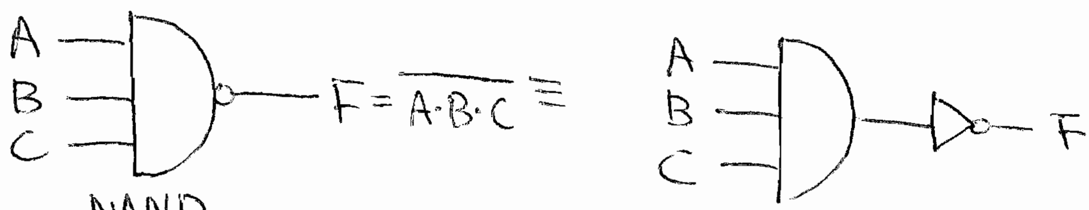
Note on NAND Gates

NAND gates are logic gates whose output is simply the inverted AND, that is, NAND is equivalent to

NAND
(2-input)

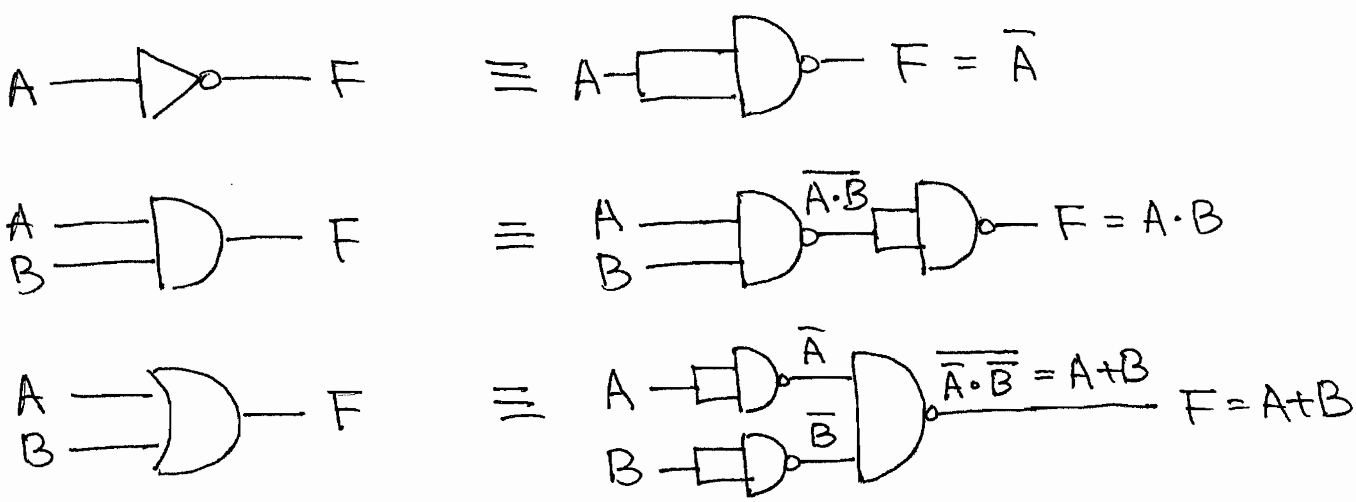
A	B	F
0	0	1
0	1	1
1	0	1
1	1	0



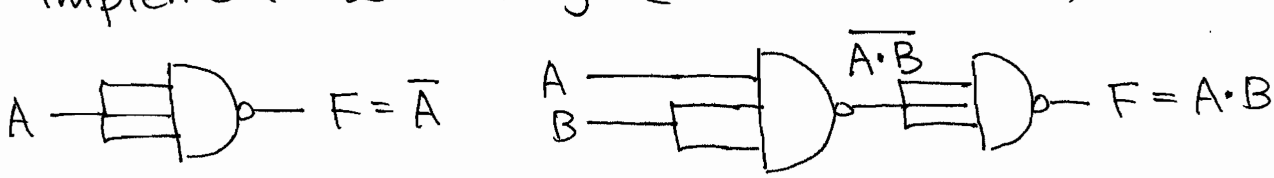
NAND
(3-input)

