

GAUTIER
Arthur

L1CPI1
2013

Groupe A

L1

Information numérique

Le 17/01/14

①

1)

1)

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A	B	a_e	S	R_s
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

1

2)

$G_i = a_i \cdot b_i$

$P_i = a_i + b_i$

D'après la table de vérité, on voit que R_s vaut 1 si A et B valent 1, si la retenue et A ou B valent 1 ou si les trois opérandes valent 1.

On peut donc écrire:

$$R_s = A \cdot B + a_e(A + B)$$

$$G_i = A \cdot B = G \text{ et } (A + B) = P$$

* Equations ?

* Minimization ?

Dans, $R_i = A_i B_i + n_i (A_i + B_i)$

$R_i = G_i + n_i P_i$

Dans la table de vérité, on peut voir que la somme S vaut si un nombre impair d'opérandes vaut 1.

Ainsi;

$S = \bar{A}\bar{B}n_e + \bar{A}B\bar{n}_e + A\bar{B}\bar{n}_e + ABn_e$ *oui*

$= n_e(\bar{A}\bar{B} + AB) + \bar{n}_e(\bar{A}B + A\bar{B})$

$= n_e(\bar{A}\bar{B} + AB) + \bar{n}_e(A \oplus B)$

$\bar{A}\bar{B} + AB$ est l'équation d'un XNOR. *oui*

Dans,

$S = n_e \oplus A \oplus B$

Dans,

$S_i = a_i \oplus b_i \oplus n_i$

3/ $R_0 = 0$ *NON*

$R_1 = G_0 + P_0 n_0$

$R_2 = G_1 + P_1(R_1) = G_1 + P_1(G_0 + P_0 n_0) = G_1 + P_1 G_0 + P_1 P_0 n_0$

$R_3 = G_2 + P_2(R_2) = G_2 + P_2(G_1 + P_1 G_0 + P_1 P_0 n_0) = G_2 + P_2 G_1 + P_2 P_1 G_0 + P_2 P_1 P_0 n_0$

en fonction EXCLUSIVEMENT $\rightarrow G_i P_i !!!$

II

$$1) B_0: \bar{A}_3 \bar{A}_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 A_1 \bar{A}_0 + \bar{A}_3 A_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 A_2 A_1 \bar{A}_0 + A_3 \bar{A}_2 \bar{A}_1 \bar{A}_0$$

$$B_0: \Sigma(0, 7, 6, 8)$$

$$B_1: \bar{A}_3 \bar{A}_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 A_1 A_0 + \bar{A}_3 A_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 A_2 A_1 A_0 + A_3 \bar{A}_2 \bar{A}_1 \bar{A}_0$$

$$\frac{2}{2} B_1: \Sigma(0, 3, 6, 7, 8)$$

$$B_2: \bar{A}_3 \bar{A}_2 \bar{A}_1 A_0 + \bar{A}_3 \bar{A}_1 A_2 \bar{A}_0 + \bar{A}_3 \bar{A}_2 A_1 A_0 + \bar{A}_3 A_2 \bar{A}_1 \bar{A}_0 + A_3 \bar{A}_2 \bar{A}_1 A_0$$

$$B_2: \Sigma(1, 2, 3, 6, 9)$$

$$\frac{2.4}{1} B_3: \bar{A}_3 A_2 \bar{A}_1 A_0 + \bar{A}_3 A_2 A_1 \bar{A}_0 + \bar{A}_3 A_2 A_1 A_0 + A_3 \bar{A}_2 \bar{A}_1 \bar{A}_0 + A_3 \bar{A}_2 \bar{A}_1 A_0$$

$$B_3: \Sigma(5, 6, 7, 8, 9)$$

2) $B_0:$

$A_3 A_2$ $A_1 A_0$	00	01	11	10
00	1	1		1
01				
11				
10	1	1		

$$B_0: \bar{A}_3 \bar{A}_0 + \bar{A}_2 \bar{A}_1 \bar{A}_0$$

$$= \bar{A}_0 (\bar{A}_3 + \bar{A}_2 \bar{A}_1)$$

$B_1:$

$A_3 A_2$ $A_1 A_0$	00	01	11	10
00	1	1		1
01				
11	1	1		
10				

$$B_1: \bar{A}_1 \bar{A}_0 \bar{A}_3 + A_1 A_0 \bar{A}_3 + \bar{A}_2 \bar{A}_1 \bar{A}_0$$

