

Ejercicio 2:

Reducir a un número mínimo de literales las siguientes funciones booleanas:

- a. $(B.C' + A'.D).(A.B' + C.D')$
- b. $B'.D + A'.B.C' + A.C.D + A'.B.C$
- c. $[(A.B)'.A].[(A.B)'.B]$
- d. $A.B' + C'.D'$

Graficar las expresiones encontradas en “b” y “d” mediante cualquier tipo de compuertas del número de entradas necesarias.

Encontrar expresiones equivalentes a las funciones “b” y “d”, pero utilizando sólo compuertas NAND del número de entradas necesarias.

Graficar las expresiones encontradas en el punto anterior.

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

$\overset{P4}{=} B\bar{C}(\bar{A}\bar{B} + C\bar{D}) + \bar{A}D(\bar{A}\bar{B} + C\bar{D})$

$\overset{P4}{=} B\bar{C}\bar{A}\bar{B} + B\bar{C}C\bar{D} + \bar{A}D\bar{A}\bar{B} + \bar{A}DC\bar{D}$

$\overset{P5}{=} \bar{C}\bar{A}.0 + B\bar{D}.0 + D\bar{B}.0 + \bar{A}C.0$

$\overset{T2}{=} 0.0.0.0$

$\overset{P2}{=} 0$

b) $\bar{B}D + \bar{A}B\bar{C} + ACD + \bar{A}BC$

$\overset{P4}{=} \bar{B}D + \bar{A}B(\bar{C} + C) + ACD$

$\overset{P5 P2}{=} \bar{B}D + \bar{A}B + ACD$

$\overset{T6}{=} \bar{B}D + \bar{B}D\bar{A}C + \bar{A}B + \bar{A}BCD + ACD$

$\overset{P2 P5}{=} \bar{B}D + \bar{B}D\bar{A}C + \bar{A}B + \bar{A}BCD + ACD(B + \bar{B})$

$\overset{P4}{=} \bar{B}D + \bar{B}D\bar{A}C + \bar{A}B + \bar{A}BCD + ACD\bar{B} + ACD\bar{B}$

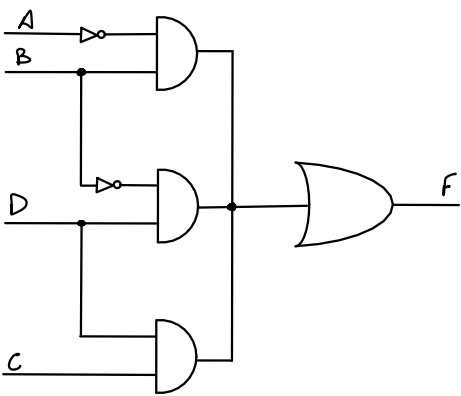
$\overset{P3 T4}{=} \bar{B}D + \bar{A}B + (\bar{A}BCD + ACD\bar{B}) + (\bar{A}BCD + \bar{A}BCD)$

$\overset{P4}{=} \bar{B}D + \bar{A}B + BCD(\bar{A} + A) + \bar{B}CD(A + \bar{A})$

$\overset{P5 P2}{=} \bar{B}D + \bar{A}B + BCD + \bar{B}CD$

$\overset{P4}{=} \bar{B}D + \bar{A}B + CD(B + \bar{B})$

$\overset{P5 P2}{=} \bar{B}D + \bar{A}B + CD$



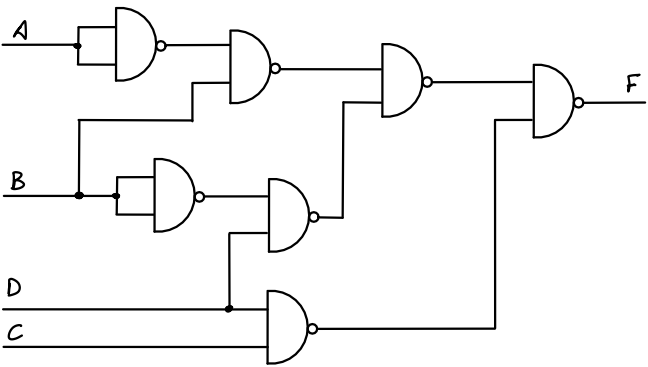
Busco la expresión equivalente con compuertas NAND:

$\bar{B}D + \bar{A}B + CD \overset{T4 T3}{=} (\overline{\overline{\bar{B}D + \bar{A}B}}) + CD$

$\overset{T5}{=} \overline{\overline{\bar{B}D} \overline{\bar{A}B}} + CD$

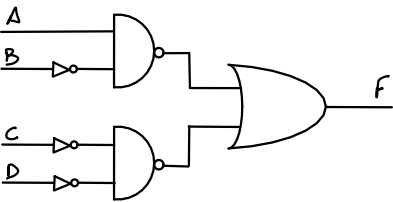
$\overset{T3}{=} \overline{\overline{\bar{B}D} \overline{\bar{A}B}} + CD$

$\overset{T5}{=} \overline{\overline{\bar{B}D} \overline{\bar{A}B} \overline{CD}}$



c) $[(\bar{A}B)A][(\bar{A}B)B] \overset{T5}{=} [(\bar{A} + \bar{B})A][(\bar{A} + \bar{B})B] \overset{P4}{=} [\bar{A}A + \bar{A}\bar{B}][\bar{A}B + \bar{B}B] \overset{P5 P2}{=} \bar{A}\bar{B}.A\bar{B} \overset{P3 T4}{=} (\bar{A}A)(\bar{B}B) \overset{P5 P2}{=} 0$

d) $A\bar{B} + \bar{C}\bar{D}$ No se puede reducir.



Busco la expresión equivalente con compuertas NAND:

$A\bar{B} + \bar{C}\bar{D} \overset{T3}{=} \overline{\overline{A\bar{B} + \bar{C}\bar{D}}} \overset{T5}{=} \overline{\overline{A\bar{B}} \overline{\bar{C}\bar{D}}}$

