

Don't Care conditions are marked in a truth table or a Kmap as X. The X means that we don't care whether the value is a zero or a one.

- When don't care cells are part of a group, the don't care cell has been assigned a 1.
- When don't care cells are not part of a group, the don't care cell has been assigned a 0.

EXAMPLE 3.19 Simplify the Boolean function whose truth table is given below:

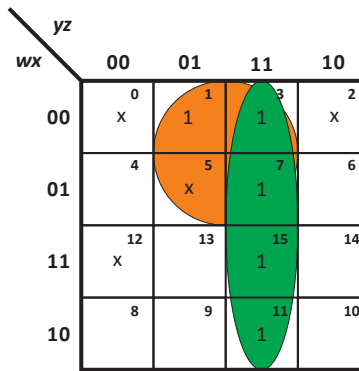
m_i	w	x	y	z	F
m_0	0	0	0	0	X
m_1	0	0	0	1	1
m_2	0	0	1	0	X
m_3	0	0	1	1	1
m_4	0	1	0	0	0
m_5	0	1	0	1	X
m_6	0	1	1	0	0
m_7	0	1	1	1	1
m_8	1	0	0	0	0
m_9	1	0	0	1	0
m_{10}	1	0	1	0	0
m_{11}	1	0	1	1	1
m_{12}	1	1	0	0	X
m_{13}	1	1	0	1	0
m_{14}	1	1	1	0	0
m_{15}	1	1	1	1	1

SOLUTION:

		yz			
wx		00	01	11	10
	00	x	1	1	x
	01	4	x	1	6
	11	12	13	15	14
10		8	9	11	10
				1	

$$F_2(w, x, y, z) = w'x' + yz$$

m_i	w	x	y	z	F_1
m_0	0	0	0	0	1
m_1	0	0	0	1	1
m_2	0	0	1	0	1
m_3	0	0	1	1	1
m_4	0	1	0	0	0
m_5	0	1	0	1	0
m_6	0	1	1	0	0
m_7	0	1	1	1	1
m_8	1	0	0	0	0
m_9	1	0	0	1	0
m_{10}	1	0	1	0	0
m_{11}	1	0	1	1	1
m_{12}	1	1	0	0	0
m_{13}	1	1	0	1	0
m_{14}	1	1	1	0	0
m_{15}	1	1	1	1	1



$$F_2(w, x, y, z) = w'z + yz$$

m_i	w	x	y	z	F_2
m_0	0	0	0	0	0
m_1	0	0	0	1	1
m_2	0	0	1	0	0
m_3	0	0	1	1	1
m_4	0	1	0	0	0
m_5	0	1	0	1	1
m_6	0	1	1	0	0
m_7	0	1	1	1	1
m_8	1	0	0	0	0
m_9	1	0	0	1	0
m_{10}	1	0	1	0	0
m_{11}	1	0	1	1	1
m_{12}	1	1	0	0	0
m_{13}	1	1	0	1	0
m_{14}	1	1	1	0	0
m_{15}	1	1	1	1	1

Please note that $F_1(w, x, y, z) \neq F_2(w, x, y, z)$

IN CLASS EXERCISE. Find a minimized Boolean function for the $F(w, x, y, z) = \sum(2, 6, 10, 14, 15), X(4, 11, 12, 13)$ where $X(4, 11, 12, 13)$ identifies the cells containing the don't care conditions.

SOLUTION:

		yz			
		00	01	11	10
wx	00	0	1	3	2
	01	4	5	7	6
	11	12	13	15	14
	10	8	9	11	10
		x	x	1	1
				x	1

$$F_1(w, x, y, z) = wx + yz'$$

		yz			
		00	01	11	10
wx	00	0	1	3	2
	01	4	5	7	6
	11	12	13	15	14
	10	8	9	11	10
		x	x	1	1
				x	1

$$F_2(w, x, y, z) = wy + yz'$$