

MAC0329

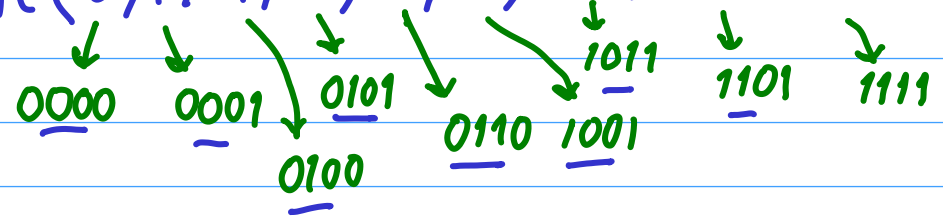
19.05.2020

ab \ cd	00	01	11	10
00				
01				
11				
10				

Bom dia!

Exercício : Minimizar usando mapa de Karnaugh

$$f(a,b,c,d) = \sum m(0,1,4,5,6,9,11,13,15)$$



ab \ cd	<u>00</u>	<u>01</u>	<u>11</u>	<u>10</u>
<u>00</u>	1	1		
<u>01</u>	1	1		1
<u>11</u>		1	1	
<u>10</u>		1	1	

0x0x

01x0

1xx1

$$f(a,b,c,d) = \bar{a}\bar{c} + ad + \bar{a}b\bar{d}$$

$$01x0 = \{0100, 0110\}$$

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

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

Soma de mintermos / produto de maxtermos

$$f(a,b,c) = \sum m(0,4,5,7) = \prod M(1,2,3,6)$$

	bc	00	01	11	10
a	0		1	1	1
	1				1

Annotations: $\bar{a}c$ (red arrow pointing to 01, 11), $b\bar{c}$ (blue arrow pointing to 01, 11), \bar{f} (circled in blue)

	bc	00	01	11	10
a	0		0	0	0
	1				0

Annotations: $a+\bar{c}$ (orange arrow pointing to 01, 11), 0×1 (orange arrow pointing to 11, 10), $a+\bar{c}$ (orange arrow pointing to 10, 10), $\bar{b}+c$ (pink arrow pointing to 01, 11), \bar{f} (circled in pink)

$\bar{f}(a,b,c) = \bar{a}c + b\bar{c}$

$f = \bar{f} \Rightarrow f(a,b,c) = \bar{a}c + b\bar{c}$

$= (\bar{a}c) \cdot (b\bar{c})$

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

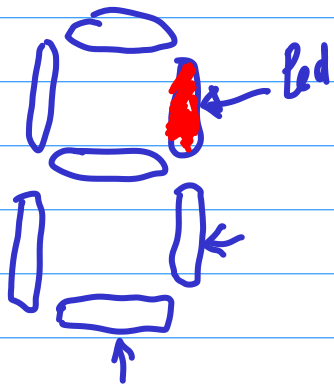
$f(a,b,c) = (a+\bar{c})(\bar{b}+c)$

Don't care

Ex. onde some don't care

BCD → Binary coded decimal

0, 1, ..., 9



0000 → 1001

1010 ~ 1111 ← don't cares

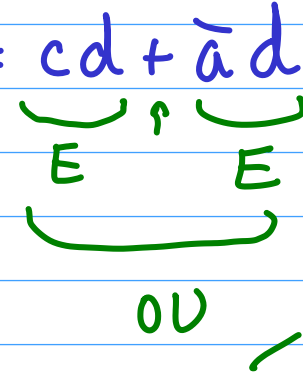
O valor da função p/ essa entrada ñ importa.

f'	x	$f(x)$
0	0000	1
1	0001	1
2	0010	1
3	0011	1
4	0100	1
5	0101	0
6	0110	0
7	0111	1
8	1000	1
9	1001	1

A red arrow points from the right side of the table down to an 'X' mark, indicating that the values for $f(x)$ for $x = 5, 6$ are not used.

