

Codification et Représentation de l'Information (CRI)

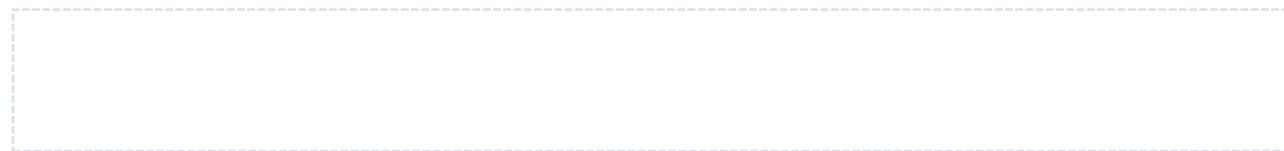
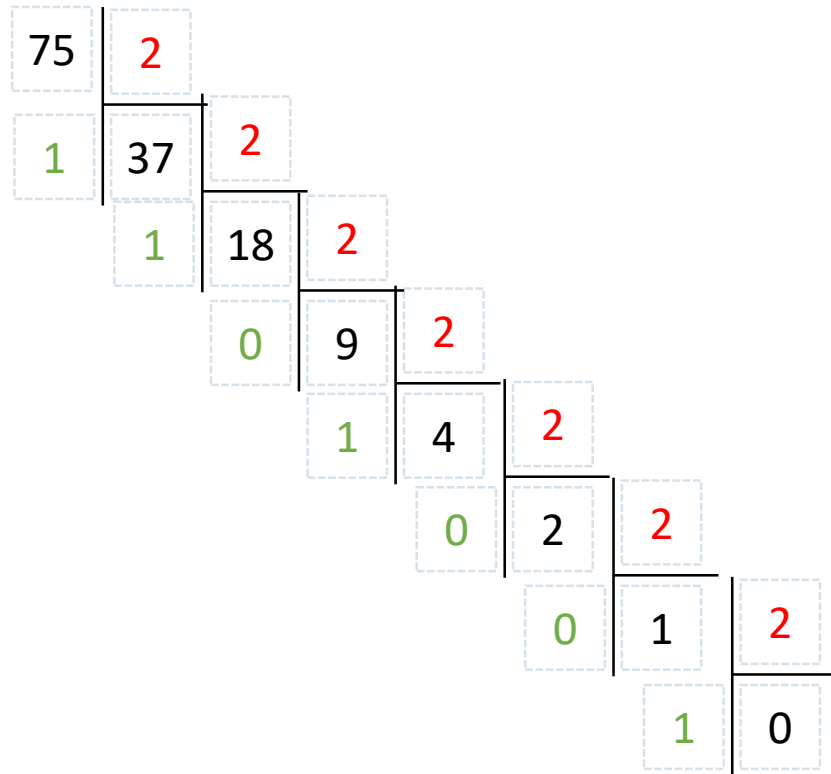
EMD 2020-2021 (révision)

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Exercice 1

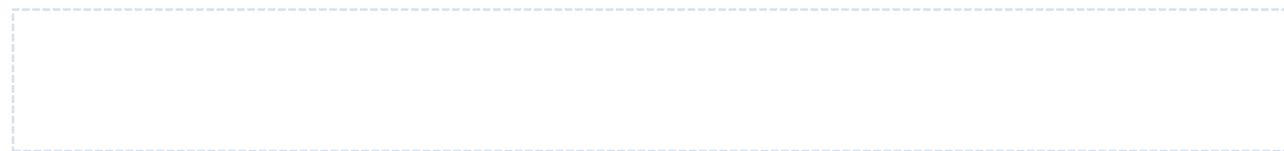
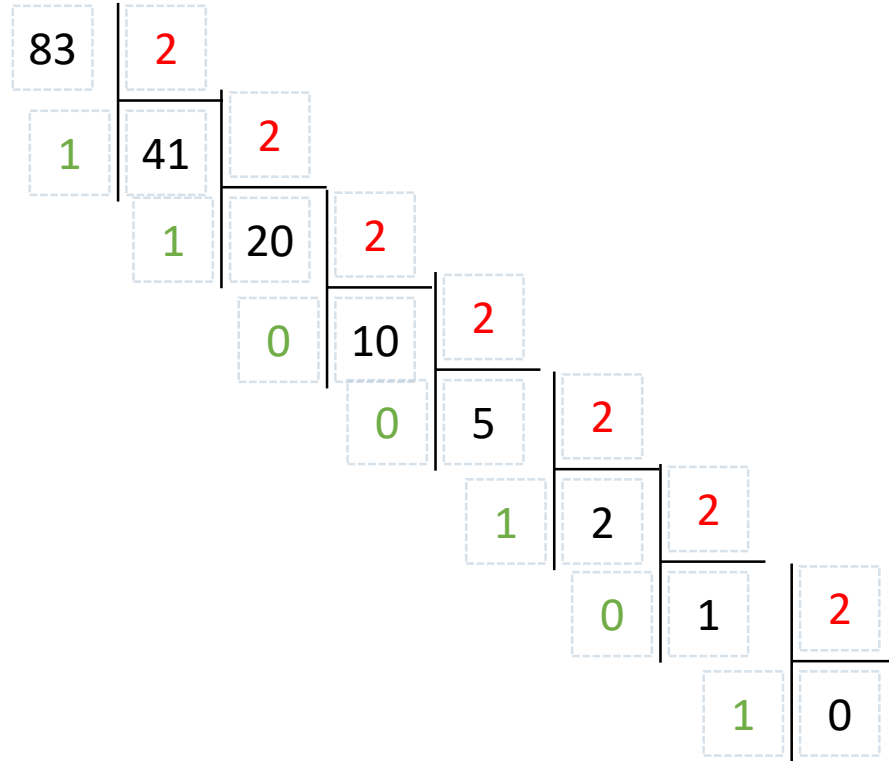
Convertir les valeurs décimales suivantes en binaire, octal et hexadécimal (2pts) :

