ET46B - Sistemas Digitais

Capítulo 4

(4.1) Simplifique usando Álgebra Booleana

b) $Y = (Q+R)(\bar{Q}+\bar{R})$

$= \cancel{Q\bar{Q}}^{0} + Q\bar{R} + R\bar{Q} + \cancel{R\bar{R}}^{0}$

$= Q\bar{R} + R\bar{Q} = Q\bar{R} + \bar{Q}R$

$= \overline{(Q \oplus R)}$ ← XNOR

d) $q = \overline{RST} \cdot \overline{(R+S+T)}$

$= (\bar{R}+\bar{S}+\bar{T})(\bar{R}\cdot\bar{S}\cdot\bar{T})$

$= \cancel{\bar{R}\cdot\bar{R}}^{\bar{R}}\cdot\bar{S}\cdot\bar{T} + \bar{R}\cdot\cancel{\bar{S}\cdot\bar{S}}^{\bar{S}}\cdot\bar{T} + \bar{R}\cdot\bar{S}\cdot\cancel{\bar{T}\cdot\bar{T}}^{\bar{T}}$

$= \bar{R}\bar{S}\bar{T} + \bar{R}\bar{S}\bar{T} + \bar{R}\bar{S}\bar{T}$

$= \bar{R}\cdot\bar{S}\cdot\bar{T}$

h) $X = AB(\overline{C \cdot D}) + \overline{A}.B.D + \overline{B}.\overline{C}.\overline{D}$

$= A.B(\overline{\overline{C}} + \overline{D}) + \overline{A}.B.D + \overline{B}.\overline{C}.\overline{D}$

$= ABC + AB\overline{D} + \overline{A}BD + \overline{B}\overline{C}\overline{D}$

$= B(AC + A\overline{D} + \overline{A}D) + \overline{B}\overline{C}\overline{D}$

$\overline{(A \oplus D)}$

$= ABC + B\overline{(A \oplus D)} + \overline{B}.\overline{C}.\overline{D}$

(4.4)

A	B	C	X	* SOMA DE PRODUTOS *
0	0	0	1	$\overline{A}.\overline{B}.\overline{C}$
0	0	1	0	
0	1	0	1	$\overline{A}.B.\overline{C}$
0	1	1	1	$\overline{A}.B.C$
1	0	0	1	$A.\overline{B}.\overline{C}$
1	0	1	0	
1	1	0	0	
1	1	1	1	ABC

$X = \overline{A}.\overline{B}.\overline{C} + \overline{A}.B.\overline{C} + \overline{A}.B.C + A.\overline{B}.\overline{C} + A.B.C$

$= \overline{A}.\overline{C}(B + \overline{B})' + (A + \overline{A})BC + A\overline{B}.\overline{C}$

$= \bar{A}.\bar{C} + BC + A.\bar{B}.\bar{C} + \bar{A}.\bar{B}.\bar{C}$

$= \bar{A}.\bar{C} + B.C + \bar{B}.\bar{C}\,(\cancel{A+\bar{A}})^{1}$

$= \bar{A}.\bar{C} + \underbrace{B.C + \bar{B}.\bar{C}}_{XOR}$

$$\boxed{X = \bar{A}.\bar{C} + (B \oplus C)}$$

4.5 PROJETE ⇒ SAÍDA 1 QUANDO A MAIORIA DAS ENTRADAS ASSUME NÍVEL BAIXO

A	B	C	X	
0	0	0	1	$\bar{A}\bar{B}.\bar{C}$
0	0	1	1	$\bar{A}.\bar{B}.C$
0	1	0	1	$\bar{A}B.\bar{C}$
0	1	1	0	
1	0	0	1	$A\bar{B}.\bar{C}$
1	0	1	0	
1	1	0	0	
1	1	1	0	

$X = \bar{A}.\bar{B}.\bar{C} + \bar{A}.\bar{B}.C + \ldots$

$\ldots + \bar{A}.B.\bar{C} + A.\bar{B}.\bar{C}$

$= \bar{A}.\bar{B}(\cancel{C+\bar{C}})^{0} + \bar{A}B\bar{C} + \ldots$

$+ A\bar{B}.\bar{C} + \underbrace{\bar{A}.\bar{B}.\bar{C} + \bar{A}\bar{B}\bar{C}}_{\text{NÃO ALTERA O RESULTADO}}$

