Simplificação algébrica

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

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

$\bar{A}(1)$

$= \bar{A}$

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

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

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

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

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

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

$= \bar{C} + (\bar{A}.B.C)$ identidade $\underset{\bar{C}}{X} + (\underset{C}{X'}.\underset{\bar{A}B}{Y}) = X + Y$

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

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

$A.\bar{A} + A.\bar{B} + AC + B\bar{A} + B.\bar{B} + BC + C\bar{A} + CB + C.C$

$0 + A.\bar{B} + AC + \underline{B\bar{A}} + 0 + BC + C\bar{A} + CB + C$

$A.\bar{B} + B.A + AC + BC + C\bar{A} + CB + C$

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

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

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

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

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

Simplifique as expressões

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

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

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

$(\bar{\bar{AC}}.\bar{B}.\bar{D}) + C\bar{A} + \cancel{C\bar{C}} + C\bar{D}$

$AC.\overline{B+D} + C\bar{A} + CD$

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

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

2) $P = \overline{AB\overline{CD}}$

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

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

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

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

$= \bar{A}+\bar{\bar{B}}+\overline{CD}$

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

* apenas portas NAND

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

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

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

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

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

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

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

$= (1.1.\bar{B}) + (\bar{A}.B)$

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

$= B + \bar{A}$

Simplifique a expressão:

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

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

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

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

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

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

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

$0 + (\overline{\overline{A.C}}) + (\overline{B.A}) + C + (\overline{\overline{\bar{A}B}})$

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

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

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

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

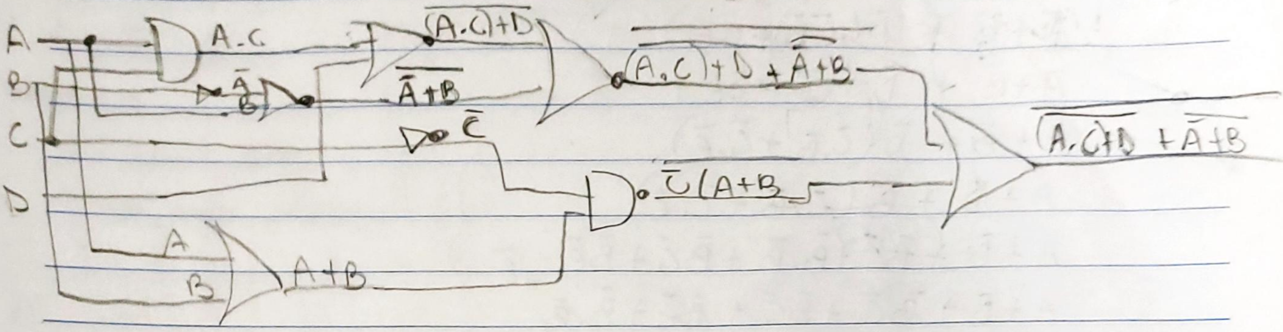
$((1) + C) + B$

$(1) + B = 1$

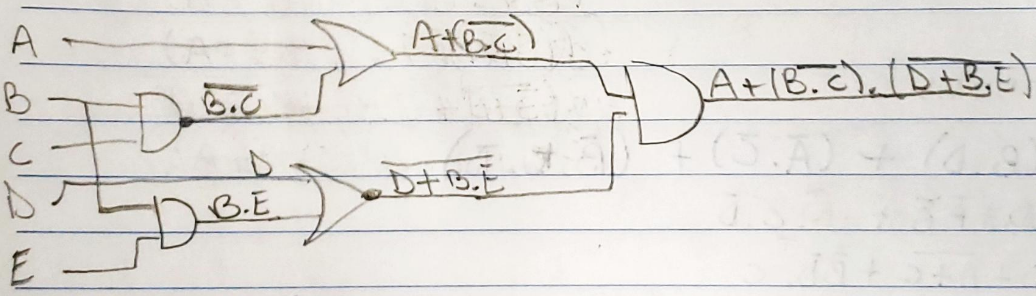
① Faça o que se pede sobre as expressões (a) e (b)

①' desenhe os circuitos das expressões

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



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



② a) $S = \overline{\overline{(A.C)+D} + \overline{\overline{A}+B}} + \overline{\overline{C}(A+B)}$

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

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

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

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

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

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

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

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

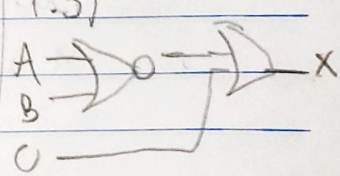
$C(B+1) + (\overline{A}\overline{B})$

$C(1) + \overline{A}\overline{B}$

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

$C + \overline{A+B}$

(1.3)



A B

② $P = (A + (\overline{B \cdot C})) \cdot (\overline{D + B \cdot E})$

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

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

$(A + \bar B + \bar C) \cdot (\bar D \cdot (\bar B + \bar E))$

$A + \bar B + \bar C \cdot (\bar D \bar B + \bar D \bar E)$

$A + \bar B + \bar C \bar D \bar B + \bar C \bar D \bar E$

$A + \bar B + \bar D (\bar C \bar B + \bar C \bar E)$

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

$A + \bar B + \bar D (\bar C \cdot \bar B + \bar C \cdot \bar E)$

$A + \bar D + \bar B (\bar C \cdot \bar B + \bar C \cdot \bar E)$

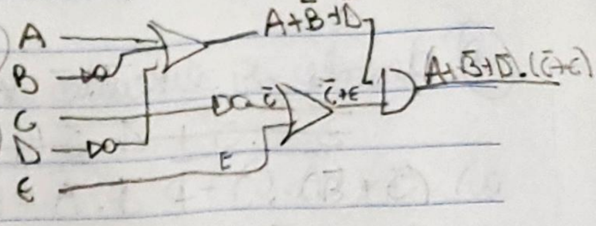
$A + \bar D + \bar B \bar C + \bar B \cdot \bar B + \bar B \bar C + \bar B \bar E$

$A + \bar D + \bar B \bar C + \bar B \bar C + \bar B \bar E + \cancel{\bar B \cdot \bar B} \rightarrow \bar B$

$A + \bar D + \bar B \bar C + \bar B \bar E$

$A + \bar D + \bar B (\bar C + \bar E)$

1.3)



utilizar apenas NAND

② $S = (B \cdot D) + (\bar A \cdot \bar C) + (\bar B \cdot C \cdot \bar D)$

$= S = BD + \bar A \bar C + \bar B \cdot C \cdot \bar D$

$BD + \overline{A + C} + \bar B \bar D \cdot C$

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

$BD + \bar A \cdot \bar C + \overline{B + D} \cdot C$

$BD + \overline{B + D} + \bar A \cdot \cancel{\bar C \cdot C} \rightarrow 1$ NAND

$BD + \bar B \cdot \bar D + \bar A \cdot (1)$

A

$B \cdot D + \underbrace{\overline{B \cdot D}}_{A} + \bar A$

$1 + \bar A = 1$