$$A = 75 = 0100\ 1011_{(2)} = 1\ 1\ 3_{(8)} = 4B_{(16)}$$



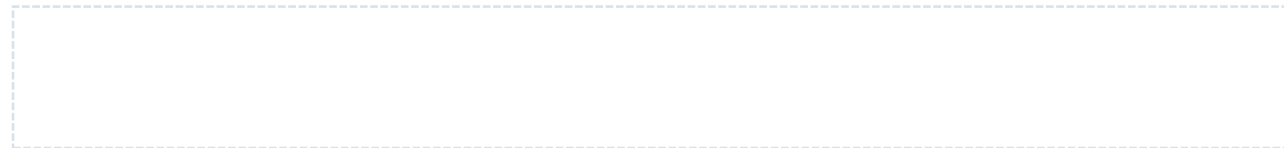
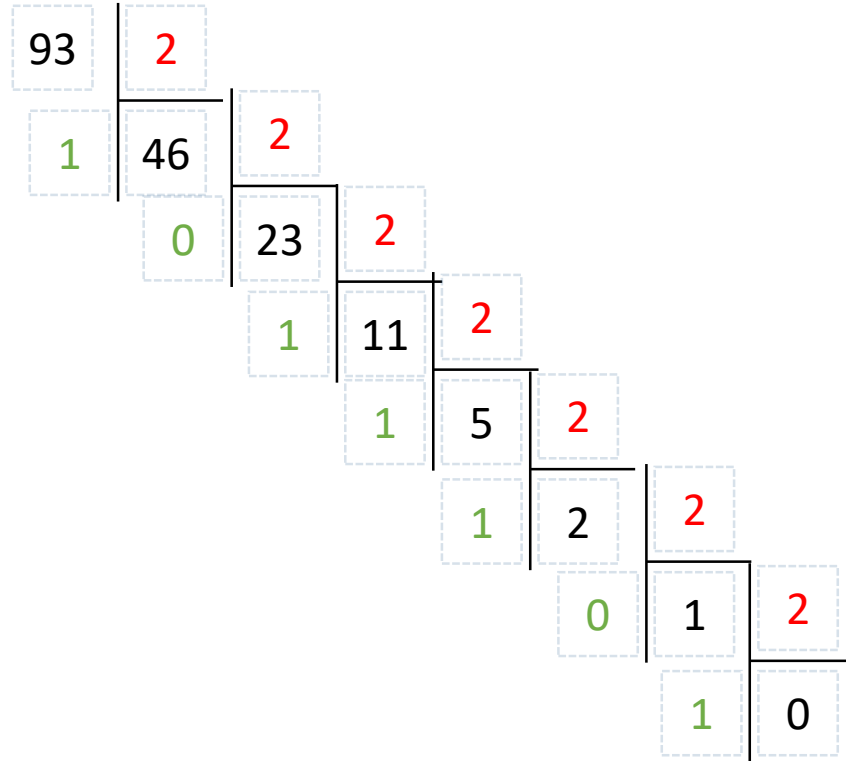
Exercise 1

$$B = 83 = 0101\ 0011_{(2)} = 123 = 53(16)$$



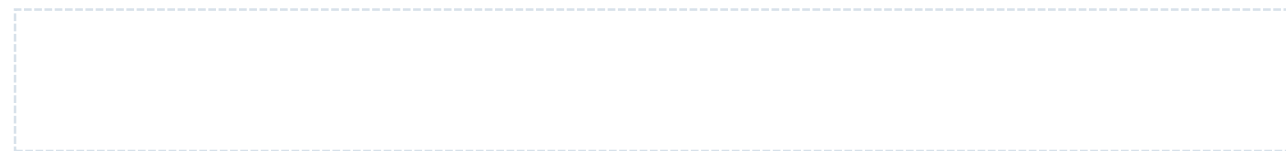
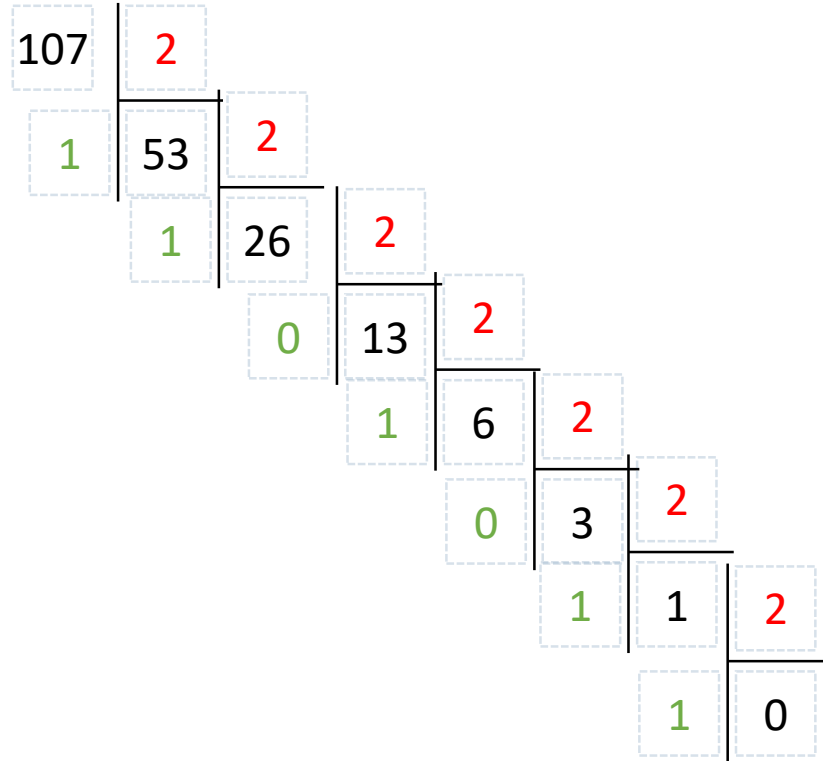
Exercise 1

$$C = 93 = 0101\ 1101_{(2)} = 1\ 3\ 5_{(8)} = 5D_{(16)}$$



Exercise 1

$$D = 107 = 110\ 1011_{(2)} = 153_{(8)} = 6B_{(16)}$$



Exercice 1

2. Représenter les valeurs suivantes en CA2 sur 8 bits , ensuite calculer B-A (1.5 pts):

$$-107 = \text{CA2}(107) = \text{CA2}(01101011) = 10010100 + 1 = 10010101_{\text{ca2}}$$

$$107 = \text{CA2}(107) = 01101011_{(2)} = 01101011_{\text{ca2}}$$

$$83 = 01010011$$

$$-83 = \text{CA2}(01010011) = 10101100 + 1 = 10101101_{\text{ca2}}$$

$$D = 107 = 110\ 1011_{(2)} = 153_{(8)} = 6B_{(16)}$$

$$C = 93 = 0101\ 1101_{(2)} = 1\ 3\ 5_{(8)} = 5D_{(16)}$$

$$B = 83 = 101\ 0011_{(2)} = 123 = 53_{(16)}$$

$$A = 75 = 0100\ 1011_{(2)} = 1\ 1\ 3_{(8)} = 4B$$

2. Calculer les valeurs suivantes en CA2 sur 8 bits

$$\text{CA2}(-107) = \text{CA2}(\text{CA2}(107)) = \text{CA2}(\text{CA2}(01101011)) = 01101011_{(\text{ca2})}$$

$$\text{CA2}(83) = \text{CA2}(01010011) = 10101100 + 1 = 10101101_{\text{ca2}}$$

$$10101100 \rightarrow 01010011 + 1 = 01010100 \rightarrow 10101011 + 1 = 10101100$$