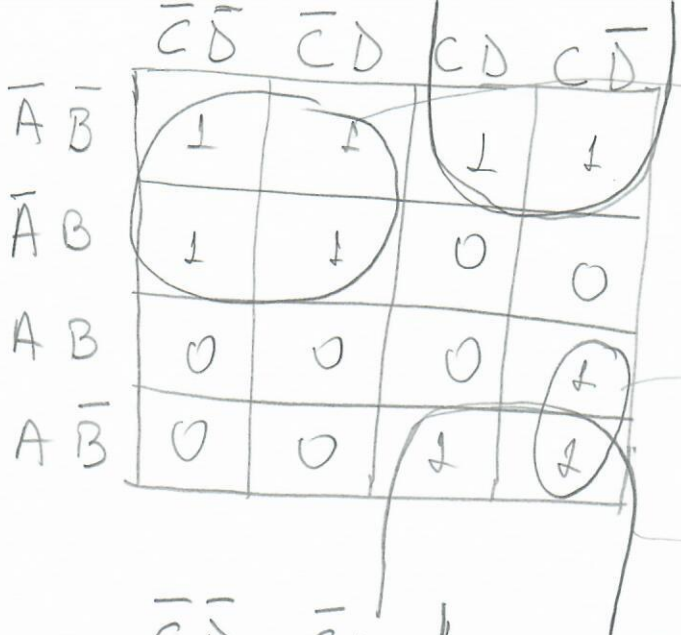
$= \bar{A}\bar{B} + \bar{A}.\bar{C}\,(\cancel{B+\bar{B}})^{1} + \ldots$

$\ldots + \bar{B}.\bar{C}\,(\cancel{A+\bar{A}})^{1}$

$= \bar{A}.\bar{B} + \bar{A}.\bar{C} + \bar{B}.\bar{C}$

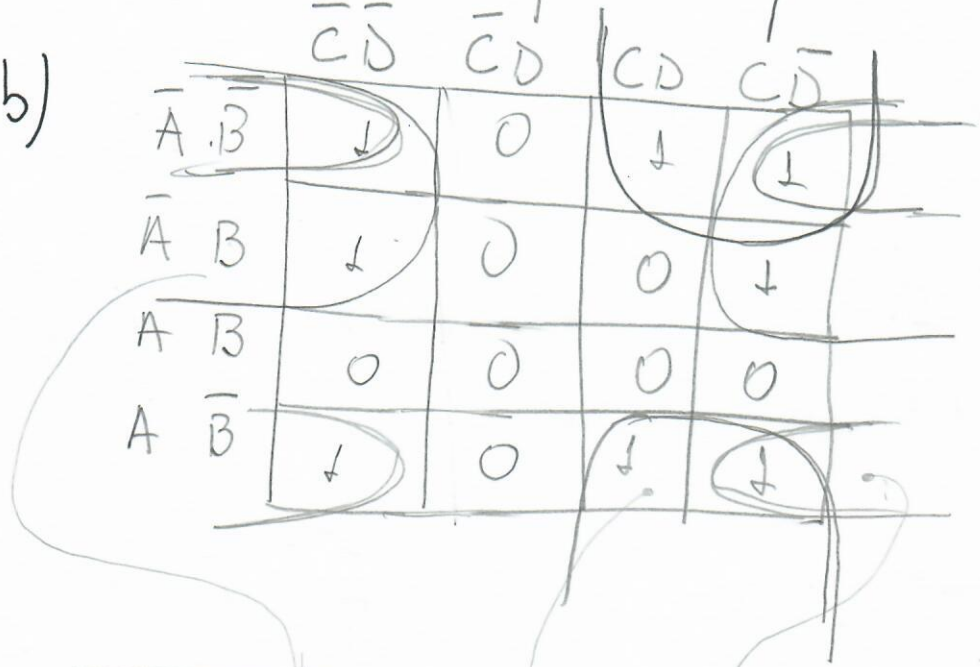
$= \overline{AB + AC + BC}$ //

(4.11) a)