A	B	C	F
0	0	0	1
0	0	1	1
0	1	0	1
1	0	0	1
0	1	1	1
1	0	1	1
1	1	0	1
1	1	1	0

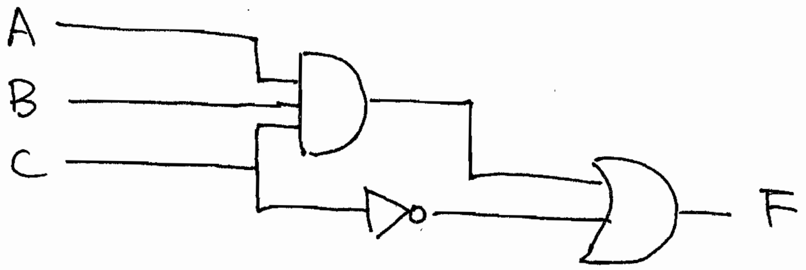
Using NAND gates, we can implement other logic gates and circuits. For example,



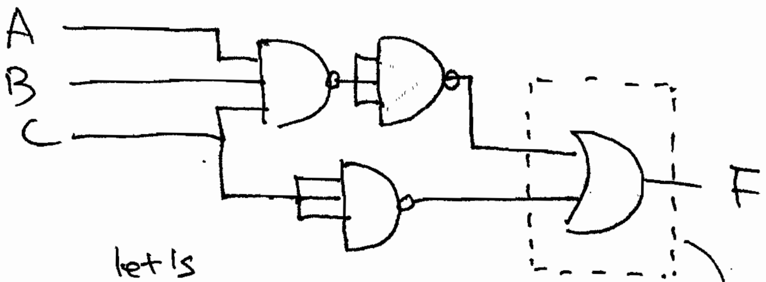
If we only have three-input NAND gates and need to implement a NOT gate and F = A · B, we can do as follows.



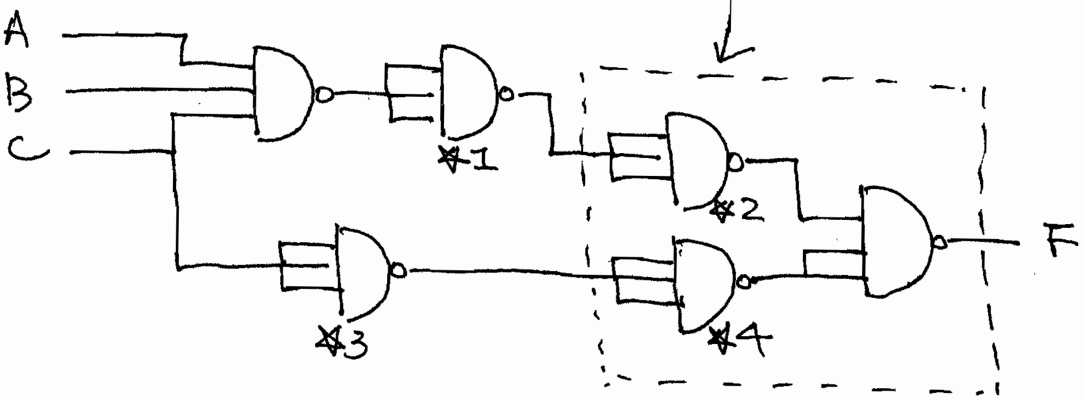
Finally, let's implement a whole circuit using only three-input NAND gates.



Let's start with the AND and NOT gate

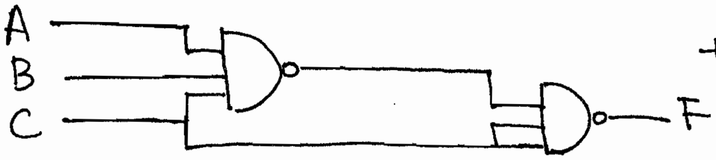


Then let's take care of the OR gate.



Note that ★1 and ★2 are redundant and so are ★3 and ★4. (Recall that A —▷o—▷o— F ≡ A — F.)

∴



this is the final implementation.