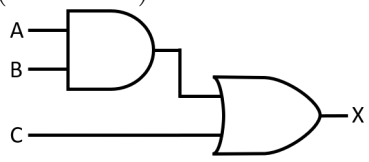
CS-150 Worksheet 4 Solution Release date: 29/11/2019

This worksheet is about getting familiar with logic gates and circuits.

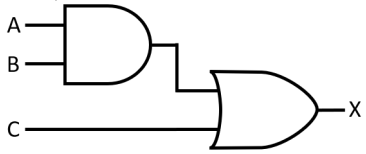
☐ Task 4 Solution.1

- Draw the following circuit diagrams (note there are different notations!):**In these diagrams I have used X to denote the output.**

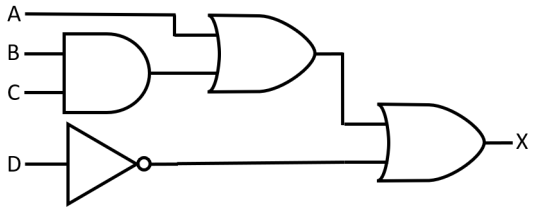
1. (A AND B) OR C



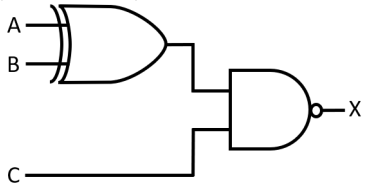
2. $AB + C$



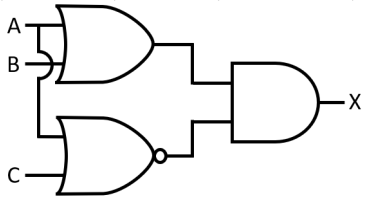
3. $(A + BC) + D'$



4. (A XOR B) NAND C



5. (A OR B) AND (C NOR A)



☐ Task 4 Solution.2

- Write the truth table for each of the above expressions.

1.

(A AND B) OR C			
A	B	C	Output
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

2.

$AB + C$			
A	B	C	Output
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

3.

$(A + BC) + D'$				
A	B	C	D	Output
0	0	0	0	1
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

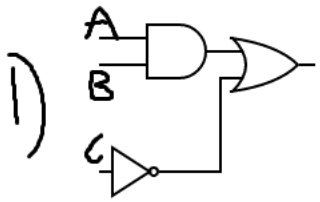
4.

(A XOR B) NAND C			
A	B	C	Output
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

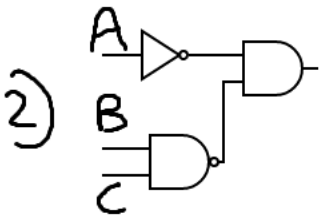
5.

(A OR B) AND (C NOR A)			
A	B	C	Output
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0

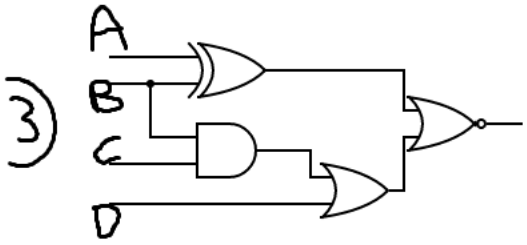
□ Task 4 Solution.3



1:
- A AND B OR NOT C
- $A \cdot B + C'$
- $AB + \neg C$



2:
- NOT A AND (B NAND C)
- $A' \cdot (B \cdot C)'$
- $\neg A \neg (BC)$



3:
- (A XOR B) NOR ((B AND C) OR D)
- $((A \oplus B) + (B \cdot C + D))'$
- $\neg((A \oplus B) + (BC + D))$