$$= \bar{A}_1 \bar{A}_0 (\bar{A}_3 + A_3) + A_1 A_0 \bar{A}_3$$

$B_2 =$

$A_3 A_2$	$A_1 A_0$	00	01	11	10
00					
01		1	1	1	1
11		1	1	1	1
10		1	1	1	1

$$B_2 = \bar{A}_3 \bar{A}_2 A_0 + \bar{A}_3 \bar{A}_2 A_1 + \bar{A}_2 \bar{A}_1 A_0 + \bar{A}_3 A_2 \bar{A}_1 \bar{A}_0 + \bar{A}_3 \bar{A}_2 (A_0 + A_1) + \bar{A}_1 (\bar{A}_2 A_0 + \bar{A}_3 A_2 \bar{A}_0)$$

démonstration par le consensus en mettant A_2 en facteur.

$B_3 =$

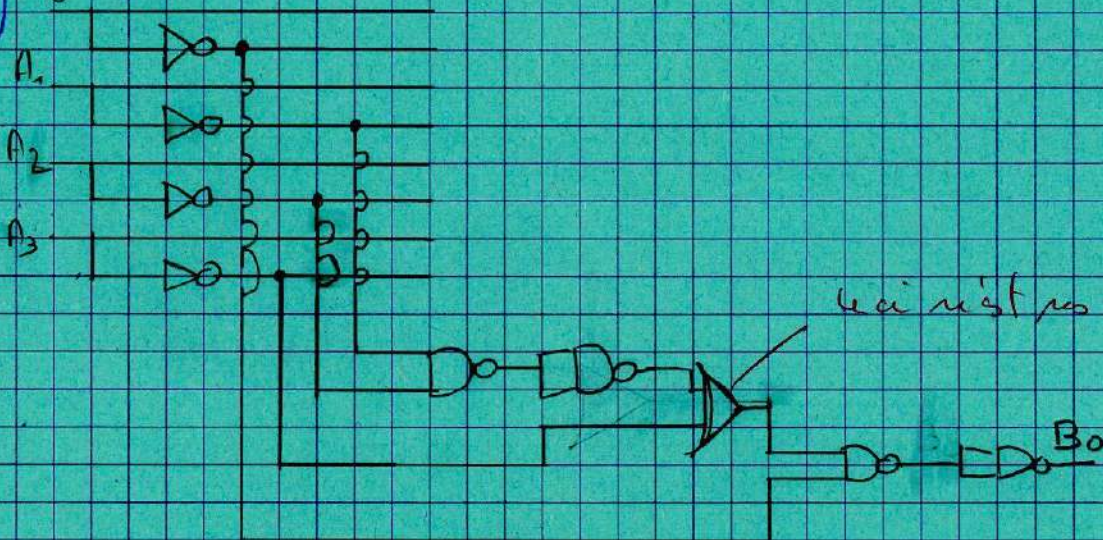
$A_3 A_2$	$A_1 A_0$	00	01	11	10
00				1	1
01		1	1	1	1
11		1	1	1	1
10		1	1	1	1

il fallait utiliser les états absents 10, 11, 13, 14, 15 :

$$B_3 = \bar{A}_3 A_2 A_0 + \bar{A}_3 A_2 A_1 + A_3 \bar{A}_2 \bar{A}_1$$

$$= \bar{A}_3 A_2 (A_0 + A_1) + A_3 \bar{A}_2 \bar{A}_1$$

3) A_0 B_0 :