ab \ cd	00	01	11	10
00	<u>x</u>	1	1	<u>x</u>
01		<u>x</u>	1	
11			1	
10			1	

$$f(a,b,c,d) = cd + \bar{a}d$$

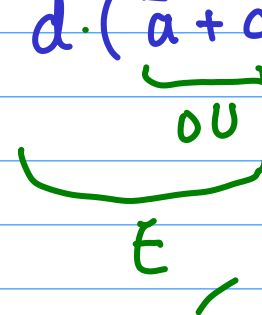


3 primes

f
↓
cd

ab \ cd	00	01	11	10
00	0			0
01	0	1		0
11	0	0		0
10	0	0		0

$$f(a,b,c,d) = d \cdot (\bar{a} + c)$$

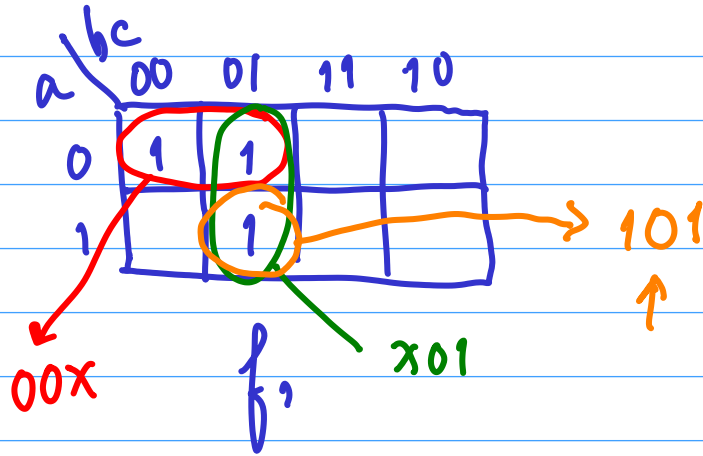


2 primes

1x0x → (a-bar + c)

xxx0 → d

Minimização de múltiplas funções



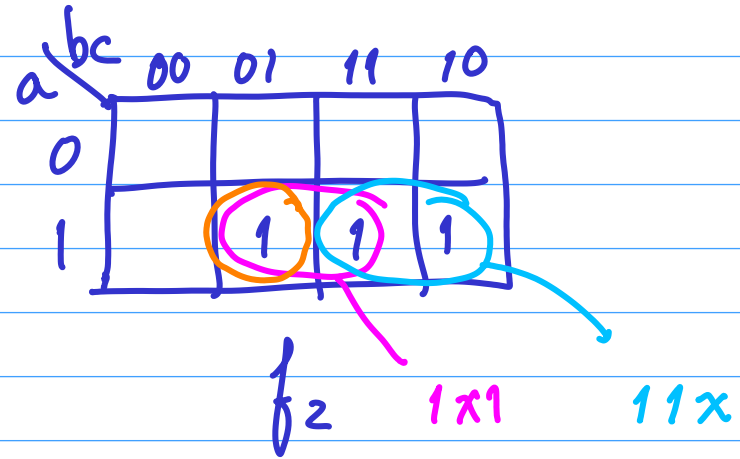
$$f_1(a,b,c) = \bar{a}\bar{b} + \bar{b}c$$

3 portas

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

$$\bar{b}(\bar{a} + ac)$$

$$\bar{b}(\bar{a} + c)$$



$$f_2(a,b,c) = ac + ab$$

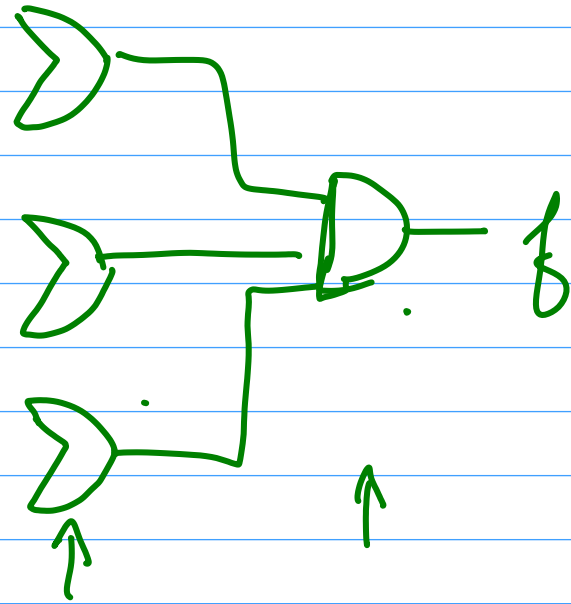
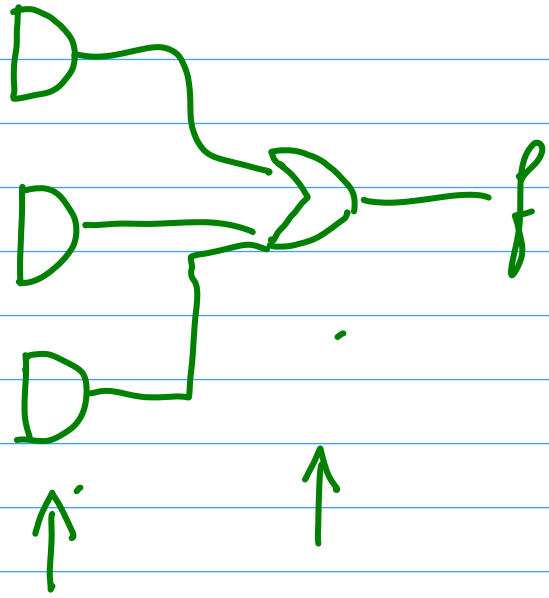
3 portas

