Digital Electronics

Experiment 1

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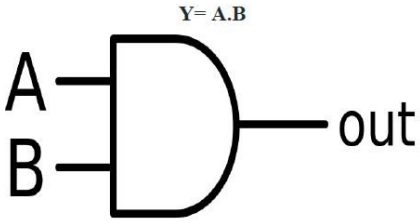
Branch: Computer Engineering

Aim:

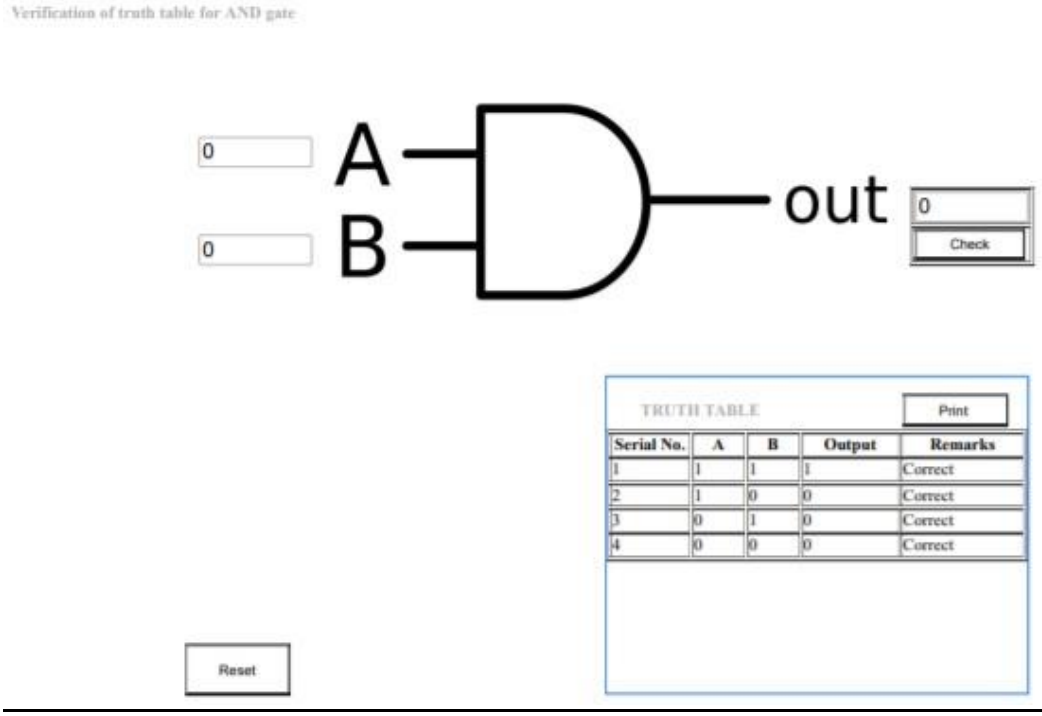
Verification and interpretation of truth table for AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates.

1. AND Gate

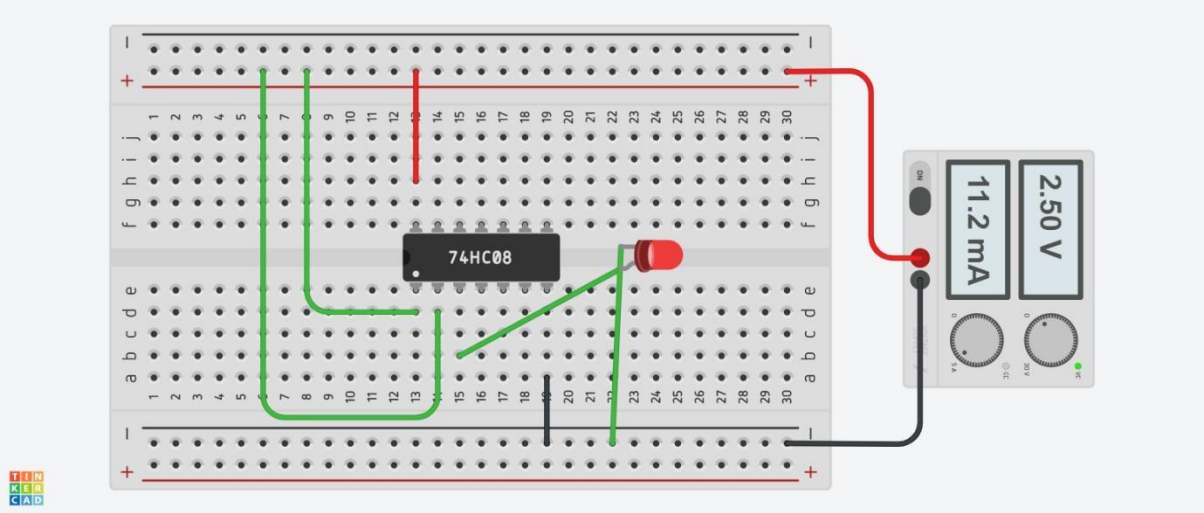
Theory: The AND gate is an electronic circuit that gives a high output (1) only if all its inputs are high. A dot (.) is used to show the AND operation i.e. A.B or can be written as AB



