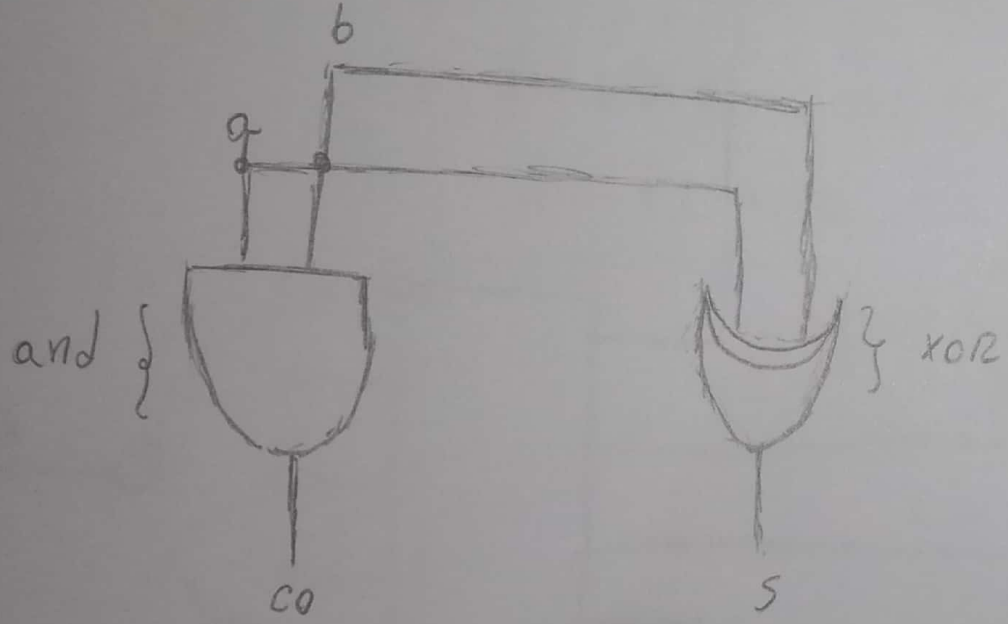
1 - a) meia - somador

1 and
1 xor

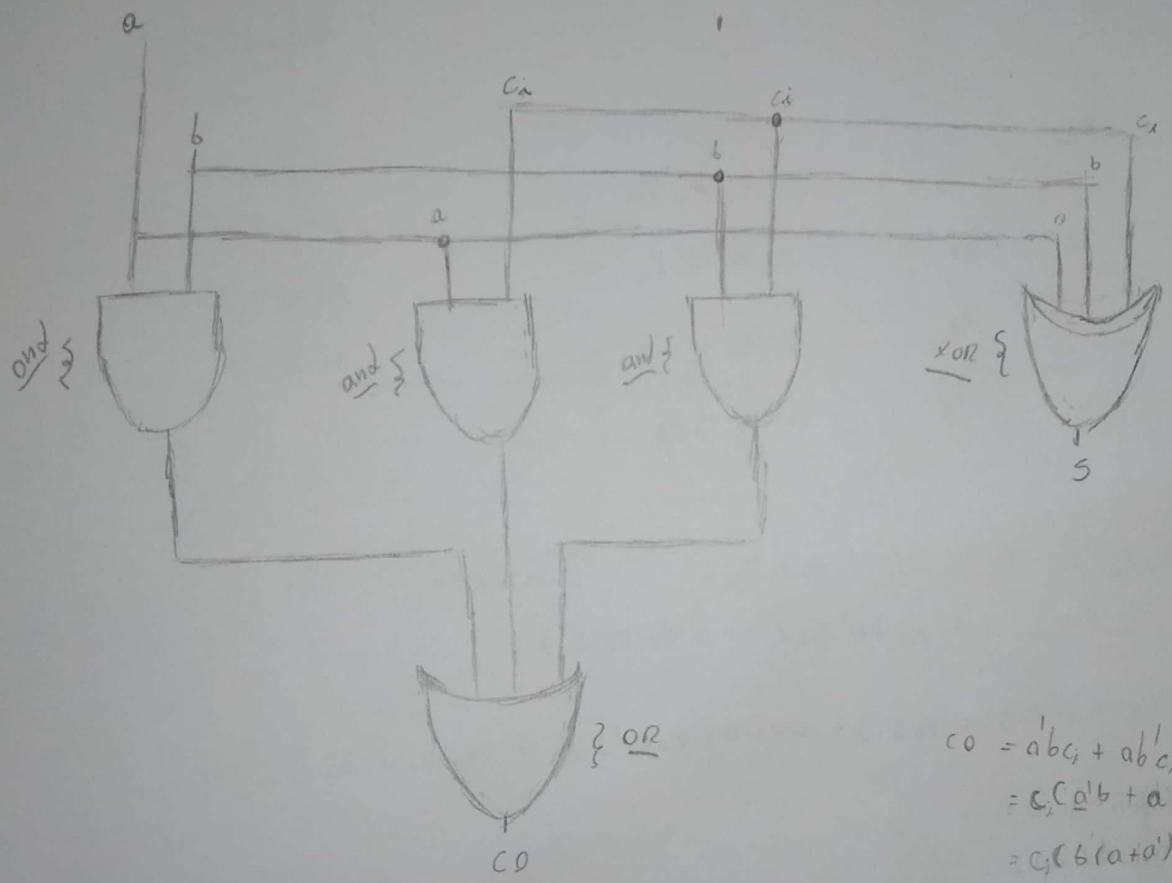


a	b	C_0	s
0	0	0	0
0	1	0	1
1	0	0	1
1	1	1	0

$s = \bar{a}b + \bar{b}a$

$C_0 = ab$

b) somador completo



$S = a'b'C_i + a'bC_i' + ab'C_i' + abC_i$

$S = a'(b'C_i + bC_i') + a(bC_i' + bC_i)$

$S = a'(b \text{ xor } C_i) + a(b \text{ xor } C_i)$

$S = a \text{ xor } b \text{ xor } C_i$

a	b	C_i	CO	S