⇒ 6 portas

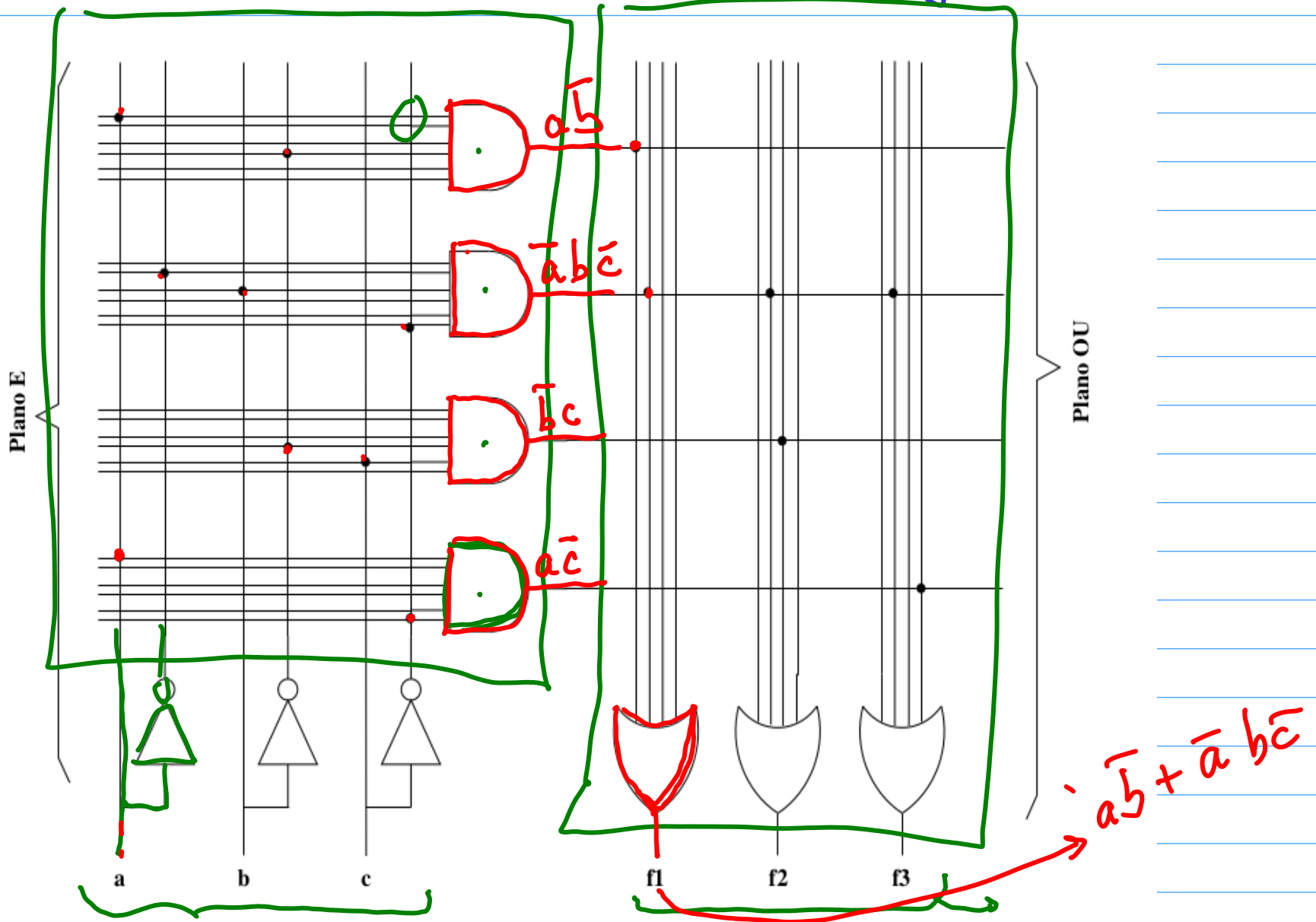
$$= a\bar{b} + a\bar{b}c$$

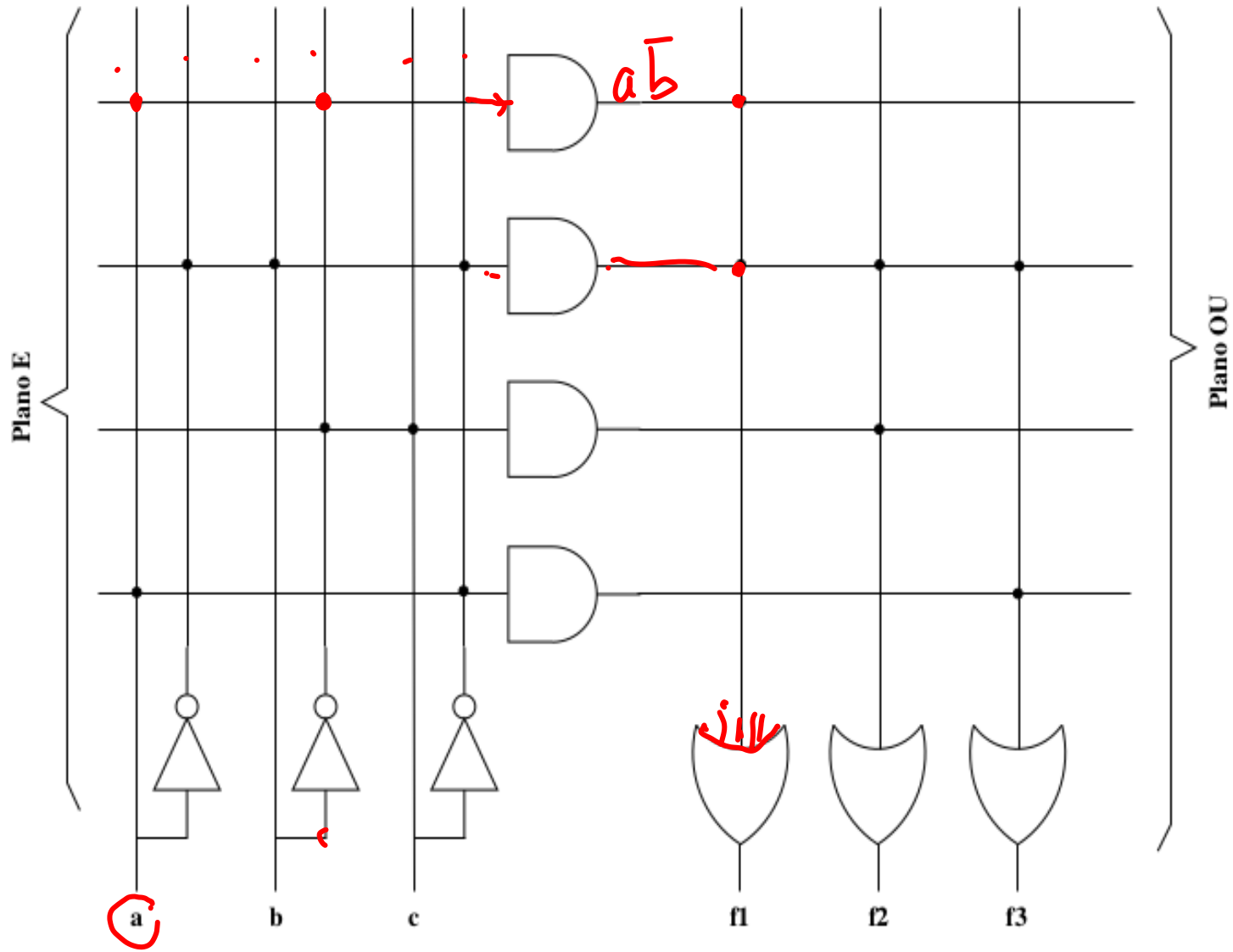
3 portas E + 2 portas O U ⇒ 5 portas

$$a(\bar{b} + \bar{b}c)$$



PLA - Programmable Logic Arrays





QM (Quine - McCluskey)

$$f(a,b,c) = \sum m(0,1,4,5,6)$$

000, 001, 100, 101, 110