Output:



Tinkercad:

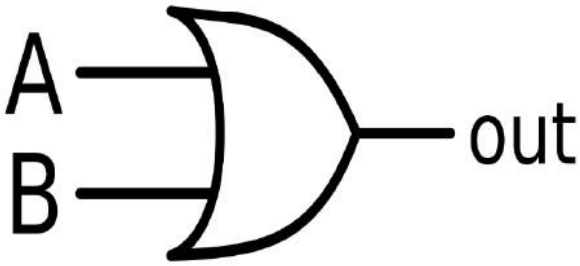


AND gate for inputs 1 and 1

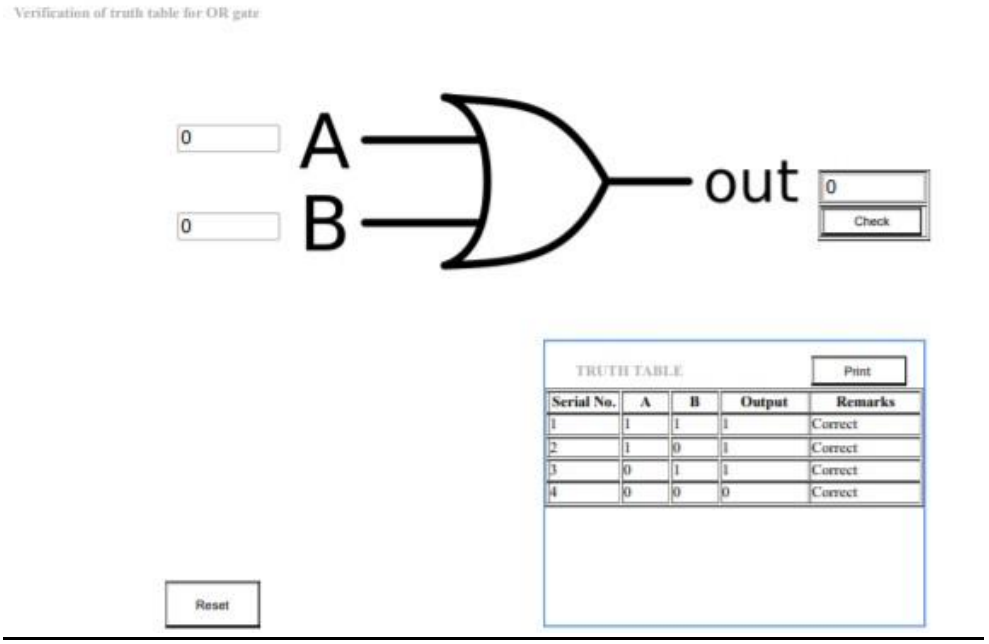
2. OR Gate

Theory: The OR gate is an electronic circuit that gives a high output (1) if one or more of its inputs are high. A plus (+) is used to show the OR operation.

Y=A+B



Output:



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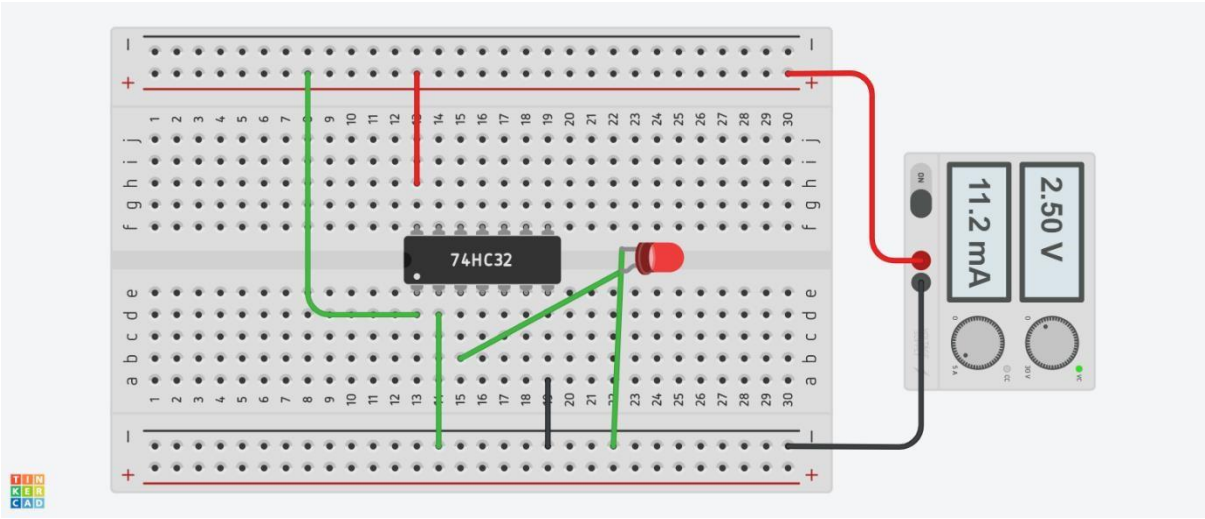


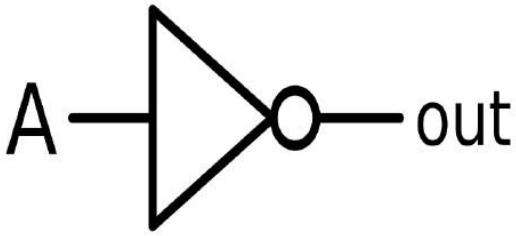
OR GATE for inputs 1 and 0

3.

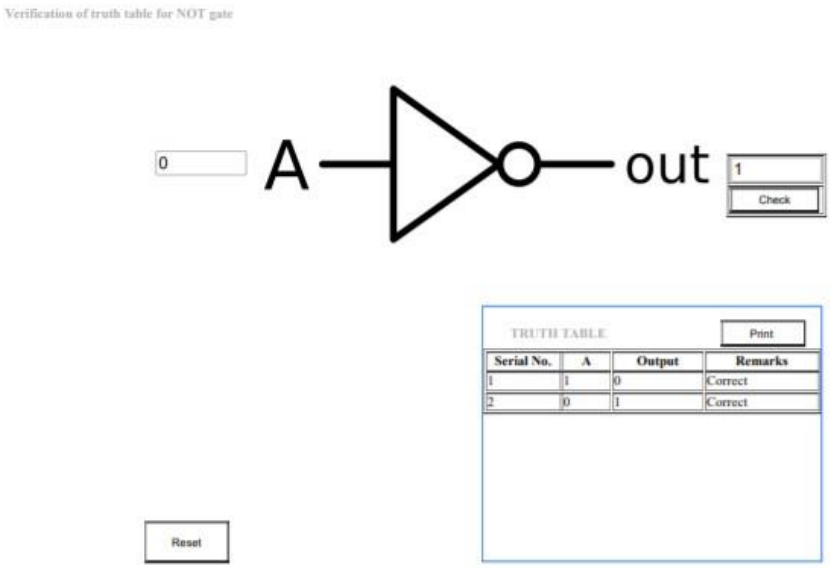
NOT Gate

Theory: The NOT gate is an electronic circuit that produces an inverted version of the input at its output. It is also known as an inverter. If the input variable is A, the inverted output is known as NOT A. This is also shown as A' or A with a bar over the top, as shown at the outputs.