Exercice 1

2. Représenter les valeurs suivantes en CA2 sur 8 bits , ensuite calculer B-A (1.5 pts):

$$(B) - (A) = (83) - (-107) = 83 + 107 = 01010011 + 0110 1011$$

$$B-A = B+CA2(A) = 83 + CA2(-107) = 83 + CA2(CA2(107)) = 83+107$$

01010011

01101011

10111110 il y a une depa de cap

$$Ca2(10111110) = 01000001+1 = 01000010 = 66 \rightarrow 10111110 = -66$$

Exercice 1

3. Calculer le CA2 des valeurs suivantes sur 8 bits, ensuite calculer A+B (1.5pts):

$$\text{CA2}(75) = \text{CA2}(01001011) = 10110100 + 1 = 10110101_{\text{ca2}}$$

$$93 = \text{CA2}(-93) = \text{CA2}(\text{CA2}(93)) = 93 = 01011101_{\text{ca2}}$$

$$C = 93 = 0101\ 1101_{(2)} = 1\ 3\ 5_{(8)} = 5D_{(16)}$$

$$A = 75 = 0100\ 1011_{(2)} = 1\ 1\ 3_{(8)} = 4B$$

$$A+B = 75 + (-93) = 01001011 + \text{CA2}(01011101) = 01001011 + 10100011$$

=

01001011

10100011

11101110

Exercice 1

4. Représenter les valeurs A et B en BCD ensuite calculer A + B (2pts) :

175 = 0001 0111 0101_{BCD}

138 = 0001 0011 1000_{BCD}

168 = 0001 0110 1000_{BCD}

138 = 0001 0011 1000_{BCD}

0001 0111 0101

0001 0011 1000

0011 1011 1101

0110 0110

10001 10011

0011 0001 0011 = 313

0001 0110 1000

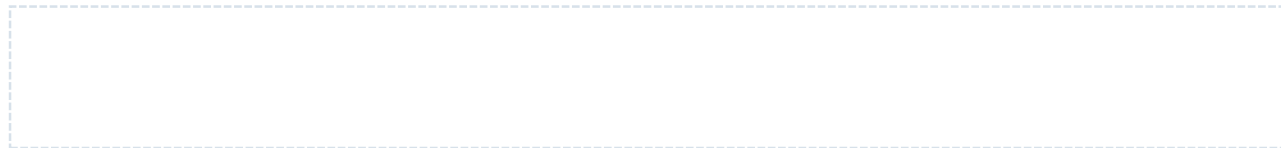
0001 0011 1000

0011 1010 10000

0110 0110

10000 10110

0011 0000 0110 = 306



Exercice 2

Simplifier les fonctions S1 et S2 à l'aide des tableaux de Karnaugh (1.5 pts).

ab	00	01	11	10
c	0	1	1	0
1	1	0	0	1

$$S1 = b/c + /bc$$

ab	00	01	11	10
c	0	1	1	0
1	1	0	0	1

$$/S1 = /b/c + bc \rightarrow S1 = (b+c)(/b+/c)$$

A	B	C	S1	S2
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	0	0
1	0	1	1	1
1	1	0	1	0
1	1	1	0	0

Exercice 2

Simplifier les fonctions S1 et S2 à l'aide des tableaux de Karnaugh (1.5 pts).



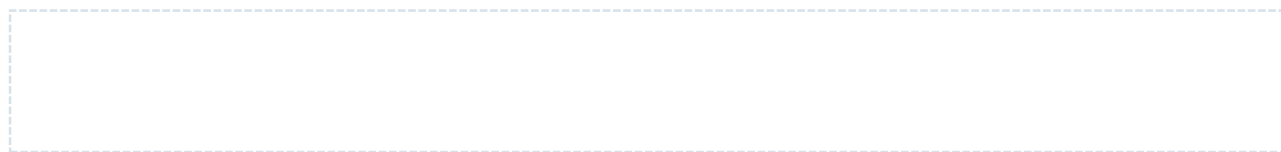
ab	00	01	11	10
c ,				
0	0	0	0	0
1	0	1	0	1

ab	00	01	11	10
c ,				
0	0	0	0	0
1	0	1	0	1

$$S2 = \overline{a}bc + a\overline{b}c$$

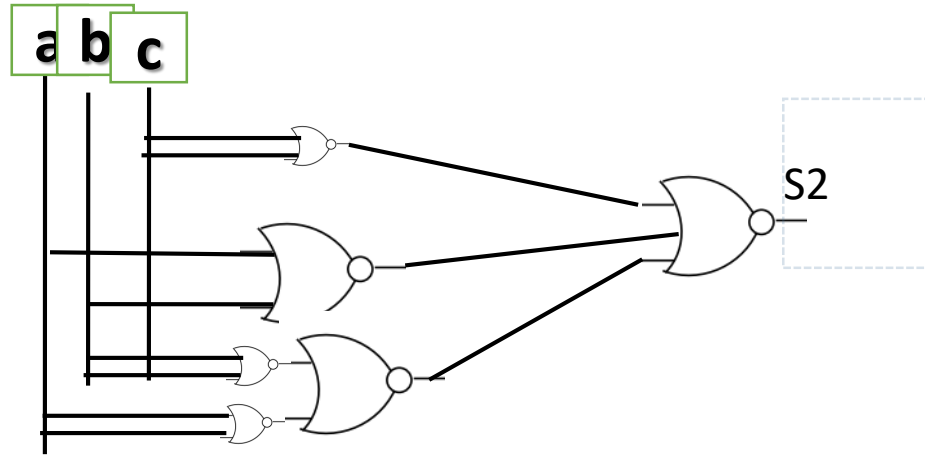
$$\overline{S2} = \overline{c} + \overline{a}/b + ab \rightarrow S2 = c(a+b)(\overline{a}+\overline{b})$$

A	B	C	S1	S2
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	0	0
1	0	1	1	1
1	1	0	1	0
1	1	1	0	0



Exercice 2

Réaliser les circuits de S1 et S2 à l'aide de portes NOR uniquement (1.5pts).