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

$CO = a'bC_i + ab'C_i + abC_i' + abC_i$

$= C_i(a'b + ab' + ab) + abC_i'$

$= C_i(b(a+a') + ab') + abC_i'$

$= C_i(b + ab') + abC_i'$

$= C_i(b + a) + abC_i'$

$= C_ia + b(C_iC_i' + aC_i')$

$= ab + aC_i + bC_i$

#RASCUNHO

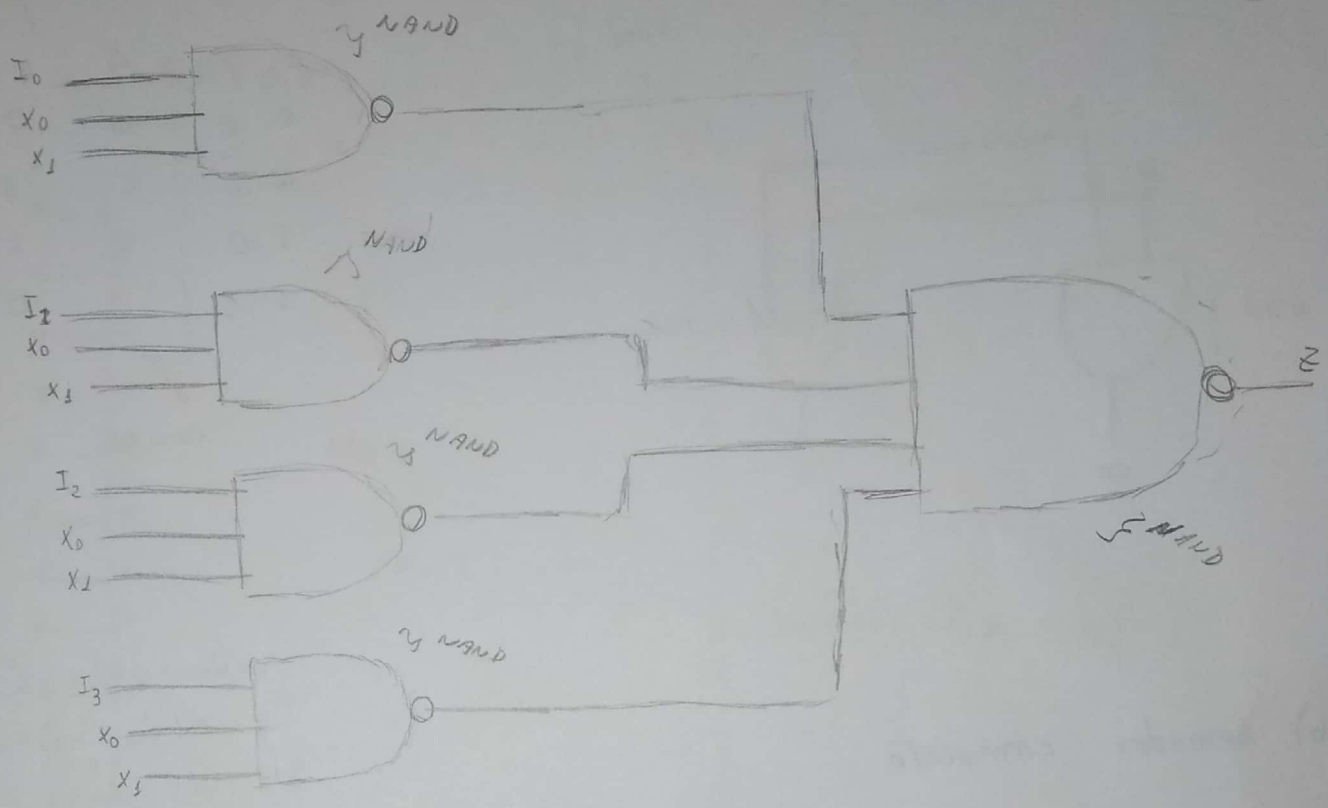
$b + ab' = b.1 + ab'$

$= b(b+b') + ab'$

$= bb' + ab'$

$= a + b$ //

c) multiplexador (somente com portas NAND)



X_1	X_0	Z	
