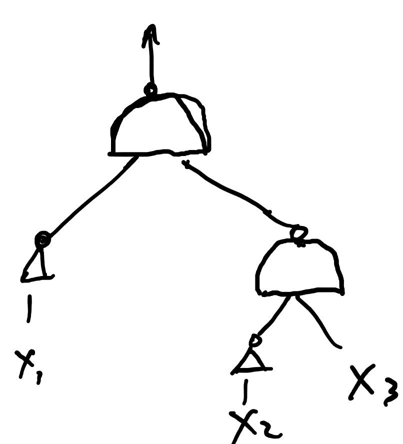
Homework §8.2, #14, 30, 33

#14: you just read off the table (those rows featuring 1 for $f(x_1, x_2, x_3)$):

$f(x_1, x_2, x_3) = x_1 x_2 x_3' + x_1 x_2' x_3 + x_1' x_2 x_3 + x_1' x_2' x_3'$

#30: We're to replace a network with NAND gates & inverters with an equivalent logic network using one AND, one OR, & an inverter (simplifying the logic network by one unit).

Just reading off the logic network (& perhaps thinking of it as a tree, & an in-order traversal):

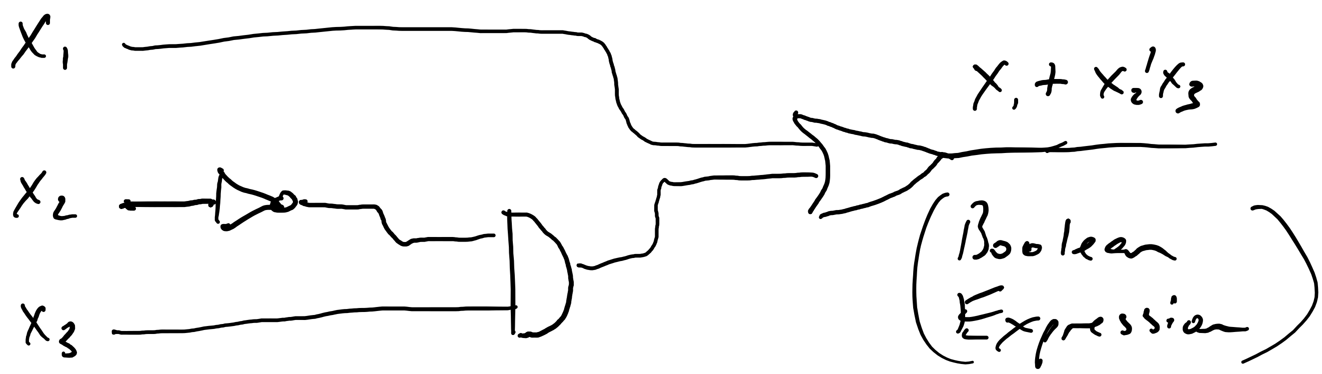


x_1' NAND $(x_2'$ NAND $x_3)$

or $(x_1' \wedge (x_2' \wedge x_3)')'$

or $x_1 \vee ((x_2' \wedge x_3)')' \iff x_1 \vee (x_2' \wedge x_3)$

Here it is: one or, and, + inverter:



#33 An interesting example, similar to my light fixture problem:

$$x_1 = \begin{cases} 1 & \text{when } T < 67^\circ F \\ 0 & \text{otherwise} \end{cases}$$

$$x_2 = \begin{cases} 1 & \text{when } t < 7\text{am} \vee t > 6\text{pm} \\ 0 & \text{otherwise} \end{cases}$$

We want the heat to come on when

$$T < 67 \quad \wedge \quad 7\text{am} \le t \le 6\text{pm}$$

That is, when $x_1 \quad \wedge \quad (x_2)'$

In terms of truth tables
(functions)

x_1	x_2	$f(x_1, x_2)$
1	1	0
1	0	1
0	1	0
0	0	0

→ $x_1 \cdot x_2' = f(x_1, x_2)$