# K - maps :

1° Combining terms: $x\cdot\bar{y} + x\cdot y = x$

| a | b | F |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 1 |
| 1 | 0 | 0 |
| 1 | 1 | 0 |

$F = m_0 + m_1 = \bar{a}\bar{b} + \bar{a}b = \bar{a}(\underbrace{\bar{b}+b}_{I}) = \bar{a}$

$m_0$, $m_1$, $m_2$, $m_3$

| | $\bar{b}$ | b |
|---|---|---|
| | 1 | 1 |
| a | 0 | 0 |

$= \bar{a}$

2° Consensus for elim. of redund terms.

M: SOP, POS

(a) minimal no. of terms

(b) minim. no. of literals

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F( x, y, z )
msb lsb

| | | z | z | |
|---|---|---|---|---|
| | 0 | 0 | 1 | 0 |
| x | 1 | 1 | 1 | 0 |
| | | | y | y |

① ② ③

$F(xyz) = x\bar{y} + \cancel{x\cdot z} + yz$

C

$F(xyz) = x\bar{y} + yz$

| x y z | F |
|---|---|
| 0 0 0 | |
| 0 0 1 | |

| | | z | z | |
|---|---|---|---|---|
| | 0 | 0 | 1 | 0 |
| x | 1 | 1 | 1 | 0 |
| | | | y | y |

$\boxed{F = x\bar{y} + yz}$

$+ \cancel{xz}$

C

| abc | F |
|---|---|
| 000 | 0 |
| 001 | 0 |
| 010 | 1 |
| 011 | 1 |
| 100 | 1 |
| 101 | 0 |
| 110 | 1 |
| 111 | 0 |

| | | $c$ | $bc$ | $b$ |
|---|---|---|---|---|
| | 0 | 0 | 1 | 1 |
| $a$ | 1 | 0 | 0 | 1 |

$$\boxed{F_{SOP} = \bar{a}\cdot b + a\bar{c}} \quad \text{SOP}$$

$$\boxed{F_{POS} = (\bar{a} + \bar{c})(a + b)} \text{ — using 0's}$$

$$F = \cancel{\bar{a}a} + \underline{a\bar{c}} + \underline{\bar{a}b} + \cancel{\bar{c}b}$$

$$\boxed{F = a\bar{c} + \bar{a}b}$$

# Karnaugh map :

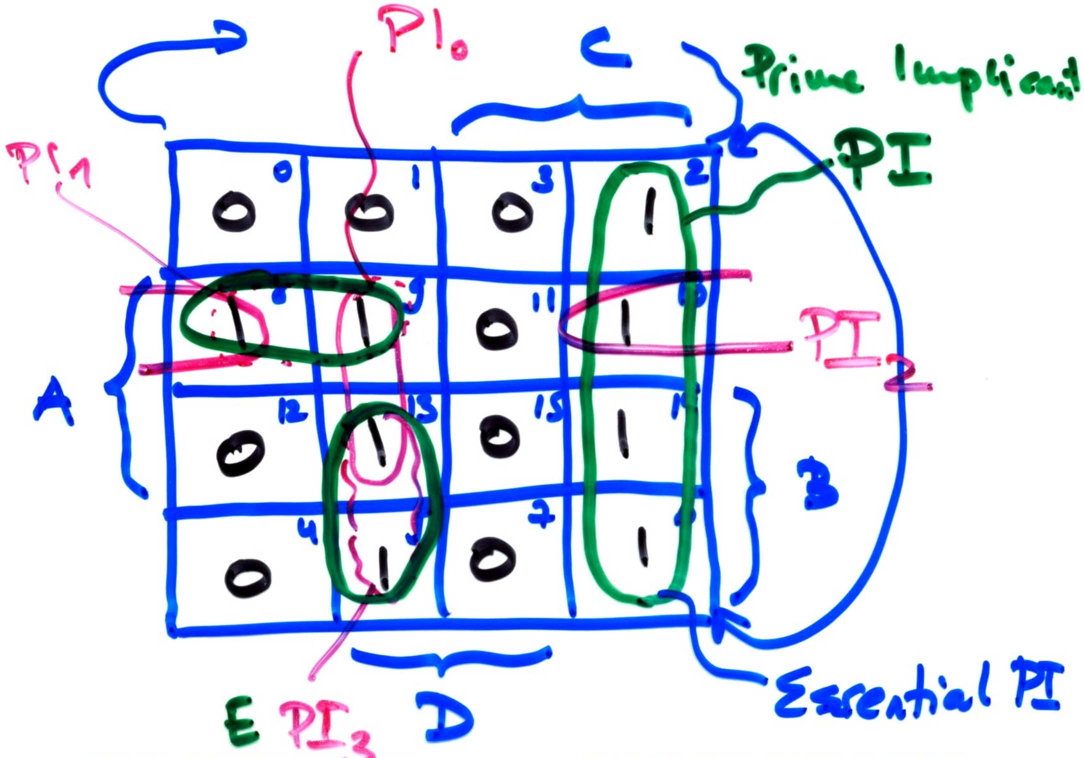
| a | b | c | f |
|---|---|---|---|
| 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | — |
| 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 |
| 1 | 0 | 1 | 0 |
| 1 | 1 | 0 | — |
| 1 | 1 | 1 | 1 |

