K-Map Exercises

2-Vairable

x_1	x_2	
0	0	m_0
0	1	m_1
1	0	m_2
1	1	m_3

(a) Truth table

x_2 \ x_1	0	1
0	m_0	m_2
1	m_1	m_3

(b) Karnaugh map

3-Variable K-Map

x_1	x_2	x_3	
0	0	0	m_0
0	0	1	m_1
0	1	0	m_2
0	1	1	m_3
1	0	0	m_4
1	0	1	m_5
1	1	0	m_6
1	1	1	m_7

(a) Truth table

x_3 \ x_1x_2	00	01	11	10
0	m_0	m_2	m_6	m_4
1	m_1	m_3	m_7	m_5

(b) Karnaugh map

4-Variable K-Map

x_3x_4 \ x_1x_2	00	01	11	10
00	m_0	m_4	m_{12}	m_8
01	m_1	m_5	m_{13}	m_9
11	m_3	m_7	m_{15}	m_{11}
10	m_2	m_6	m_{14}	m_{10}

x_1 (columns 11, 10) · x_4 (rows 01, 11) · x_3 (rows 11, 10) · x_2 (columns 01, 11)

K-Map exercises

Example 1.

A	B	C	F
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

F= B~C + AB;

Exercise 1. Write Minimized Boolean Expression for this functions

A	B	C	**F1**	**F2**	**F3**	**F4**
0	0	0	**1**	**0**	**1**	**0**
0	0	1	**0**	**0**	**0**	**0**
0	1	0	**1**	**0**	**1**	**1**
0	1	1	**1**	**1**	**1**	**1**
1	0	0	**1**	**0**	**0**	**1**
1	0	1	**1**	**1**	**0**	**1**
1	1	0	**0**	**1**	**0**	**1**
1	1	1	**0**	**1**	**1**	**1**

Exercise 2. Write the Simplest Boolean expression for below sum of product (SOP) and POS expression

A. ∑m(5,7,13,15).
B. ∑m(4,6,12,14).
C. ∑m(5,6,7,9,10,11,13,14,15)
D. ∏M(11,10,15,14).