

LISTA 4

②

a) $A + \bar{A} = 1 //$

b) $A \cdot (B + C) = A \cdot B + A \cdot C //$

c) $\bar{\bar{A}} = A //$

d) $\overline{A + B} = (\bar{A} \cdot \bar{B}) = A + B //$

e) $A \cdot 1 = A$

f) $A \cdot A = A$

g) $A + A = A$

h) $A + 0 = A$

i) $A + 1 = 1$

j) $A \cdot 0 = 0$

k) $A \cdot \bar{A} = 0$

②

$$A) A + A.B = A ?$$

$$A.1 + A.B = A$$

$$A.(1+B) = A$$

$$A.1 = A$$

$$A = A //$$

$$b) (A+B).(A+C) = A + B.C$$

$$A.A + A.C + A.B + B.C = A + B.C$$

$$A + A.C + A.B + B.C = A + B.C$$

$$A - A.(C+B) + B.C = A + B.C$$

$$A.(1 + (C+B)) + B.C = A + B.C$$

$$A.1 + B.C = A + B.C$$

$$A + B.C = A + B.C //$$

$$c) A + \bar{A}.B = A + B$$

$$(A + \bar{A}).(A + B) = A + B$$

$$1.(A + B) = A + B$$

$$A + B = A + B //$$

$$③ S = \bar{A}.\bar{B}.C + \bar{A}.B.\bar{C} + \bar{A}.\bar{B}.\bar{C} + \bar{A}.B.C$$

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

$$= \bar{A}(\bar{B}(C + \bar{C}) + B(\bar{C} + C))$$

$$= \bar{A}(\bar{B}.1 + B.1)$$

$$= \bar{A}(\bar{B} + B)$$

$$= \bar{A}.1$$

$$= \bar{A}$$

$$④ S = \bar{A} + B [C + (\overline{A \cdot \bar{B} + A \cdot \bar{C}})]$$

$$= \bar{A} + B [\bar{C} + (\overline{A \cdot \bar{B} + A \cdot \bar{C}})]$$

$$= \bar{A} + B [\bar{C} \cdot (A \cdot \bar{B} + A \cdot \bar{C})]$$

$$= \bar{A} + B [\bar{C} \cdot A (\bar{B} + \bar{C})]$$

$$= \bar{A} + B \bar{C} A (\bar{B} + \bar{C})$$

$$= \bar{A} + A (\bar{B} \cdot B \cdot \bar{C} + B \cdot \bar{C} \cdot \bar{C})$$

$$= \bar{A} + A (0 + B \cdot \bar{C})$$

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

$$= \bar{A} + (A \cdot B \cdot \bar{C})$$

$$= (\bar{A} + A) \cdot (\bar{A} + B) \cdot (\bar{A} + \bar{C})$$

$$= 1 \cdot (\bar{A} + B) \cdot (\bar{A} + \bar{C})$$

$$= (\bar{A} + B) \cdot (\bar{A} + \bar{C})$$

$$= [(\bar{A} + B) \cdot \bar{A}] + (\bar{A} + B) \cdot \bar{C} \quad (\text{lei da absorção})$$

$$= \bar{A} + \bar{C} \cdot (\bar{A} + B)$$

$$= \bar{A} + (\bar{C} \cdot \bar{A} + \bar{C} B)$$

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

$$= \bar{A} (1 + \bar{C}) + \bar{C} B$$

$$= \bar{A} \cdot 1 + \bar{C} B$$

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

$$⑤ S = \overline{A \cdot \bar{B} + C \cdot (\overline{A \oplus B})}$$

$$= \overline{A \cdot \bar{B} + C \cdot (\overline{A \bar{B} + \bar{A} B})}$$

$$= (\bar{A} + B) \cdot (\bar{C} + A \cdot \bar{B} + \bar{A} \cdot B) \cdot B$$

$$= (\bar{A} + B) \cdot \bar{C} + (\bar{A} + B) \cdot A \cdot \bar{B} + (\bar{A} + B) \cdot \bar{A} \cdot B$$

