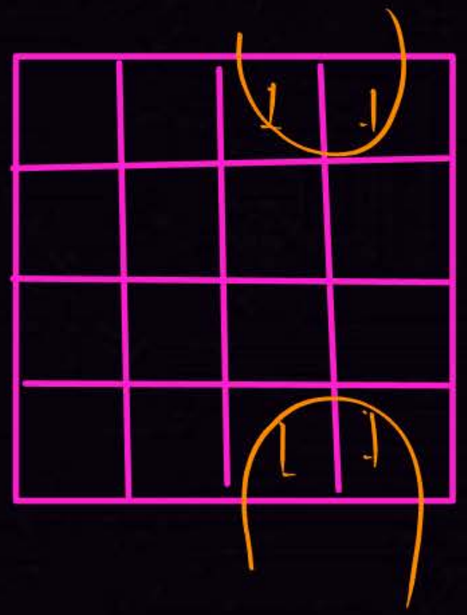
Quad
(4 group)

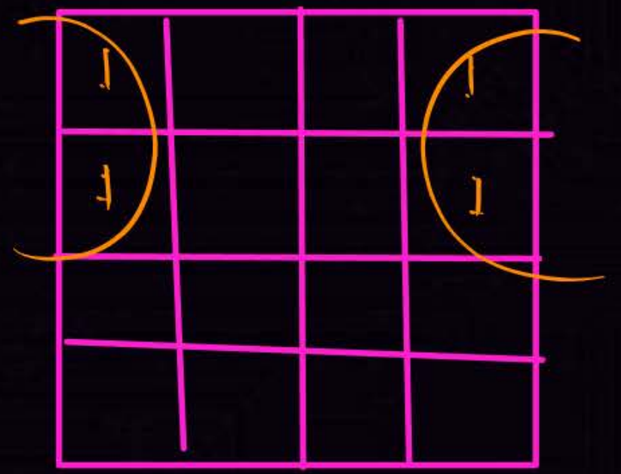


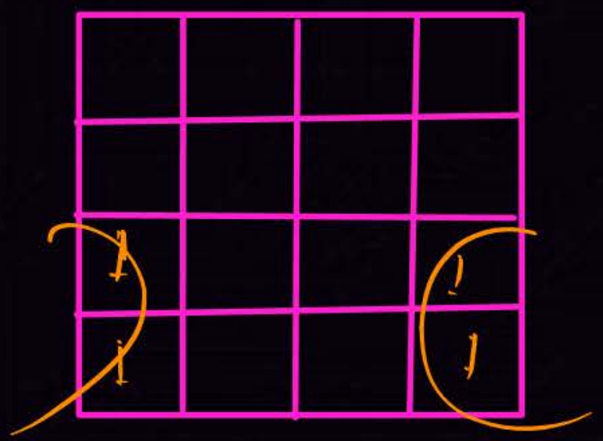


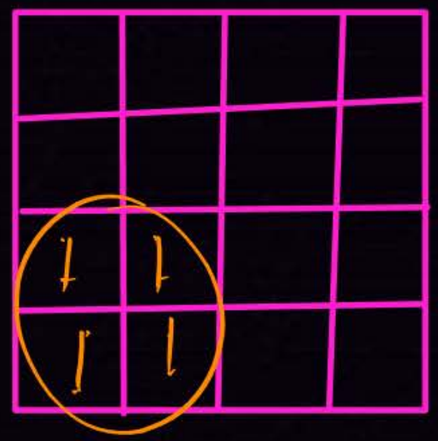