K-map

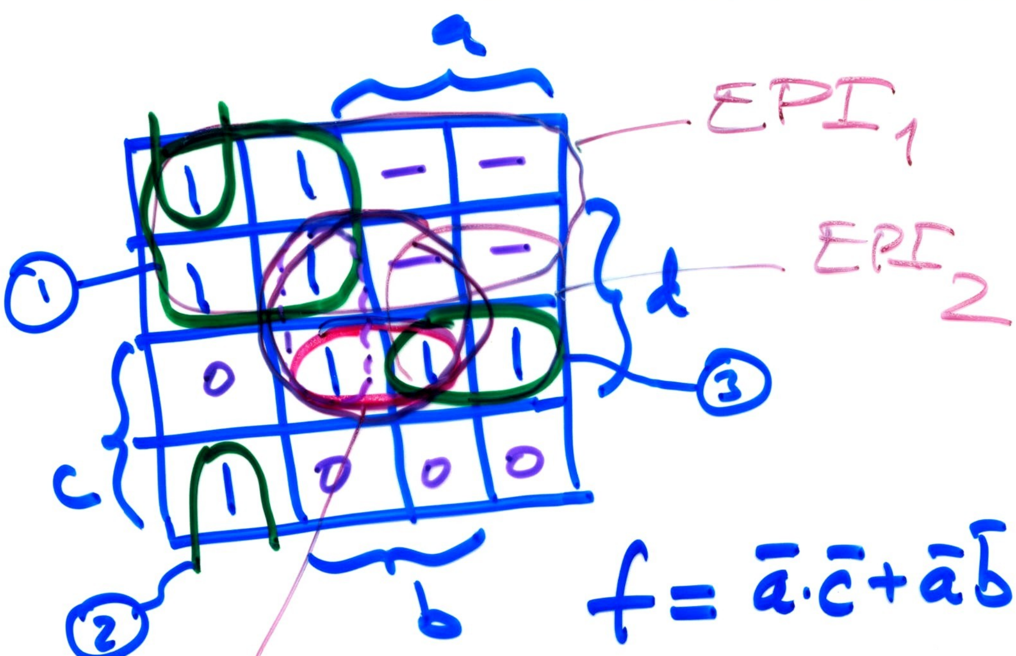
| | | c | c | |
|---|---|---|---|---|
| | 1 (0) | 1 (1) | 1 (3) | 0 (2) |
| a | 0 (4) | 0 (5) | 1 (7) | 0 (6) |
| | | | b | b |