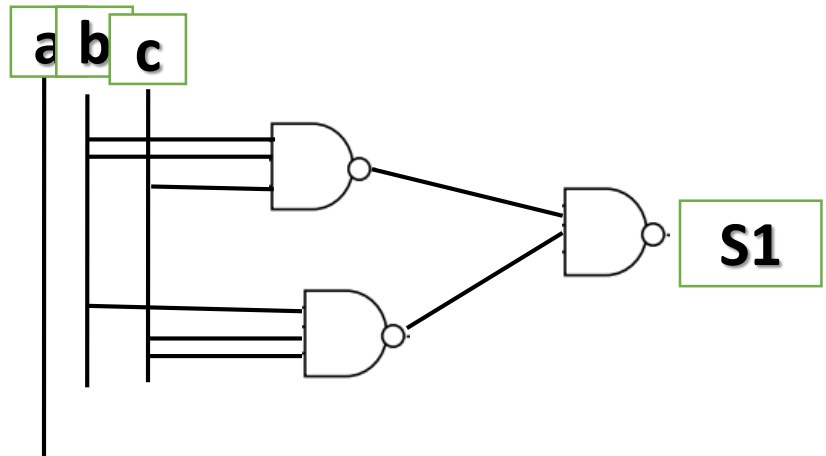
$$\overline{S2} = \overline{c + \overline{a/b + ab}} \rightarrow S2 = c(a+b)(\overline{a+b}) = \overline{\overline{c(a+b)(\overline{a+b})}} = \overline{c + (a+b) + (\overline{a+b})} =$$

$$\overline{S1} = \overline{b/c + bc} \rightarrow S1 = (b+c)(\overline{b+c})$$

Exercice 2

Réaliser les circuits de S1 et S2 à l'aide de portes NAND uniquement (1.5pts).

$$S1 = b/c + /bc = \overline{\overline{b/c} + \overline{/bc}} = \overline{\overline{b/c} \cdot \overline{/bc}}$$

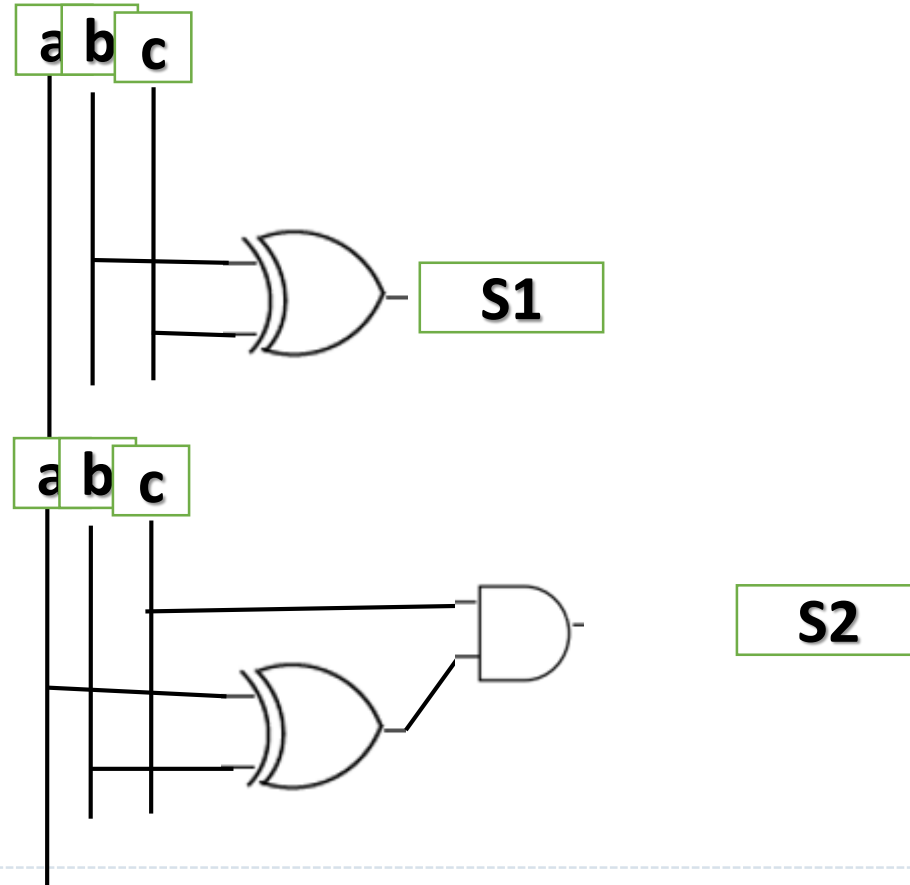


Exercice 2

Réaliser les circuits de S1 et S2 à l'aide de portes XOR (1.5pts).

$$S1 = b/c + /bc = b \text{ xor } c$$

$$S2 = /abc + a/bc = c(/ab + a/b) = c(a \text{ xor } b)$$



Exercice 2

Réaliser le circuit de S1 et S2 à l'aide de DEC 3*8 (1.5pts).

