

Lab 5

To Demonstrate the Working of Binary Adders

Note: You may draw all the logic diagrams with hand and paste the pictures here or on logicly software with your name, roll number & section mentioned in your workspace. Make sure that all of your connections are clearly visible and distinguishable.

Tasks

1. Construct a logic circuit for half and full adder with the help of truth table. Also write the Boolean expression for output(s).

Half Adder

a) Truth Table

A	B	SUM	Carry
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

b) Boolean Expression (Simplified)

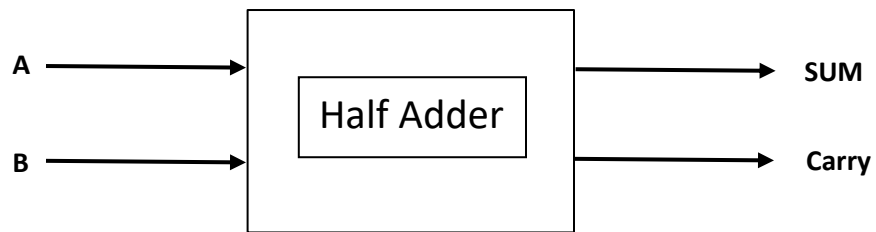
SUM (S) bit:

$$F1 = A \oplus B = A \text{ XOR } B$$

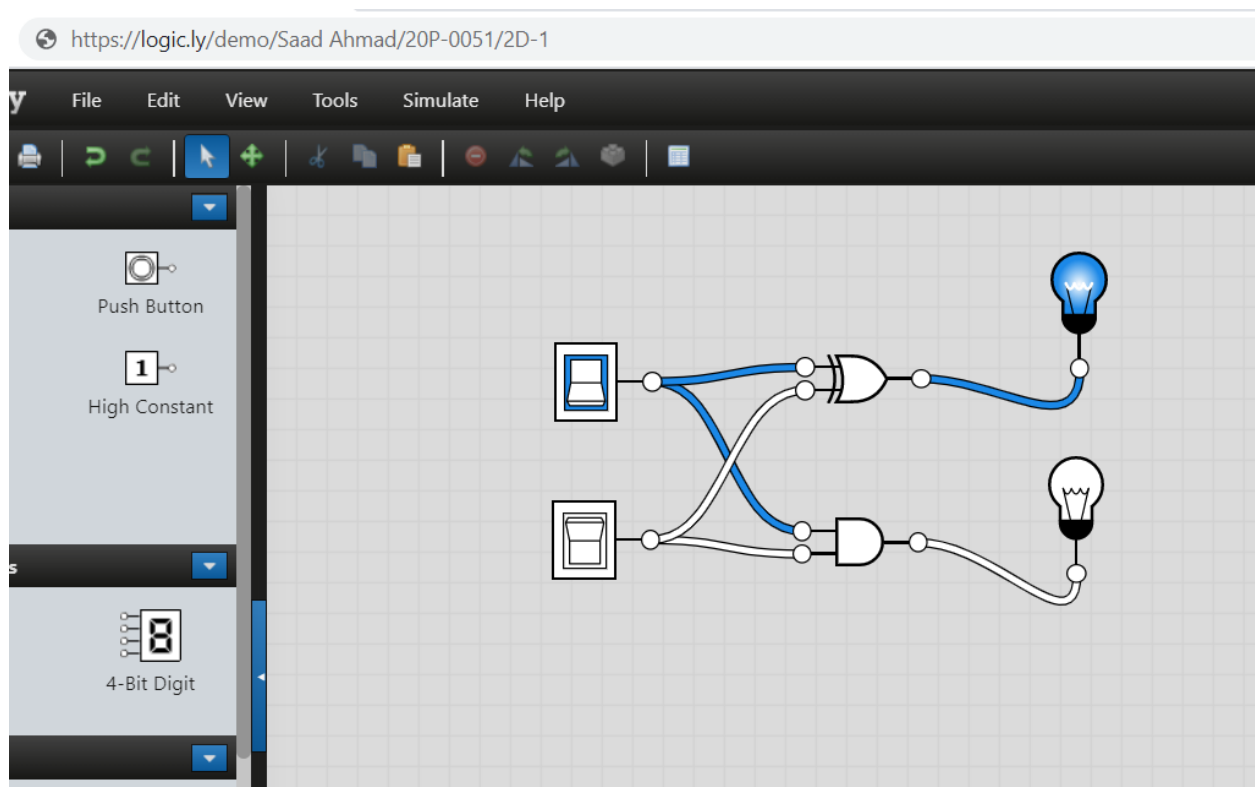
CARRY-OUT (Cout) bit:

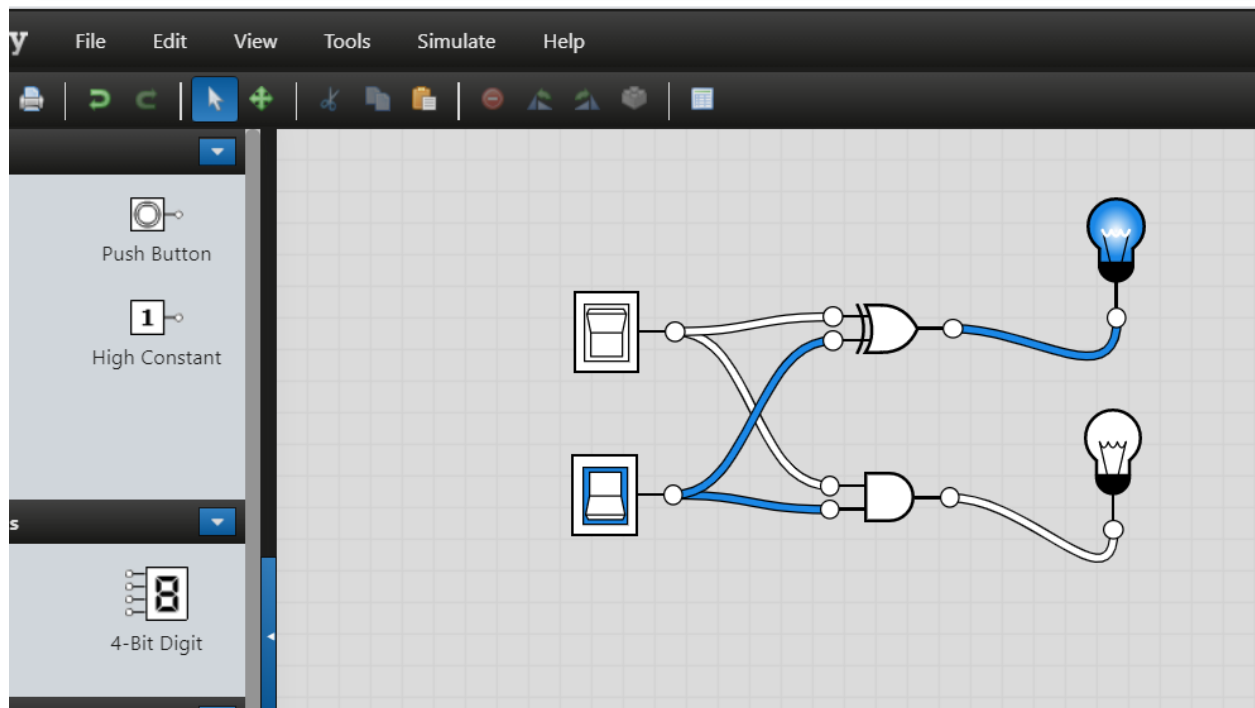
$$F2 = A.B = A \text{ AND } B$$

c) Logic Diagram



d) Software Simulation ([Show here your results for each combination that gives a high output](#))





Full Adder

a) Truth Table

A	B	Cin	SUM	Cout
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

b) Boolean Expression (Simplified)

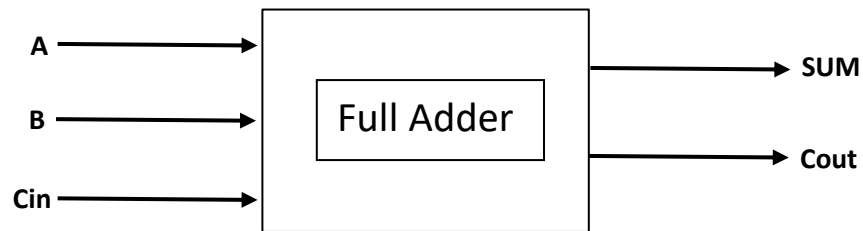
SUM (S) bit:

$$F1 = (A \oplus B) \oplus Cin = (A \text{ XOR } B) \text{ XOR } Cin$$

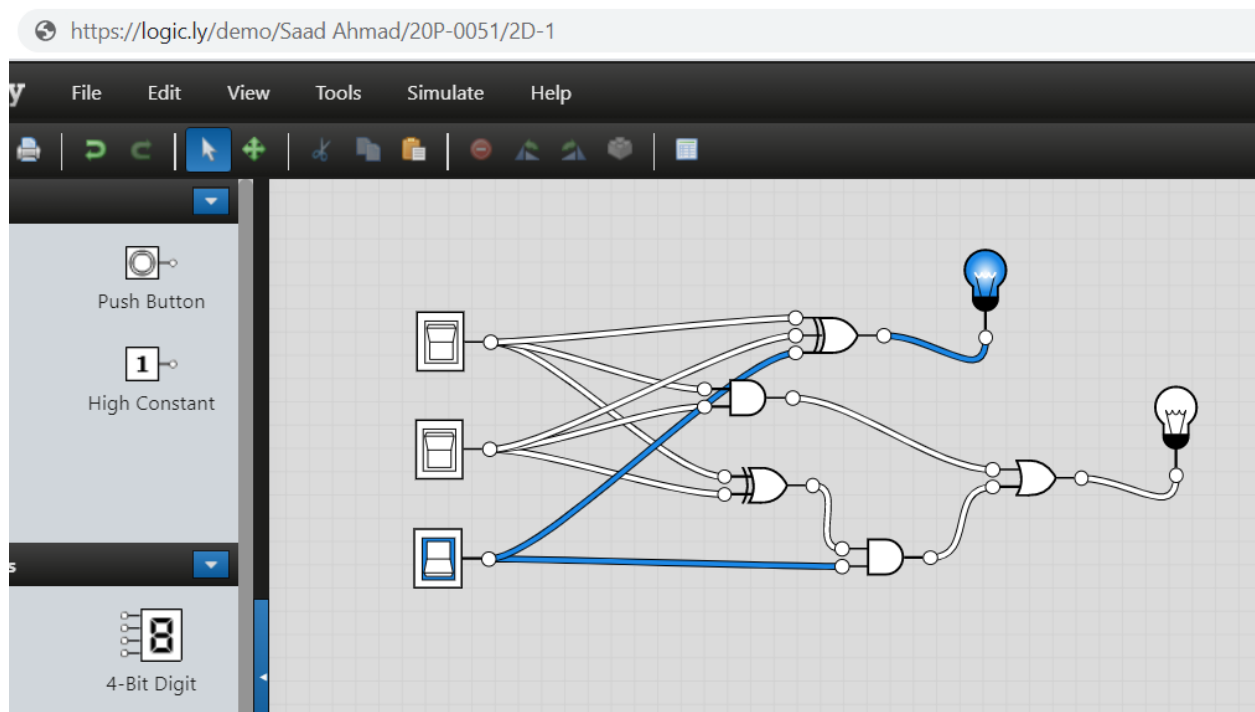
CARRY-OUT (Cout) bit:

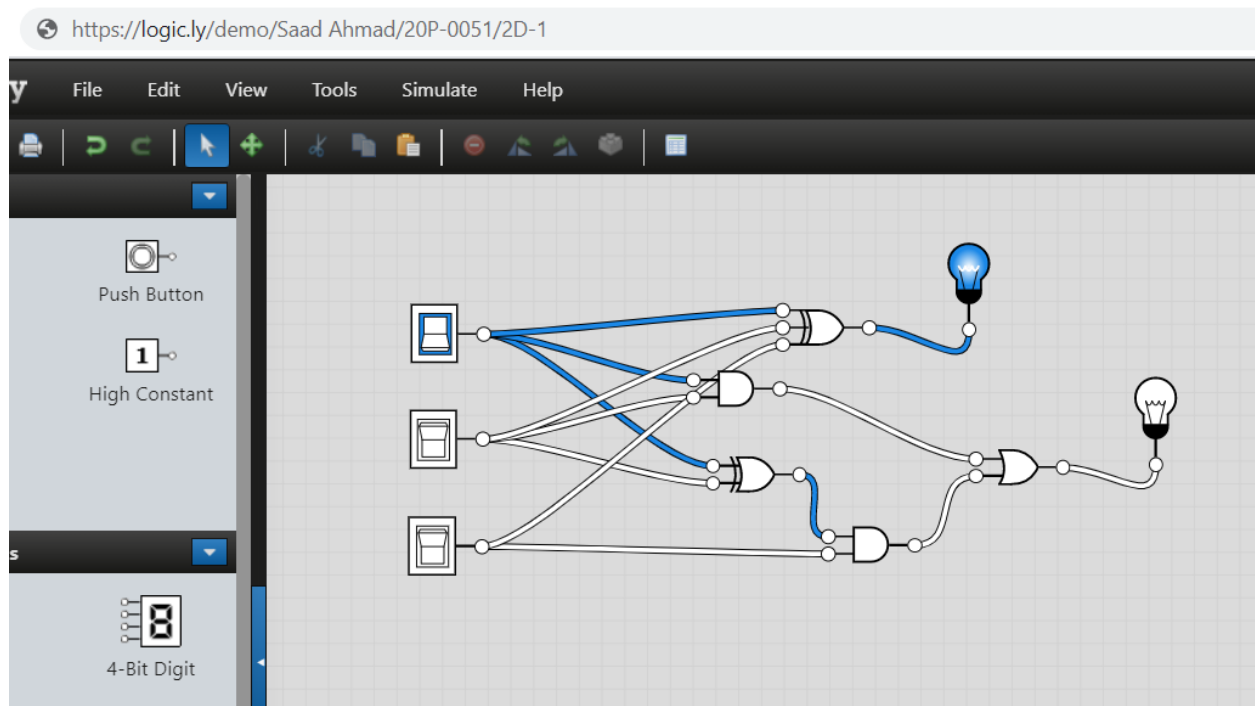
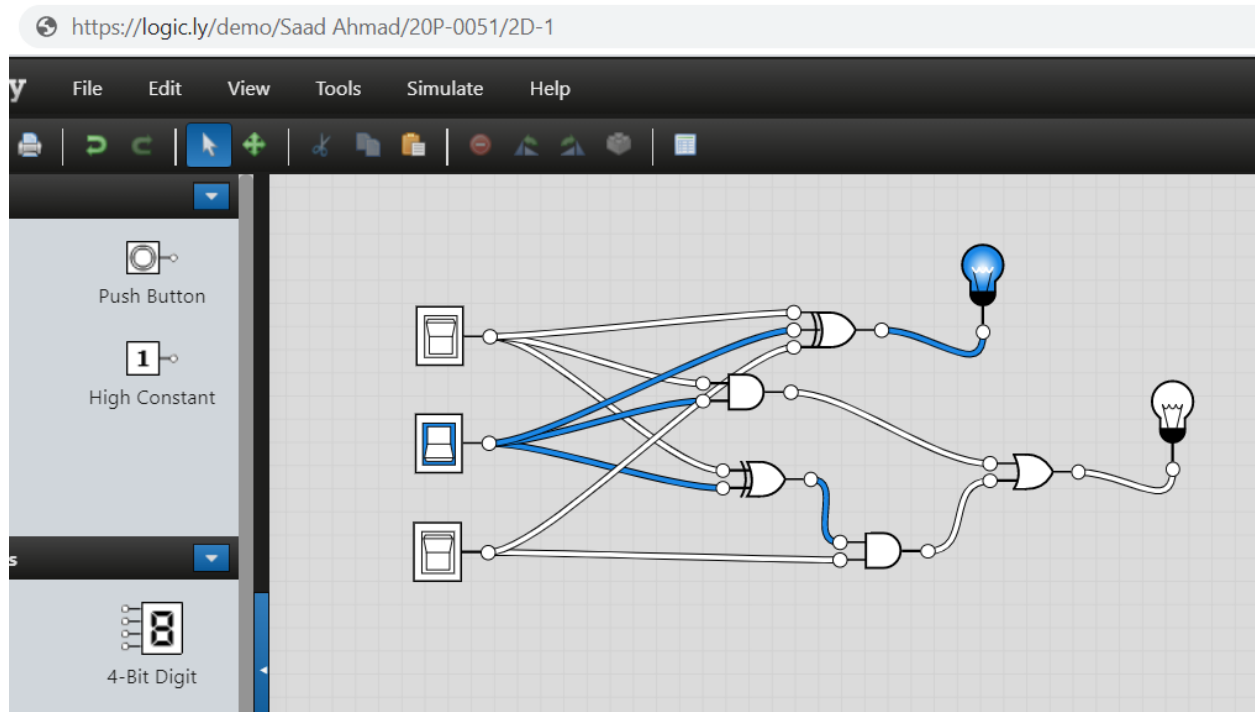
$$F2 = A.B + Cin (A \oplus B) = A \text{ AND } B \text{ OR } Cin (A \text{ XOR } B)$$

