

TDO5

→ Algèbre Boole:

$$\begin{aligned}
 1) & - x(\bar{x} + y) = xy = x\bar{x} + xy = 0 + xy \\
 & - (x+y)(x+z) = xx + xz + yx + yz = x(1+y+z) + yz \\
 & = x + yz \\
 & - xy + x\bar{y} = x(y + \bar{y}) = x(1) = x \\
 & - (x+y)(x+\bar{y}) = x + x\bar{y} + yx + y\bar{y} = x(1 + \bar{y} + y) + 0 \\
 & = x + 0 \\
 & - xy + \bar{y} = (\bar{y} + x)(\bar{y} + y) = \bar{y} + x
 \end{aligned}$$

$$\begin{aligned}
 2) & - AB\bar{C} + \overline{(AB\bar{C})} = \Delta + \bar{\Delta} = 1 \\
 & - (AB + C\bar{D})(AB + \bar{D}E) = AB + C\bar{D}AB + C\bar{D}AB + C\bar{D}\bar{D}E \\
 & = AB(1 + C\bar{D} + C\bar{D}) + C\bar{D}E = AB + C\bar{D}E \\
 & - A + \bar{B}C + \bar{D}(A + \bar{B}C) = \Delta + \Delta/\bar{D} = \Delta = A + \bar{B}C \\
 & - ((\bar{E}F) + AB + C\bar{D})(\bar{E}F) = (\bar{E}F)(\bar{E}F) + \bar{E}FAB + \bar{E}FC\bar{D} \\
 & = \bar{E}FAB + \bar{E}FC\bar{D} = \bar{E}F(AB + C\bar{D}) \\
 & - (AB + C) + (\bar{D} + EF)(\overline{(AB + C)}) = (\overline{(AB + C)} + (\bar{D} + EF))(\overline{(AB + C)}) \\
 & = (\overline{(AB + C)} + (\bar{D} + EF))(\overline{(AB + C)}) \\
 & = (\bar{D} + EF)
 \end{aligned}$$

3)

	Q
	0 1
P	0 1
	1 0 1

$$\begin{aligned}
 & \rightarrow Q(P + \bar{P}) + \bar{P}(Q + \bar{Q}) \\
 & = Q + \bar{P}
 \end{aligned}$$

4)

	A
	0 1
	0 0 1
	0 1 1
BC	1 1 0 1
	1 0 0 0

$$\bar{B}C + \bar{A}B\bar{C} + A\bar{B} + AC$$

→ L'assassinat de la Duchesse

$x: "x \text{ a t\u00e9e la duchesse}" \quad x: "x \text{ dit la v\u00e9rit\u00e9}"$

Si x a t\u00e9e qui x a racont\u00e9 ou tout

B	C	D	E	b	c	d	e	un seul menteur
0	0	0	0	1	0	0	1	0
0	0	0	1	1	0	0	1	0
0	0	1	0	1	0	0	1	0
0	0	1	1	1	1	0	1	1
0	1	0	0	1	0	0	0	0
0	1	0	1	1	0	1	0	0
0	1	1	0	1	0	0	0	0
0	1	1	1	1	1	1	0	1
1	0	0	0	0	0	0	1	0
1	0	0	1	0	0	0	1	0
1	0	1	0	0	0	0	1	0
1	0	1	1	0	1	0	1	0
1	1	0	0	0	0	0	0	0
1	1	0	1	0	0	1	0	0
1	1	1	0	0	0	0	0	0
1	1	1	1	0	1	1	0	0

2 solutions existent: C, D, E ont t\u00e9e
D, E ont t\u00e9e

→ Probl\u00e8me du coffre fort

$$1) F(D, S, C, F) \rightarrow \{0, 1\}$$

$$F(D, S, C, F) = D \cdot S + D \cdot C \cdot F + S \cdot C \cdot F$$

$$2) F(D, S, C, F) = 1 \rightarrow F(\overset{2^3}{1}\overset{2^2}{1}\overset{2^1}{0}\overset{2^0}{0}), F(\overset{2^3}{1}\overset{2^2}{1}\overset{2^1}{0}\overset{2^0}{1}), F(\overset{2^3}{1}\overset{2^2}{1}\overset{2^1}{1}\overset{2^0}{0}), F(\overset{2^3}{1}\overset{2^2}{1}\overset{2^1}{1}\overset{2^0}{1}), F(\overset{2^3}{1}\overset{2^2}{0}\overset{2^1}{1}\overset{2^0}{1}), F(\overset{2^3}{0}\overset{2^2}{1}\overset{2^1}{1}\overset{2^0}{1})$$

$$\rightarrow F(D, S, C, F) = \sum(12, 13, 14, 15, 17, 1)$$

3) $\bar{F} \rightarrow$

CF

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

$$\bar{F} = (\bar{C}\bar{F} + CF)$$

$$4) \bar{F} = \bar{D}\bar{S} + \bar{D}\bar{C} + \bar{S}\bar{F} + \bar{S}\bar{C} + \bar{D}\bar{F}$$

$$5) \bar{F} = (\bar{D} + \bar{S}) + (\bar{D} + \bar{C}) + (\bar{S} + \bar{F}) + (\bar{S} + \bar{C}) + (\bar{D} + \bar{F})$$

$$\Rightarrow \bar{F} = (\bar{D} + \bar{S})(\bar{D} + \bar{C})(\bar{S} + \bar{F})(\bar{S} + \bar{C})(\bar{D} + \bar{F})$$

6) 2 first done 5 removed:

Delta 1, 2, 5

Sigma 1, 3, 4

Gamma 2, 4

Foeta 3, 5