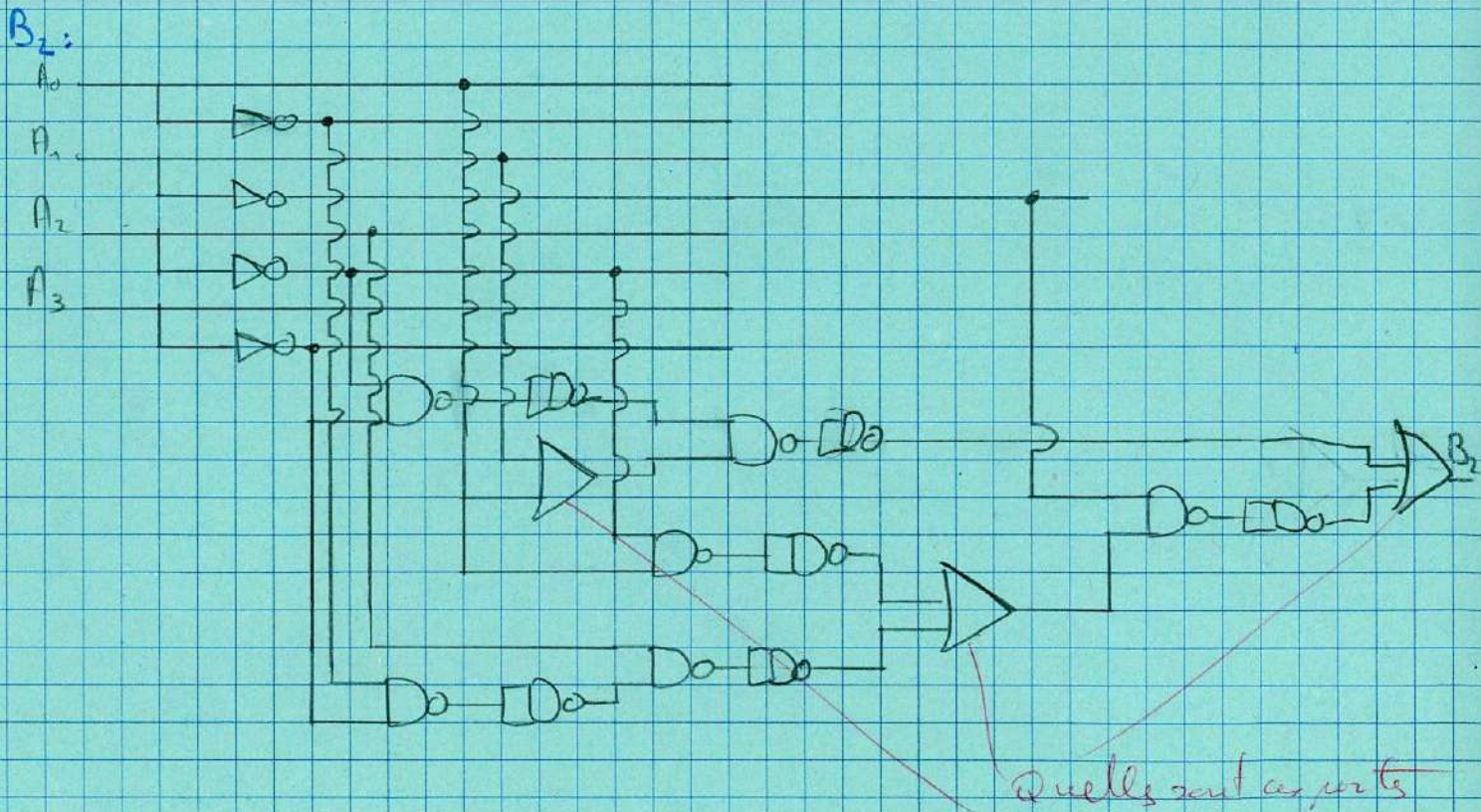