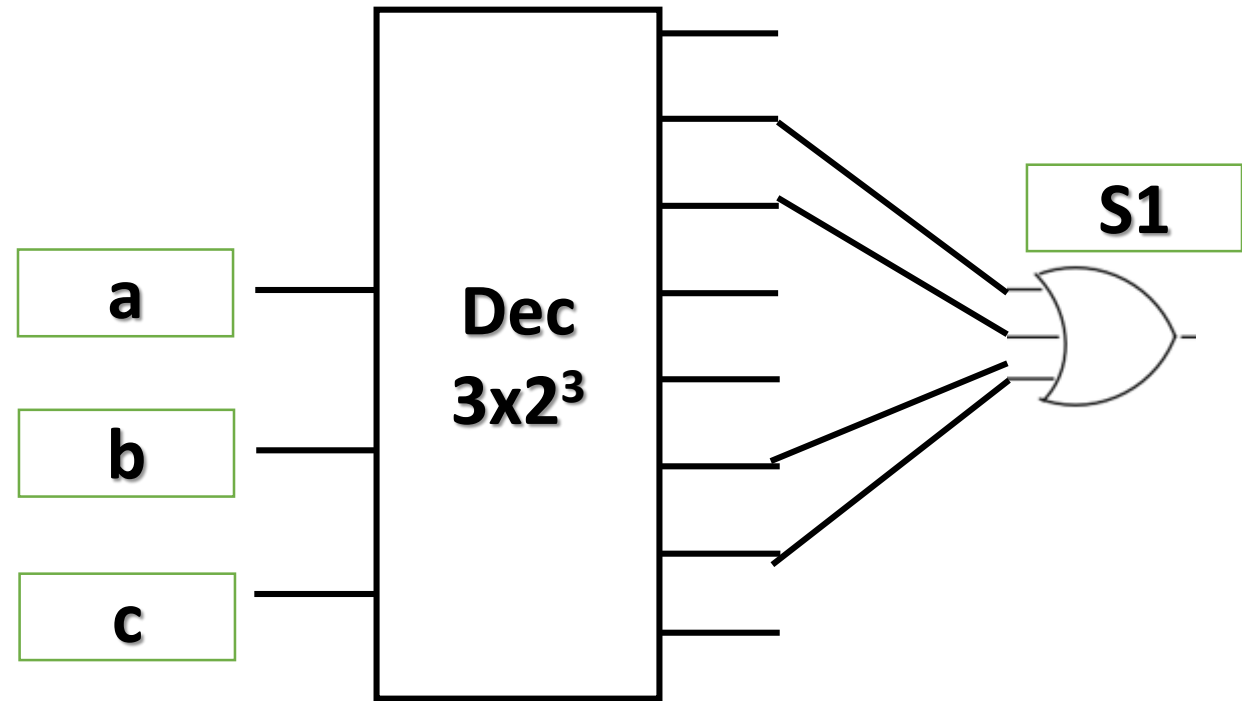
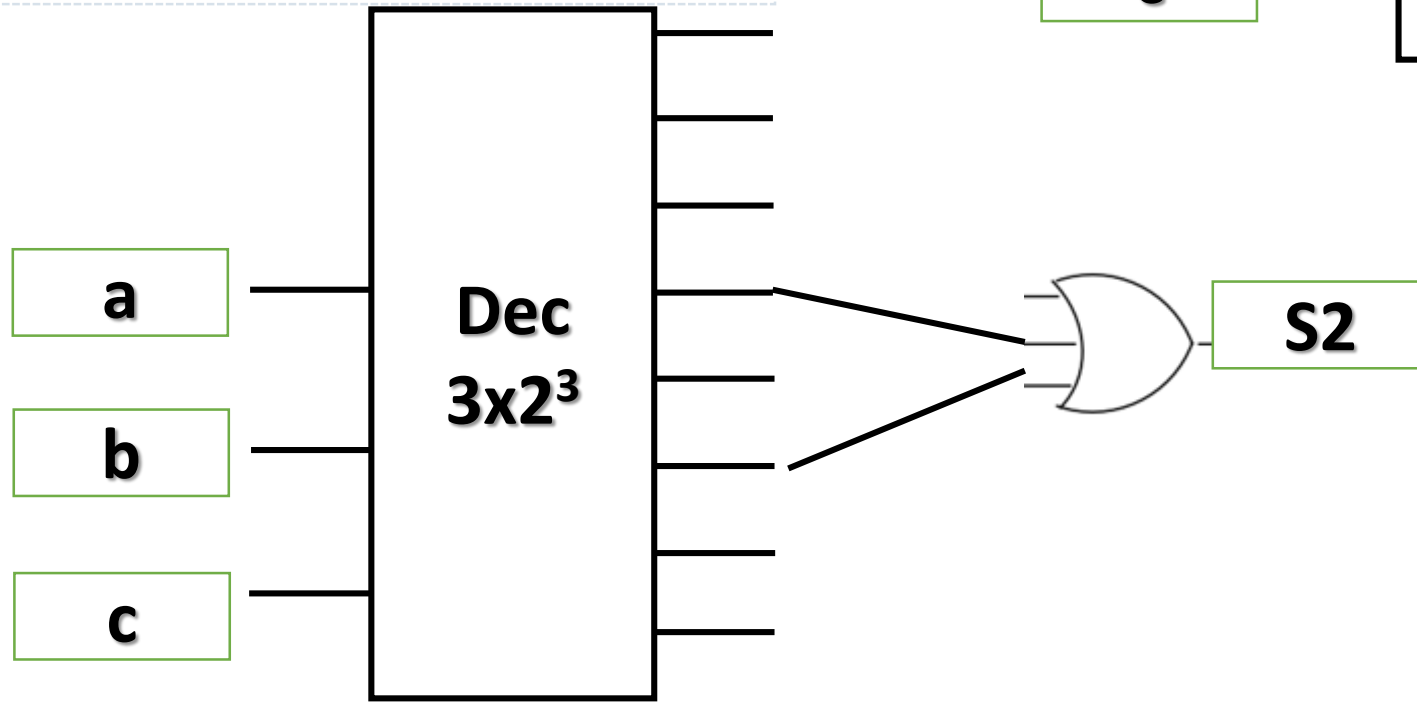
$$S1 = b/c(a+/a) + /bc(a+/a)$$

