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

$$f = m_1 + m_4 + m_7 = M_0 M_2 M_3 M_5 M_6$$
$$= !(!f)$$
$$= !(m_0 + m_2 + m_3 + m_5 + m_6)$$
$$= (!m_0)(!m_2)(!m_3)(!m_5)(!m_6)$$
$$= M_0 M_2 M_3 M_5 M_6$$

$$m_0 = \bar{x}\bar{y}\bar{z}$$
$$\overline{m_0} = \overline{\bar{x}\bar{y}\bar{z}}$$
$$= x + y + z$$
$$= M_0$$

So, $\overline{m_i} = M_i$

$\overline{M_i} = m_i$

Karnaugh Maps (K Maps).

* Truth table in a different format.
* Allows for application of Boolean Algebra graphicaly.
* Good for functions of ≤ 5 variables.

2 variable kmap

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

$$f = m_0 + m_1 + m_3$$
$$= \bar{x}\bar{y} + \bar{x}y + xy$$
$$= \underbrace{\bar{x}\bar{y} + \bar{x}y} + \underline{\underline{\bar{x}y}} + xy$$
$$= \bar{x}(\bar{y} + y) + (\bar{x} + x)y$$
$$= \bar{x} + \bar{y}$$

$y \backslash x$	0	1
0	1 m_0	0 m_2
1	1 m_1	1 m_3

$\bar{x}$ $\quad$ 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

$$\begin{array}{ccccccc} & m_1 & & m_5 & & m_6 & & m_7 \\ f = & \bar{x}\bar{y}z & + & x\bar{y}z & + & xy\bar{z} & + & xyz \end{array}$$

$z \backslash xy$	00	01	11	10
0	m_0	m_2	1 m_4	m_6
1	1 m_1	m_3	1 m_5	1 m_7

greycode counting

4 1×1

2 1×2
2×1

xy xz $\bar{y}z$

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

Ex.

$z \backslash xy$	00	01	11	10
0	1	0	0	1
1	1	1	1	1

$\bar{y}$

z

$f = z + \bar{y}$

	00	01	11	10
0	0	1	1	1
1	1	1	1	0

$\bar{z}x$

$\bar{x}z$

y

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

4 variable map

yz \ wx	00	01	11	10
00	1	1	0	1
01	1	1	0	1
11	1	1	0	1
10	1	1	0	0

$\bar{y}\bar{x}$

$\bar{x}z$

$\bar{w}$

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