Friday, 16 July 2021 8:33 PM

logic gates

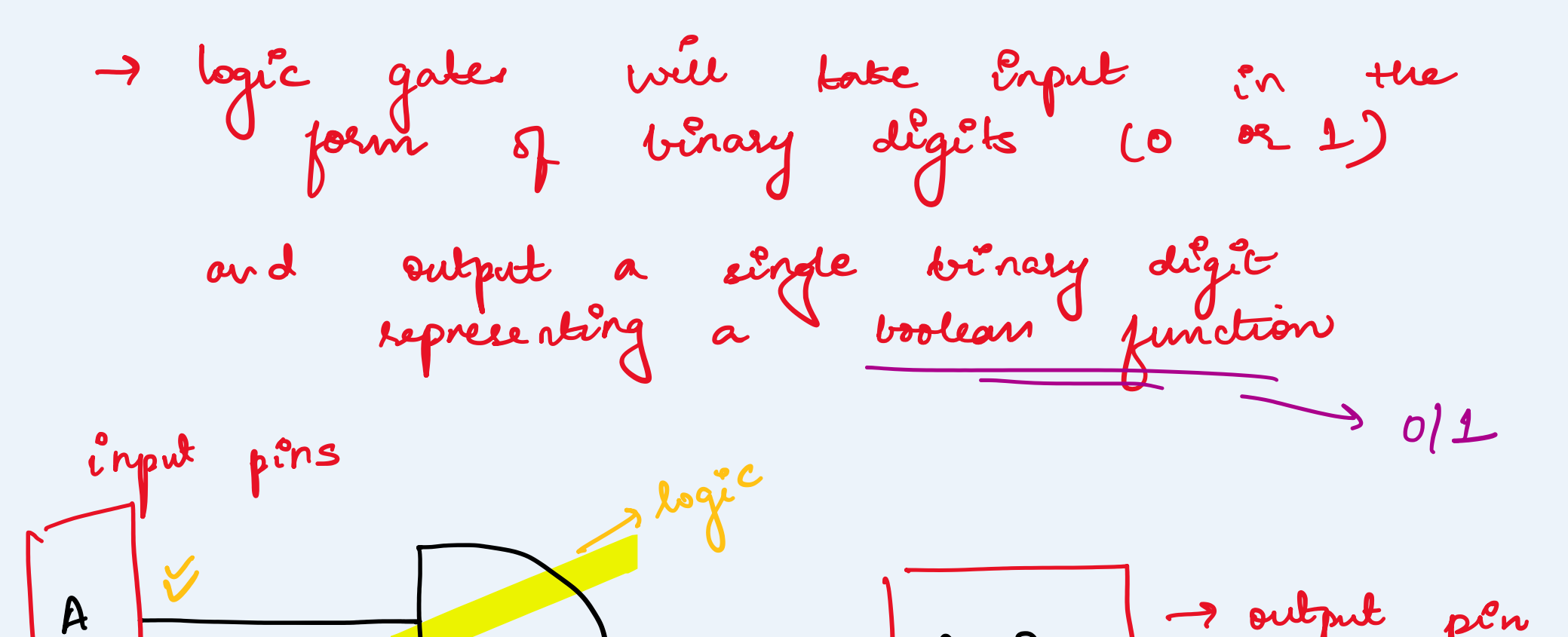
→ logic gates are the basic building block of any digital system.

→ It is an electronic circuit having one or more input and only one output.

→ The relationship between the input and the output is based on a certain logic.

How do logic gates work ??

→ logic gate will take input in the form of binary digits (0 or 1) and output a single binary digit representing a boolean function → 0/1



Truth table

→ A diagram with rows & columns, which identify the Truthiness (1) or Falness (0) of a compound statement, or in this case logic gates circuit.