$$S1 = ab/c + /ab/c + a/bc + /a/bc$$

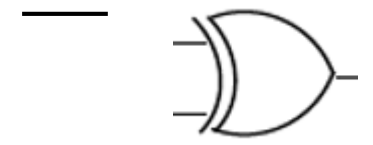
110 010 101 001

$$S2 = /abc + a/bc$$

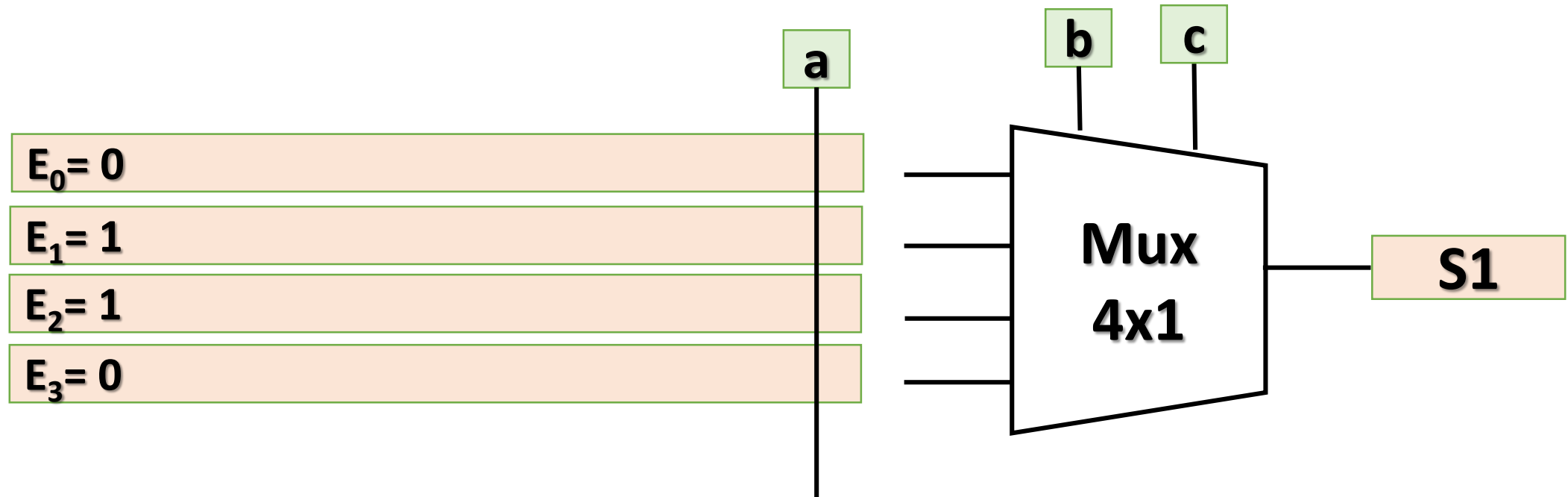
011 101



Exercice 2

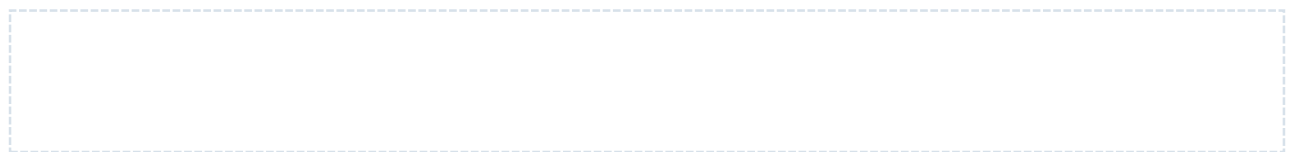


Réaliser le circuit de S1 et S2 à l'aide de Mux 4*1 uniquement (1.5pts).

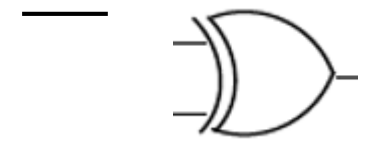


$$S1 = b/c + /bc$$

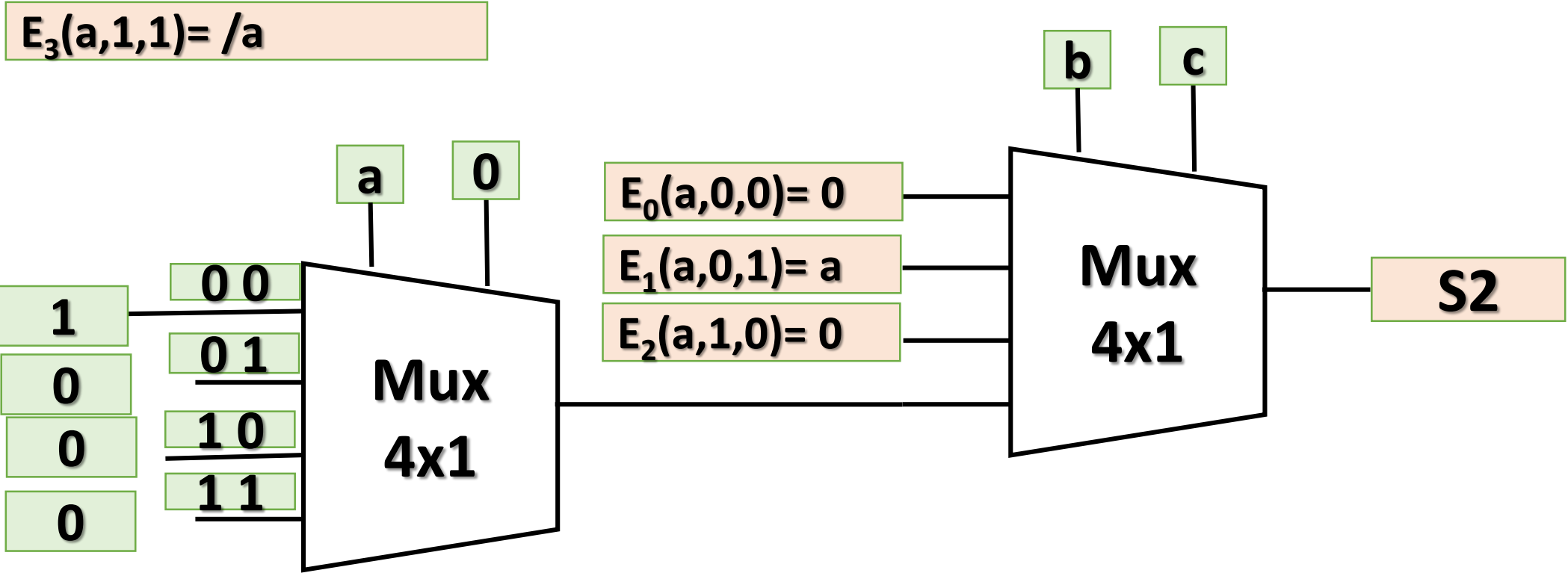
$$S2 = /abc + a/bc$$



Exercice 2

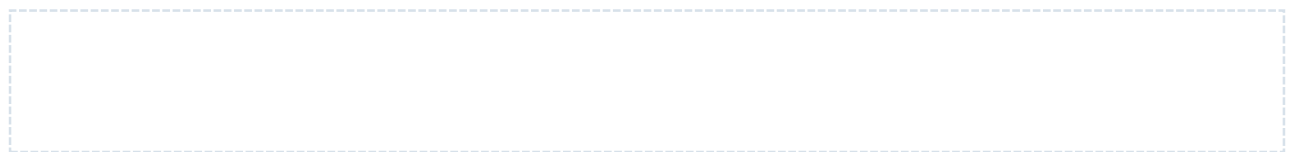


Réaliser le circuit de S1 et S2 à l'aide de Mux 4*1 uniquement (1.5pts).