$$\boxed{f = bc + \bar{a}\bar{b}}$$

| ABCD | F |
|---|---|
| 0000 | 0 |
| 0001 | 0 |
| ⋮ | ⋮ |



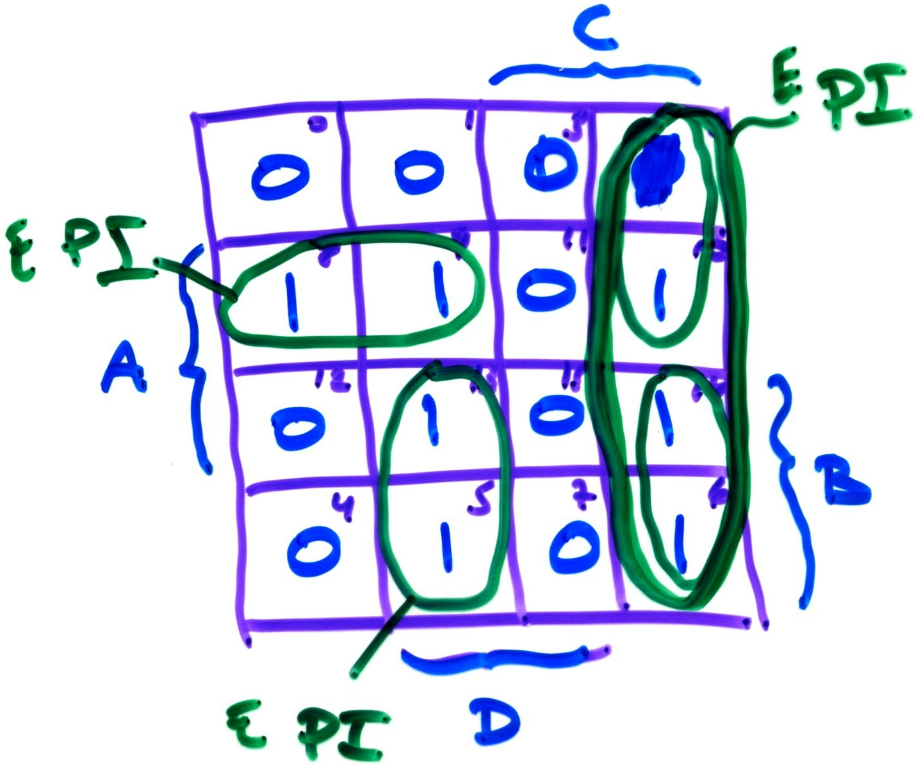

$$\boxed{F_{min} = \underbrace{C\cdot\overline{D}}_{\text{Essent. PI}} + \underbrace{B\overline{C}D}_{\text{EPI}} + \underbrace{A\overline{B}\,\overline{C}}_{\text{EPI}}}$$




$$f = \bar{a}\cdot\bar{c} + \bar{a}\bar{b}\bar{d} + acd + \left\{\begin{matrix} bcd \\ \text{or} \\ \bar{a}bd \end{matrix}\right\}$$

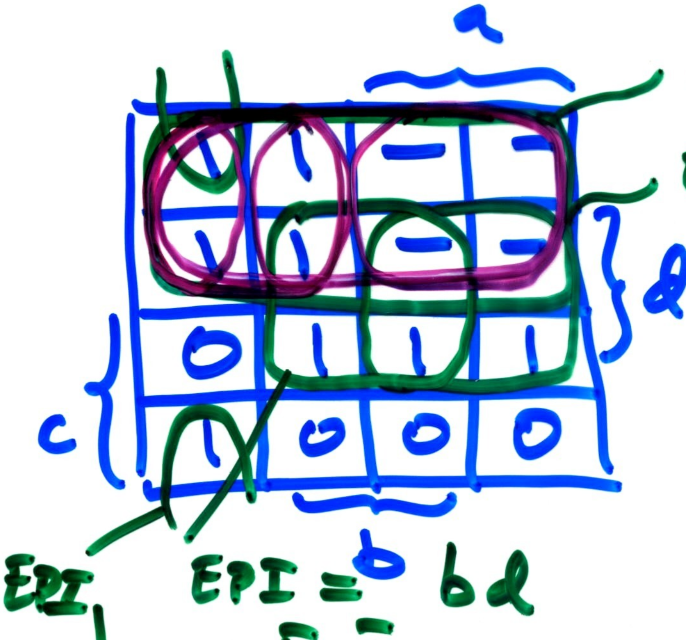
$$f_{(-)} = \bar{c} + ad + bd$$

| ABCD | F |
|---|---|
| 0000 | 0 |
| 0001 | 0 |
| 0010 | 1 |
| 0011 | 0 |
| 0100 | 0 |
| ⋮ | ⋮ |




$$F = BC\bar{D} + \bar{B}C\bar{D} = (B+\bar{B})C\bar{D}$$

$$\boxed{F = \underset{\text{p,}}{C\bar{D}} + \underset{\text{p,}}{BD\bar{C}} + \underset{\text{p,}}{A\bar{B}\bar{C}}}$$