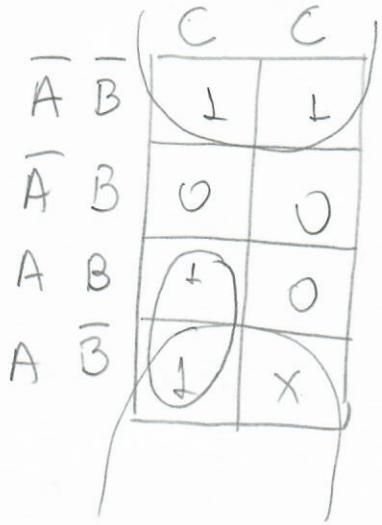
$$X = \bar{A}\bar{C} + \bar{B}C + AC\bar{D}$$

b)



$$X = \bar{A}\bar{D} + \bar{B}C + \bar{B}\bar{D}$$

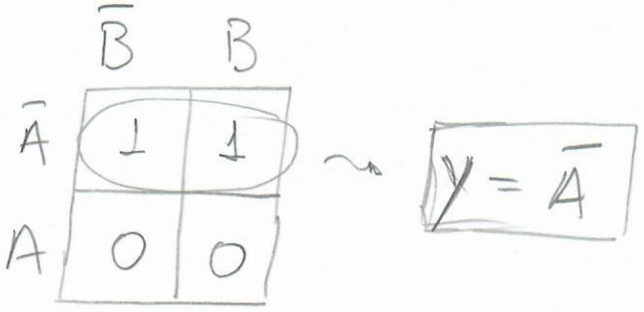
c)



$$X = \bar{B} + A\bar{C}$$

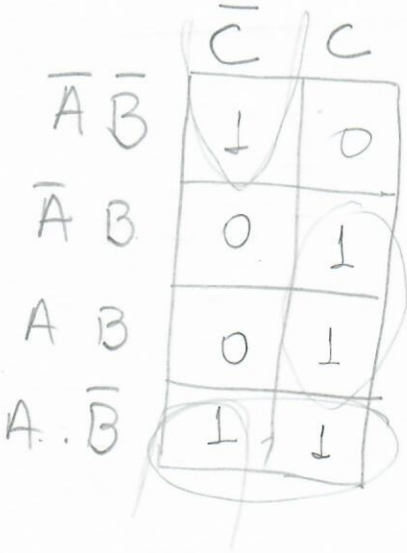
(4.12) MAPA DE KARNAUGH → EXPRESSÃO SIMPLIFICADA.

A	B	Y
0	0	1
0	1	1
1	0	0
1	1	0



(4.14) a) SIMPLIFIQUE USANDO MAPA DE KARNAUGH

$$X = \bar{A}.\bar{B}.\bar{C} + \bar{A}.B.C + A.B.C + A.\bar{B}.\bar{C} + A.\bar{B}.C$$



$$X = \bar{B}.\bar{C} + BC + A.\bar{B}$$

c) $X = AB.\overline{(\bar{C}.D)} + \bar{A}BD + \bar{B}.\bar{C}.\bar{D}$

$= AB(\bar{\bar{C}} + \bar{D}) + \bar{A}BD + \bar{B}.\bar{C}.\bar{D}$

$= ABC + AB\bar{D} + \bar{A}BD + \bar{B}.\bar{C}.\bar{D}$

	$\bar{C}\bar{D}$	$\bar{C}D$	CD	$C\bar{D}$
$\bar{A}\bar{B}$	1	0	0	0
$\bar{A}B$	0	1	1	0
AB	1	0	1	1
$A\bar{B}$	1	0	0	0

$$X = AB\bar{D} + \bar{B}\bar{C}.\bar{D} + \bar{A}.BD + ABC$$

4.22 → 1 QUANDO TODAS AS 3 ENTRADAS ASSUMIREM 0/1

A	B	C	X
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

⇒

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

$$X = ABC + \bar{A}.\bar{B}.\bar{C}$$