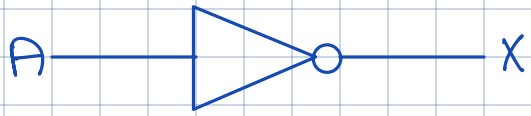
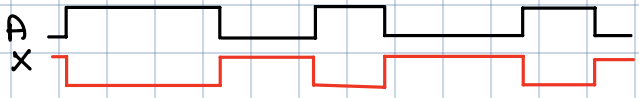
The inverter / NOT Gate:



↳ $X = \overline{A}$

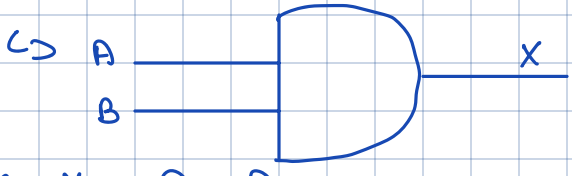
A	$X = \overline{A}$
0	1
1	0

↳ Example Waveform:



↳ A group of inverters can be used to form 1's complement.

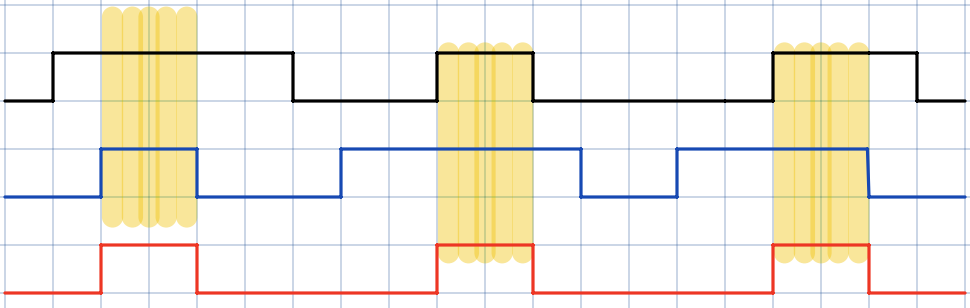
The AND Gate:



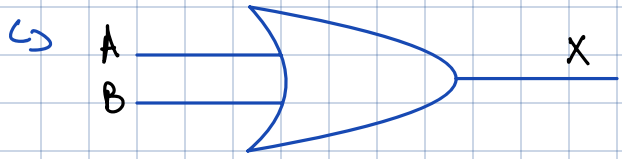
↳ $X = A \cdot B$

A	B	$X = A \cdot B$
0	0	0
0	1	0
1	0	0
1	1	1

↳ Used as a selective mask.
↳ To select certain bits & discard other.



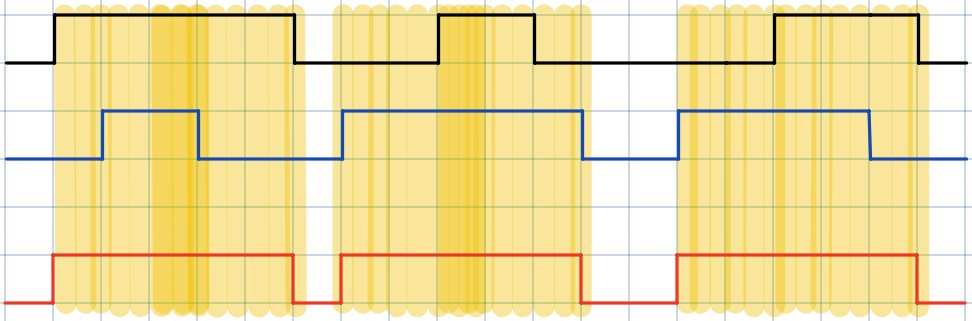
OR Gate:



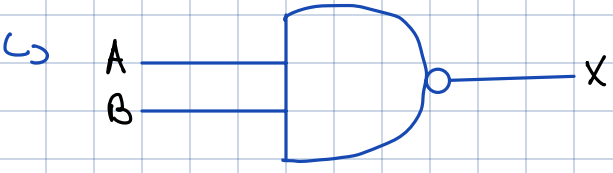
↳ $X = A + B$

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

↳ Used to set some bits to 1.

