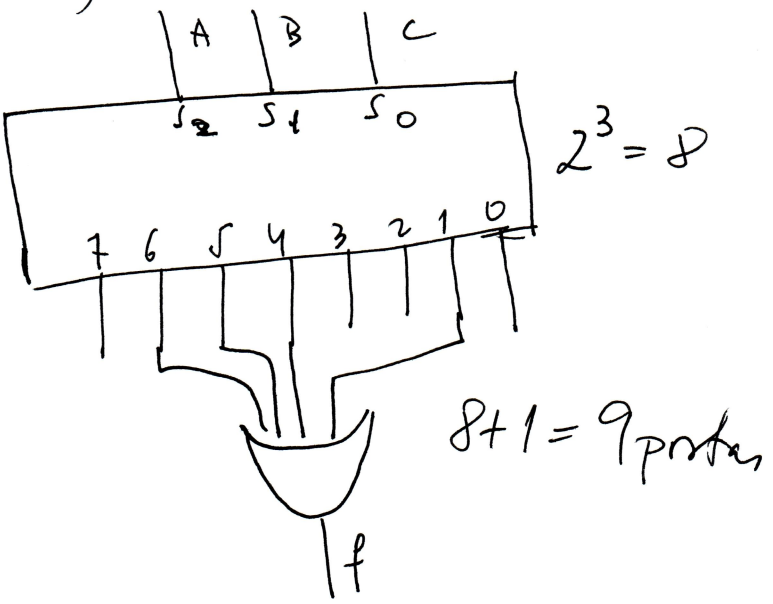
Q1
a)

A	B	C	D	E
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	1
0	1	1	0	0
0	1	1	1	1
1	0	0	0	1
1	0	0	1	0
1	0	1	0	1
1	0	1	1	0
1	1	0	0	1
1	1	0	1	0
1	1	1	0	1
1	1	1	1	0

Q1 $F(A,B,C) = \Pi(0,2,3,7)$

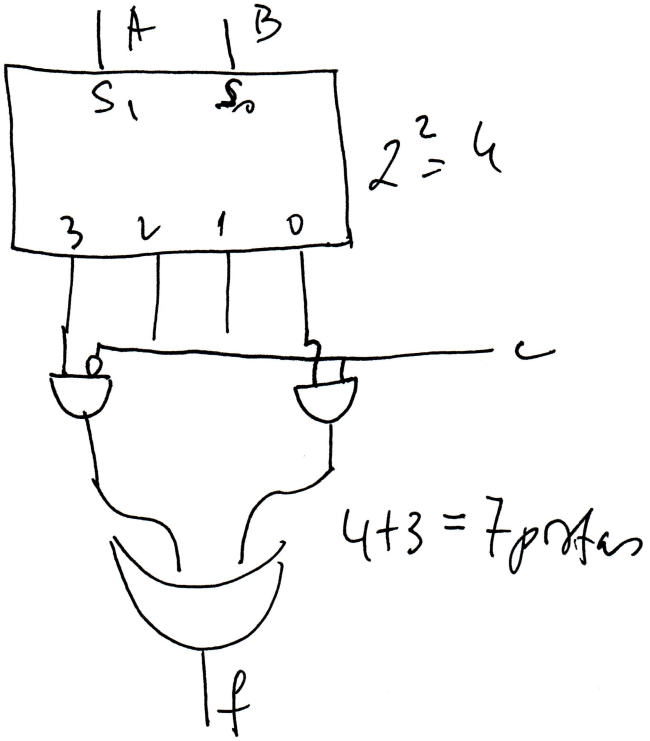
b)

A B C	f	
0 0 0	0	C
0 0 1	1	
0 1 0	0	0
0 1 1	0	
1 0 0	1	1
1 0 1	1	
1 1 0	1	$\bar{C}$
1 1 1	0	