EPI $= \bar{c}$

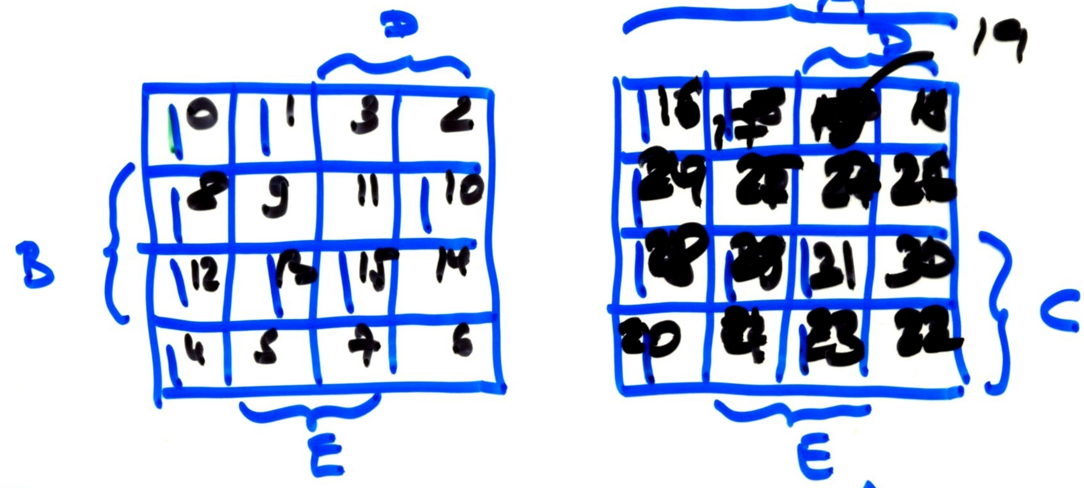
EPI $= ad$

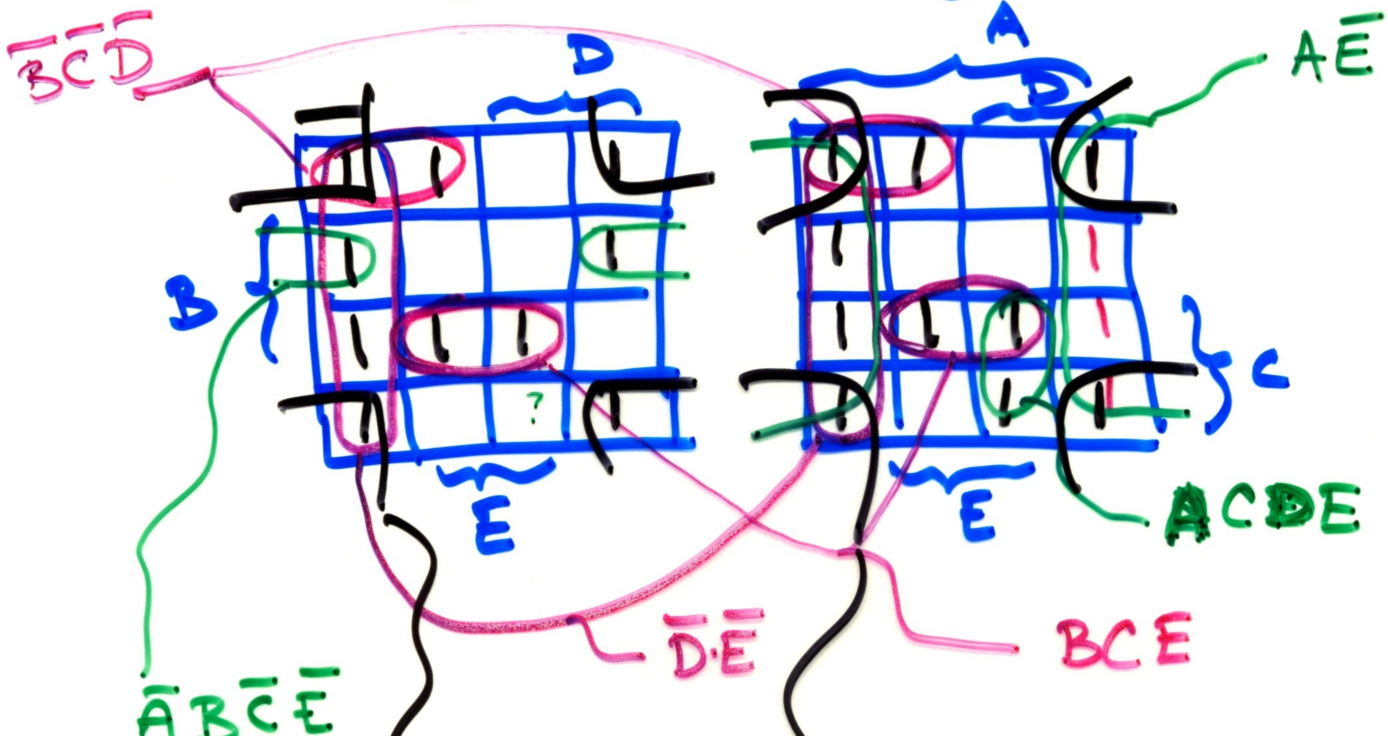
EPI $= \bar{b}d$

EPI $= \bar{a}\bar{b}\bar{d}$

$$F = \bar{c} + ad + \bar{a}\bar{b}\bar{d}$$

# K-Map 5-variables (A, B, C, D, E)

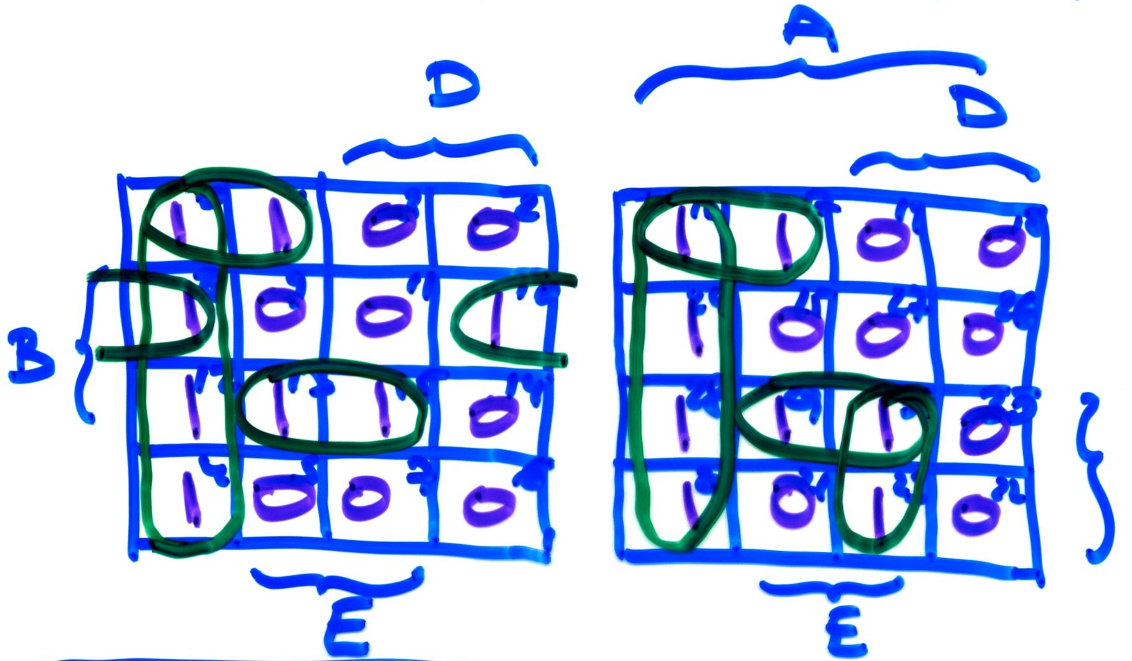