Y = A’



Output:



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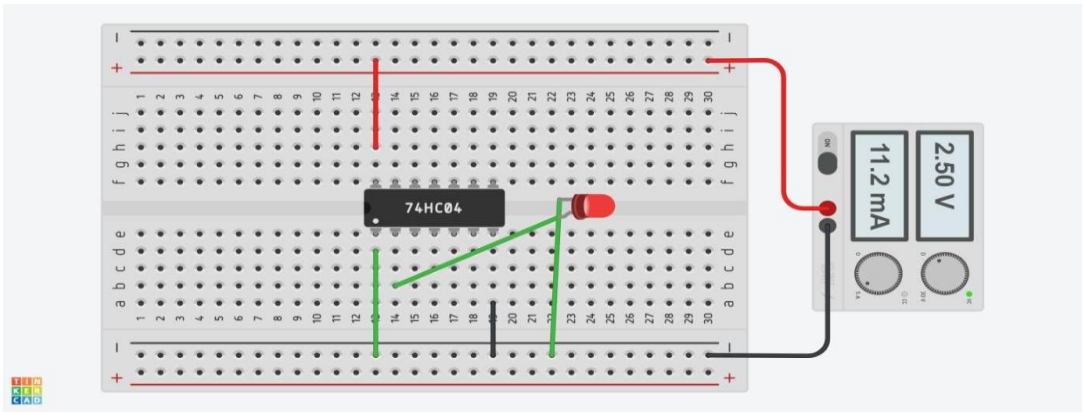


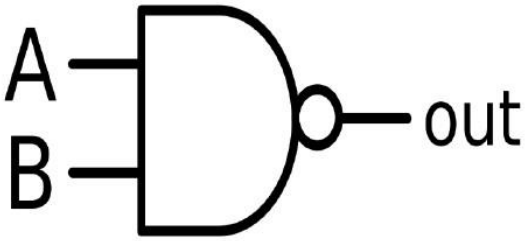
NOT Gate for input 0

4.

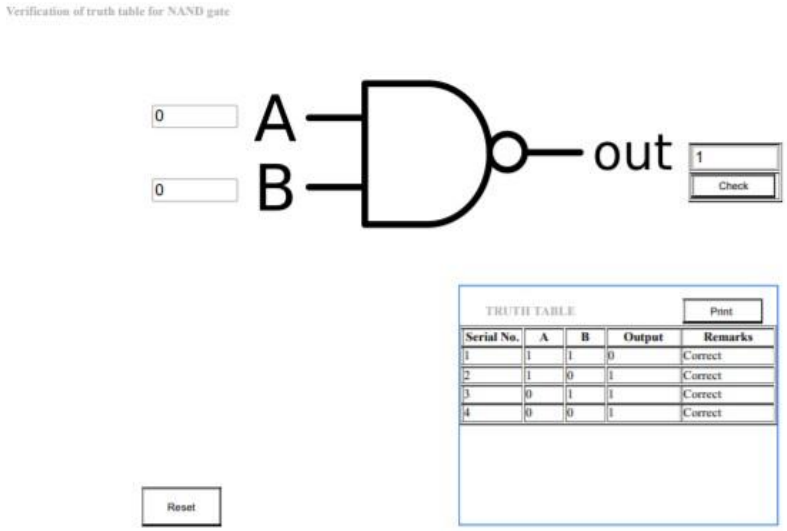
NAND gate

Theory: This is a NOT-AND gate which is equal to an AND gate followed by a NOT gate. The outputs of all NAND gates are high if any of the inputs are low. The symbol is an AND gate with a small circle on the output. The small circle represents inversion.

Y = (A.B)'



Output:



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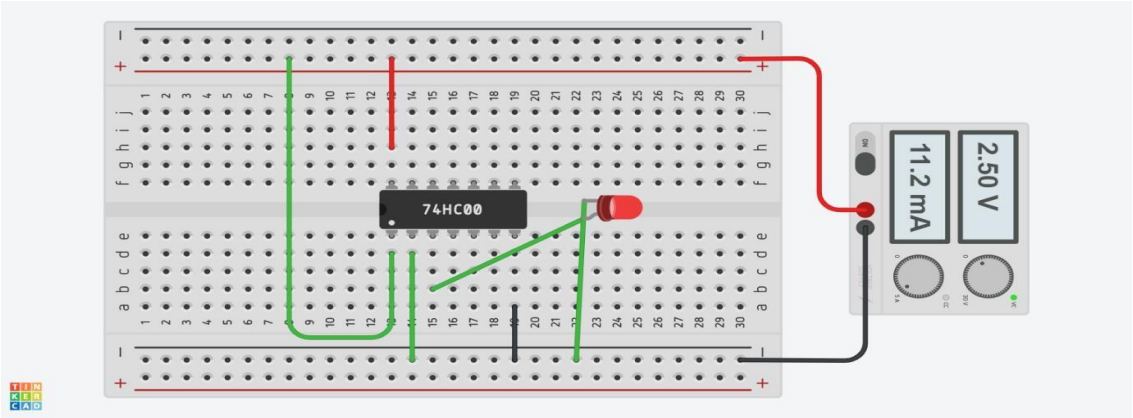


