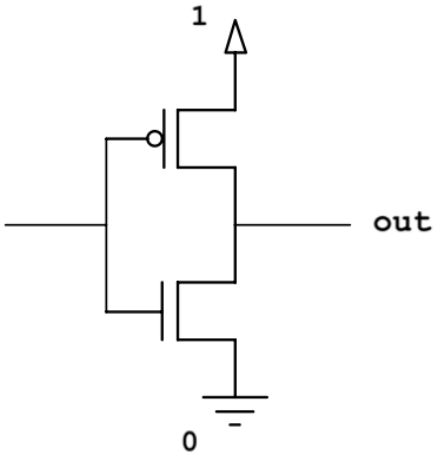
Homework Assignment 5 Answered

pMOS  **conducts when the incoming voltage is low (0)**

nMOS  **conducts when the incoming voltage is high (1)**

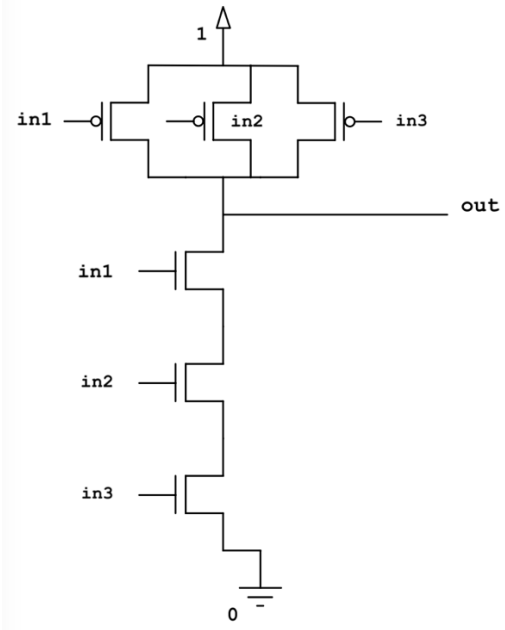
Parallel – just one semiconductor needs to conduct

Series – all semiconductors need to conduct



1. If this CMOS inverter was given an input of 1, what would be the output? 0
2. If this CMOS inverter was given an input of 0, what would be the output? 1
3. What is the logical operation being performed? NOT
4. Fill out its truth table.

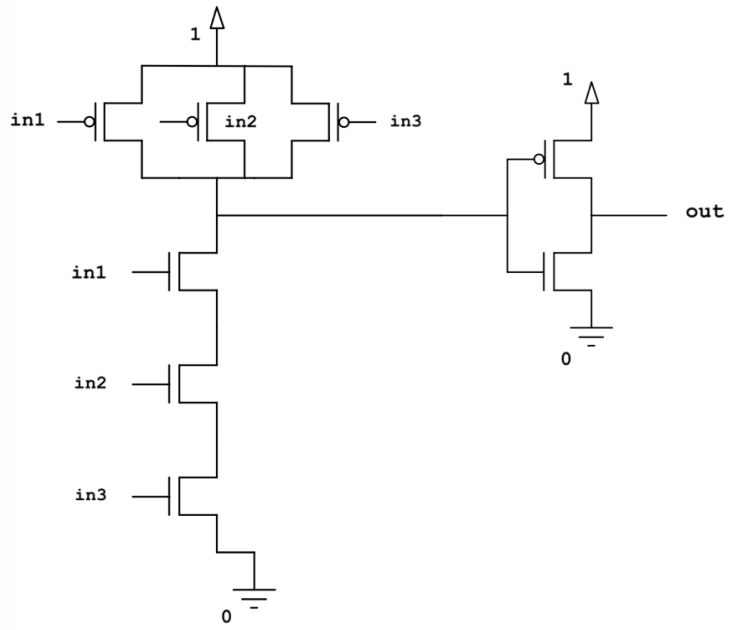
in1	out
0	1
1	1



5. Fill out the truth table for the gate on the left.

in1	in2	in3	out
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	0

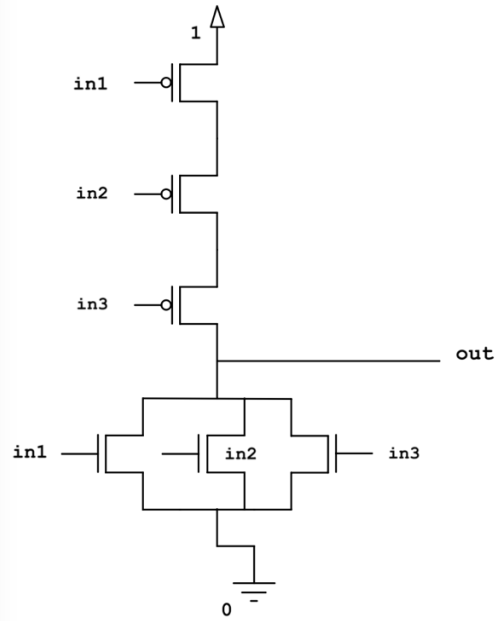
6. What is the logical operation being performed? NAND