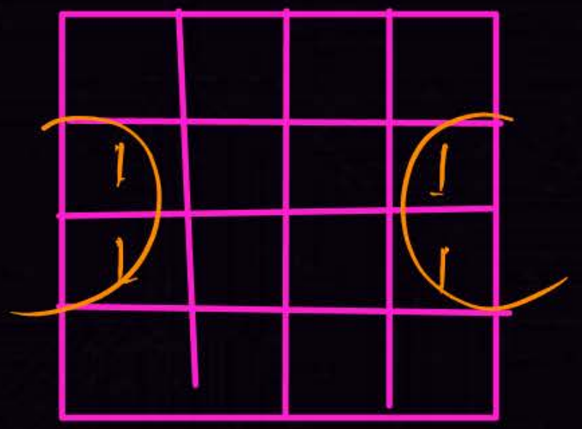


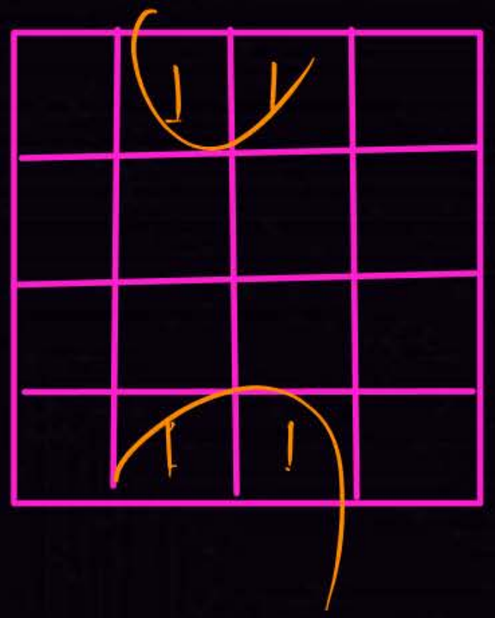




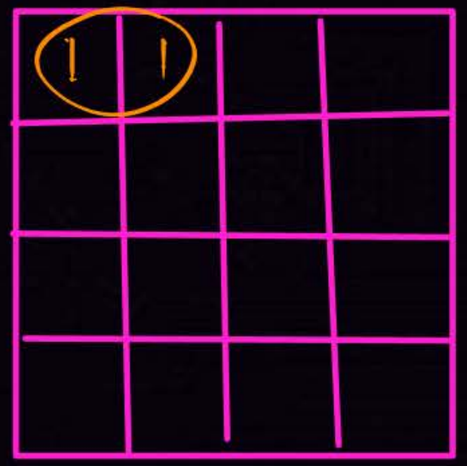


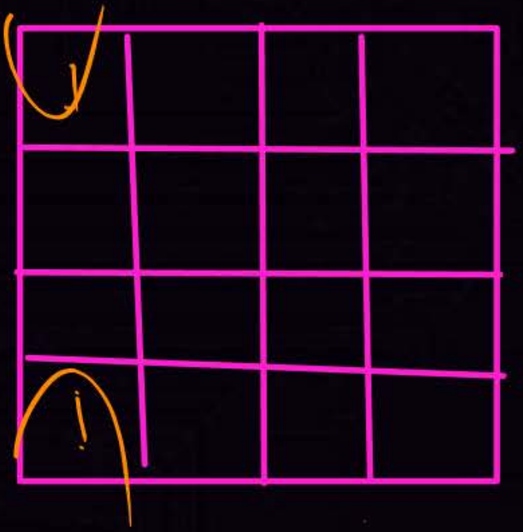




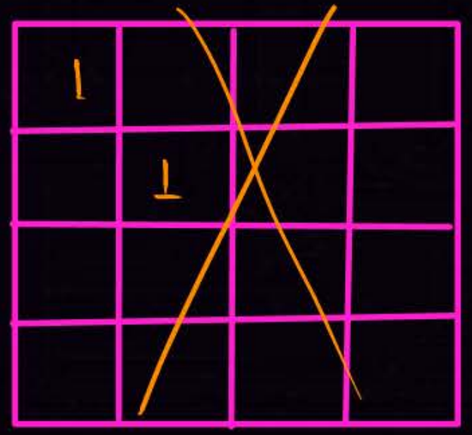