c) Logic Diagram

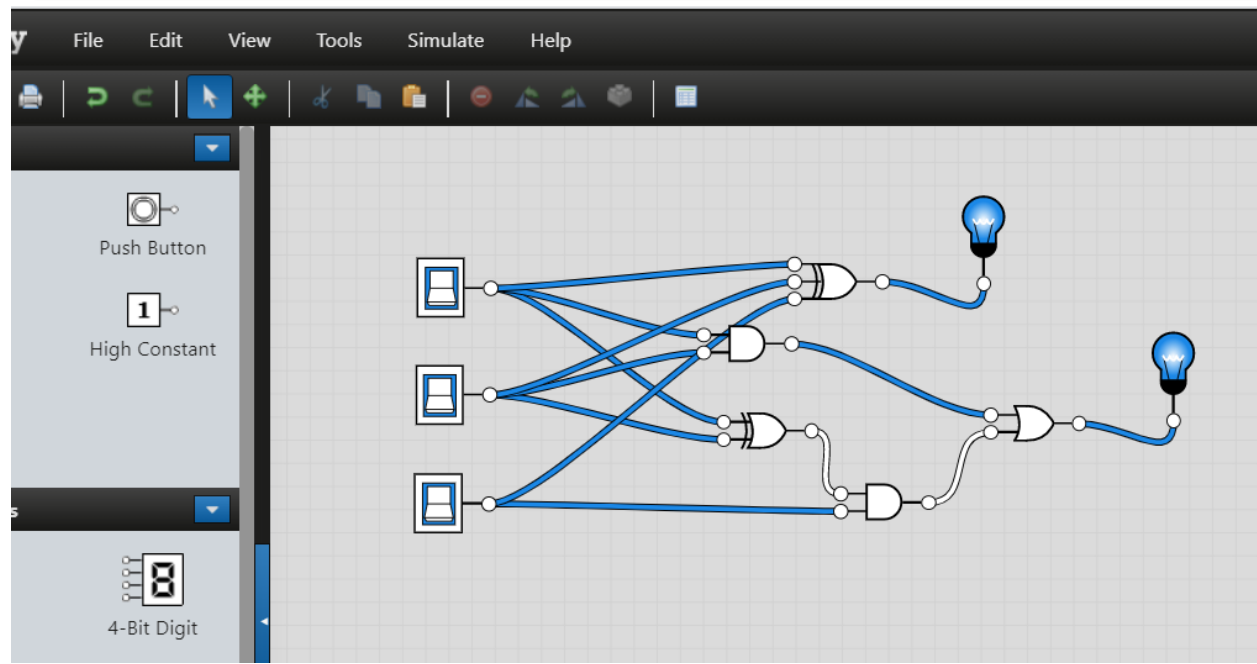


d) Software Simulation (Show here your results for each combination that gives a high output)



