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Presentation

on

Karnaugh Map

Presented by
Group 19

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What is Karnaugh Map ?

- The *Karnaugh map(K-map)* is a graphical technique for the representation and simplification of a Boolean expression which is a two-dimensional form of the truth table, drawn in such a way that the simplification of a Boolean expression.

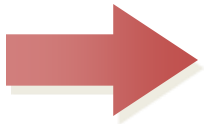
How to solve Karenaugh map?

- Sketch a Karnaugh map grid for the problem.
- Fill in the 1’s and 0’s from the truth table.
- Circle groups of 1’s.
  - Circle the largest groups of 2, 4, 8,16,32 etc.
  - First Minimize the number of circles but make sure that every 1 is in a circle.

K-Map for two variables

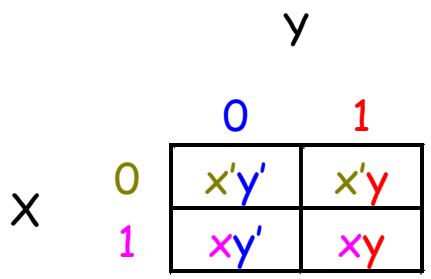
- A two-variable function has four possible minterms. We can re-arrange these minterms into a Karnaugh map.

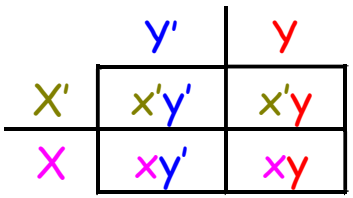
x	y	minterm
0	0	x'y'
0	1	x'y
1	0	xy'
1	1	xy



x \ y	0	1
0	x'y'	x'y
1	xy'	xy

- Now we can easily see which minterms contain common literals.
  - Minterms on the left and right sides contain y’ and y respectively.
  - Minterms in the top and bottom rows contain x’ and x respectively





A three-variable Karnaugh map

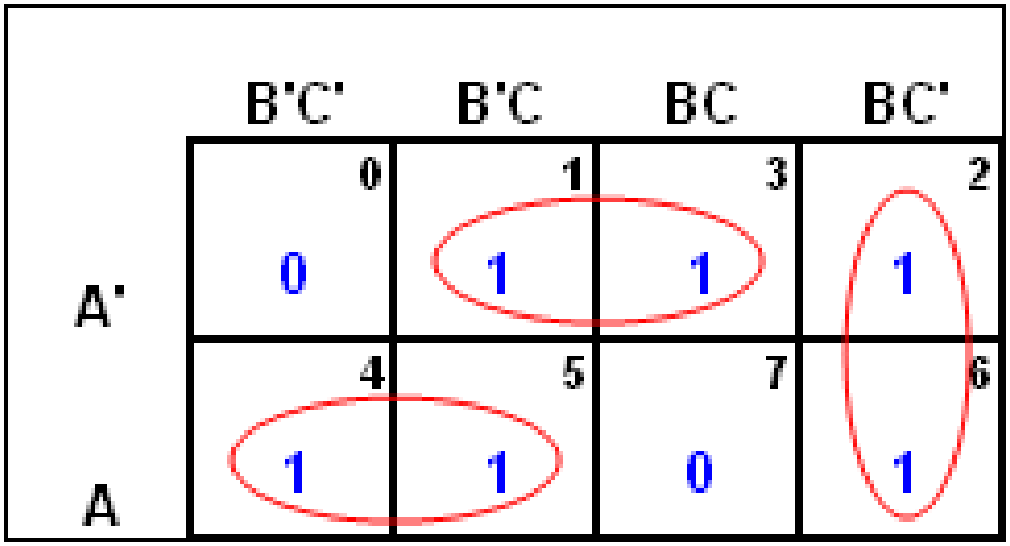
- For a three-variable expression with inputs x, y, z, the arrangement of minterms is more tricky:

			y	
	x′y′z′	x′y′z	x′yz	x′yz′
X	xy′z′	xy′z	xyz	xyz′
		Z		

		YZ			
		00	01	11	10
X	0	m_0	m_1	m_3	m_2
	1	m_4	m_5	m_7	m_6

Example of three variables of K-Map.