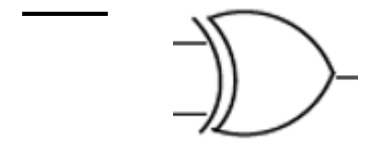


$S_1 = b/c + \neg bc$

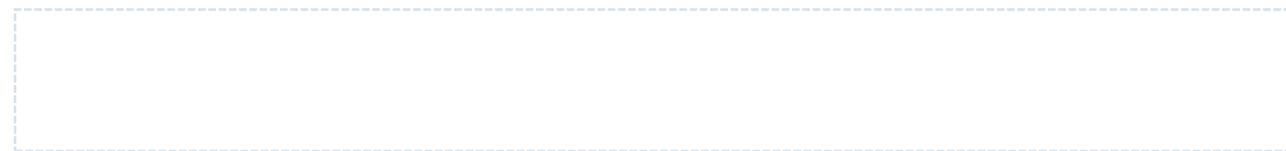
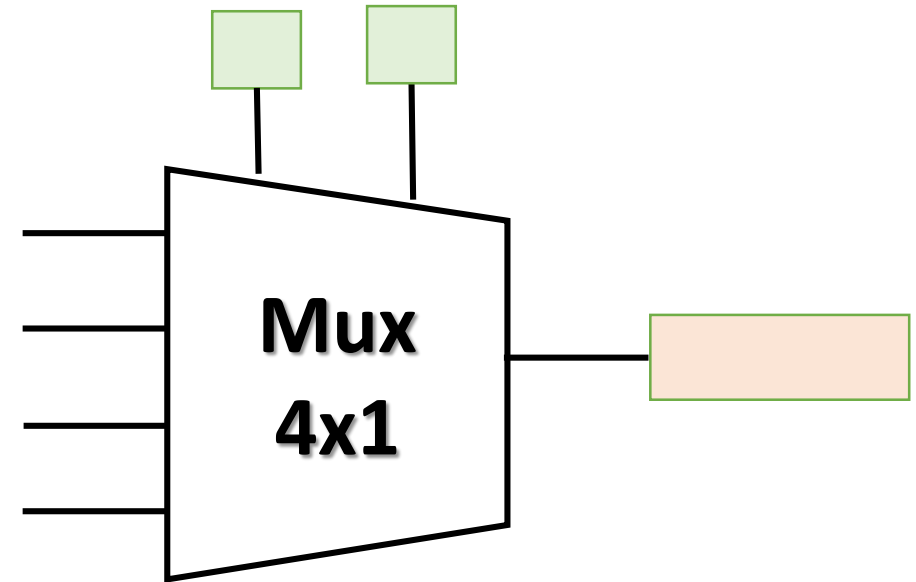
$S_2 = \neg abc + a/bc$



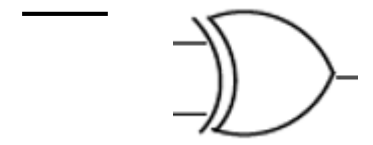
Exercice 2



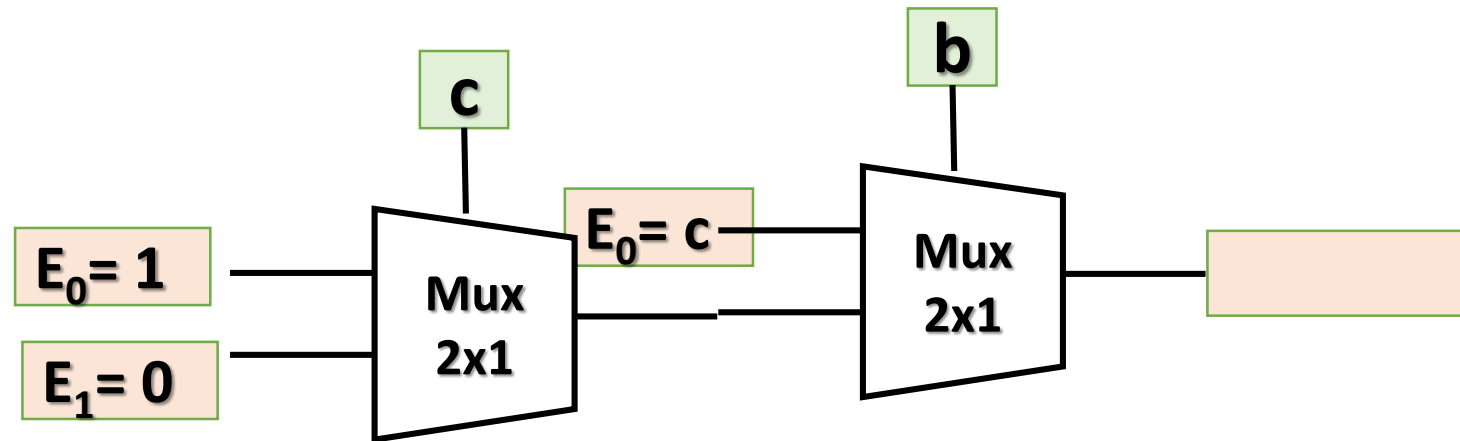
Réaliser le circuit de S1 et S2 à l'aide de Mux 4*1 uniquement (1.5pts).



Exercice 2



Réaliser le circuit de S1 et S2 à l'aide de Mux 4*1 uniquement (1.5pts).

