Recall:

↳ $f(A, B, C, D, E)$

→ if we have 'n' variables, then there will be 2^n combinations of the variable

total 2^n cells

→ Grouping

↳ make group as large as possible

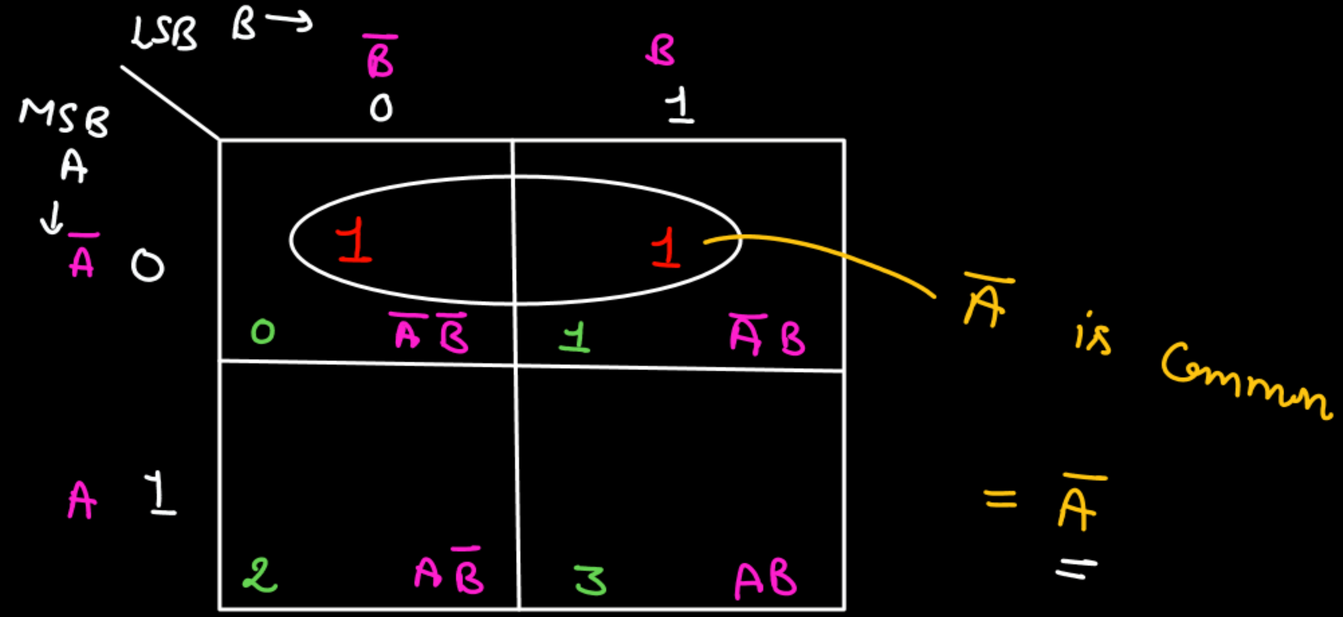
→ The no. of 1's in group must be in Power of 2

↳ 1, 2, 4, 8, 16, 32

2 Variable K-MAP :

Ex SOP (minterm)

	A	B	f	SOP (minterm)
0	0	0	1 ✓	$\bar{A}\bar{B}$ ✓
1	0	1	1 ✓	$\bar{A}B$ ✓
2	1	0	0	$A\bar{B}$
3	1	1	0	AB