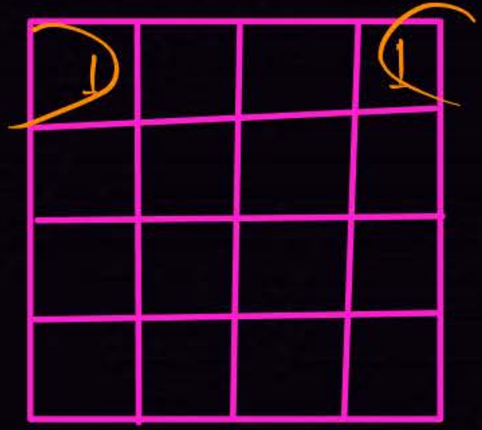
pair

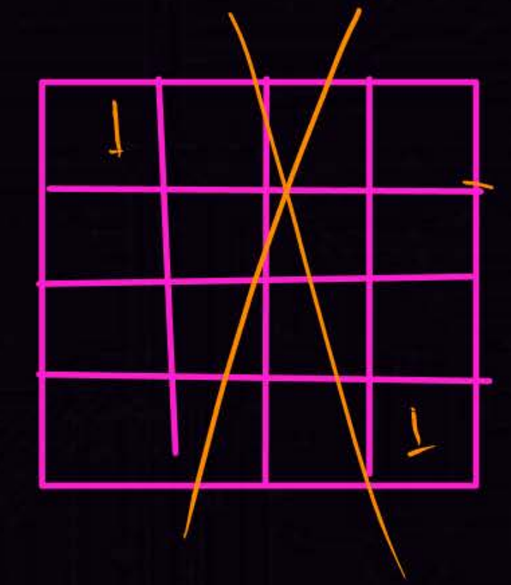


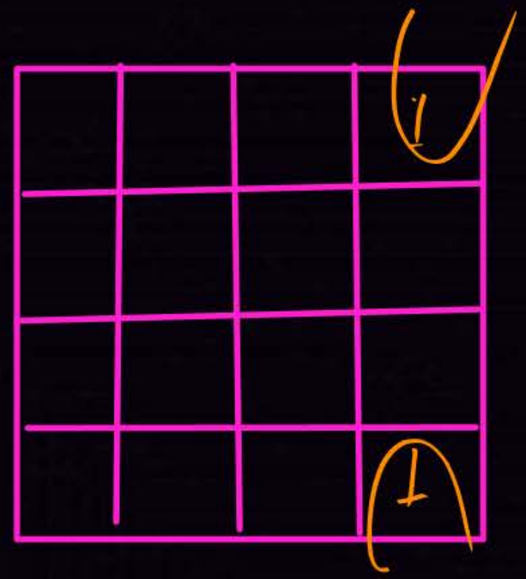


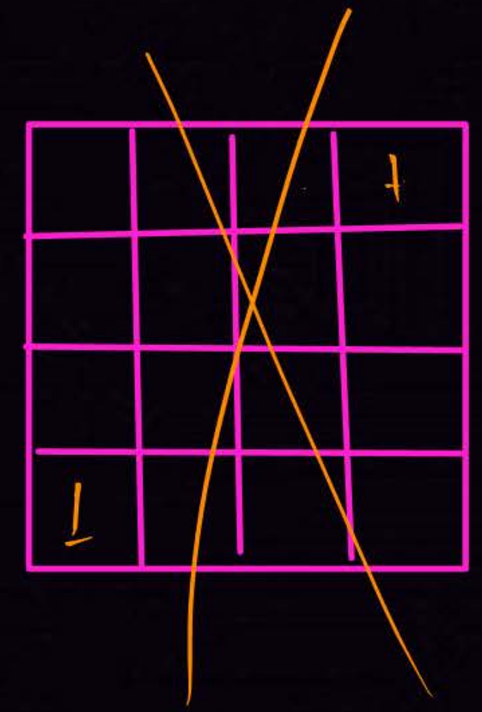
pair

