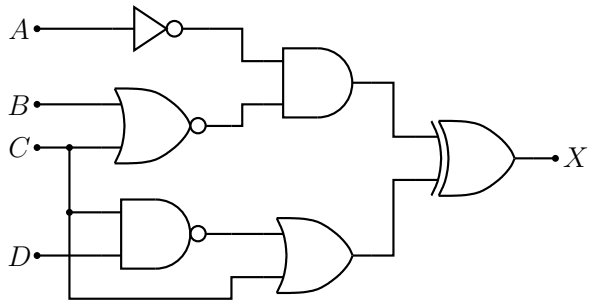
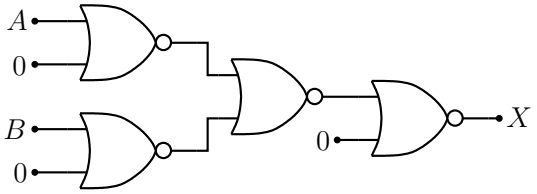
EE 112 (MBP): HW 1 (January 2017)

1. Construct truth tables for $X_1 = \overline{A}\,B + A\,\overline{B}$ and $X_2 = \overline{A\,B}\,(A + B)$, and show that they are equivalent.

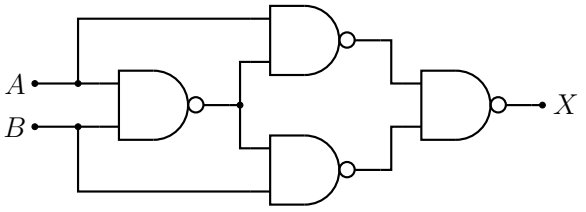
2. Write the Boolean expression for X. Simplify the expression and determine the conditions for which $X = 0$.



3. Write the Boolean expression for X, and construct its truth table.



4. (a) Show that $\overline{A} + A\,B = \overline{A} + B$. (b) Using this identity, simplify the expression for the output X in the figure. What function is this circuit performing?



5. Implement the function $Y = \overline{A}\,(B + C) + D$ using (a) only NAND gates, (b) only NOR gates.

6. Implement the function in Q 5 using (i) a 16-to-1 MUX, (ii) an 8-to-1 MUX.

7. Minimise the functions Y_1, Y_2, Y_3 given by the following K-maps.

CD \ AB	00	01	11	10
00	1	1	1	1
01	1	X	0	0
11	0	0	X	1
10	0	1	1	0

Y_1

CD \ AB	00	01	11	10
00	X	0	1	1
01	1	0	0	1
11	0	0	0	0
10	1	0	1	1

Y_2

C \ AB	00	01	11	10
0	X	0	1	1
1	1	0	0	1

Y_3