$\bar{A}$ is Common

$= \bar{A}$

Using Boolean Logic

$\Rightarrow \bar{A}\bar{B} + \bar{A}B$

$\bar{A}(B + \bar{B})$

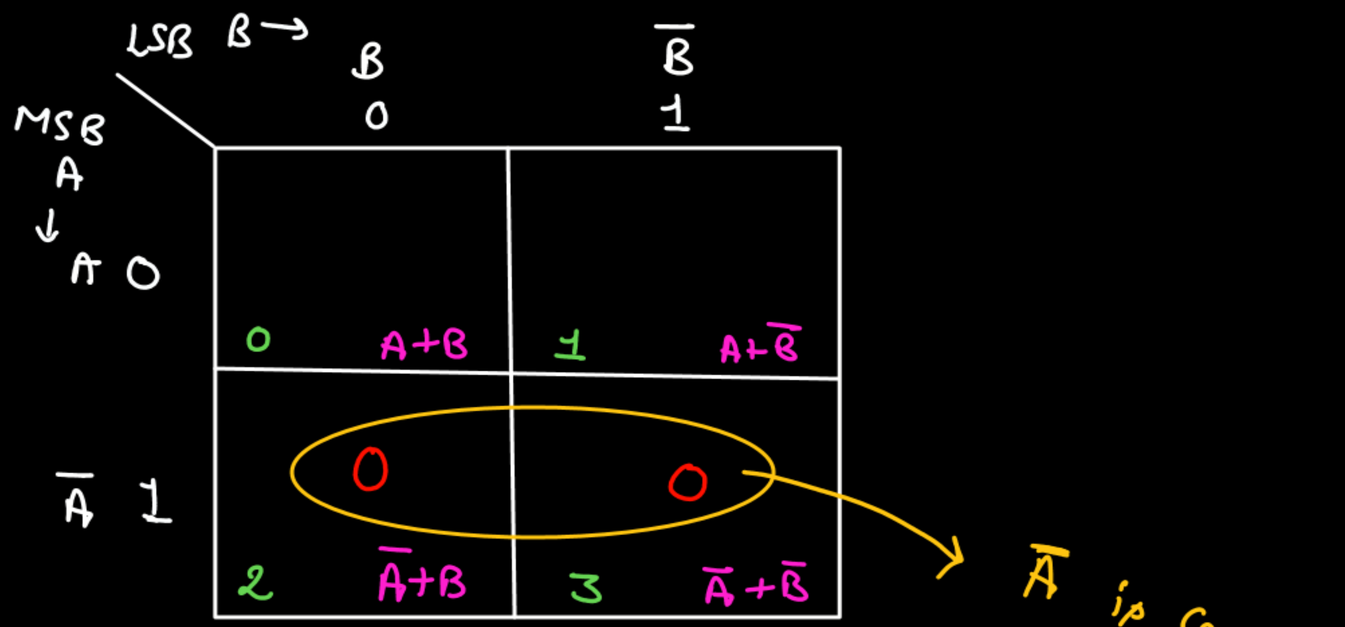
$= \bar{A}$

$f = \sum m(0, 1)$

Sequence No.

Ex: Using Pos form

	A	B	f	POS (maxterm)
0	0	0	1	$A+B$
1	0	1	1	$A+\bar{B}$
2	1	0	0 ✓	$\bar{A}+B$ ←
3	1	1	0 ✓	$\bar{A}+\bar{B}$ ←



Pos form में zeroes consider करेंगे,

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

$$f(A,B) = \Pi M(2,3)$$ ← Canonical Pos

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

Boolean Algebra

$$(\bar{A}+B)\cdot(\bar{A}+\bar{B})$$

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

$$\bar{A} + \bar{A}(\bar{B}+B)$$

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

3 Variable K-Map → Gray Code

↳ total Combinations = $2^3 = 8$

Total cells = 8

8 minterms 8 maxterms

MSB … LSB

A	B	C	minterm	Seq	maxterm
0	0	0	$\bar{A}\bar{B}\bar{C}$ →	0	$A+B+C$
0	0	1	$\bar{A}\bar{B}C$ →	1	$A+B+\bar{C}$
0	1	0	$\bar{A}B\bar{C}$ →	2	$A+\bar{B}+C$
0	1	1	$\bar{A}BC$ →	3	$A+\bar{B}+\bar{C}$
1	0	0	$A\bar{B}\bar{C}$ →	4	$\bar{A}+B+C$
1	0	1	$A\bar{B}C$ →	5	$\bar{A}+B+\bar{C}$
1	1	0	$AB\bar{C}$ →	6	$\bar{A}+\bar{B}+C$
1	1	1	ABC →	7	$\bar{A}+\bar{B}+\bar{C}$

Minterms →

A \ BC	$\bar{B}\bar{C}$ (00)	$\bar{B}C$ (01)	BC (11)	$B\bar{C}$ (10)
$\bar{A}$ (0)	0 $\bar{A}\bar{B}\bar{C}$	1 $\bar{A}\bar{B}C$	3 $\bar{A}BC$	2 $\bar{A}B\bar{C}$
A (1)	4 $A\bar{B}\bar{C}$	5 $A\bar{B}C$	7 ABC	6 $AB\bar{C}$

