

3) Type-3

Simplify the boolean function $f(w, x, y, z) = w\bar{x}\bar{y} + w\bar{y} + w\bar{y}z + w\bar{y}\bar{z}$

	$y\bar{z}$	$\bar{y}z$	$y\bar{z}$	$\bar{y}z$
$w\bar{x}$	1			1
$\bar{w}\bar{x}$	1			1
$w\bar{x}$			1	1
$\bar{w}\bar{x}$	1	1	1	1

wherever the variables are 1, mark as 1

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

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

4) Type-4

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

	$y\bar{z}$	$y\bar{z}$	$\bar{y}z$	$\bar{y}z$
$w\bar{x}$	1	1		
$\bar{w}\bar{x}$	1	1	1	1
$\bar{w}\bar{x}$	1	1	1	1
$\bar{w}\bar{x}$	1	1	1	1

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

5) Type - 5 utility don't care d or q

Given $f(A, B, C, D) = \sum m(1, 3, 7, 11, 15) + \sum d(0, 2, 4)$

	$\bar{C}\bar{D}$	$\bar{C}D$	$C\bar{D}$	CD
$\bar{A}\bar{B}$	0	1	3	2
$\bar{A}B$	4	5	7	6
AB	12	13	15	14
$A\bar{B}$	8	9	11	10

$Y = \bar{A}\bar{B} + CD$

6) Type - 6 simply π will be there instead of Σ This put complements for \odot

7) SOP \rightarrow Sum of products (Type 1)

PO \rightarrow product of sum (Type 2)

8) Type - 8 Map for SOP and POS

Given $A\bar{C} + \bar{B}D + \bar{A}CD + ABCD$

i) SOP

	$\bar{C}\bar{D}$	$\bar{C}D$	$C\bar{D}$	CD
$\bar{A}\bar{B}$		1	1	
$\bar{A}B$			1	
$A\bar{B}$	1	1	1	
AB	1	1	1	

$\therefore f(A, B, C, D) = CD + A\bar{C} + \bar{B}D$

ii) POS

	$\bar{C}\bar{D}$	$\bar{C}D$	$C\bar{D}$	CD
$\bar{A}\bar{B}$	0			0
$\bar{A}B$	0	0		0
$A\bar{B}$				0
AB				0

$= (\bar{C} + D)(A + D)(A + \bar{B} + C)$

9) If more variables are given put $2^{n \times n}$ K-map and order the sequential

Ex $F(A, B, C, D, E)$

A

DC \ DE	0	1	3	2
1				
9	1	5	7	6
12		13	15	
8		18	11	10

\bar{A}

BC \ DE	0	1	3	2
1				
20		21	23	24
28		29	31	30
27		25	27	26

10) There are three variables too for that use 2×3

Magnitude Comparator

① Bit Comparator