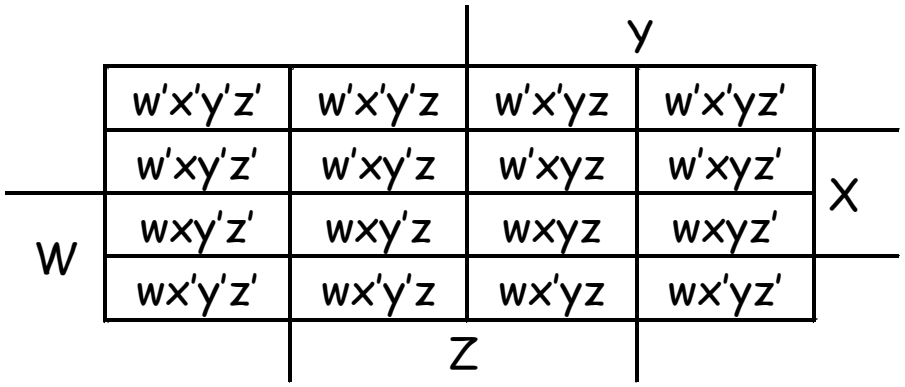
F (a,b,c) = ∑m (1, 2, 3, 4, 5, 6)

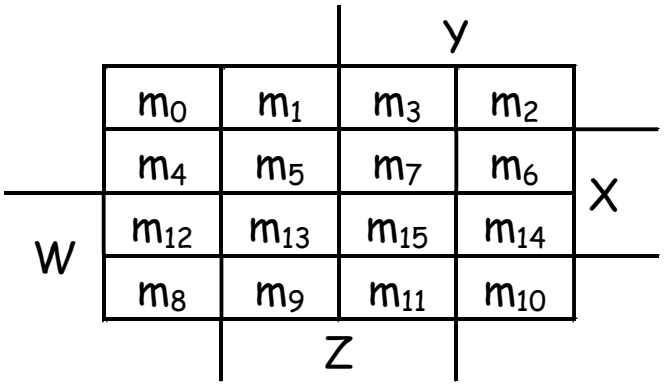


F = A'C + BC' + AB'

Four-variable K-maps

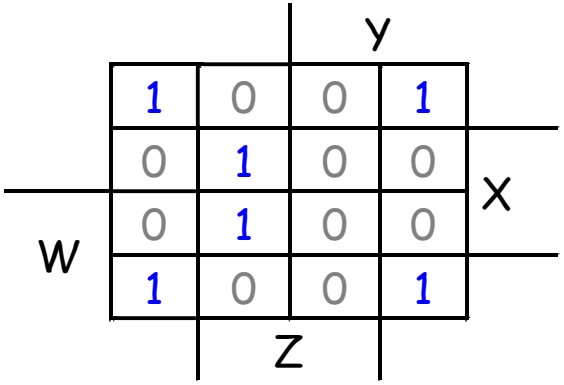
– Grouping minterms is similar to the three-variable case, but:
We can have rectangular groups of 1, 2, 4, 8 or 16 minterms.

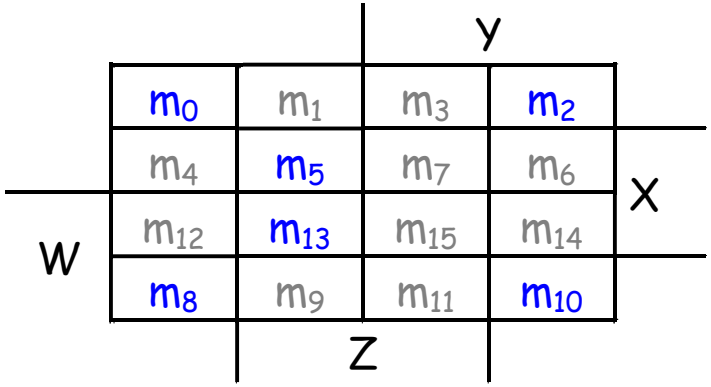




Example: Simplify $m_0+m_2+m_5+m_8+m_{10}+m_{13}$

- The expression is already a sum of minterms, so here's the K-map:





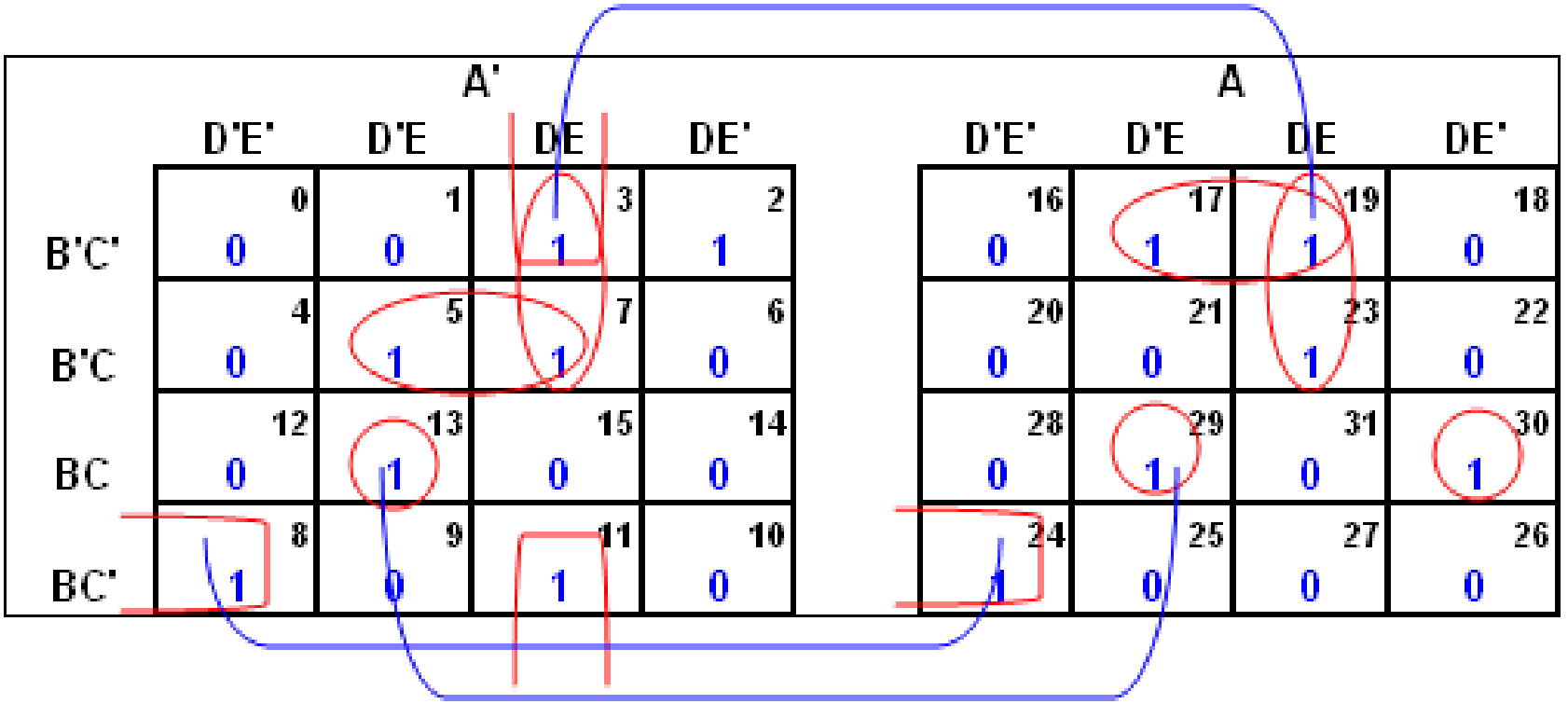
Result, F=x'z' + xy'z.

K-Map for five Variables

- For five variable K-map 2ˆ5=32 Square be build in.
- First 16 square makes a square and another 16 square makes the rest one.
- One box is acts as the shadow of the another.

Example of five variables of K-Map.

F (A, B, C , D, E) = Σm (0, 2, 3, 5, 7, 8, 11, 13, 17, 19, 23, 24, 29, 30)



F = B’DE + A’C'DE + A’B'C’E’ + A’B'CE + AB’C'E + BCD’E + BC’D'E’ + ABCDE’

That’s All

Thank You