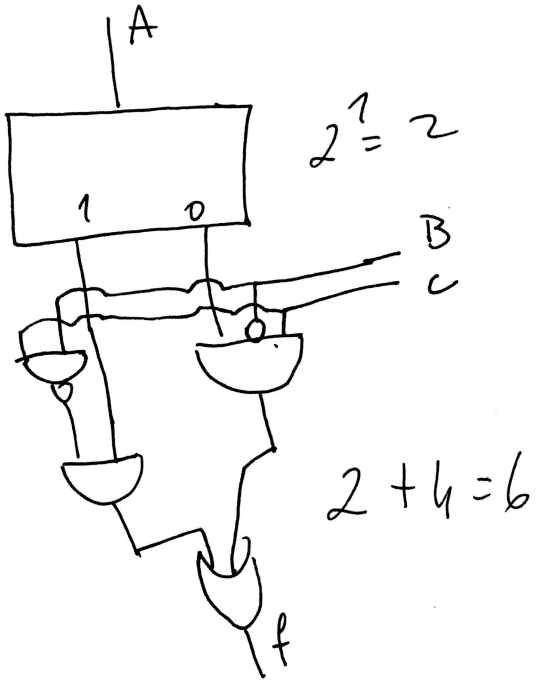
$2^3 = 8$

8+1 = 9 portas



$2^2 = 4$

4+3 = 7 portas



$2^1 = 2$

2+4 = 6

A = 0 $\quad \bar{B}C$

C \ B	0	1
0	0	0
1	(1)	0

A = 1

C \ B	0	1
0	(1)	(1)
1	(1)	0

$\bar{B} + \bar{C} = \overline{BC}$

a melhor solução é com descodificador de uma variável

Q1

c) $F = A * (B + [C_1 C_0]) + D$

$$\begin{array}{r} \emptyset \quad B \\ +\quad C_1 \; C_0 \\ \hline S_2' \; S_1' \; S_0' \end{array} * A$$

$$\begin{array}{r} AS_2' \; AS_1' \; AS_0' \\ +\quad \emptyset \quad \emptyset \quad D \\ \hline S_2 \; S_1 \; S_0 \end{array}$$

Podemos utilizar unicamente semi somadores porque nunca temos de somar 3 bits (dois bit do numero mais o transporte da soma anterior)

$S_2 = AS_2$ ou T_1

porque

1) se $C_1 C_0 = 11$
e $B = 1$
e $A = 1$
e $D = 1$
então

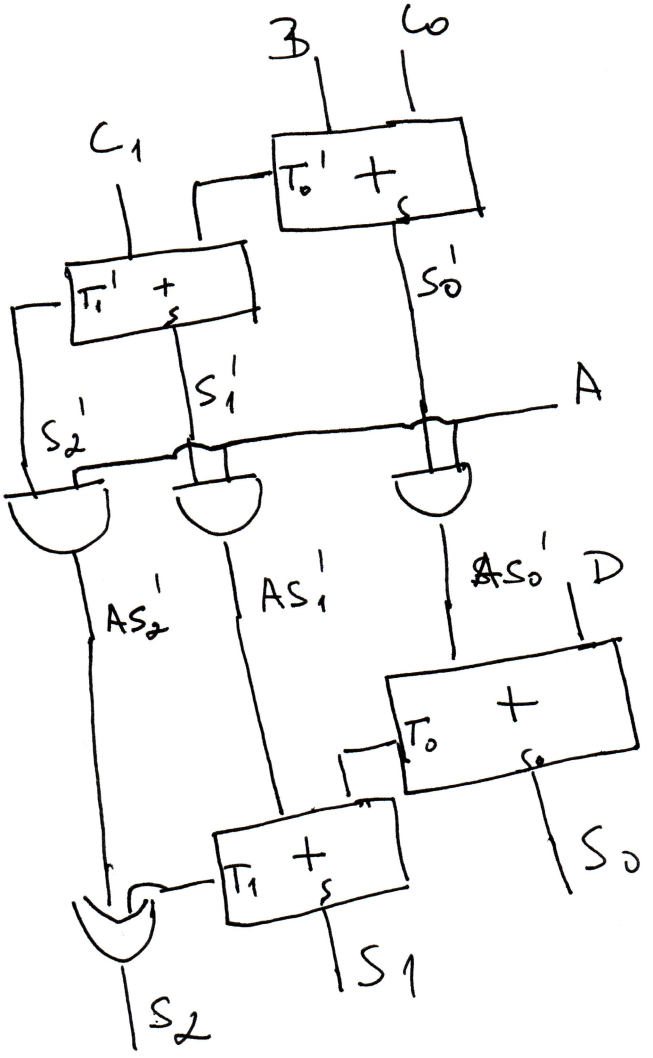
$$\begin{array}{r} AS_2' \; AS_1' \; AS_0' \\ 1 \quad 0 \quad 0 \\ \hline 1 \\ 1 \quad 0 \quad 1 \end{array}$$