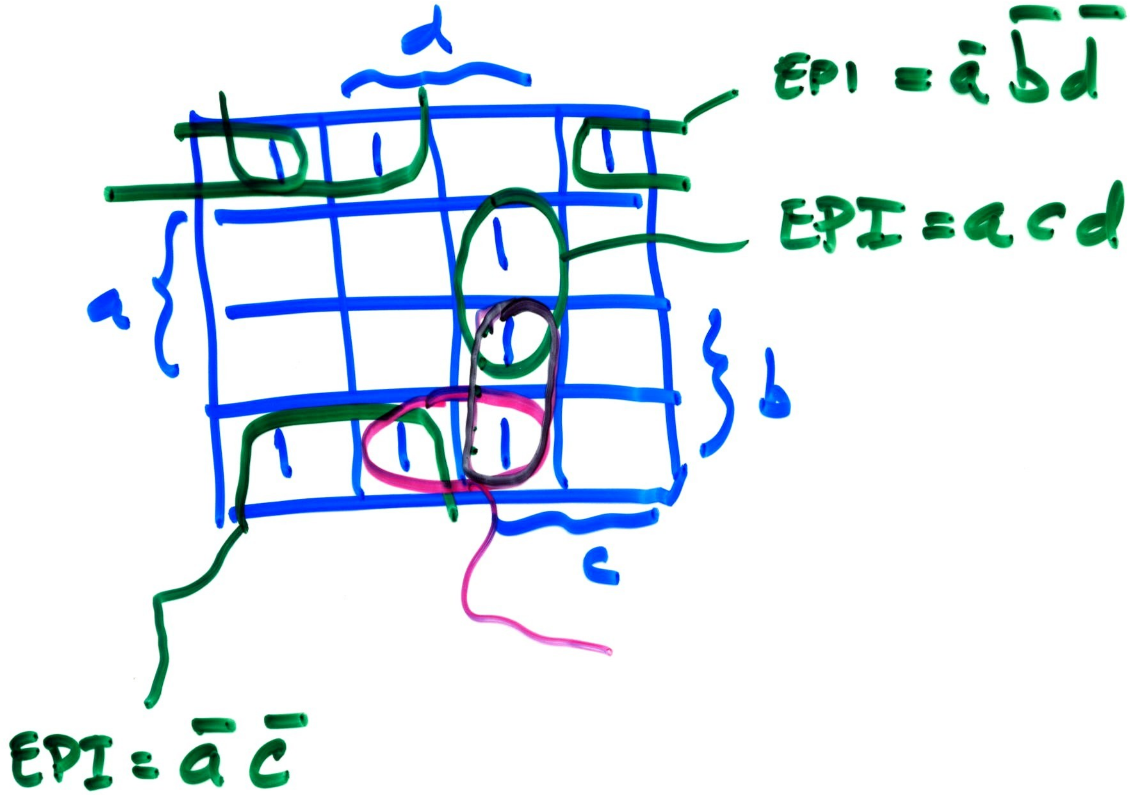

$$\underbrace{\bar{A}B\bar{E} + AB\bar{E}} = B\bar{E}(A+\bar{A})$$

$$f(A,B,C,D,E) = \sum m(0,1,4,8,10,12,13,15$$

$$\ldots 16,17,20,23,24,28,29,31)$$




$$\boxed{\begin{aligned} f = \bar{D}\bar{E} + BCE + \bar{A}B\bar{C}\bar{E} \\ \bar{B}\bar{C}\bar{D} \qquad + ACDE \end{aligned}}$$




$$f = \underset{\text{EPI}}{\bar a \bar c} + \underset{\text{EPI}}{\bar a \bar b \bar d} + \underset{\text{EPI}}{acd} + \overset{\text{P1}}{\left\{\begin{matrix}\bar a b d \\ bcd\end{matrix}\right\}}$$