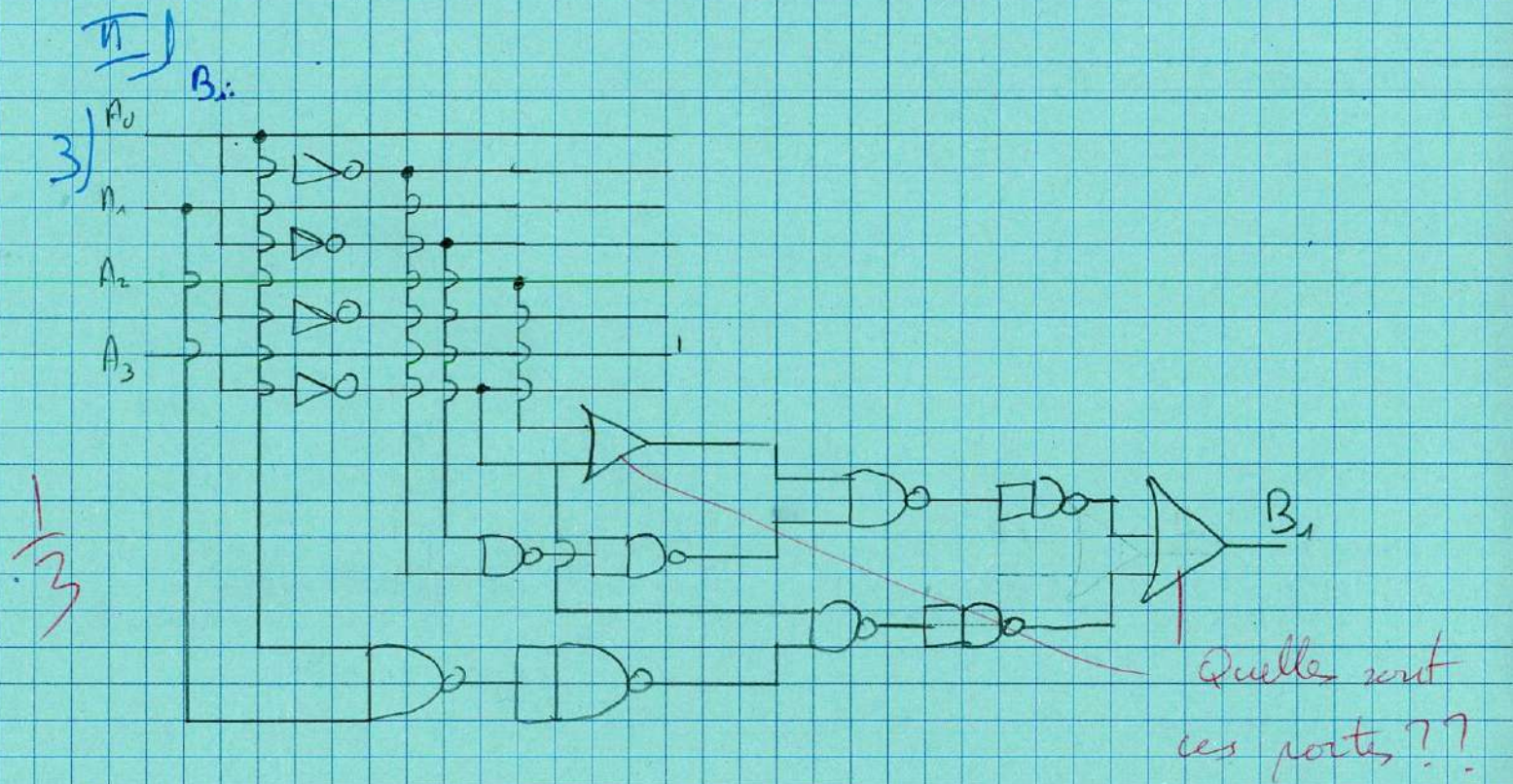
ceci n'est pas une NANA!