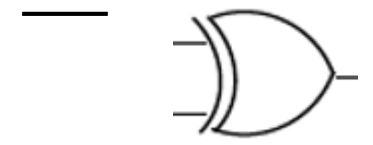


$$S1 = b/c + /bc$$

$$S2 = /abc + a/bc$$

$$E_1 = /c$$

Exercice 2

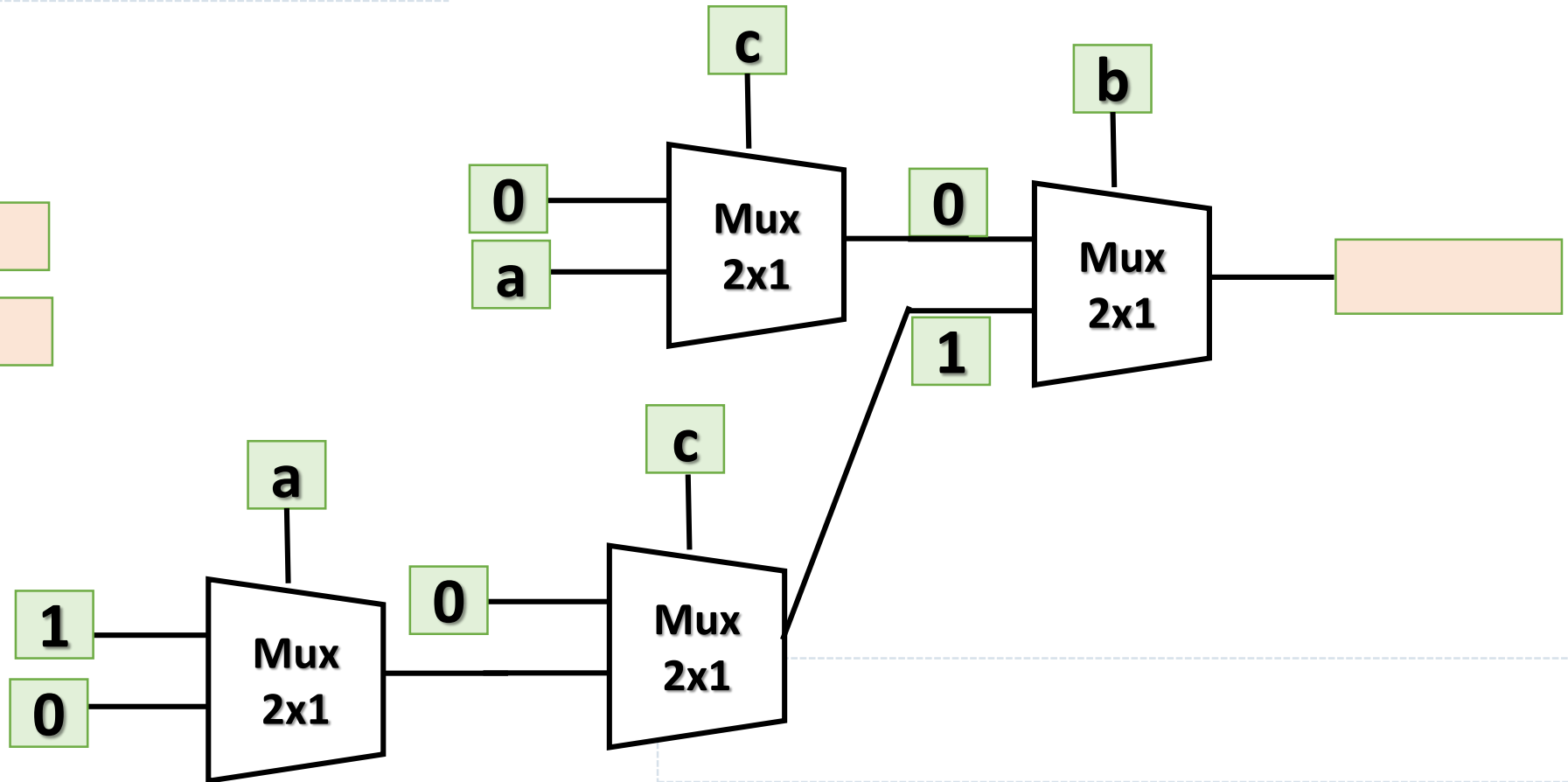


Réaliser le circuit de S1 et S2 à l'aide de Mux 2*1 uniquement (1.5pts).

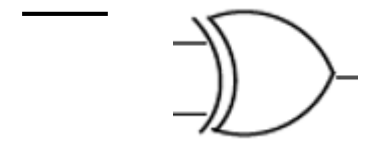
$$S2(a,b,c) = \neg abc + a/bc$$

$$E_0 = ac$$

$$E_1 = \neg ac$$



Exercice 2

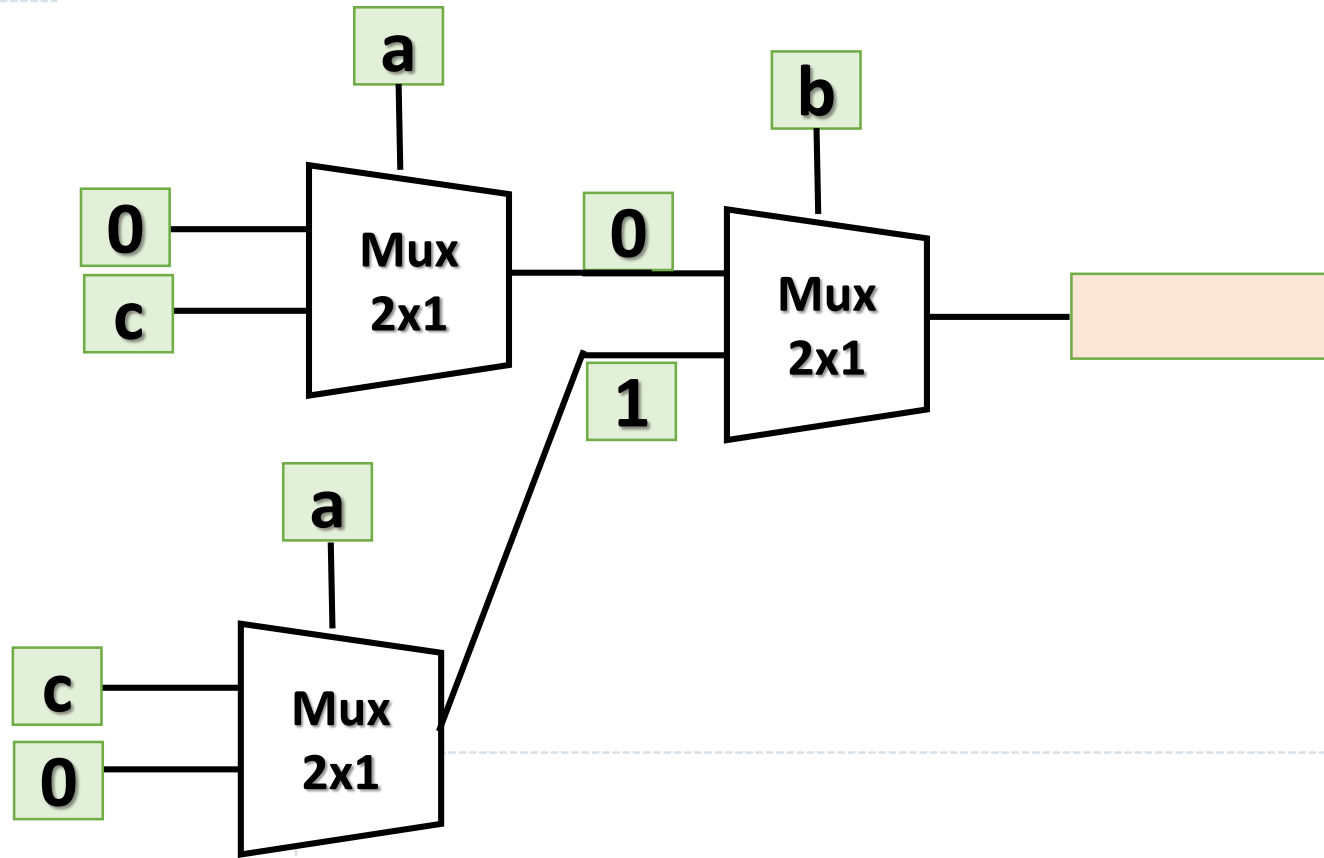


Réaliser le circuit de S1 et S2 à l'aide de Mux 2*1 uniquement (1.5pts).

$$S2(a,b,c) = \neg abc + a/bc$$

$$E_0 = ac$$

$$E_1 = \neg ac$$



Exercice 2

1. Donner le rôle des fonctions S1 et S2 pour $A = 0$ et pour $A=1$ (2pts).

