

Example:

x	y	z	f
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

$$f = m_1 + m_4 + m_7 = M_0 M_2 M_3 M_5 M_6$$

$$= \prod (f)$$

$$= \prod (m_0 + m_2 + m_3 + m_5 + m_6)$$

$$= (\prod m_0) (\prod m_2) (\prod m_3) (\prod m_5) (\prod m_6)$$

$$= M_0 M_2 M_3 M_5 M_6$$

$$m_0 = \bar{x}\bar{y}\bar{z}$$

$$\text{So, } \bar{m}_i = M_i$$

$$\bar{m}_0 = \overline{\bar{x}\bar{y}\bar{z}}$$

$$= x + y + z$$

$$= M_0$$

$$\bar{M}_i = m_i$$

Karnaugh Maps (K Maps).

* Truth table in a different format.

* Allows for application of Boolean Algebra graphically.

* Good for functions of ≤ 5 variables.

2 variable kmap

x	y	f
0	0	1
0	1	1
1	0	0
1	1	1

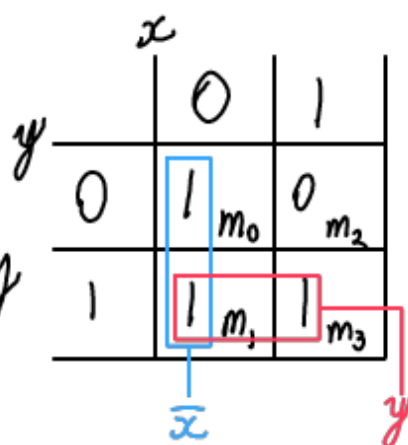
$$f = m_0 + m_1 + m_3$$

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

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

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

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



3 variable map

x	y	z	f
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

m_1 m_5 m_6 m_7

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

		xy				
		00	01	11	10	greycode counting
z	0	m_0	m_2	1 m_4	m_6	4 1x1 2 1x2 2x1
	1	1 m_1	m_3	1 m_5	1 m_7	

xy xz yz

$$\begin{aligned} f &= \bar{x}\bar{y}z + x\bar{y}z + xy(z + \bar{z}) \\ &= \bar{x}\bar{y}z + x\bar{y}z + xy \\ &= (\bar{x} + x)\bar{y}z + xy \\ &= \bar{y}z + xy \end{aligned}$$

Ex.

		xy				
		00	01	11	10	
z	0	1	0	0	1	\bar{y} $f = z + \bar{y}$
	1	1	1	1	1	

z

		00	01	11	10	
	0	0	1	1	1	$\bar{z}x$ $f = y + \bar{x}z + x\bar{z}$
	1	1	1	1	0	

$\bar{x}z$ y

4 variable map

wz	00	01	11	10
yz				
00	1	1	0	1
01	1	1	0	1
11	1	1	0	1
10	1	1	0	1

\overline{w}

$\overline{y}\overline{x}$

$\overline{x}z$

$$f = \overline{w} + \overline{x}\overline{y} + \overline{x}z$$