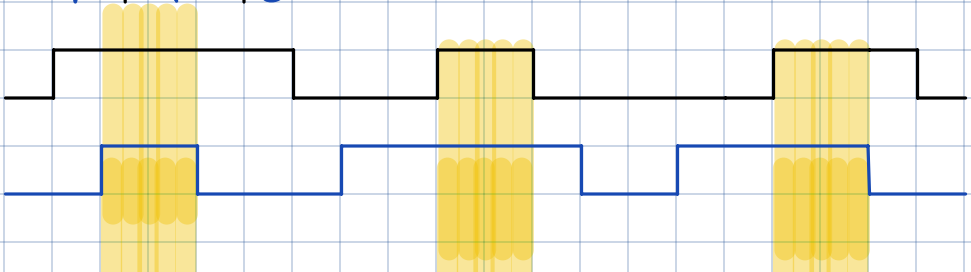


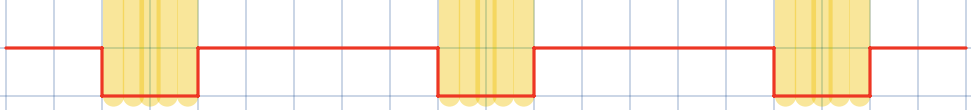
NAND Gate:



↳ $X = \overline{A \cdot B}$

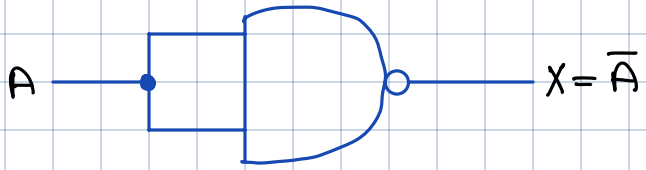
A	B	X
0	0	1
0	1	1
1	0	1
1	1	0





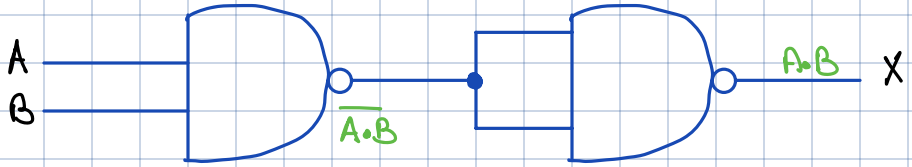
↳ It is an universal gate.
↳ All other Basic gates can be constructed from it.