7. Fill out the truth table for the gate on the left.

in1	in2	in3	out
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

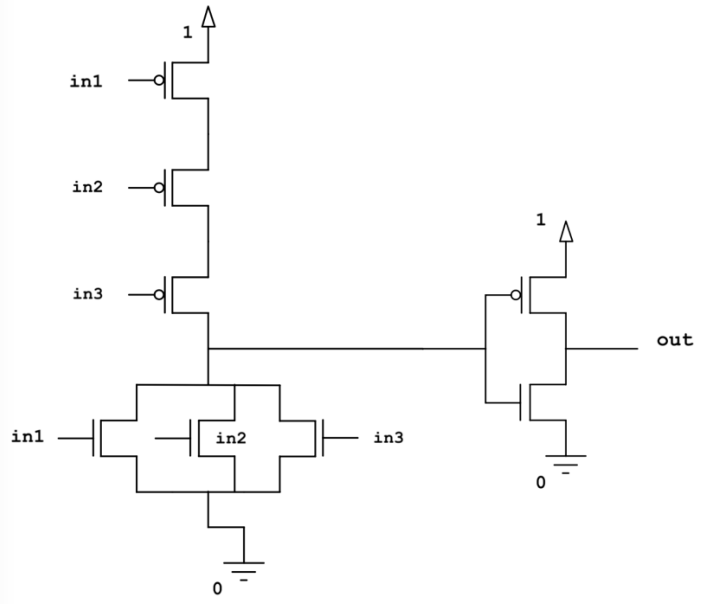
8. What is the logical operation being performed? AND



9. Fill out the truth table for the gate on the left.

in1	in2	in3	out
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0

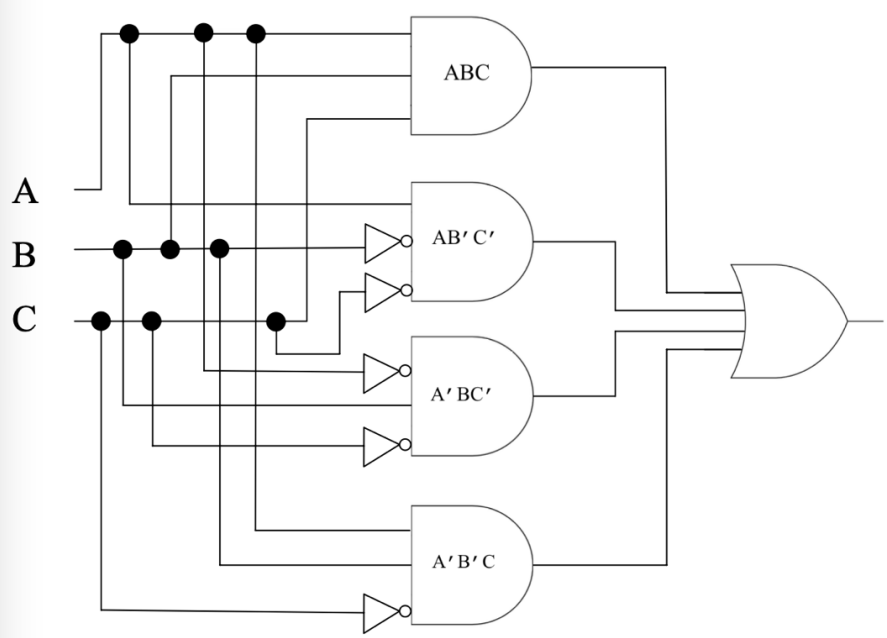
10. What is the logical operation being performed? NOR



11. Fill out the truth table for the gate on the left.

in1	in2	in3	out
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	1
1	1	1	1

12. What is the logical operation being performed? OR



A	B	C	out
1	1	1	1
1	1	0	0
1	0	1	0
1	0	0	1
0	1	1	0
0	1	0	1
0	0	1	1
0	0	0	0

13. What is the final expression for the logic gate above?

`out = ABC + AB'C' + A'BC' + A'B'C`

14. What logical operation does the truth table appear to be equivalent to?

XOR