Computer Technology

Logic Gates Part 1

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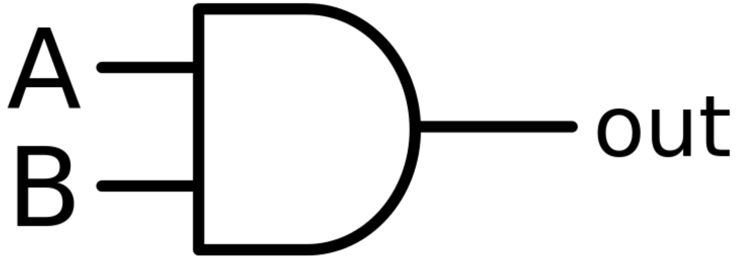
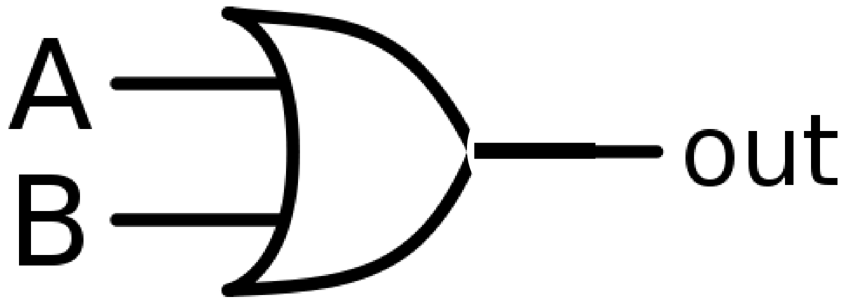
The AND Gate



Input		Output
A	B	Y=A.B
0	0	0
0	1	0
1	0	0
1	1	1

The AND Gate only results True (1) when all the inputs are True (1).

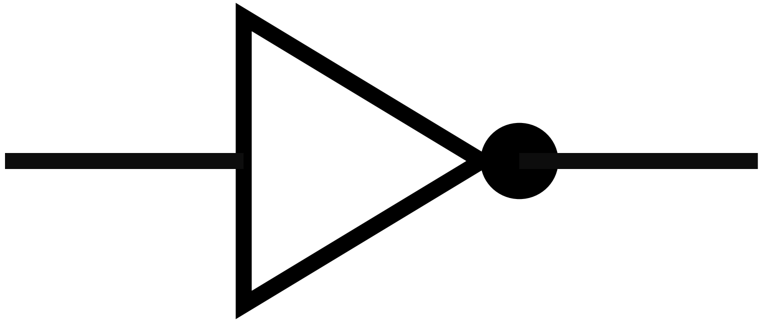
The OR Gate



Input		Output
A	B	Y=A+B
0	0	0
0	1	1
1	0	1
1	1	1

The OR Gate only results False (0) when all the inputs are False (0).

The NOT Gate / The Invertor

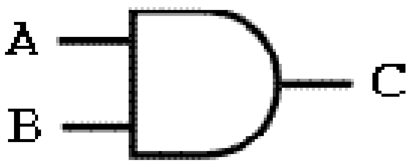


Input(2^1)	Output
A	$Y = \overline{A}$
0	1
1	0

The NOT Gate convert the state of the input into its corresponding Opposite.

Recap

AND

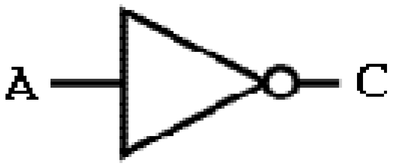


Inputs		Output
A	**B**	**C**
0	0	0
0	1	0
1	0	0
1	1	1

OR

Inputs		Output
A	**B**	**C**
0	0	0
0	1	1
1	0	1
1	1	1

NOT

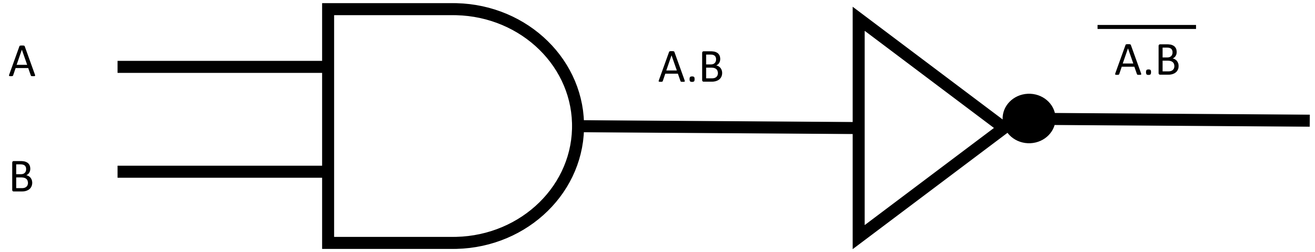


Input	Output
A	**C**
0	1
1	0

Construct the logic circuits for following Boolean expressions.