1. NOT Gate:

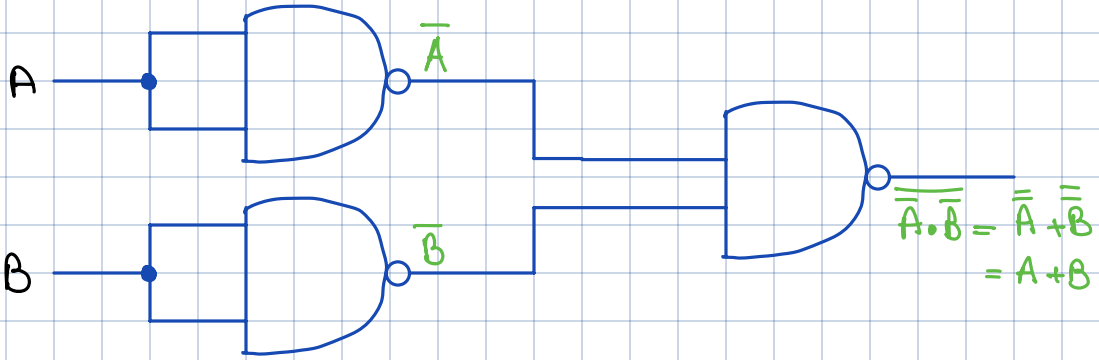


$X = \overline{A \cdot A}$

2. AND gate:

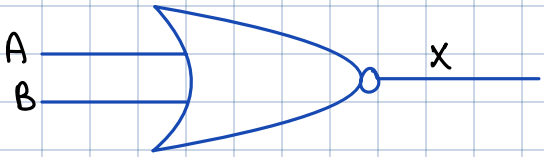


3. OR Gate:



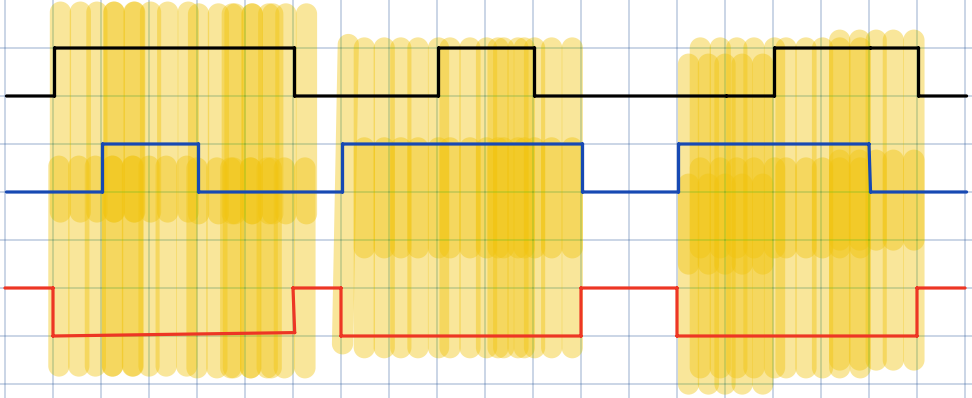
NOR Gate:

↳



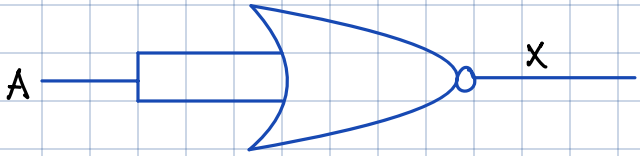
↳

A	B	$X = \overline{A+B}$
0	0	1
0	1	0
1	0	0
1	1	0



↳ Can be used to make the basic gates:

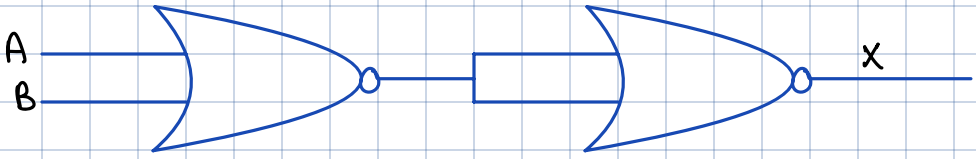
1. NOT gate:



↳ $X = \overline{A+A}$

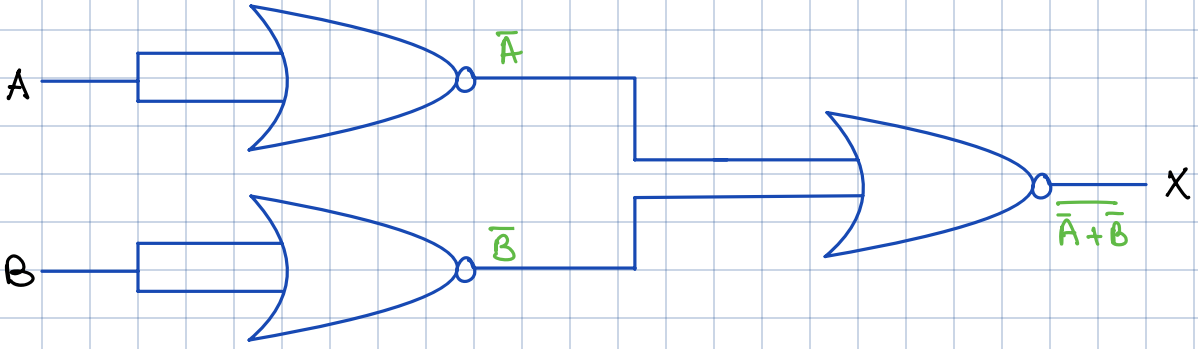
2. OR gate:

$$A+B = \overline{\overline{A+B}}$$

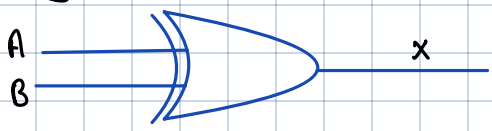


3. AND gate:

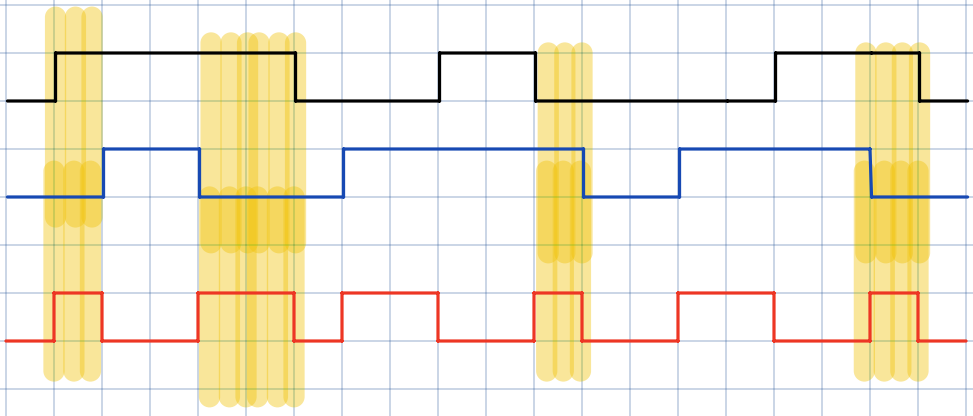
↳ $A \cdot B = \overline{\overline{A}+\overline{B}} = \overline{\overline{A}} \cdot \overline{\overline{B}} = A \cdot B$



XOR gate:

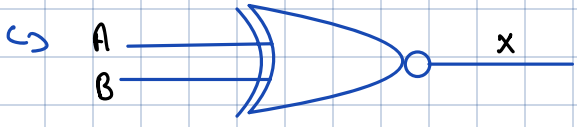


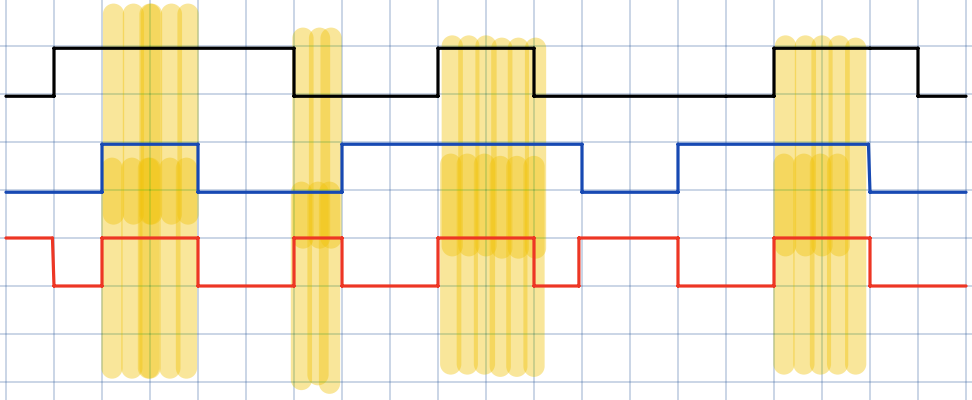
A	B	$X = A \oplus B$
0	0	0
0	1	1
1	0	1
1	1	0

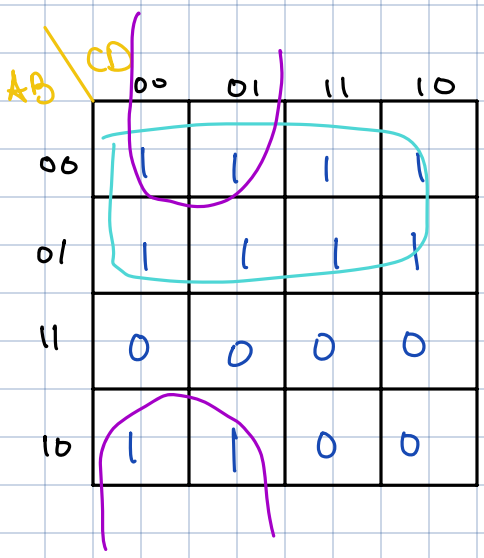


XNOR gate:

A	B	$X = A \odot B$
0	0	1
0	1	0
1	0	0
1	1	1







$G1 = \bar{A}$

$G2 = \bar{B}\bar{C}$

$K = \bar{A} + \bar{B}\bar{C}$

A	B	C	D	
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0