para todos os outros casos $AS_2' = 0$

2) considerando
$AS_1' = 1$ e $AS_0' = 1$
e $D = 1$

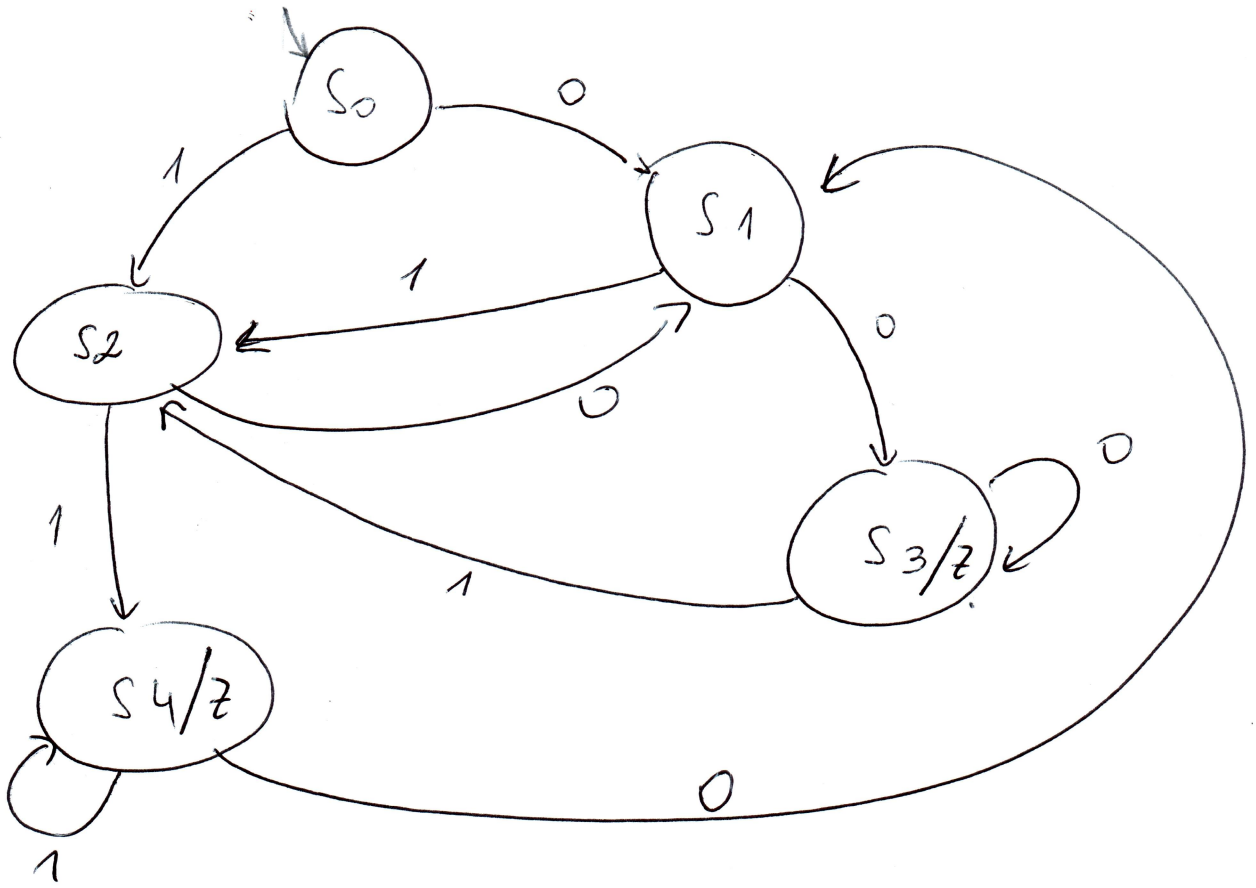
$$\begin{array}{r} 1 \; 1 \\ +\quad 1 \\ \hline 1_{T_1} \; 0_{S_1} \; 0_{S_0} \end{array}$$