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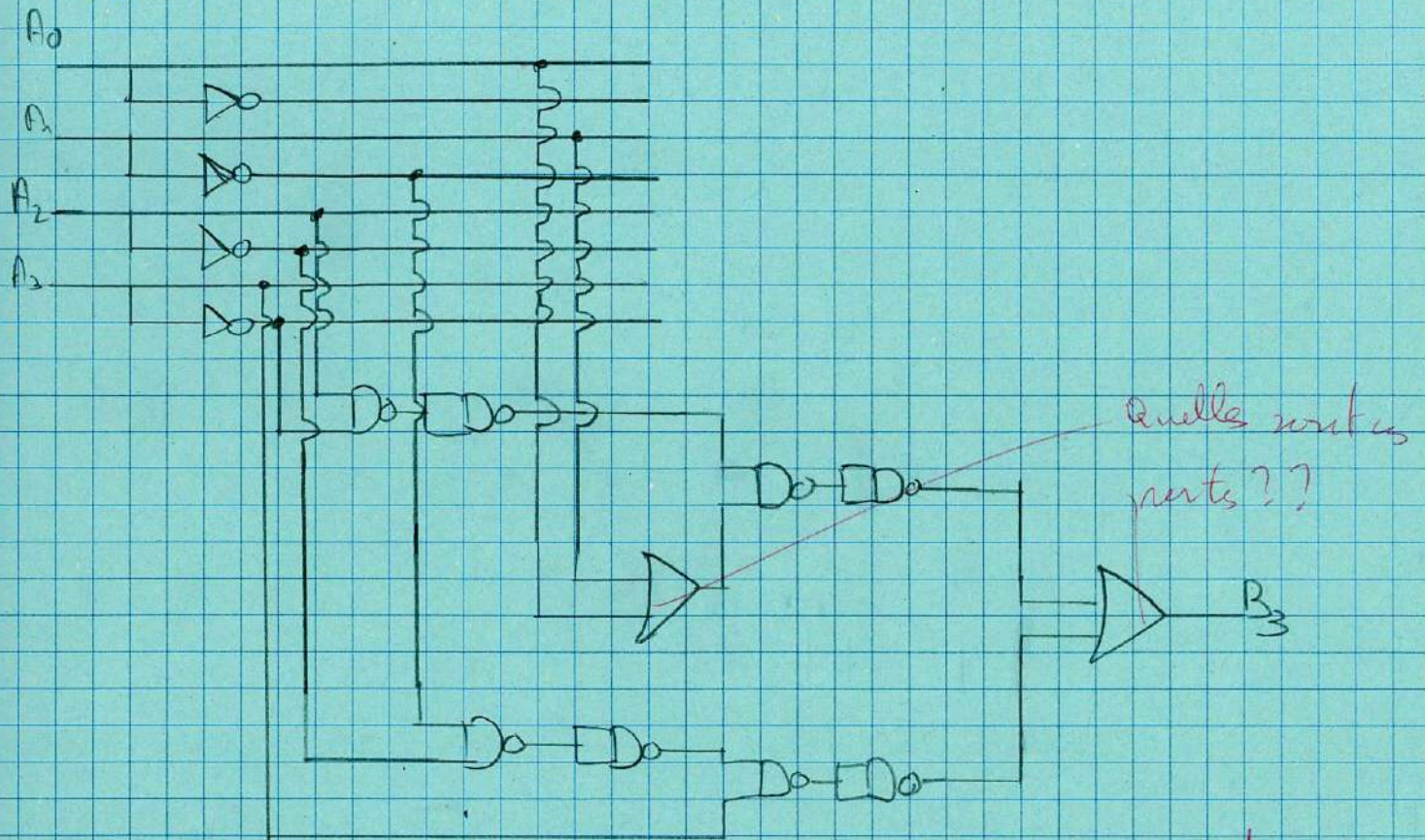
6 17/01/16

Informatique numérique

②



B₃:



4) $B_0 = \sum(0, 2, 4, 6, 8) = [0000 + 0010 + 0100 + 0110 + 1000]_2 = 20_{10}$

$B_1 = \sum(0, 3, 4, 7, 8) = [0000 + 0011 + 0100 + 0111 + 1000]_2 = 22_{10}$

$B_2 = \sum(1, 2, 3, 6, 9) = [0001 + 0010 + 0011 + 0100 + 1001]_2 = 19_{10}$

$B_3 = \sum(5, 6, 7, 8, 9) = [0101 + 0110 + 0111 + 1000 + 1001]_2 = 35_{10}$

5)

0/27

III

1) $t = \overline{A+B}$

$y = C+D$

2/2 $z = (C+D)(\overline{B \oplus \overline{C}})$

$S = \overline{t \cdot y \cdot z}$

$= (\overline{A+B})(C+D)(\overline{B \oplus \overline{C}})$ oui

$= (\overline{A+B})(\overline{C+D})(\overline{B \oplus \overline{C}})$ NON

$= (\overline{A+B})(\overline{C+D})(\overline{B \oplus \overline{C}})$

$= \overline{a+b+c}$

$= \overline{a} \overline{b} \overline{c}$

0/3 2)

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