3-

a)

b)

c)

d)

4-

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

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

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

$$x = A + B + \overline{C}$$

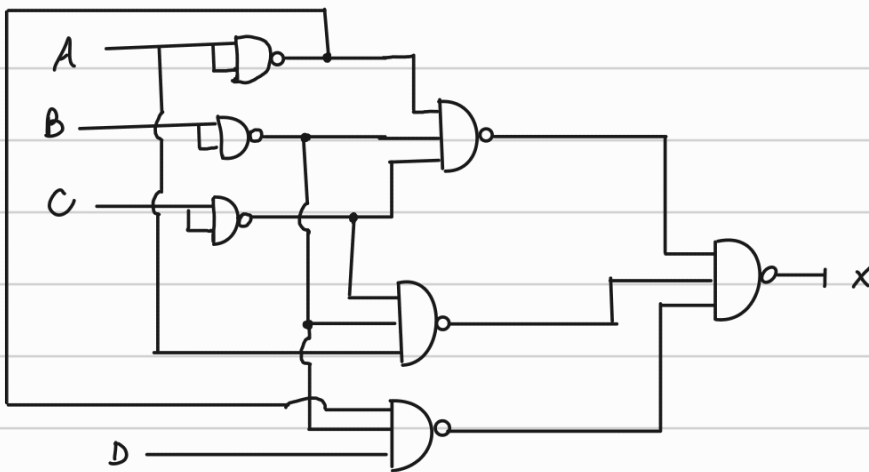| A	B	C	$\overline{C}$	$A+B+\overline{C}$
0	0	0	1	1
0	0	1	0	0
0	1	0	1	1
0	1	1	0	1
1	0	0	1	1
1	0	1	0	1
1	0	0	1	1
1	0	1	0	1

x

6- a) $\overline{A B \overline{C}}$

$A + \overline{B} + C$ //

b) $\overline{\overline{A} + \overline{B} C}$

$A(B + \overline{C})$

$AB + A\overline{C}$ //

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

$\overline{A(\overline{B} C) D}$

$\overline{A} + B + \overline{C} + \overline{D}$

d) $\overline{(M + \overline{N}) \cdot (\overline{M} + N)}$
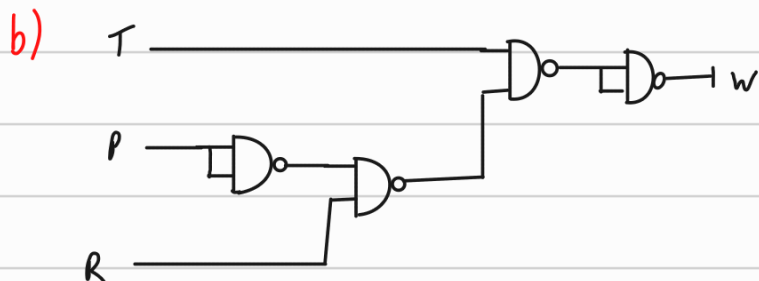
$(\overline{M} N) + (M \overline{N})$

$M \oplus N$

8- $X_{original} = (\overline{A} . \overline{B} . \overline{C}) + (A . \overline{B} . \overline{C}) + (\overline{A} . \overline{B} . D)$

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

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

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

Tanto a expressão original quanto a expressão usando portas NANDs e simplificando-a com De Morgan são iguais.

9- RPM = 0 → V < 4800 RPM

$P = 0$ → $\rho < 1,33 \ N/m^2$

$T = 0$ → $T < 93,3°C$

$W = 1$ → liga a luz

b)

a) $W = (\bar{R}+P) \cdot T$

R	P	T	$\bar{R}$	$\bar{R}+P$	$(\bar{R}+P) \cdot T$
0	0	0	1	1	0
0	0	1	1	1	1
0	1	0	1	1	0
0	1	1	1	1	1
1	0	0	0	0	0
1	0	1	0	0	0
1	1	0	0	1	0
1	1	1	0	1	1

11-a)