I. (A’.B)+(B+C)
II. (A.B.C) . (C+B’)’
III. (B’+C’)’.A’
IV. A+B’.C+D
V. X’.Y’.Z’+(P.Q)’

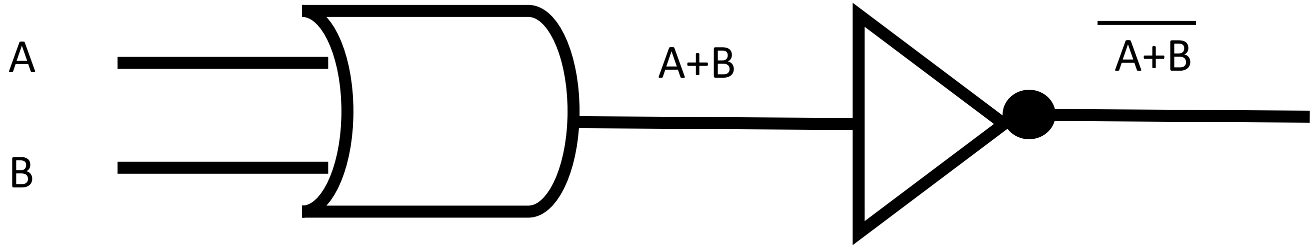
The NAND Gate



Input		Output
A	B	Y= $\overline{A.B}$
0	0	1
0	1	1
1	0	1
1	1	0

NAND gate is a combination of And gate and the Not gate

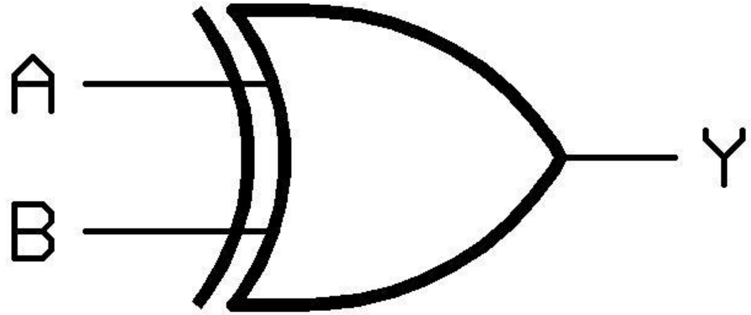
The NOR Gate



Input		Output
A	B	$\overline{A+B}$
0	0	1
0	1	0
1	0	0
1	1	0

Nor gate is a combination of Or gate and the Not gate

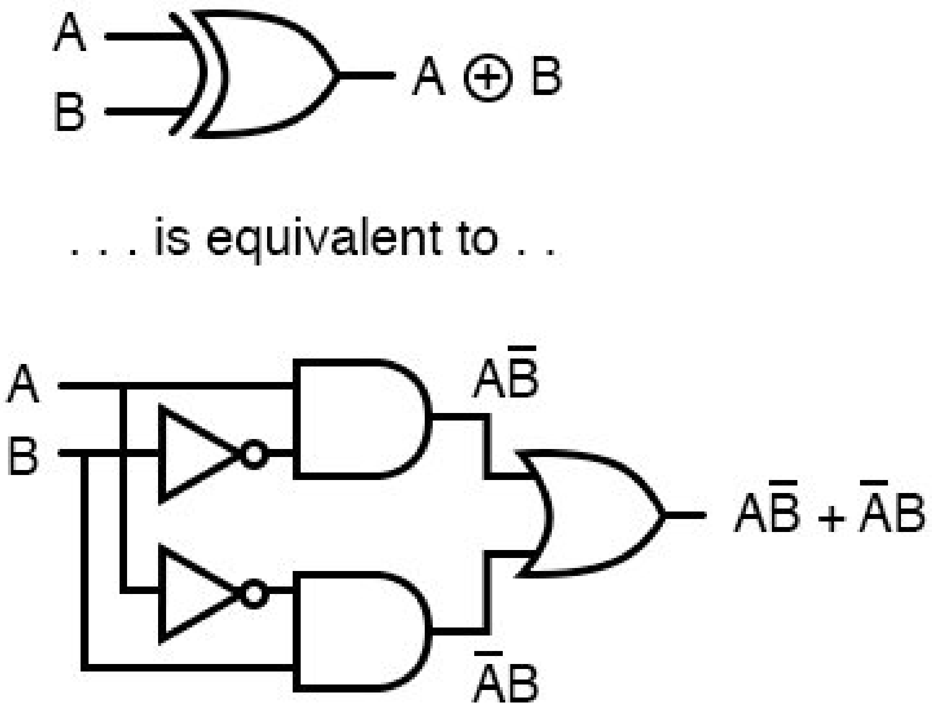
The XOR Gate



Inputs		Outputs
X	Y	Z
0	0	0
0	1	1
1	0	1
1	1	0

XOR gate is the exclusive approach of the Or gate.

XOR Continue



$$A \oplus B = A\bar{B} + \bar{A}B$$

Construct a truth table to prove the relationship of these two circuits!!!!!

Draw the logic circuits for following expressions

I. $(A'.B.C)'+(B+C)$
II. $(A.B.C) . (C+B')'$
III. $((B'+C')'.A')'$
IV. $(A+B'.C)+D$
V. $X'.Y.Z'+(P.Q)'$
VI. $A'B+AB'$

Question 2

A greenhouse uses a system to monitor the conditions that plants need to grow.

The inputs to the system are:

Input	Binary value	Condition
W	1	Window is open
	0	Window is closed
T	1	Temperature >=26 °C
	0	Temperature <26 °C
H	1	Humidity >=50%
	0	Humidity <50%

The system will sound an alarm when certain conditions are detected.

Alarm (X) will sound (=1) when:

window is closed and temperature >=26 °C

or

temperature <26 °C and humidity >=50%

Thank You !!!