Gray Code

$\bar{A}$ \ BC	BC (00)	$B\bar{C}$ (01)	$\bar{B}\bar{C}$ (11)	$\bar{B}C$ (10)
A (0)	0 $A+B+C$	1 $A+B+\bar{C}$	3 $A+\bar{B}+\bar{C}$	2 $A+\bar{B}+C$
$\bar{A}$ (1)	4 $\bar{A}+B+C$	5 $\bar{A}+B+\bar{C}$	7 $\bar{A}+\bar{B}+\bar{C}$	6 $\bar{A}+\bar{B}+C$

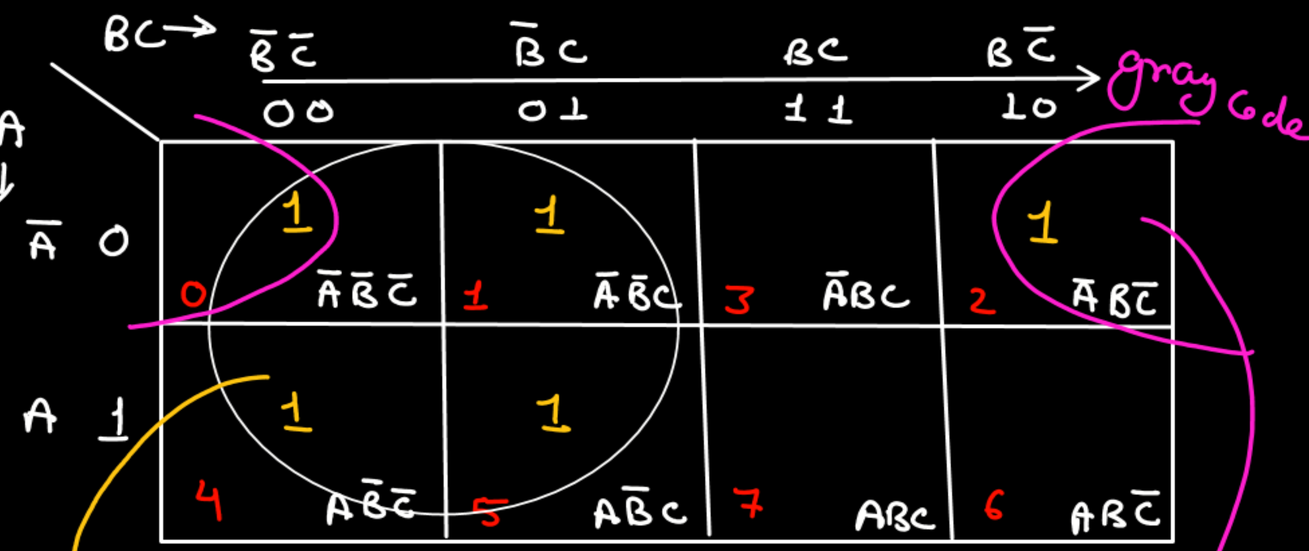
Gray Code

Maxterms

Ex $f(A,B,C) = \sum m(0,1,2,4,5)$

MSB A	B	LSB C	minterm	Seq	output
0	0	0	$\bar{A}\bar{B}\bar{C}$ →	0	1 ✓
0	0	1	$\bar{A}\bar{B}C$ →	1	1 ✓
0	1	0	$\bar{A}B\bar{C}$ →	2	1 ✓
0	1	1	$\bar{A}BC$ →	3	0
1	0	0	$A\bar{B}\bar{C}$ →	4	1 ✓
1	0	1	$A\bar{B}C$ →	5	1 ✓
1	1	0	$AB\bar{C}$ →	6	0
1	1	1	ABC →	7	0

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



Quad = $\bar{B}$ is Common in this quad

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

$\bar{A}\bar{C}$ is Common

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

↓

Simplified form

Task

$f(A, B, C) = \pi M(3, 6, 7)$

↓

Kmap

↓

O/P must be

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

Tomorrow

↓

* → Question on 3 variable k maps