0	0	I_0	$\rightarrow X_1' X_0' I_0$
0	1	I_1	$\rightarrow X_1' X_0 I_1$
1	0	I_2	$\rightarrow X_1 X_0' I_2$
1	1	I_3	$\rightarrow X_1 X_2 I_3$

$Z = (X_1' X_0' I_0 + X_1' X_0 I_1 + X_1 X_0' I_2 + X_1 X_0 I_3)$ ⇝ usa D-MORGAN

$Z = (X_1' X_0' I_0)' + (X_1' X_0 I_1)' + (X_1 X_0' I_2)' + (X_0 X_1 I_3)'$

$Z = NAND(X_1' X_0' I_0) + NAND(X_1' X_0 I_1) + NAND(X_1 X_0' I_2) + NAND(X_1 X_0 I_3)$

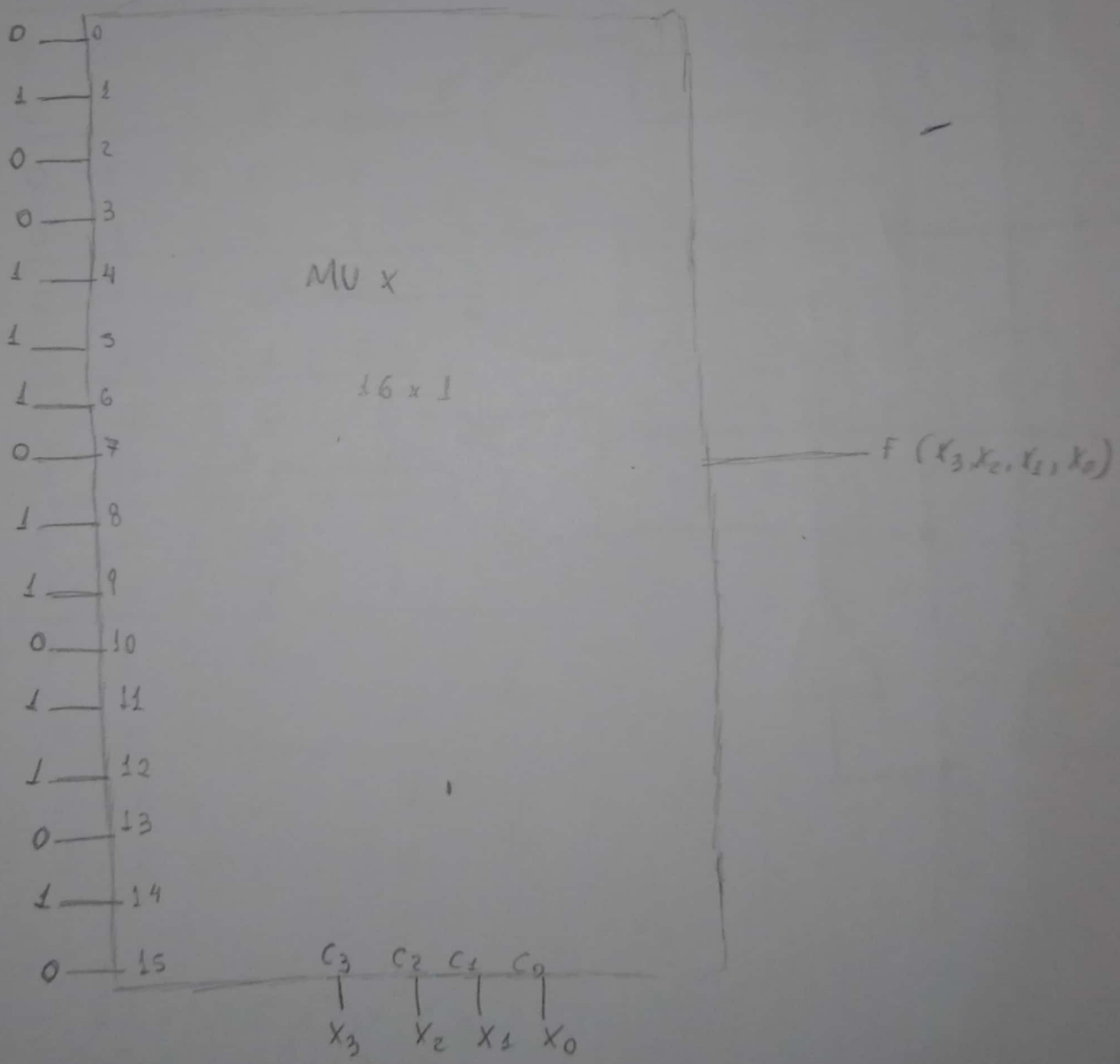
2. a)