$$= (\bar{A} + B) \cdot \bar{C} + \bar{A} A \bar{B} + A B \bar{B} + (\bar{A} + B) \bar{A} B$$

$$= (\bar{A} + B) \cdot \bar{C} + [(\bar{A} + B) \bar{A}] B \quad (\text{lei da absorção})$$

$$= (\bar{A} + B) \cdot \bar{C} + \bar{A} B$$

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

$$= (\bar{A} \bar{C} + B) (B + \bar{C})$$

$$\textcircled{6} S = [A + (\bar{B} + C) \cdot (\bar{B} + \bar{C}) \cdot (\bar{C} + \bar{D})] \cdot A \cdot (C \cdot D + \bar{C} \cdot D)$$

$$S = [A + (\bar{B} + C) \cdot (\bar{B} + \bar{C}) \cdot (\bar{C} + \bar{D})] \cdot A \cdot (C \cdot D + \bar{C} \bar{D} + \bar{C} D)$$

$$= (A + \underbrace{(\bar{B} + C) \cdot (\bar{B} + \bar{C}) \cdot (\bar{C} + \bar{D})}) + \bar{A} + (C D + \bar{C} \bar{D} + \bar{C} D)$$

$$* (\bar{B} + C) \cdot (\bar{B} + \bar{C})$$

$$= \bar{B}(\bar{B} + C) + \bar{C}(\bar{B} + C)$$

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

$$= \bar{B} + \bar{B}C + \bar{B}\bar{C} + 0$$

$$= \bar{B}(1 + C + \bar{C})$$

$$= \bar{B} \cdot 1 = \bar{B}$$

LEI DA
REDUNDANCIA
OU ASSOCIAÇÃO
LOGICA

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

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

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

LEI DA ASSOCIAÇÃO

$$= \bar{A} + (C D + \bar{C} \bar{D} + \bar{C} D)$$

$$= \bar{A} + (\bar{C} D + \bar{C} \bar{D} + \bar{C} D)$$

$$* C D + \bar{C} D$$

$$= (C D + \bar{C})(C D + D)$$

$$= (C D + \bar{C})(D(C + 1))$$

$$= (C D + \bar{C}) D \cdot 1$$

$$= C D D + \bar{C} D$$

$$= C D + \bar{C} D$$

$$= D(C + \bar{C})$$

$$= D \cdot 1 = D$$

LEI DA
REDUNDANCIA
OU ASSOCIAÇÃO
LOGICA

$$= \bar{A} + (D + \bar{C} \bar{D})$$

$$= \bar{A} + (\bar{D} \cdot (\bar{C} + \bar{D}))$$

$$= \bar{A} + (\bar{D} \cdot (C + D))$$

$$= \bar{A} + \bar{D}(C + D)$$

$$= \bar{A} + C \bar{D} + D \bar{D} = \bar{A} + C \bar{D} //$$

7a)

$$\begin{aligned} \bar{X}_1 + X_2 &= \bar{X}_1 \bar{X}_2 + \bar{X}_1 X_2 + X_1 X_2 \\ &= (\bar{X}_1 \bar{X}_2) + (\bar{X}_1 X_2) + X_1 X_2 \\ &= (\bar{X}_1 X_2 + \bar{X}_1)(\bar{X}_1 X_2 + \bar{X}_2) + X_1 X_2 \\ &= \bar{X}_1 (X_2 + 1)(\bar{X}_1 X_2 + \bar{X}_2) + X_1 X_2 \\ &= \bar{X}_1 (\bar{X}_1 X_2 + \bar{X}_2) + X_1 X_2 \\ &= \bar{X}_1 \bar{X}_2 X_2 + \bar{X}_1 \bar{X}_2 + X_1 X_2 \\ &= \bar{X}_1 X_2 + \bar{X}_1 \bar{X}_2 + X_1 X_2 \\ &= \bar{X}_1 (X_2 + \bar{X}_2) + X_1 X_2 \\ &= \bar{X}_1 + X_1 X_2 \\ &= (\bar{X}_1 + X_1)(\bar{X}_1 + X_2) \\ &= 1(\bar{X}_1 + X_2) \\ &= \bar{X}_1 + X_2 \end{aligned}$$