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

	$\bar{D}\bar{C}$	$\bar{D}C$	DC	$D\bar{C}$
$\bar{B}\bar{A}$	0	0	X	0
$\bar{B}A$	0	0	X	1
BA	1	0	X	X
$B\bar{A}$	1	0	X	X

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

b)
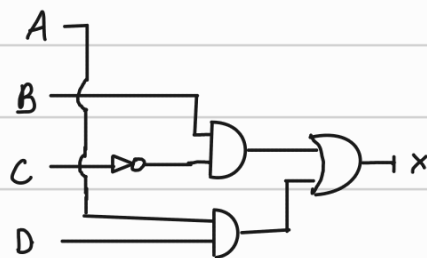
D	C	B	A	x
0	0	0	0	1
0	0	0	1	0
0	0	1	0	0
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	0
1	0	1	0	X
1	0	1	1	X
1	1	0	0	X
1	1	0	1	X
1	1	1	0	X
1	1	1	1	X

	$\bar{D}\bar{C}$	$\bar{D}C$	DC	$D\bar{C}$
$\bar{B}\bar{A}$		1	X	1
$\bar{B}A$		1	X	
BA	1		X	X
$B\bar{A}$			X	X

$$x = C\bar{B} + \bar{C}BA + D\bar{C}B$$
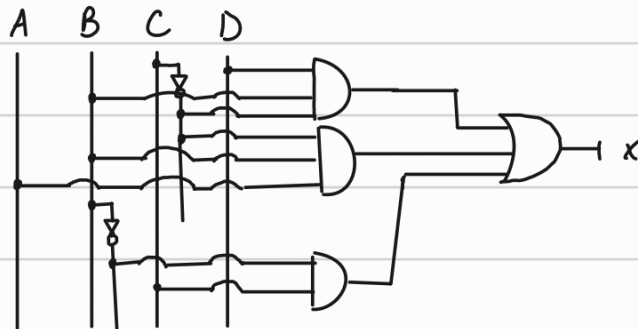
12-

a) $\bar{E}_1 = \bar{E}_2 = E_3 = A_1 = A_2 = A_3 = 0$

Portanto, $O_0 = O_1 = O_2 = O_3 = O_4 = O_5 = O_6 = O_7 = 1$

b) $\bar{E}_1 = \bar{E}_2 = A_1 = A_2 = A_3 = 0$, $E_3 = 1$

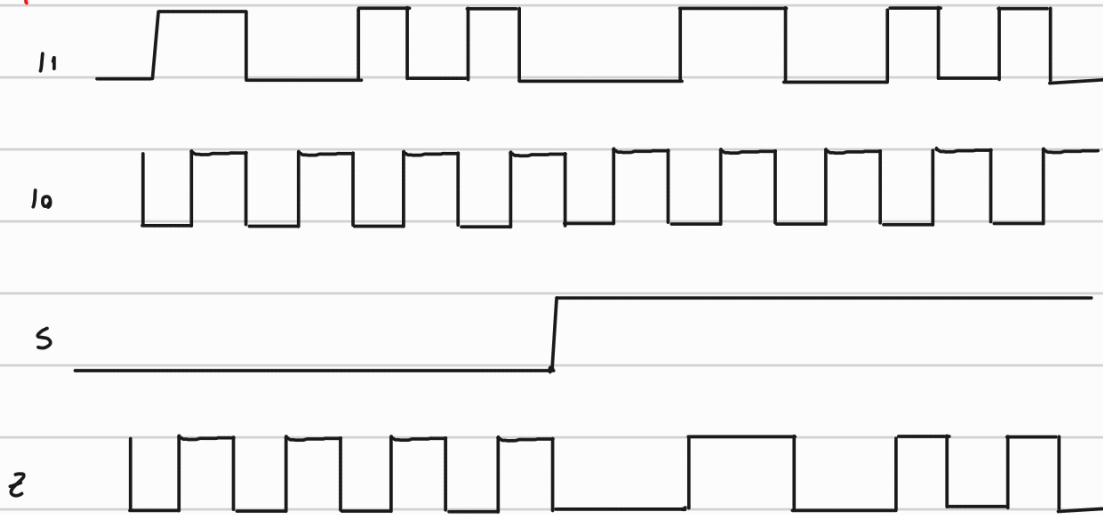Portanto, $O_0 = O_1 = O_2 = O_3 = O_4 = O_5 = O_6 = O_7 = 1$