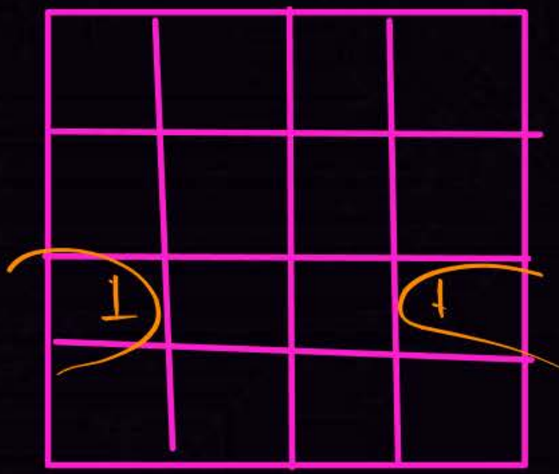






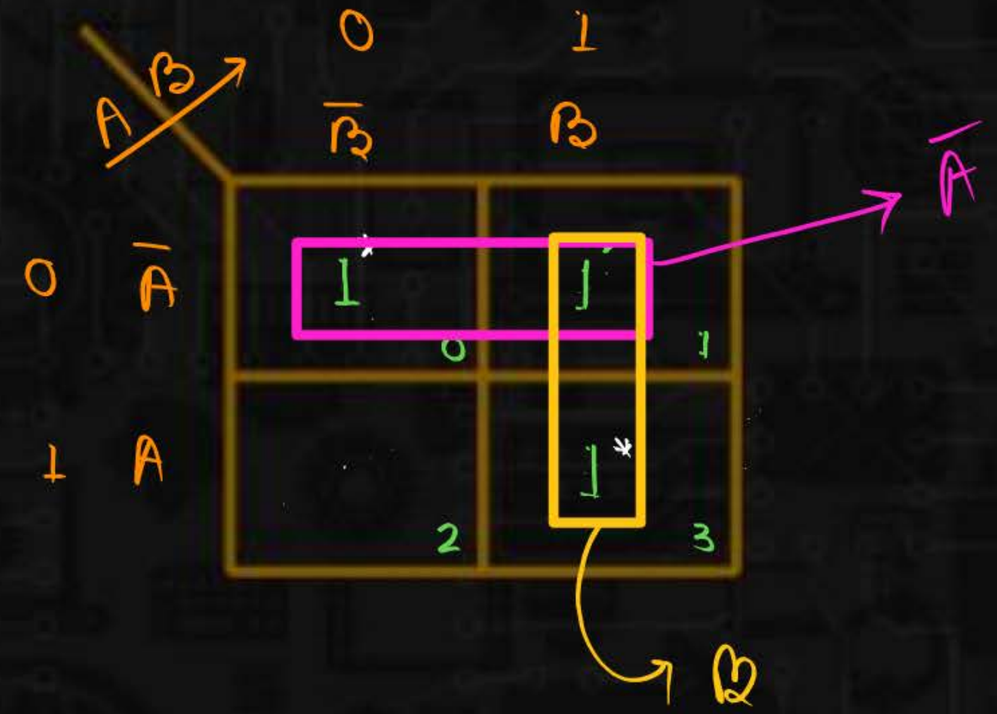






0 00 01 1 11 3

Q.1 $f(A,B) = \overline{A}\,\overline{B} + \overline{A}B + AB = \sum m\,(0, 1, 3)$