Expressão Verdadeira

b)

$$\begin{aligned} x\bar{y}\bar{z} + \bar{x}y\bar{z} + \bar{x}\bar{y}z + x\bar{y}z &= (x+y)\bar{z} + \bar{x}\bar{y}z \\ x\bar{z}y + x\bar{z}\bar{y} + \bar{x}y\bar{z} + \bar{x}\bar{y}z &= \\ x\bar{z} + \bar{x}y\bar{z} + \bar{x}\bar{y}z &= \\ \bar{z}(x + \bar{x}y) + \bar{x}\bar{y}z &= \\ \bar{z}(x + \bar{x}(x+y)) + \bar{x}\bar{y}z &= \\ \bar{z}(1(x+y)) + \bar{x}\bar{y}z &= \\ \bar{z}(x+y) + \bar{x}\bar{y}z &= \end{aligned}$$

Expressão Verdadeira

c)

$$\begin{aligned}\bar{X}_1 X_2 + X_1 X_2 \bar{X}_3 + \bar{X}_1 X_2 + X_1 \bar{X}_2 &= \bar{X}_2 X_3 + X_1 \bar{X}_3 + X_2 \bar{X}_3 + \bar{X}_1 X_2 X_3 \\ (X_2 + \bar{X}_3)(\bar{X}_1 + \bar{X}_2 + X_3)(X_1 + \bar{X}_2)(\bar{X}_1 + X_2) &= (X_2 + \bar{X}_3)(\bar{X}_1 + X_3)(\bar{X}_2 + X_3)(X_1 + \bar{X}_2 + \bar{X}_3) \\ (X_1 + \bar{X}_2 \bar{X}_3)(\bar{X}_1 + X_2(\bar{X}_2 + X_3)) &= (\bar{X}_3 + X_2(X_1 + \bar{X}_2))(X_3 + \bar{X}_1 \bar{X}_2) \\ (X_1 + \bar{X}_2 \bar{X}_3)(\bar{X}_1 + X_2 \bar{X}_2 + X_2 X_3) &= (\bar{X}_3 + X_1 X_2 + X_2 \bar{X}_2)(X_3 + \bar{X}_1 \bar{X}_2) \\ X_1 \bar{X}_1 + X_1 X_2 X_3 + \bar{X}_1 \bar{X}_2 \bar{X}_3 + \bar{X}_2 \bar{X}_3 X_2 X_3 &= \bar{X}_3 \bar{X}_3 + \bar{X}_1 \bar{X}_2 \bar{X}_3 + X_1 X_2 X_3 + X_1 X_2 \bar{X}_2 \\ X_1 X_2 X_3 + \bar{X}_1 \bar{X}_2 \bar{X}_3 &= \bar{X}_1 \bar{X}_2 \bar{X}_3 + X_1 X_2 X_3\end{aligned}$$

EXAMESSO VONNADGINA

d)

