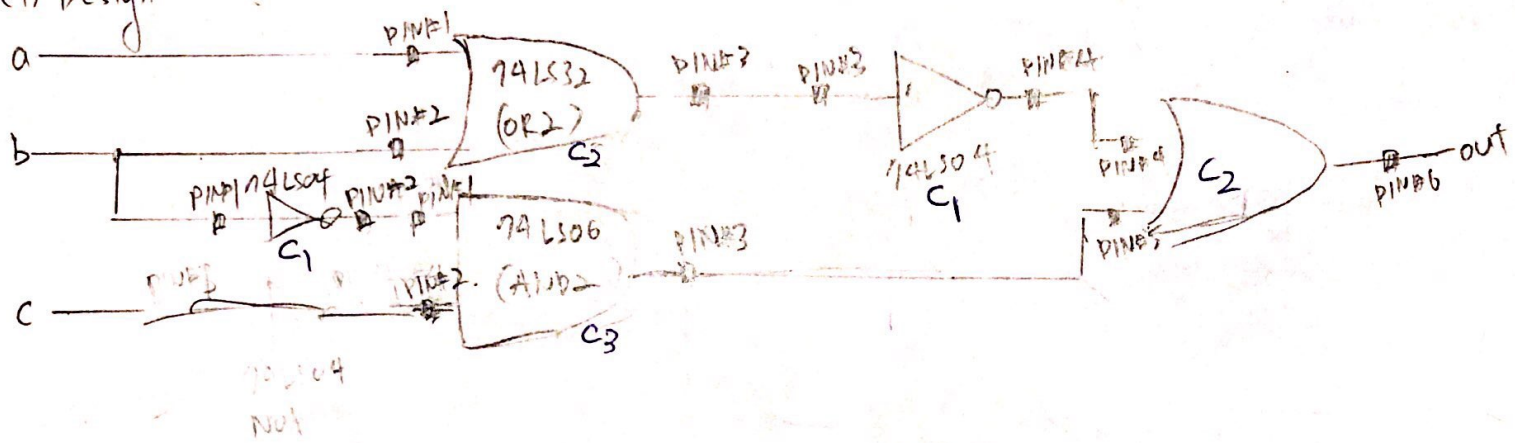
Part 2 Pre-lab.

$f = (a+b)' + cb'$

(1) Design



(2) The truth table

a	b	c	b'	(a+b)'	cb'	(a+b)'+cb'
0	0	0	1	1	0	1
0	0	1	1	1	1	1
0	1	0	0	0	0	0
0	1	1	0	0	0	0
1	0	0	1	0	0	0
1	0	1	1	0	1	1
1	1	0	0	0	0	0
1	1	1	0	0	0	0

(4) Yes, there is a cheaper Implementation for the design that uses fewer gates:

$$f = (a+b)' + cb'$$

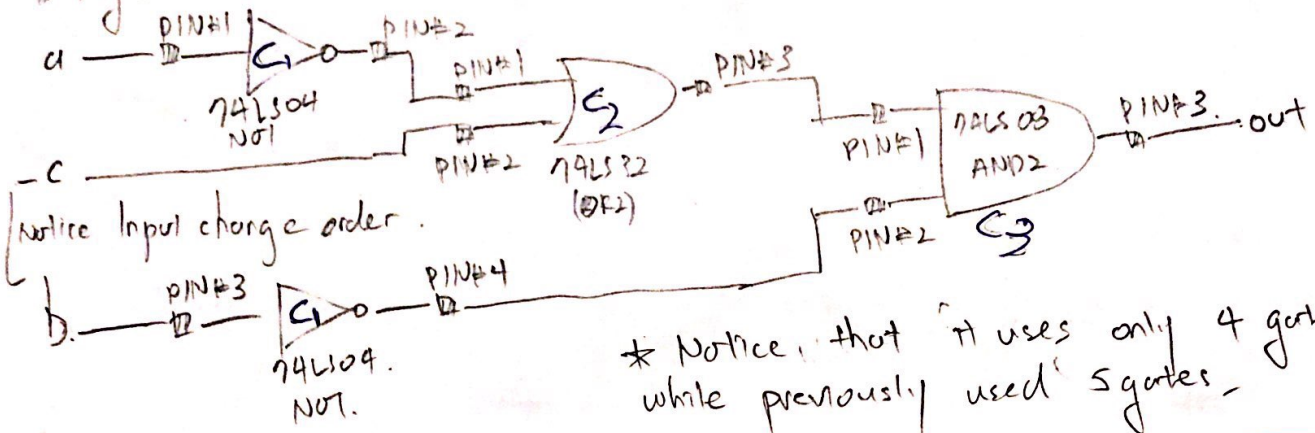
$$= (a'b' + cb' \quad \text{(Demorgan's laws)}$$

$$= b'a' + b'c \quad \text{(commutative property of AND)}$$

$$= b'(a'+c) \quad \text{(Distributive property of OR)}$$

$$\therefore f = b'(a'+c)$$

Design



* Notice, that it uses only 4 gates, while previously used 5 gates.

the truth table.

a	b	c	a'	b'	(a'+c)	b'(a'+c)
0	0	0	1	1	1	1
0	0	1	1	1	1	1
0	1	0	1	0	1	0
0	1	1	1	0	1	0
1	0	0	0	1	0	0
1	0	1	0	1	1	1
1	1	0	0	0	0	0
1	1	1	0	0	1	0