c) $E_3 = A_1 = A_2 = A_3 = 1$, $\bar{E}_1 = \bar{E}_2 = 0$

Portanto, $O_0 = O_1 = O_2 = O_3 = O_4 = O_5 = O_6 = O_7 = 1$

d) $\bar{E}_1 = \bar{E}_2 = E_3 = A_1 = A_2 = A_3 = 1$

Portanto, $O_0 = O_1 = O_2 = O_3 = O_4 = O_5 = O_6 = O_7 = 1$

14-

Waveforms: I_1, I_0, S, Z

15-

$T_0 \sim T_1 =$ Sem saída	$T_8 \sim T_9 =$ Sem saída	$D = A_2$
$T_1 \sim T_2 = O_0$	$T_9 \sim T_{10} = O_4$	$C = A_1$
$T_2 \sim T_3 =$ Sem saída	$T_{10} \sim T_{11} =$ Sem saída	$B = A_0$
$T_3 \sim T_4 = O_1$	$T_{11} \sim T_{12} = O_5$	$A = \overline{E_1}$
$T_4 \sim T_5 =$ Sem saída	$T_{12} \sim T_{13} =$ Sem saída	
$T_5 \sim T_6 = O_2$	$T_{13} \sim T_{14} = O_6$	
$T_6 \sim T_7 =$ Sem saída	$T_{14} \sim T_{15} =$ Sem saída	
$T_7 \sim T_8 = O_3$	$T_{15} \sim T_{16} = O_7$	

16-

17-

comp. de 2 de 7

a)

```
 _  1  1  0  0   (12)          , 1 0 0 0
      1  0  0  1   (7)                1
 _____                   _____
(1) 0  1  0  1    (5)           1 0 0 1  (-7)
```
dixote
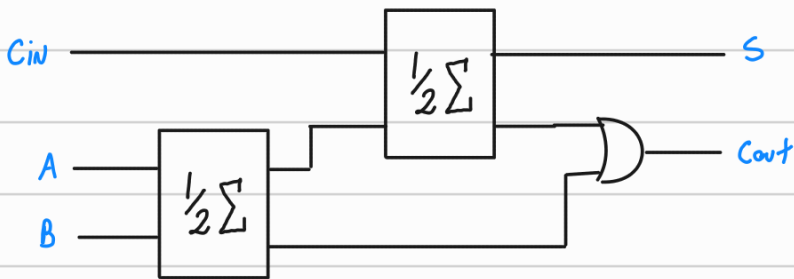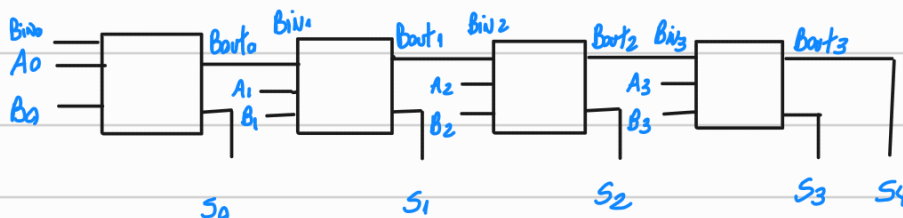
b)

$S_0 = B_0 \oplus A_0 \oplus B_{iN_0} = 1$ $B_{out_0} = 0$

$S_1 = B_1 \oplus A_1 \oplus B_{iN_1} = 0$ $B_{out_1} = 0$

$S_2 = B_2 \oplus A_2 \oplus B_{iN_2} = 1$ $B_{out_2} = 0$

$S_3 = B_3 \oplus A_3 \oplus B_{iN_3} = 0$ $B_{out_3} = 1$

$S_4 = B_{out_3} = 1 \rightarrow$ descarte

O resultado foi igual.