

Exercices sur les tableaux de KARNAUGH

I. Exercice 1 :

Simplifiez les fonctions suivantes en utilisant les tableaux de karnaugh :

$$F1 = a.b.\bar{c} + \bar{a}.\bar{b}.c + a.\bar{b}.\bar{c} + a.\bar{b}.c$$

$\begin{matrix} \backslash b.c \\ a \end{matrix}$	00	01	11	10
0				
1				

F1

$$F2 = a.b.c + \bar{a}.b.c + \bar{a}.\bar{b}.c + a.b.\bar{c}$$

$\begin{matrix} \backslash c \\ a.b \end{matrix}$	0	1
00		
01		
11		
10		

F2

$$F3 = \bar{a}.\bar{b}.c.\bar{d} + \bar{a}.b.\bar{c}.d + a.\bar{b}.c.\bar{d} + \bar{a}.\bar{b}.\bar{c}.\bar{d} + a.b.\bar{c}.d + \bar{a}.b.c.d + a.\bar{b}.\bar{c}.\bar{d}$$

$\begin{matrix} \backslash c.d \\ a.b \end{matrix}$	00	01	11	10
00				
01				
11				
10				

F3

$$F4 = \bar{a}\bar{b}\bar{c}\bar{d} + \bar{a}\bar{b}c\bar{d} + \bar{a}b\bar{c}\bar{d} + \bar{a}b\bar{c}d + a\bar{b}\bar{c}\bar{d} + a\bar{b}c\bar{d} + a\bar{b}c\bar{d} + a\bar{b}c\bar{d} + a\bar{b}c\bar{d}$$

\c.d a.b	00	01	11	10
00				
01				
11				
10				

F4

$$F5 = \bar{a}\bar{b}\bar{c}\bar{d} + \bar{a}\bar{b}c\bar{d} + a\bar{b}\bar{c}\bar{d} + a\bar{b}c\bar{d} + a\bar{b}\bar{c}\bar{d} + a\bar{b}c\bar{d}$$

\c.d a.b	00	01	11	10
00				
01				
11				
10				

F5

$$F6 = (\bar{a}b + a\bar{b} + a\bar{b})(c\bar{d} + \bar{c}\bar{d}) + (\bar{a}b + a\bar{b})(c\bar{d})$$

\c.d a.b	00	01	11	10
00				
01				
11				
10				

F6

$$F7 = \bar{a}.b.\bar{c}.\bar{d} + a.b.\bar{c}.\bar{d} + \bar{a}.\bar{b}.c.\bar{d} + a.\bar{b}.c.\bar{d} + \bar{a}.b.c.\bar{d} + \bar{a}.\bar{b}.\bar{c}.d + a.\bar{b}.\bar{c}.\bar{d}$$

\c.d a.b	00	01	11	10
00				
01				
11				
10				

F7

$$F8 = \bar{a}.\bar{b}.\bar{c}.\bar{d} + \bar{a}.\bar{b}.c.\bar{d} + a.\bar{b}.c.\bar{d} + \bar{a}.b.c.\bar{d} + \bar{a}.\bar{b}.\bar{c}.d + \bar{a}.\bar{b}.\bar{c}.d$$

\c.d a.b	00	01	11	10
00				
01				
11				
10				

F8

$$F9 = \bar{a}.\bar{b}.\bar{c}.\bar{d} + \bar{a}.\bar{b}.c.\bar{d} + a.\bar{b}.c.\bar{d} + a.\bar{b}.c.d + \bar{a}.b.c.d + \bar{a}.\bar{b}.\bar{c}.d$$

\c.d a.b	00	01	11	10
00				
01				
11				
10				

F9

$$F10 = a.b + \bar{c}.\bar{d} + \bar{a}.\bar{b}.\bar{c}.\bar{d} + \bar{a}.\bar{b}.\bar{c}.d$$

\c.d a.b	00	01	11	10
00				
01				
11				
10				

F10

II. Exercice 2 :

Simplifiez, en utilisant les états indifférents, les fonctions incomplètement définies :

$$G1 = \bar{a}.\bar{c}.d + \bar{a}.b.c + \bar{a}.\bar{b}.\bar{c}.\bar{d} + \bar{b}.\bar{c}.d + a.\bar{b}.c.d$$

Avec les états différents suivants :

$$\bar{a}.\bar{b}.\bar{c}.\bar{d}; \bar{a}.\bar{b}.\bar{c}.d; \bar{a}.\bar{b}.c.\bar{d}; \bar{a}.\bar{b}.c.d; a.\bar{b}.\bar{c}.\bar{d}$$

\c.d a.b	00	01	11	10
00				
01				
11				
10				

G1

$$G2 = a.b.\bar{d} + b.\bar{c}.\bar{d} + a.b.\bar{c} + \bar{a}.\bar{b}.\bar{c}.\bar{d} + a.\bar{b}.c.d$$

Avec les états différents suivants :

$$\bar{a}.\bar{b}.c.d; \bar{a}.\bar{b}.\bar{c}.d; \bar{a}.\bar{b}.c.\bar{d}; \bar{a}.\bar{b}.\bar{c}.\bar{d}; a.\bar{b}.c.d$$

\c.d a.b	00	01	11	10	
00					
01					
11					
10					
					G2

III. Exercice 3 :

Simplifiez les fonctions suivantes en vue de réalisations n'utilisant que :

- 1) Des portes NON ET ;
- 2) Des portes NON OU ;

a	b	c	d	H1	H2
0	0	0	0	0	1
0	0	0	1	X	1
0	0	1	0	1	0
0	0	1	1	0	0
0	1	0	0	0	0
0	1	0	1	X	1
0	1	1	0	1	1
0	1	1	1	1	X
1	0	0	0	0	0
1	0	0	1	1	0
1	0	1	0	0	0
1	0	1	1	0	0
1	1	0	0	1	X
1	1	0	1	1	1
1	1	1	0	0	1
1	1	1	1	0	0