AND gate

Output → 1 if both the input pins provide 1 as input

logic Diagram

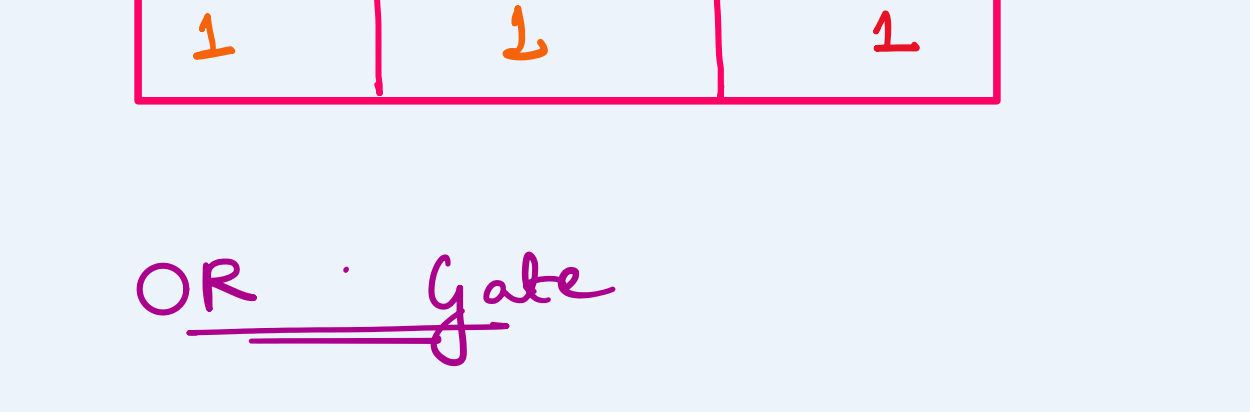
Truth table

Input A	Input B	Output A·B
0	0	0
0	1	0
1	0	0
1	1	1

OR gate

Output → 1 if any of the input pins has 1.