$$\begin{aligned}X_1 \bar{X}_3 + X_2 X_3 + \bar{X}_2 \bar{X}_3 &= (X_1 + \bar{X}_2 + X_3)(X_1 + X_2 + \bar{X}_3)(\bar{X}_1 + X_2 + X_3) \\ &= (X_1 + \bar{X}_2 + X_3)(X_2 + \bar{X}_3 + X_1)(X_2 + \bar{X}_3 + \bar{X}_1) \\ &= (X_1 + \bar{X}_2 + X_3)(X_2 + \bar{X}_3) \\ &= (X_1 + \bar{X}_2 + X_3)X_2 + (X_1 + \bar{X}_2 + X_3)\bar{X}_3 \\ &= X_2(X_1 + \bar{X}_2 + X_3) + (X_1 + \bar{X}_2 + X_3)\bar{X}_3 \\ &= X_2(X_1 + X_3) + (X_1 + \bar{X}_2 + X_3)\bar{X}_3 \\ &= (X_2 X_1 + X_2 X_3) + (X_1 + \bar{X}_2 + X_3)\bar{X}_3 \\ &= X_2 X_1 + X_2 X_3 + (X_1 + \bar{X}_2 + X_3)\bar{X}_3 \\ &= X_2 X_1 + X_2 X_3 + \bar{X}_3(X_1 + \bar{X}_2 + X_3) \\ &= X_2 X_1 + X_2 X_3 + (\bar{X}_3 X_1 + \bar{X}_3 \bar{X}_2 + \bar{X}_3 X_3) \\ &= X_2 X_1 + X_2 X_3 + (\bar{X}_3 X_1 + \bar{X}_3 \bar{X}_2) \\ &\neq X_2 X_1 + X_2 X_3 + X_1 \bar{X}_3 + \bar{X}_2 \bar{X}_3\end{aligned}$$

EXAMESSO FALSA

e)

$$\begin{aligned}
 X_1 X_2 \bar{X}_3 + \bar{X}_1 X_2 + \bar{X}_1 X_2 X_3 + X_2 \bar{X}_3 &= (X_1 + X_2)(X_2 + X_3)(\bar{X}_1 + \bar{X}_3) \\
 &= [(X_1 + X_2)X_2 + (X_1 + X_2)X_3](\bar{X}_1 + \bar{X}_3) \\
 &= [X_1 X_2 + X_2 X_2 + X_1 X_3 + X_2 X_3](\bar{X}_1 + \bar{X}_3) \\
 &= (X_1 X_2 + X_2 + X_1 X_3 + X_2 X_3)(\bar{X}_1 + \bar{X}_3) \\
 &= \bar{X}_1 X_1 X_2 + \bar{X}_1 X_2 + \bar{X}_1 X_1 X_3 + \bar{X}_1 X_2 X_3 + X_1 X_2 \bar{X}_3 + X_2 \bar{X}_3 + X_1 X_2 X_3 + X_2 X_3 \bar{X}_3 \\
 &= X_1 X_2 \bar{X}_3 + \bar{X}_1 X_2 + \bar{X}_1 X_2 X_3 + X_2 \bar{X}_3
 \end{aligned}$$

Expressão Venn diagrama

l)

$$\begin{aligned}
 (X_1 + X_3)(\bar{X}_1 + \bar{X}_2 + \bar{X}_3)(\bar{X}_1 + X_1) &= X_1 \bar{X}_2 + X_1 \bar{X}_3 + \bar{X}_1 X_3 + \bar{X}_2 X_3 \\
 (X_1 \bar{X}_1 + X_1 \bar{X}_2 + X_1 \bar{X}_3 + \bar{X}_1 X_3 + \bar{X}_2 X_3 + X_3 \bar{X}_3)(\bar{X}_1 + X_1) &= \\
 X_1 \bar{X}_2 \bar{X}_1 + X_1 \bar{X}_3 \bar{X}_1 + \bar{X}_1 X_3 \bar{X}_1 + \bar{X}_2 X_3 \bar{X}_1 + X_1 \bar{X}_2 X_1 + X_1 \bar{X}_3 X_1 + \bar{X}_1 X_3 X_1 + \bar{X}_2 X_3 X_1 \\
 \bar{X}_1 X_3 + \bar{X}_1 \bar{X}_2 X_2 + X_1 \bar{X}_2 + X_1 \bar{X}_3 + X_1 \bar{X}_2 X_3 &= \\
 \bar{X}_2 X_3 + X_1 \bar{X}_2 + X_1 \bar{X}_3 + \bar{X}_2 X_3 &=
 \end{aligned}$$

Expressão Venn diagrama