$\overline{A} + B$ Ans

$\overline{A}\,\overline{B} + \overline{A}B + AB$

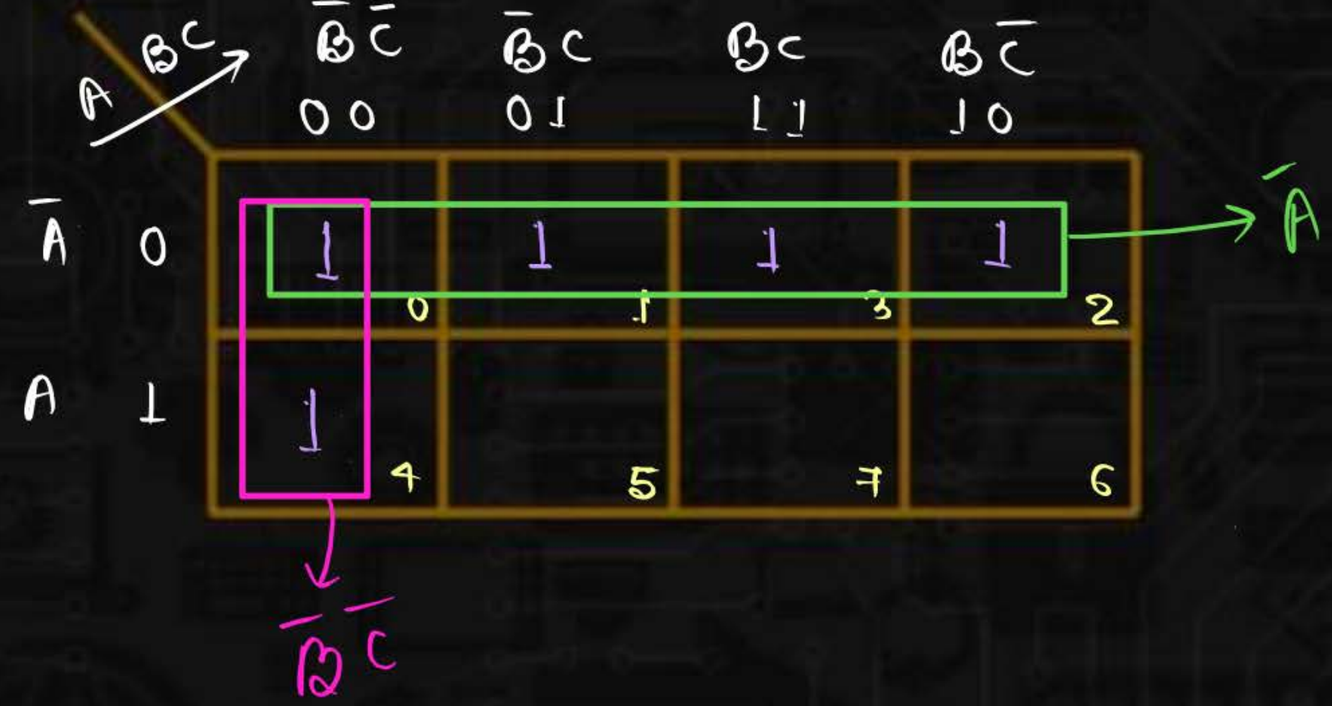
$\overline{A}(\overline{B} + B) + AB$

$\overline{A} + AB = (\overline{A} + A)(\overline{A} + B)$

$= \overline{A} + B$

Q.2