logic diagram



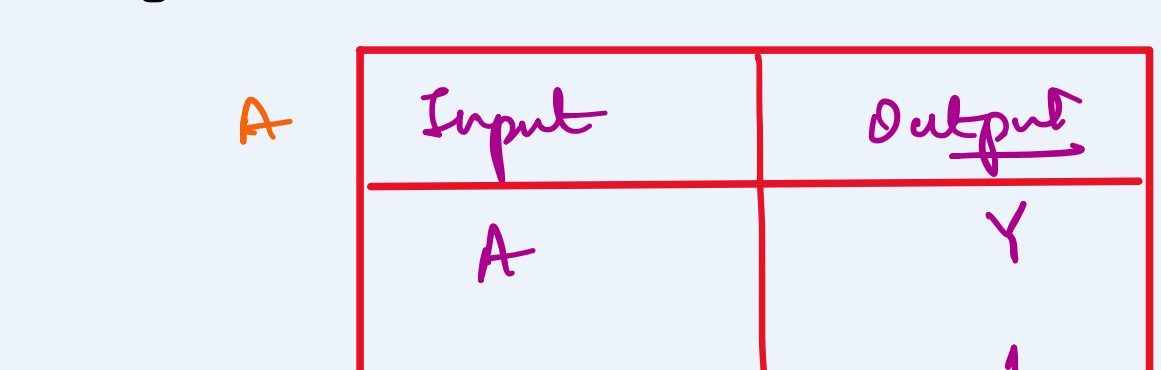
Truth table

Input A	Input B	Output A + B
0	0	0
0	1	1
1	0	1
1	1	1

NOT gate

1 → 0
0 → 1

logic diagram



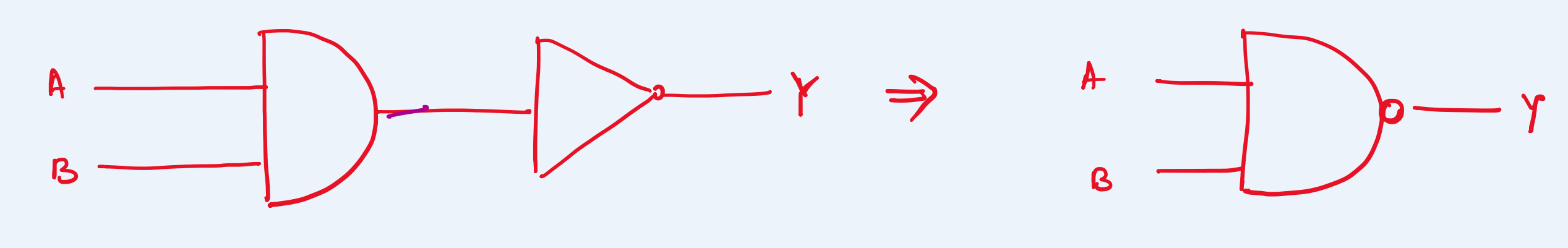
Truth table

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

NAND gate

NOT - AND gate

logic diagram



Truth table

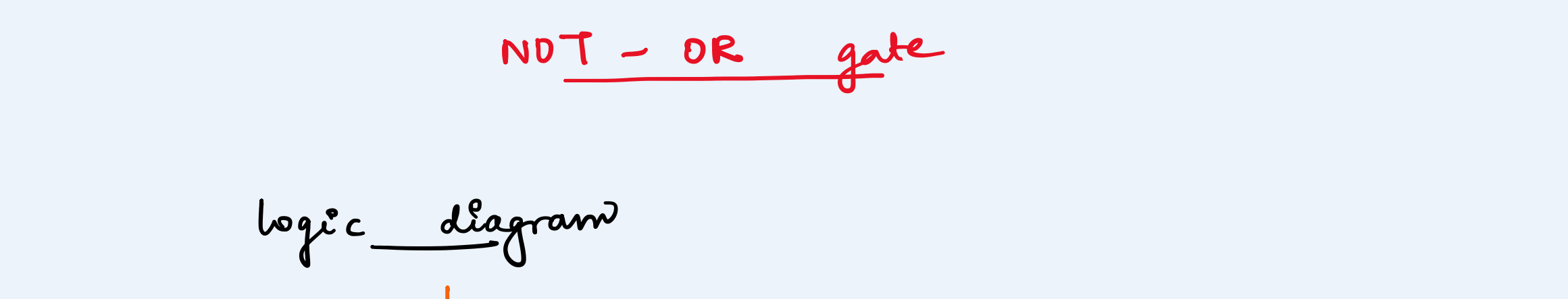
Input A	Input B	Output $\overline{A \cdot B}$
0	0	1
0	1	1
1	0	1
1	1	0