-> $F(X_3, X_2, X_1, X_0) = \Pi M(0, 2, 3, 7, 10, 13, 15)$

mux 16 x 1

$f(x) = \Pi M(0, 2, 3, 7, 10, 13, 15)$

$= \Sigma m(1, 4, 5, 6, 8, 9, 11, 12, 14)$



2 - 6) MUX 8 x 1

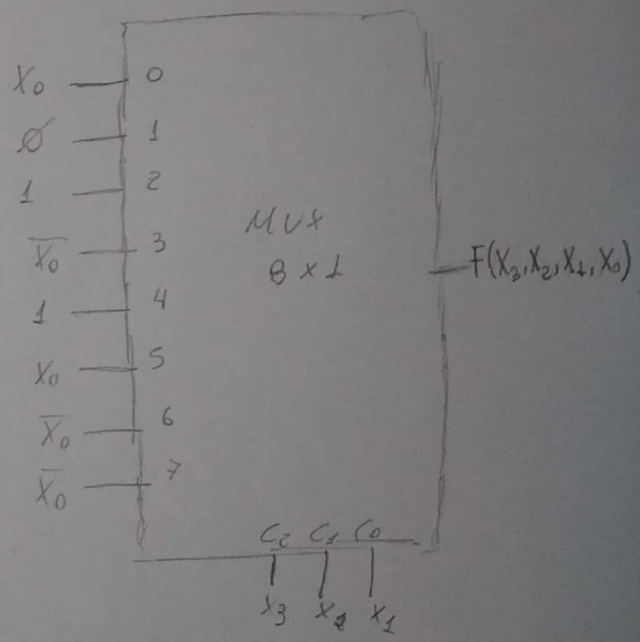
$\begin{cases} 0 \\ 0 \end{cases} = \emptyset$

$\begin{cases} 0 \\ 1 \end{cases} = X_0$

$\begin{cases} 1 \\ 1 \end{cases} = 1$

$\begin{cases} 1 \\ 0 \end{cases} = \bar{X_0}$

m	X_3	X_2	X_1	X_0		
0	0	0	0	0	0	
1	0	0	0	1	1	X_0
2	0	0	1	0	0	
3	0	0	1	1	0	$\emptyset$
4	0	1	0	0	1	
5	0	1	0	1	1	1
6	0	1	1	0	1	
7	0	1	1	1	0	$\bar{X_0}$
8	1	0	0	0	1	
9	1	0	0	1	1	1
10	1	0	1	0	0	
11	1	0	1	1	1	X_0
12	1	1	0	0	1	
13	1	1	0	1	0	$\bar{X_0}$
14	1	1	1	0	1	
15	1	1	1	1	0	$\bar{X_0}$



$Im(0, 2, 3, 7, 10, 13, 15)$

$Em(1, 4, 5, 6, 8, 9, 11, 12, 14)$