Lec-31

$F = (\bar{x}y) + (x\bar{y})$ (AND, OR) ; $F_1 = (x+y)(y+z)$ (OR, AND)

$F = \bar{x}y + x\bar{y}$; $F_1 = (x+y)(y+z)$

Standard Forms:

(i) Minterms
(ii) Max terms.

$xy + \bar{z}(x+y)$

$xy + xz + yz$

Maxterms

i/p's ↓ O/P ↓

Minterms

x	y	F	Terms	Designation	Terms	Designation
0	0	0	$\bar{x}\bar{y}$	m_0	$x+y$	M_0
0	1	1	$\bar{x}y$	m_1	$x+\bar{y}$	M_1
1	0	1	$x\bar{y}$	m_2	$\bar{x}+y$	M_2
1	1	0	xy	m_3	$\bar{x}+\bar{y}$	M_3

$F = \bar{x}y + x\bar{y}$

$F = \sum(1,2)$ ← sum of Minterms

$\bar{F} = (\bar{x}y + x\bar{y}) = \bar{x}y \cdot x\bar{y} = (\bar{\bar{x}} + \bar{y}).(\bar{x} + \bar{\bar{y}})$

$\bar{F} = (x+\bar{y})(\bar{x}+y)$

$\bar{F} = x\bar{x} + xy + x\bar{y} + y\bar{y}$ ($x\bar{x} = 0$, $y\bar{y} = 0$)

$\bar{F} = xy + \bar{x}\bar{y}$

$\bar{F} = \sum(0,3)$

$F = \sum(1,2)$

$\bar{F} = (x+\bar{y})(\bar{x}+y) = \Pi(1,2)$

Product of Maxterms

$\bar{F} = F = \Pi(0,3)$

$F = (x+y)(\bar{x}+\bar{y})$

$F_1 = x(\bar{x}+\bar{y})$

F_1'

Canonical forms
Standard forms

$F = A\bar{B} + A\bar{B}$, [F is $f(A,B,C)$ Standard.]

Express it in SOP / Canonical form.

Sum of product

$F = A\bar{B}\cdot 1 + A\bar{B}\cdot 1 = A\bar{B}(C+\bar{C}) + A\bar{B}(C+\bar{C})$

$= ABC + AB\bar{C} + A\bar{B}C + A\bar{B}\bar{C}$ ← SOP

$F = \sum(4,5,6,7)$ ← SOP

$\bar{F} = \sum(0,1,2,3)$

Ex 2 $F = xy + \bar{x}z$ — standard. $x = f(x,y,z)$

Express in POS. form.

$F = xy + \bar{x}z$ ~~$F = xy + \bar{x}z + x\bar{x}$~~

$\rightarrow A + BC = (A+B)(A+C)$

$F = (xy + \bar{x})(xy + z)$

$= (x + \bar{x})(y + \bar{x})(x + z)(y + z)$

$= (\bar{x} + y + z\cdot\bar{z})(x + z + y\cdot\bar{y})(y + z + x\cdot\bar{x})$

$= (\bar{x} + y + z)(\bar{x} + y + \bar{z})(x + z + y)(x + z + \bar{y})$

$(y + z + x)(y + z + \bar{x})$

$= (x + y + z)(\bar{x} + y + z)(x + \bar{y} + z)(\bar{x} + y + \bar{z})$

$0 \quad\quad 1 \quad\quad 2 \quad\quad 5$

$F = \Pi(0,2,4,5)$

$\bar{F}$ in SOP, $\bar{F} = \sum(0,2,4,5)$

F in SOP, $F = \sum(1,3,6,7)$

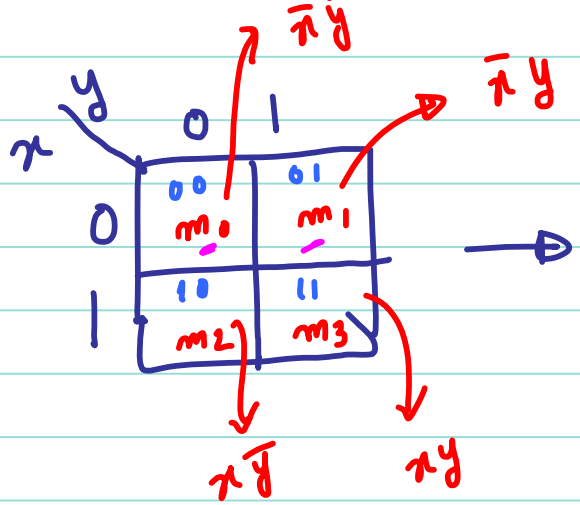
Karnaugh Map (K-Map)