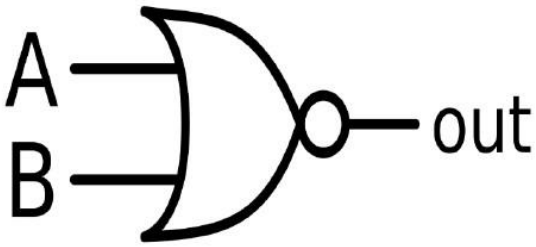
NAND Gate for inputs 1 and 0

5.

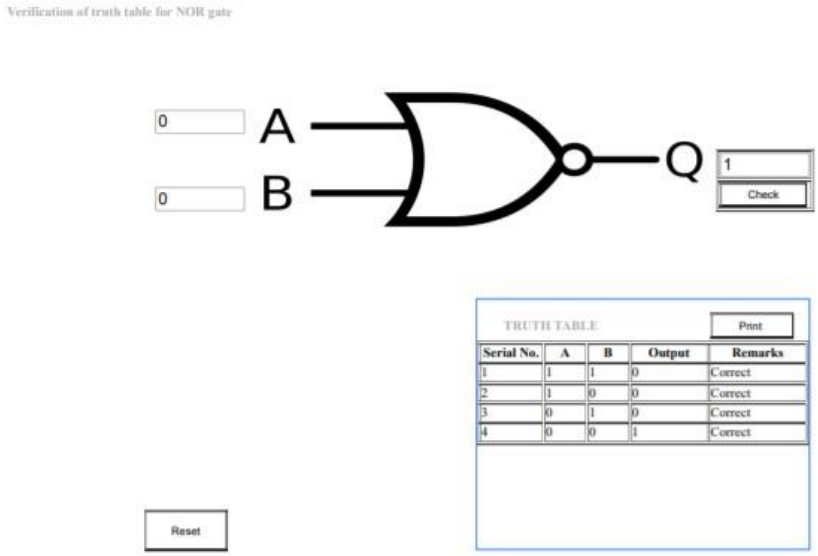
NOR gate

Theory: This is a NOT-OR gate which is equal to an OR gate followed by a NOT gate. The outputs of all NOR gates are low if any of the inputs are high. The symbol is an OR gate with a small circle on the output. The small circle represents inversion.

Y = (A+B)'



Output:



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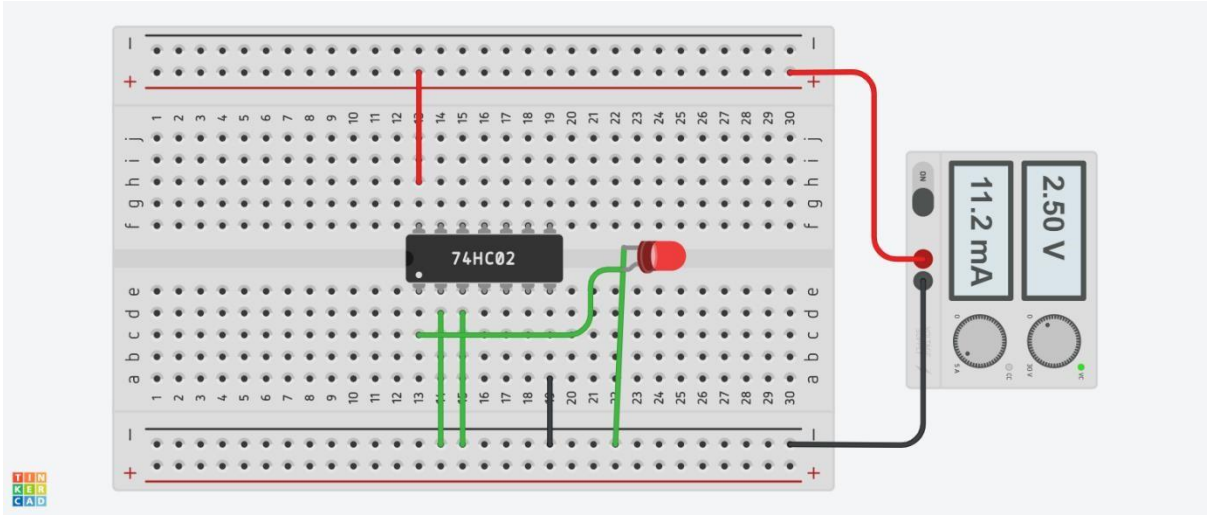


