

A+

## Lista de exercícios 5 - Correção da P1

$$\textcircled{1} \quad f(a, b, c, d) = \bar{a}b\bar{c} + (\bar{d} + \underline{\bar{a}\bar{b}})(\underline{\bar{c} + b\bar{c}\bar{d}}) + \bar{a}(\underline{a \oplus b})$$

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

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

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

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

$$= \bar{a}\bar{b} + \underline{\bar{b}\bar{c}\bar{d}} + \emptyset + \bar{a}\bar{b}c + \underline{acd} + \underline{\bar{b}c} + \underline{\bar{b}\bar{c}\bar{d}} = \rightarrow$$

$$= \bar{a}\bar{b} + \underline{\bar{b}c} + \underline{\bar{a}\bar{b}c} + \underline{\bar{a}\bar{b}cd} + abc\bar{d} = \rightarrow$$

$$= \bar{a}\bar{b} + \bar{b}c + \underline{abcd} = \rightarrow$$

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

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

$$= \bar{a}\bar{b} + \bar{b}c + \underline{bcd} = \rightarrow$$

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

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

$$= \boxed{\bar{a}\bar{b} + \bar{b}c + cd} //$$

de Morgan:  $\bar{\bar{a}\bar{b}} = \bar{a} + \bar{b}$

complemento:  $\bar{\bar{a}} = a$        $a \oplus b = \bar{a}b + a\bar{b}$

de Morgan:  $\bar{c} + b\bar{c}\bar{d} = \bar{c} \cdot \bar{b}\bar{c}\bar{d}$

Distributiva e identidades:  $\bar{d} \cdot d = 0$

$\bar{a}\bar{a} = \bar{a}$  /  $\bar{a}a = 0$

Absorção:  $\bar{a}\bar{b}(\bar{c} + 1) = \bar{a}\bar{b}$

de Morgan:  $\bar{b}\bar{c} = \bar{b} + \bar{c}$

Distributiva e identidade:  $c\bar{c} = 0$

Identidades:  $d \cdot \bar{d} = 0$  /  $\bar{b} \cdot b = \bar{b}$

Distributiva

Absorção:  $\bar{b}c + \bar{b}cd = \bar{b}c(1 + d) = \bar{b}c$

"acd" expandido:  $\bar{a}\bar{b}cd + \bar{a}\bar{b}cd$

Absorção:  $\bar{a}\bar{b}c(1 + d) = \bar{a}\bar{b}c$

$\bar{b}c(1 + \bar{a}) = \bar{b}c$

Propriedade:  $\bar{b} + bd = \bar{b} + d$

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

$\bar{a} + acd = \bar{a} + cd$

② a)  $54_{10} - 34_{10}$   
Em complemento de 2:

$$\begin{array}{r}
 54 \quad |_2 \\
 0 \quad 27 \quad |_2 \\
 \swarrow \quad \downarrow \quad \downarrow \\
 1 \quad 13 \quad |_2 \\
 \quad \quad \quad \downarrow \\
 1 \quad 6 \quad |_2 \\
 \quad \quad \quad \downarrow \\
 0 \quad 3 \quad |_2 \\
 \quad \quad \quad \downarrow \\
 1 \quad 1 \quad |_2 \\
 \quad \quad \quad \downarrow \\
 1 \quad 0
 \end{array}$$

$\therefore +54: 0110110$

em binário	em C2
$32_{10}: 100000$	$\rightarrow +32_{10}: 0100000$
$\therefore +34_{10}: 0100010$	$\uparrow$
$-34_{10}: 1011110$	$\boxed{\text{L sinal} \oplus}$

número mínimo de bits = 7

$$\Rightarrow 54_{10} - 34_{10} \stackrel{\text{C2}}{=} \begin{array}{r}
 0 \ 1 \ 1 \ 0 \ 1 \ 1 \ 0 \\
 + 1 \ 0 \ 1 \ 1 \ 1 \ 1 \ 0 \\
 \times 0 \ 0 \ 1 \ 0 \ 1 \ 0 \ 0 = +20_{10} //
 \end{array}$$

b)  $-5B_{16} - 3F_{16}$

8 bits  
Em binário:  $(5B)_{16}: \underline{0 \ 1 \ 0 \ 1} \quad \underline{1 \ 0 \ 1 \ 1}$

$-5B$  em C2:  
 $10100101$

$(3F)_{16}: \underline{0 \ 0 \ 1 \ 1} \quad \underline{1 \ 1 \ 1 \ 1}$

$-3F$  em C2:  
 $11000001$

$$\Rightarrow -5B_{16} - 3F_{16} \stackrel{\text{C2}}{=} \begin{array}{r}
 10100101 \\
 + 11000001 \\
 \hline
 \times 01100110 = +102_{10} //
 \end{array}$$

O resultado encontrado está incorreto. Houve troca de sinal, caracterizando overflow.

- ③)  $d[3:0]$  são entradas (binário de 4 bits). Faixa válida de 1 a 12.
- $y=1$  para  $d=1$  ou  $6 \leq d \leq 9$
  - $y=0$  caso contrário

→ Mapa de Karnaugh

$d_3\backslash d_0$	00	01	11	10
00	X	0	0	1
01	1	0	X	1
11	0	1	X	0
10	0	1	X	0

①:  $d_2d_1$ ,  
②:  $d_2'd_1'$

$y = d_2d_1 + d_2'd_1'$

③

④ → Mapas de Karnaugh

$d\backslash ab$	00	01	11	10
00	1	1	1	1
01	1	0	0	1
11	0	0	0	0
10	1	1	1	0

①

③

①  $b'd'$

②  $a'c'e'$

$d\backslash ab$	00	01	11	10
00	1	0	1	1
01	1	0	0	1
11	0	0	0	0
10	0	0	1	0

$c=1$

$f(a,b,c,d) = b'd' + a'c'e' + a'b'e'$