NOR gate

↓

NOT - OR gate

logic diagram



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

XOR gate

↓

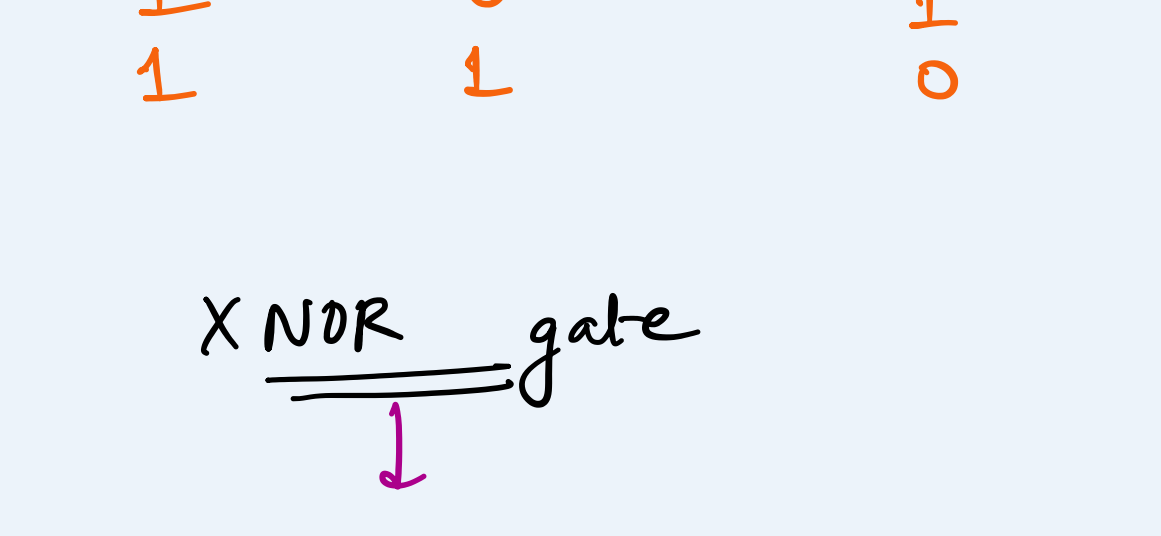
EX - OR gate

↓

Exclusive OR gate

different bits → 1
same bits → 0

logic diagram



A	B	A ⊕ B
0	0	0
0	1	1
1	0	1
1	1	0

XNOR gate