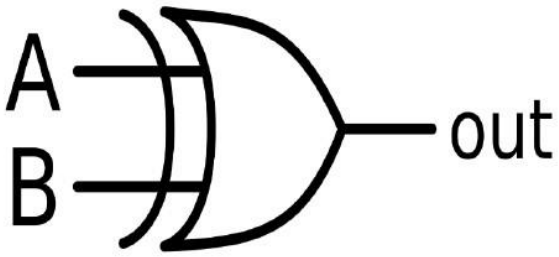
NOR gate for input 0 and 0

6.

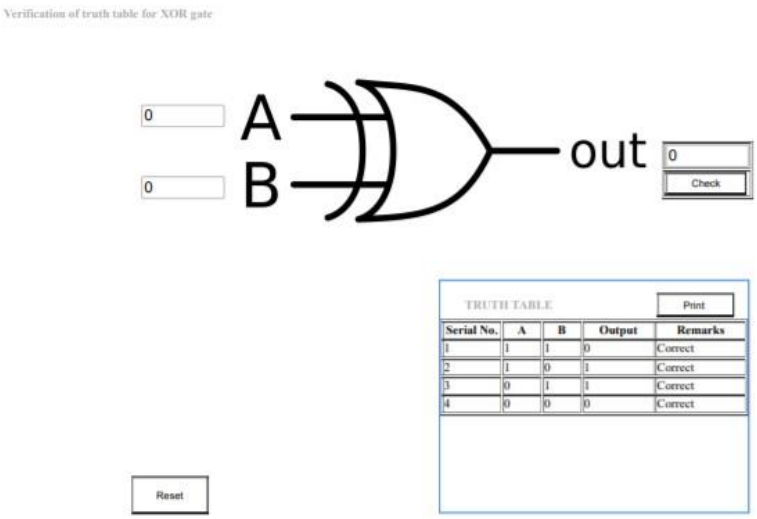
EX-OR gate

Theory: The 'Exclusive-OR' gate is a circuit which will give a high output if either, but not both of its two inputs are high. An encircled plus sign (⊕) is used to show the Ex-OR operation. Ex-OR gate is created from AND, NAND and OR gates. The output is high only when both the inputs are different.

Y= A⊕B



Output:



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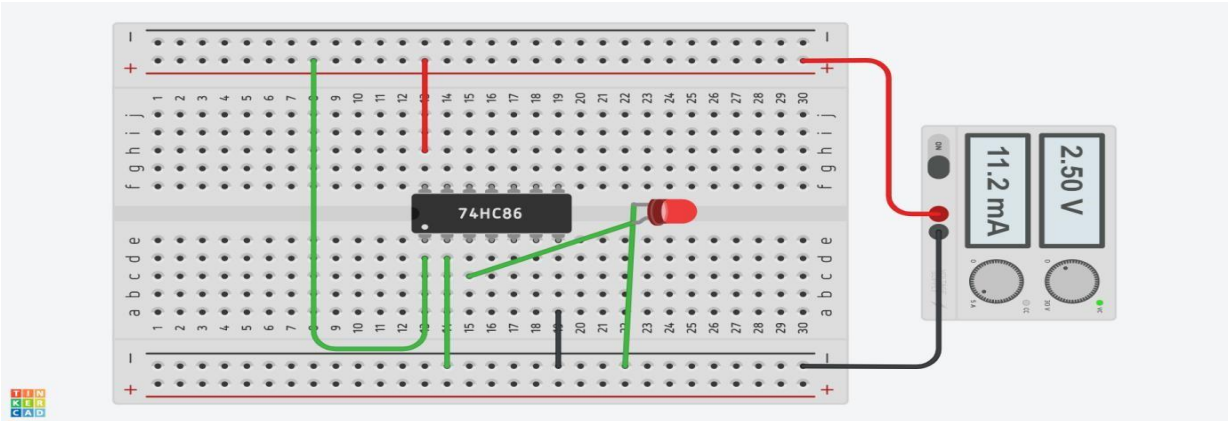

XOR gate for inputs 1 and 0

7.