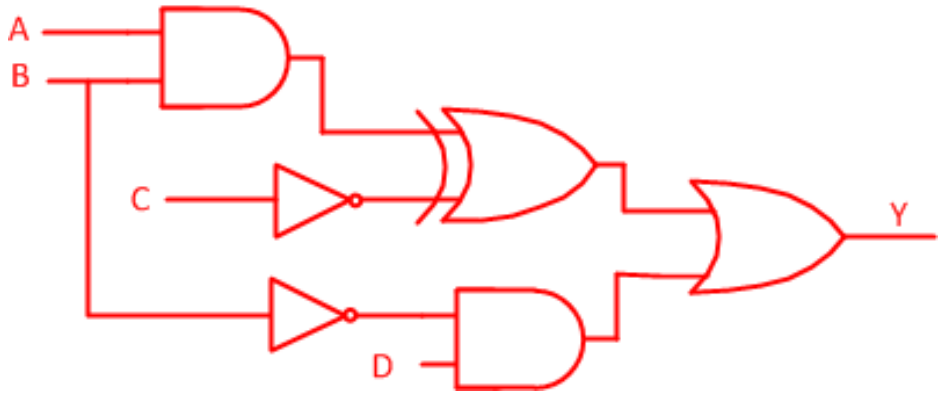
Sample problems on Ch. 4

1. Draw the circuit diagram of the following Boolean expression.

Ans:

$$Y = \left(\left(A \bullet B \right) \oplus \overline{C} \right) + \left(\overline{B} \bullet D \right)$$

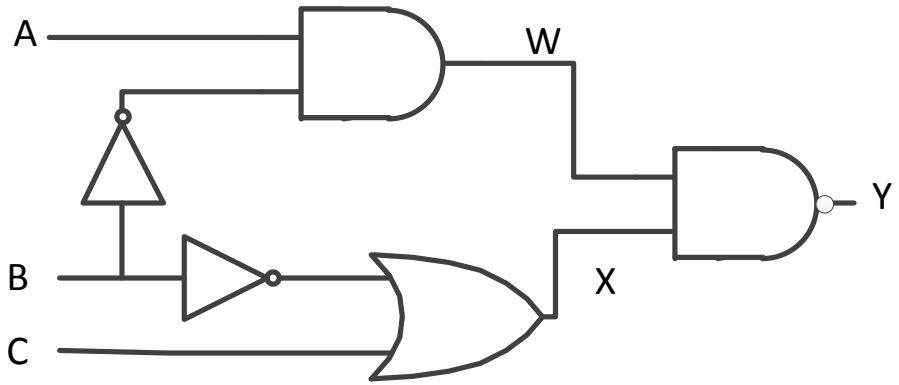
There are 6 logic gate operators and 4 inputs in the above Boolean expression



Sample problems on Ch. 4

2a. How many transistors are required to implement the following circuit? What is the corresponding Boolean expression for the circuit?

2b. Complete the truth table



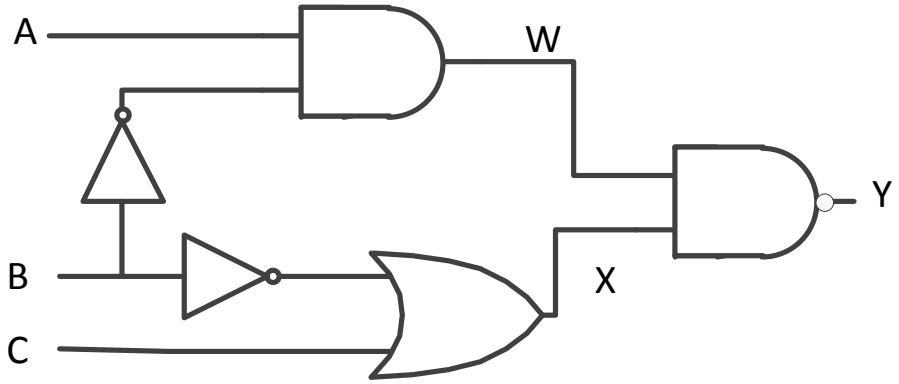
Ans:

2 NOT gates require 2 transistors, 1 AND gate requires 3 transistors, 1 OR gate requires 3 transistors, 1 NAND gate requires 2 transistors,
so the total is: **10 transistors**

Boolean expression: $Y = \overline{\left(A \bullet \overline{B}\right) \bullet \left(\overline{B} + C\right)}$

Sample problems on Ch. 4

Ans:



A	B	C	W	X	Y
0	0	0	0	1	1
0	0	1	0	1	1
0	1	0	0	0	1
0	1	1	0	1	1
1	0	0	1	1	0
1	0	1	1	1	0
1	1	0	0	0	1
1	1	1	0	1	1

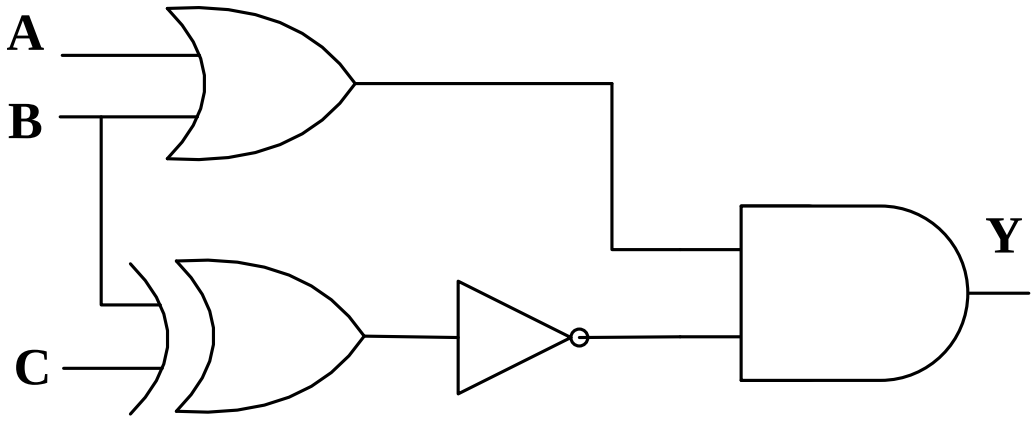
Sample problems on Ch. 4

3a. Draw the circuit diagram of the following Boolean expression:

$$Y = (A + B) \bullet \overline{(B \oplus C)}$$

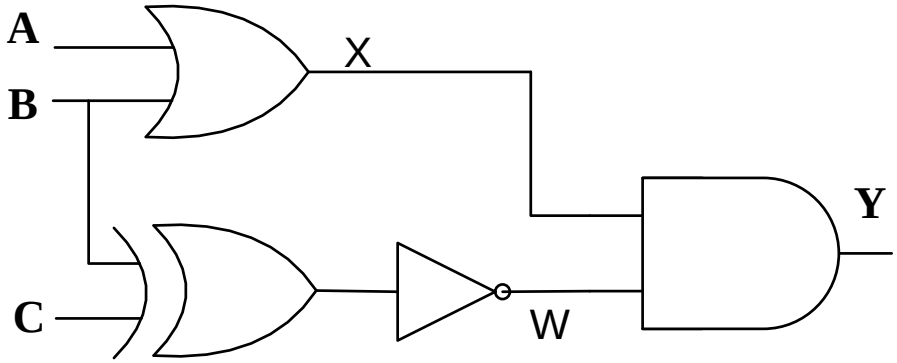
3b. Complete the truth table, let $X = (A + B)$ and $W = \overline{(B \oplus C)}$

Ans:



Sample problems on Ch. 4

Ans:



OR gate

A	B	X
0	0	0
0	1	1
1	0	1
1	1	1

Inversion of XOR gate

B	C	W
0	0	1
0	1	0
1	0	0
1	1	1

A	B	C	X	W	Y
0	0	0	0	1	0
0	0	1	0	0	0
0	1	0	1	0	0
0	1	1	1	1	1
1	0	0	1	1	1
1	0	1	1	0	0
1	1	0	1	0	0
1	1	1	1	1	1