$$f(A,B,C) = \Sigma m(0,1,2,3,4)$$

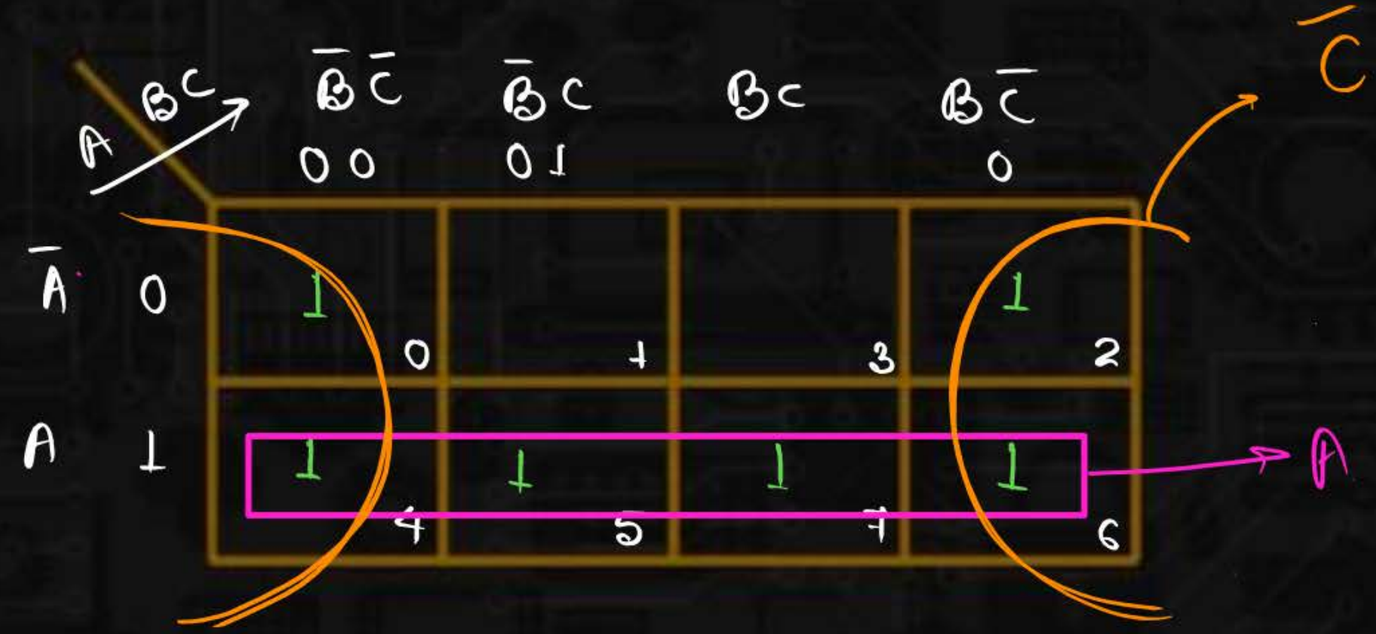


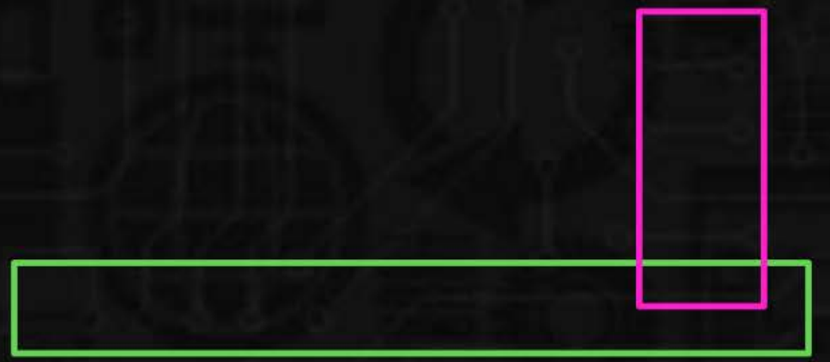
$$= \bar{A} + \bar{B}\bar{C}$$

Ans

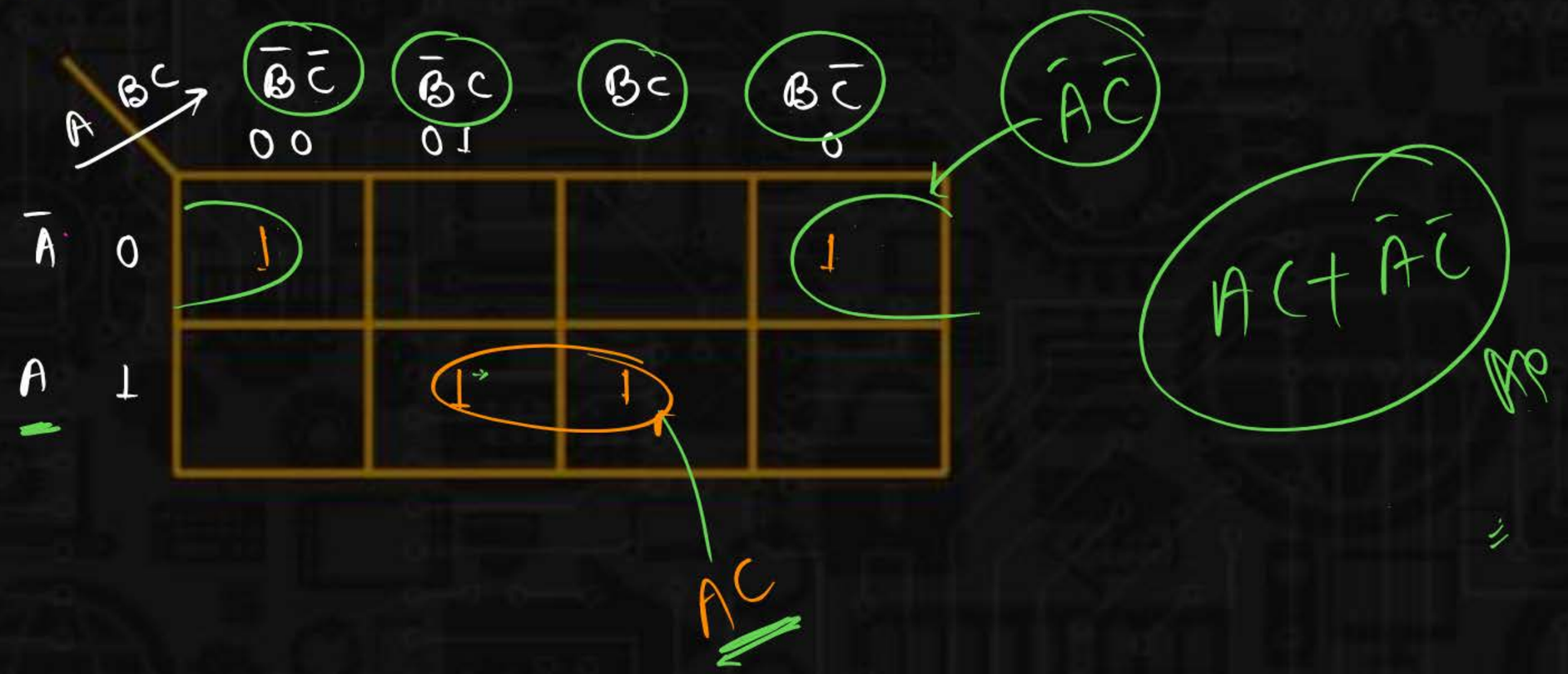
Q.2

$f(A,B,C) = \Sigma m(0,2,4,5,6,7)$



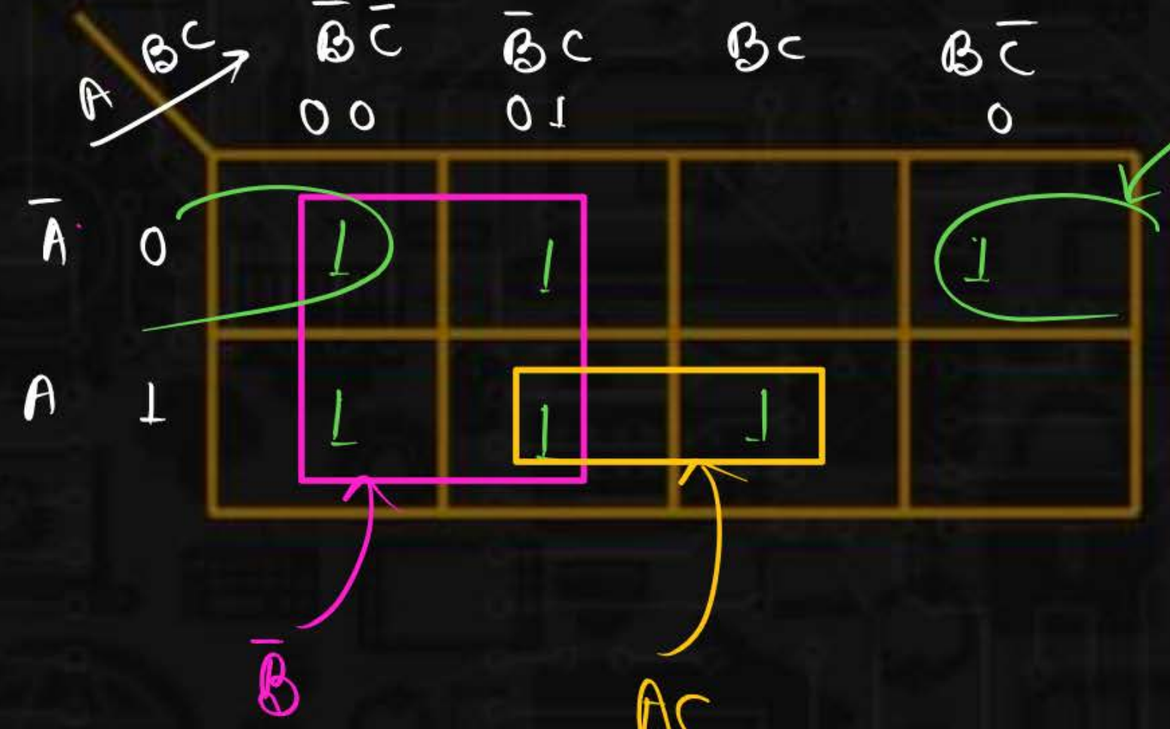


Q.2


A
BC
$\bar{B}\bar{C}$
$\bar{B}C$
BC
$B\bar{C}$
00
01
11
10
$\bar{A}$
0
A
1
1
1
1
1
$\bar{A}\bar{C}$
$AC + \bar{A}\bar{C}$
AC

Q.2

$f(A, B, C)$



$\bar{A}\bar{C}$

$\bar{B} + AC + \bar{A}\bar{C}$

Friday → 7PM - 9PM


THANK YOU GW
SOLDIERS !