↓

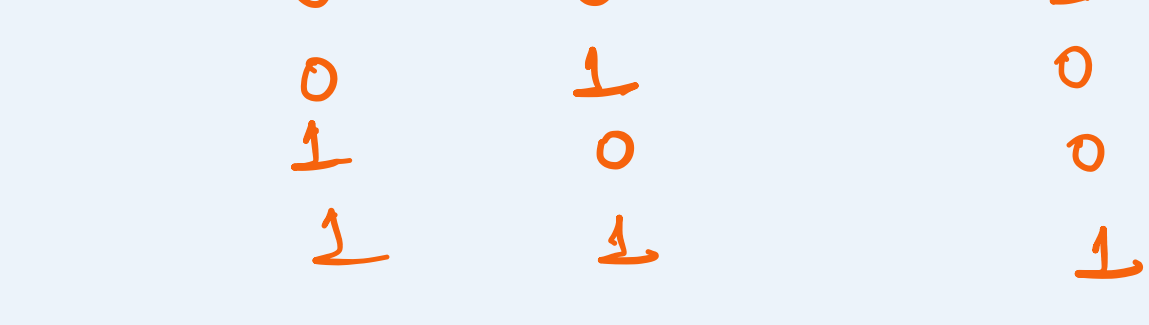
Ex - NOR gate

↓

Exclusive NOR gate

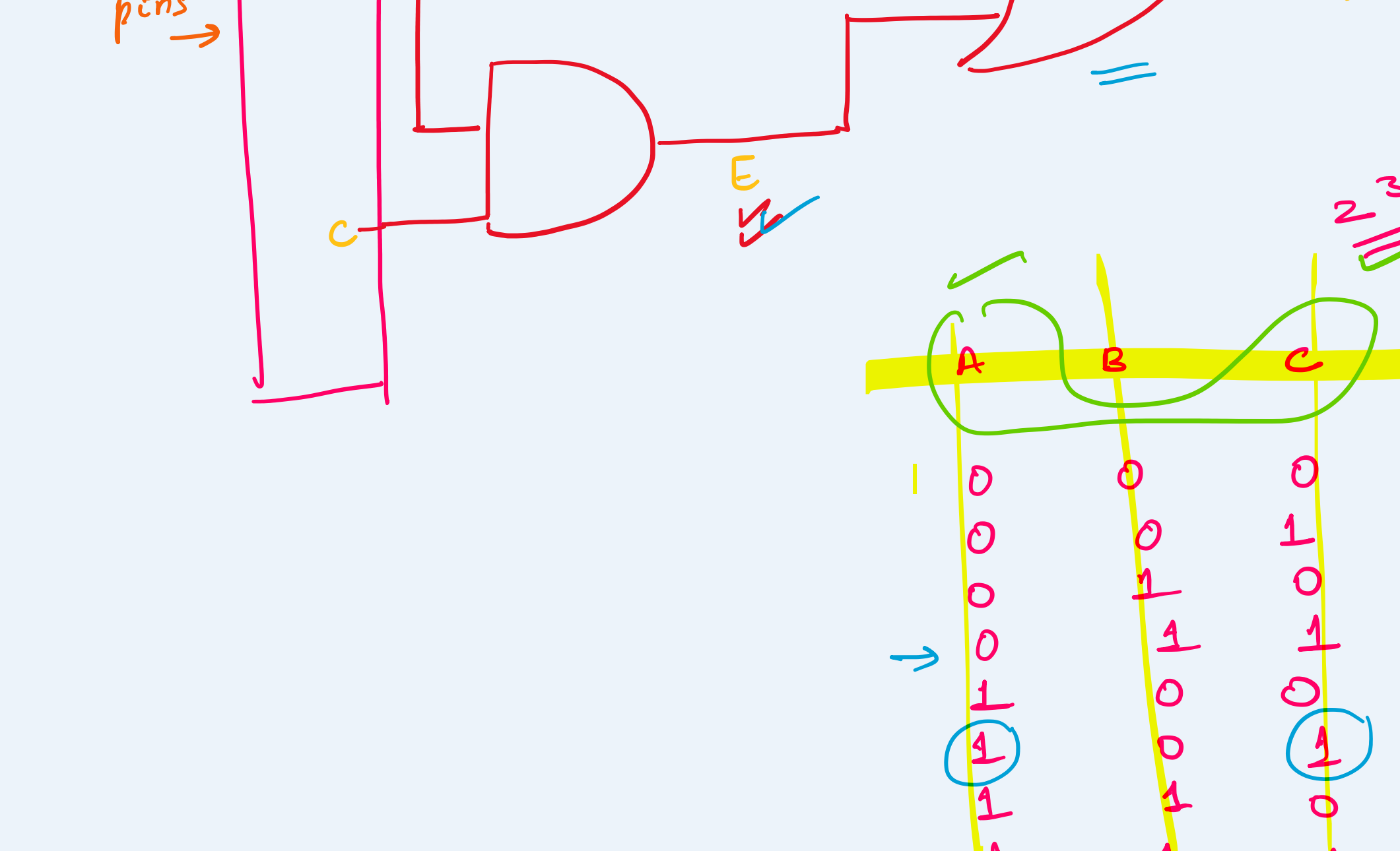
NOR

logic diagram



Truth table

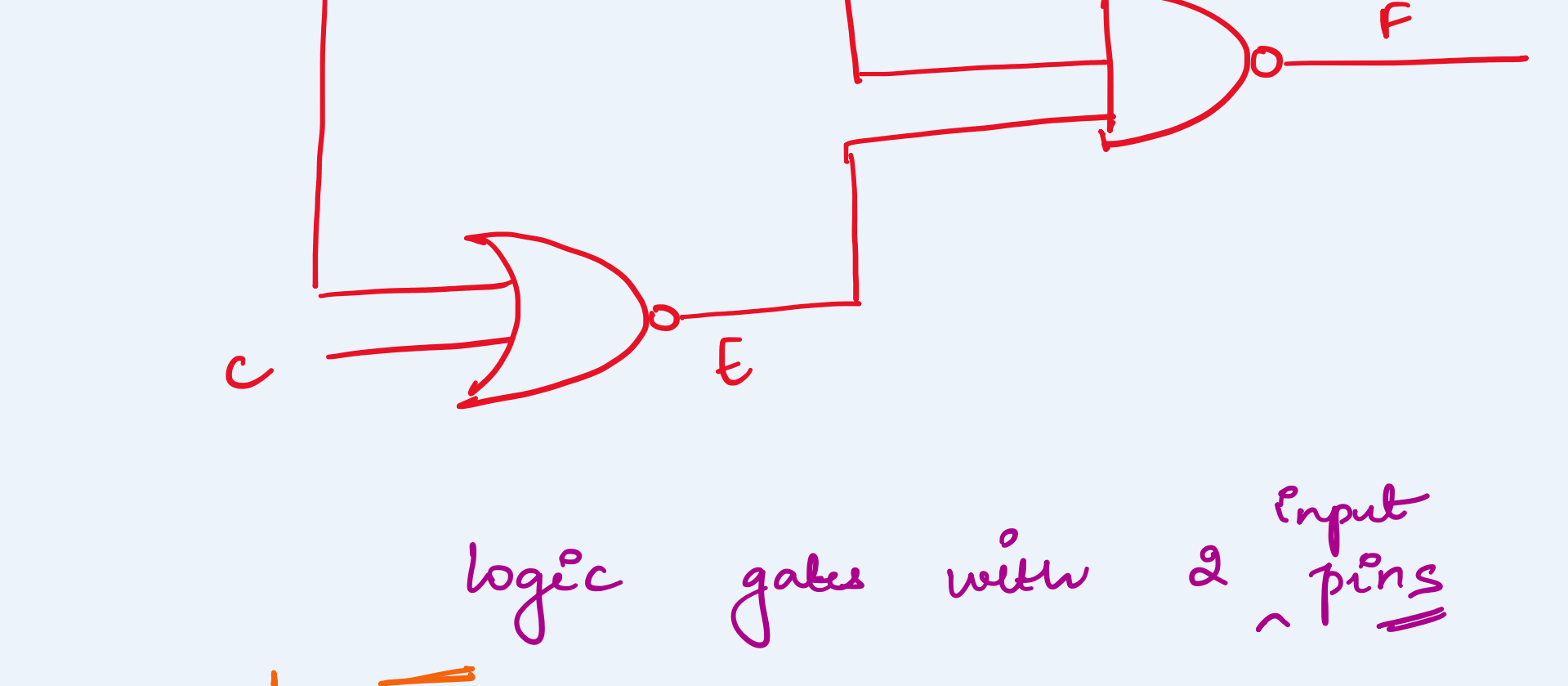
A	B	A ⊙ B
0	0	1
0	1	0
1	0	0
1	1	1



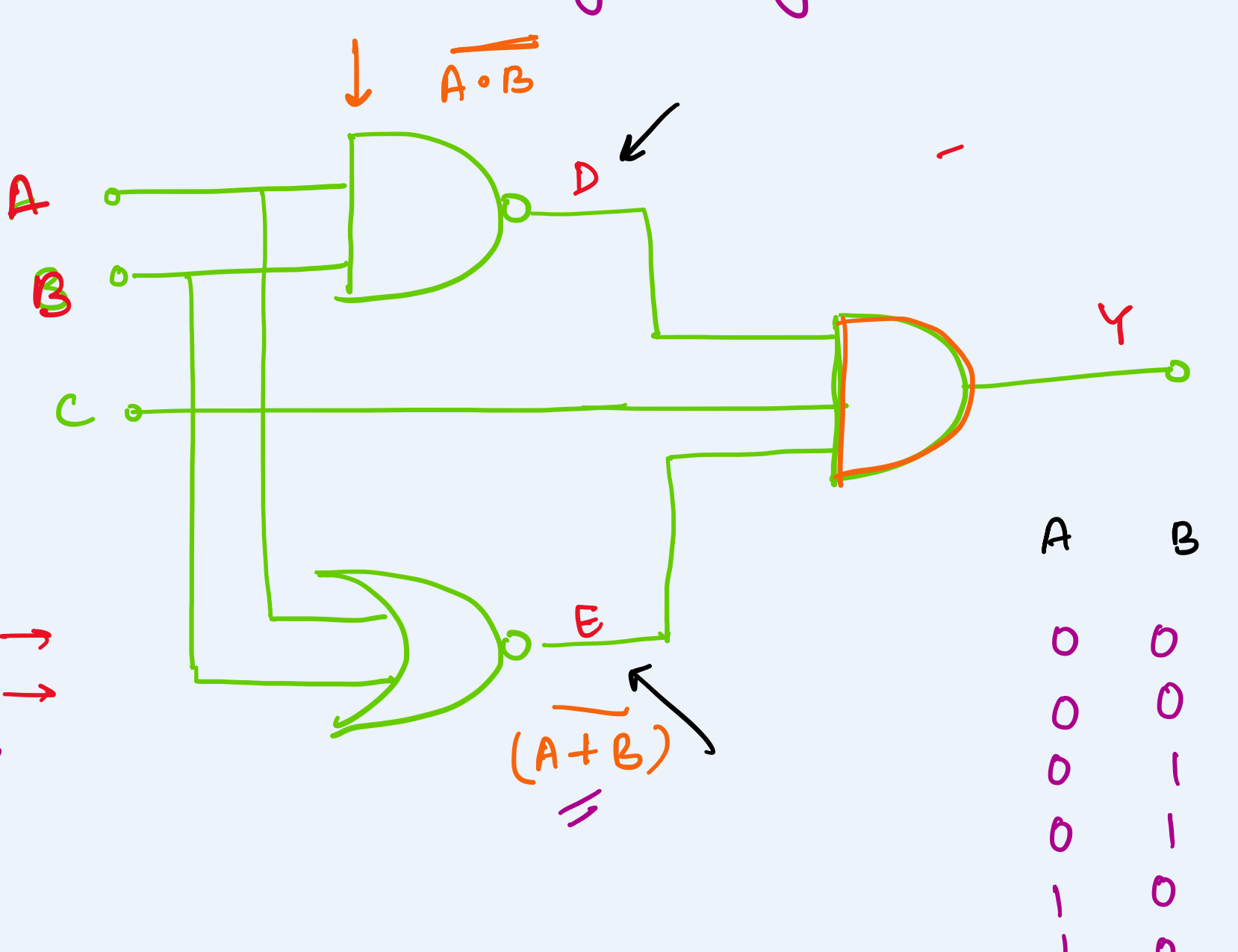
2^3

A	B	C	D	E	Y
0	0	0	0	0	0
0	0	1	0	0	0
0	1	0	0	0	0
0	1	1	0	0	0
1	0	0	0	0	0
1	0	1	0	1	1
1	1	0	1	0	1
1	1	1	1	1	1

HW



logic gates with 2 input pins



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

A	B	C	Y
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	1
1	1	0	0
1	1	1	0