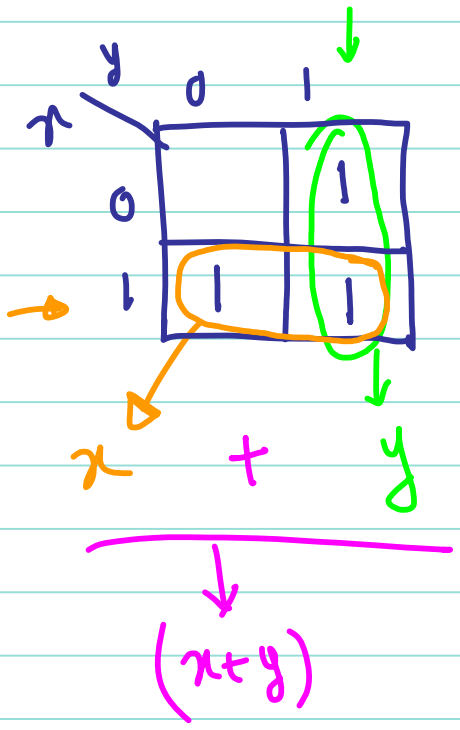
$x\bar{y} + xy + \bar{x}y$

$F = x\bar{y} + xy + \bar{x}y$

$= x(y+\bar{y}) + \bar{x}y = x + \bar{x}y = (x+\bar{x})\cdot(x+y)$

$F = x + y$





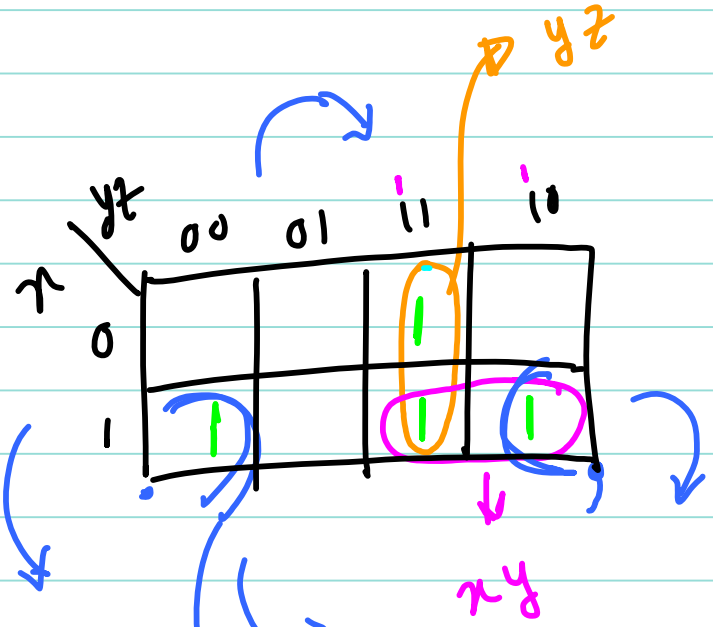
$$F = \bar{x}yz + x\bar{y}\bar{z} + xyz + xy\bar{z}$$

3 4 7 6

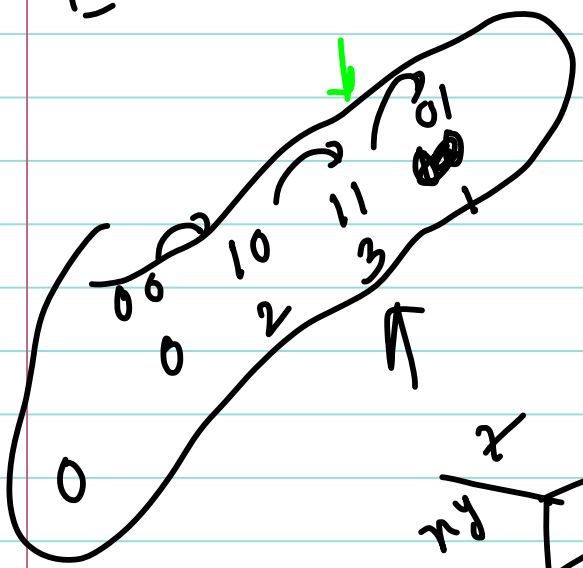
yz: 00 01 11 10

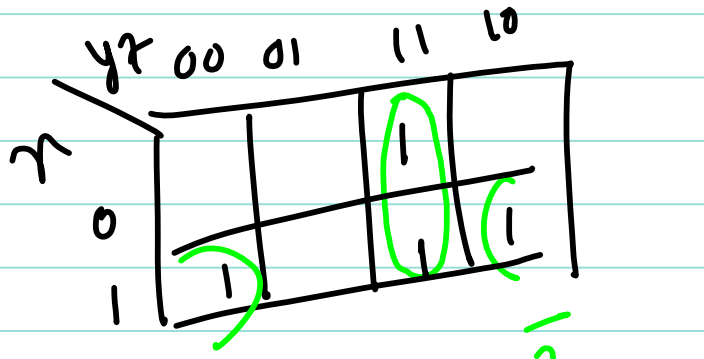
x: 0 | 1

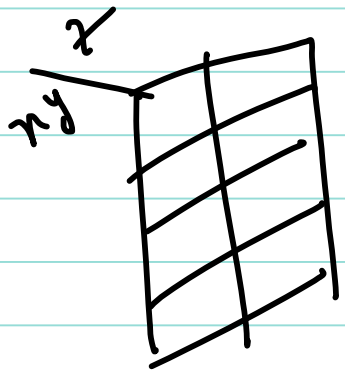
x \ yz	00	01	11	10
0	m0 0	m1 1	m3 3	m2 2
1	m4 4	m5 5	m7 7	m6 6



$$F = xy + yz + x\bar{z}$$







$$F = yz + x\bar{z}$$