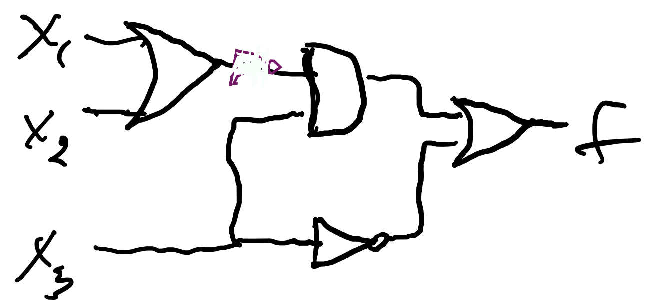
§ 8.2 # 4, 14, 29

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

Write a truth function + a logic network

x_1	x_2	x_3	$f(x_1, x_2, x_3)$
1	1	1	0
1	1	0	1
1	0	1	0
1	0	0	1
0	1	1	0
0	1	0	1
0	0	1	1
0	0	0	1



#14 $f(x_1, x_2, x_3) = x_1 x_2 x_3' +$

$x_1 x_2' x_3 +$

$x_1' x_2 x_3 +$

$x_1' x_2' x_3'$

#29 $x_3' \cdot x_1 + x_2' \cdot x_1 + x_3' = f(x_1, x_2, x_3)$

x_1	x_2	$(x_1 \bullet x_2)'$
1	1	0
1	0	1
0	1	1
0	0	1

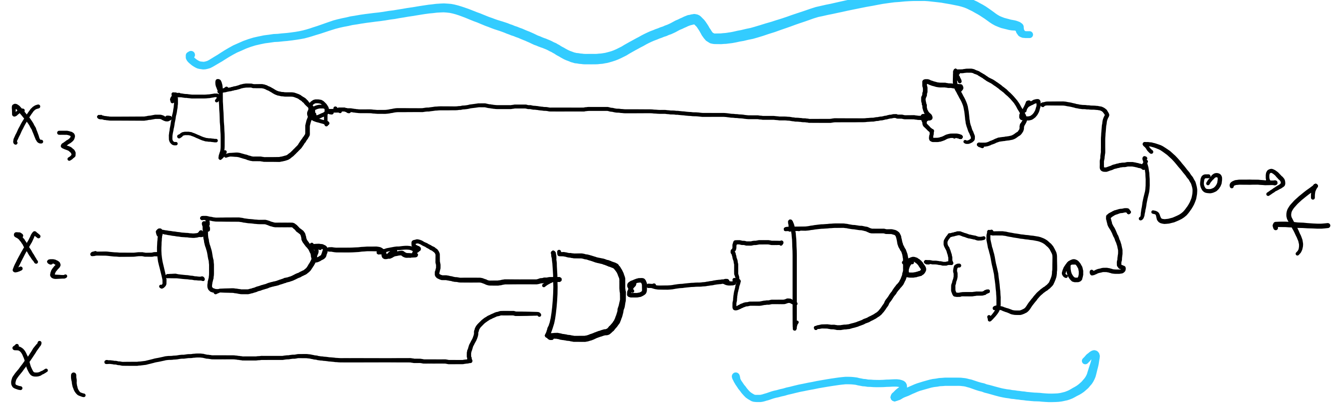
As seen on page 651, we can replace ands ors with the units in figure 8.17.

I'm going to simplify a little before step a. :

$$x_3' x_1 + x_3' + x_2' x_1$$

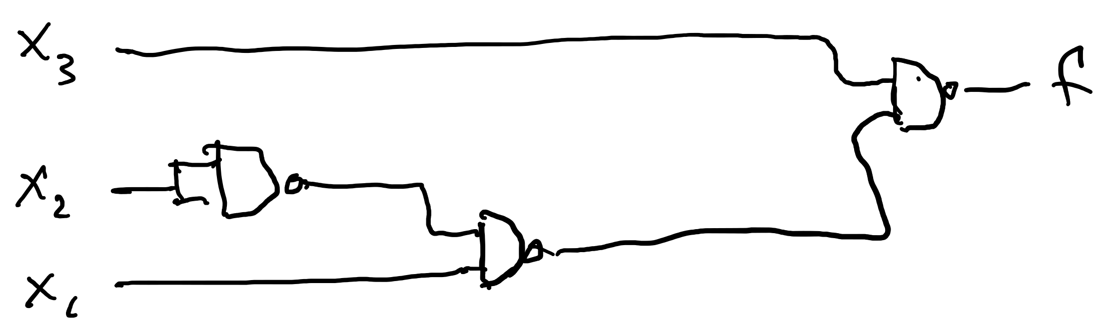
$$= x_3'(x_1 + 1) + x_2' x_1$$

$$= x_3' + x_2' x_1$$



When we see two negations in a row we can simplify!

b)



So this did the simplification for me!

$$f(x_1, x_2, x_3) = (x_3 \cdot (x_2' \cdot x_1)')'$$

$$= x_3' + x_2' \cdot x_1$$

<u>Note</u>: This is slightly simpler

than the one given in the back of the book ;

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

this one contributes nothing, since

$$= (((x_3 \cdot x_2)' \cdot x_1)' \cdot x_3)'$$

$$= ((x_1 \cdot (x_2 \cdot x_3)')' \cdot x_3)'$$