$T_1 = 1$ para todos os outros casos $T_1 = 0$



Q1

d) Detectar 00 ou 11 com sobreposição

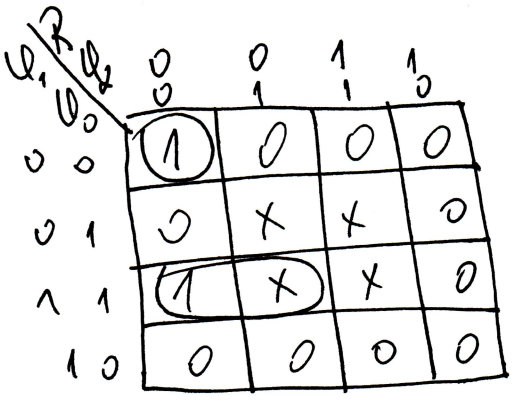


Q_2

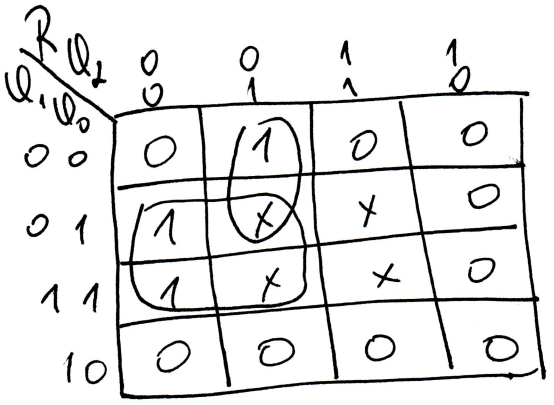
a)

R	Q_2	Q_1	Q_0	D_2 Q_2	D_1 Q_1	D_0 Q_0
0	0	0	0	1	0	0
0	0	0	1	0	1	1
0	0	1	0	0	0	1
0	0	1	1	1	1	0
0	1	0	0	0	1	0
0	1	0	1	X	X	X
0	1	1	0	0	0	0
0	1	1	1	X	X	X
1	0	0	0	0	0	0
1	0	0	1	0	0	0
1	0	1	0	0	0	0
1	0	1	1	0	0	0
1	1	0	0	0	0	0
1	1	0	1	X	X	X
1	1	1	0	0	0	0
1	1	1	1	X	X	X

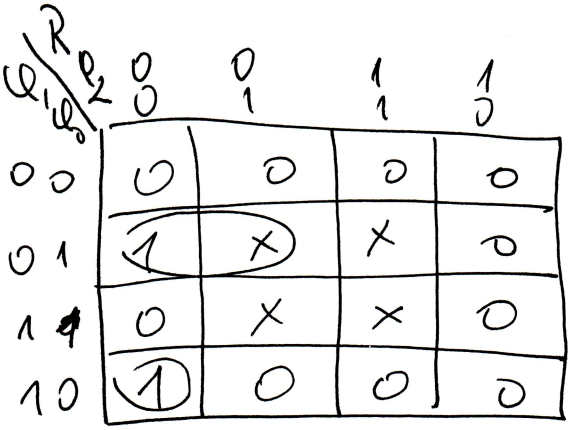
b)



$$D_2 = \bar{R}\bar{Q}_2 Q_1 \bar{Q}_0 + \bar{R} Q_1 Q_0$$



$$D_1 = \bar{R} Q_0 + \bar{R} \bar{Q}_2 Q_1$$



$$D_0 = \bar{R}\bar{Q}_2 Q_1 \bar{Q}_0 + \bar{R} Q_1 Q_0$$

c) Substituindo nas expressões

$Q_2 = 1;\ Q_1 = 1;\ Q_0 = 1;\ R = 0$

$D_2 = \bar{0}\bar{1}\bar{1}\bar{1} + \bar{0}11 = 1$

$D_1 = \bar{0}1 + \bar{0}\bar{1}1 = 1$

$D_0 = \bar{0}\bar{1}1\bar{1} + \bar{0}\bar{1}1 = 0$

Próximo estado 110 (6)

$Q_2 = 1;\ Q_1 = 1;\ Q_0 = 1;\ R = 1$

$D_2 = \bar{1}\bar{1}\bar{1}\bar{1} + \bar{1}11 = 0$ $D_0 = \bar{1}\bar{1}\bar{1}1 + \bar{1}\bar{1}1 = 0$

$D_1 = \bar{1}1 + \bar{1}\bar{1}1 = 0$ Próximo estado 000 (0)