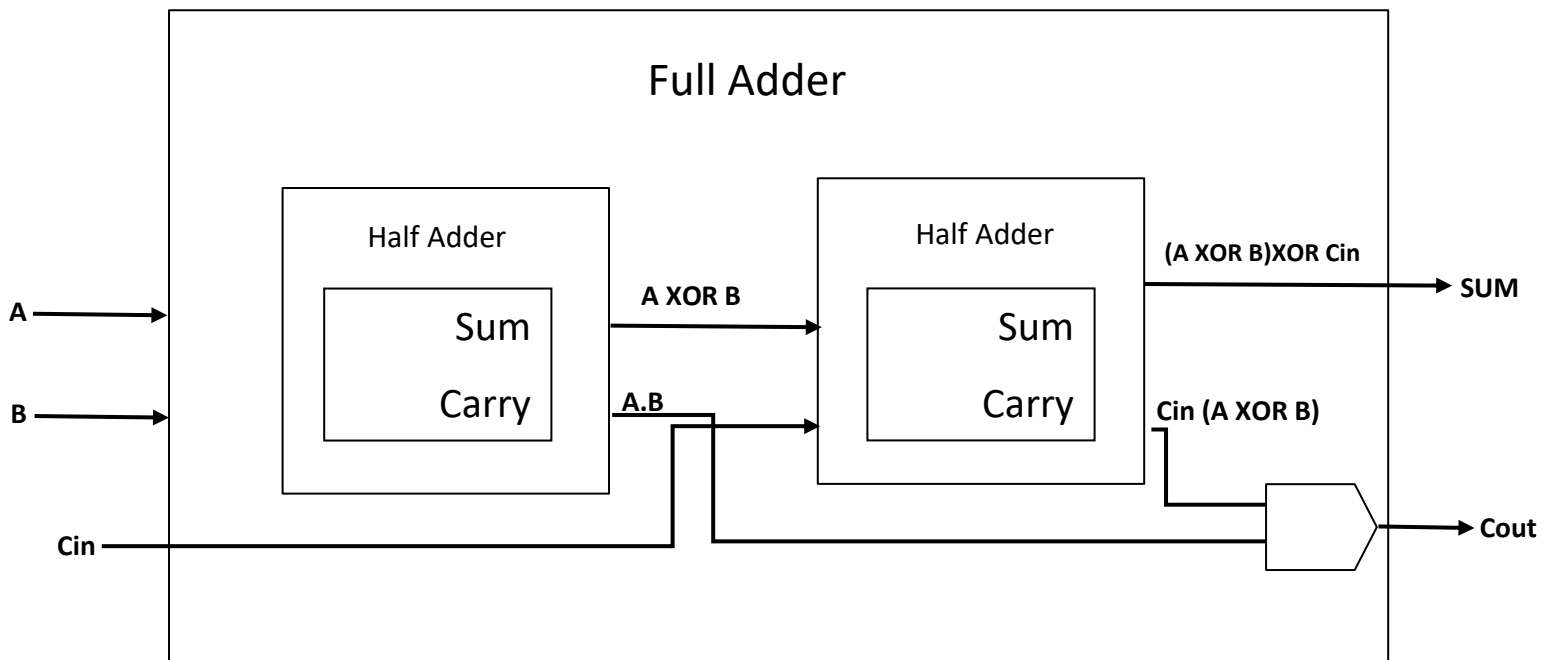


[https://logic.ly/demo/Saad Ahmad/20P-0051/2D-1](https://logic.ly/demo/Saad%20Ahmad/20P-0051/2D-1)

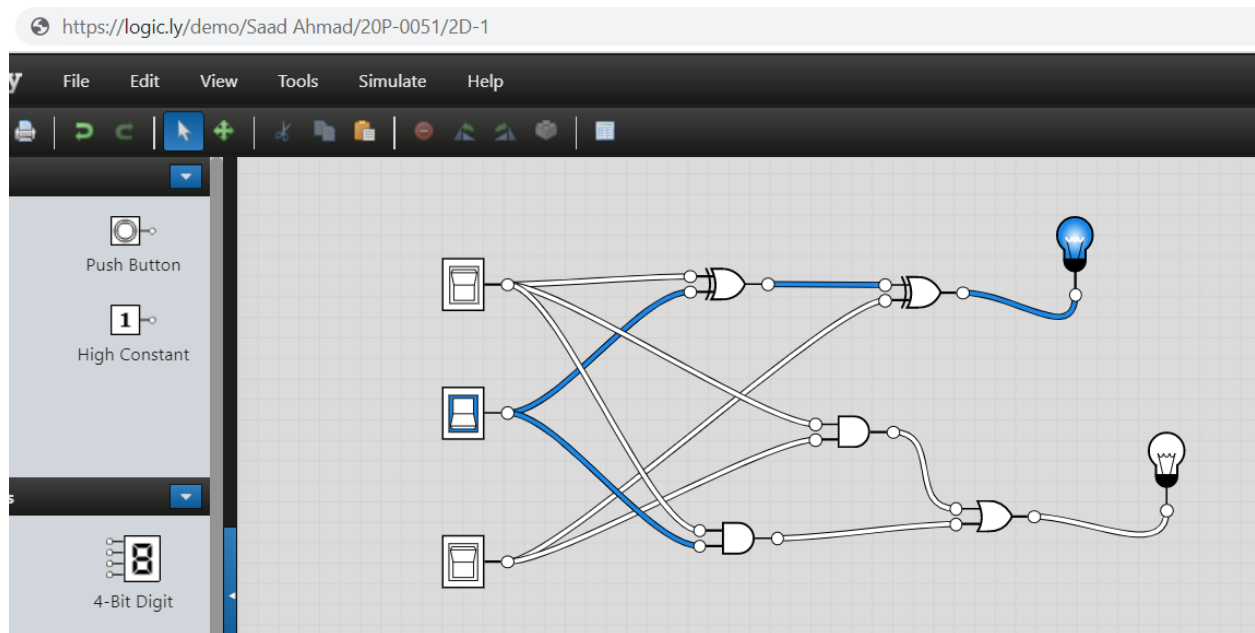
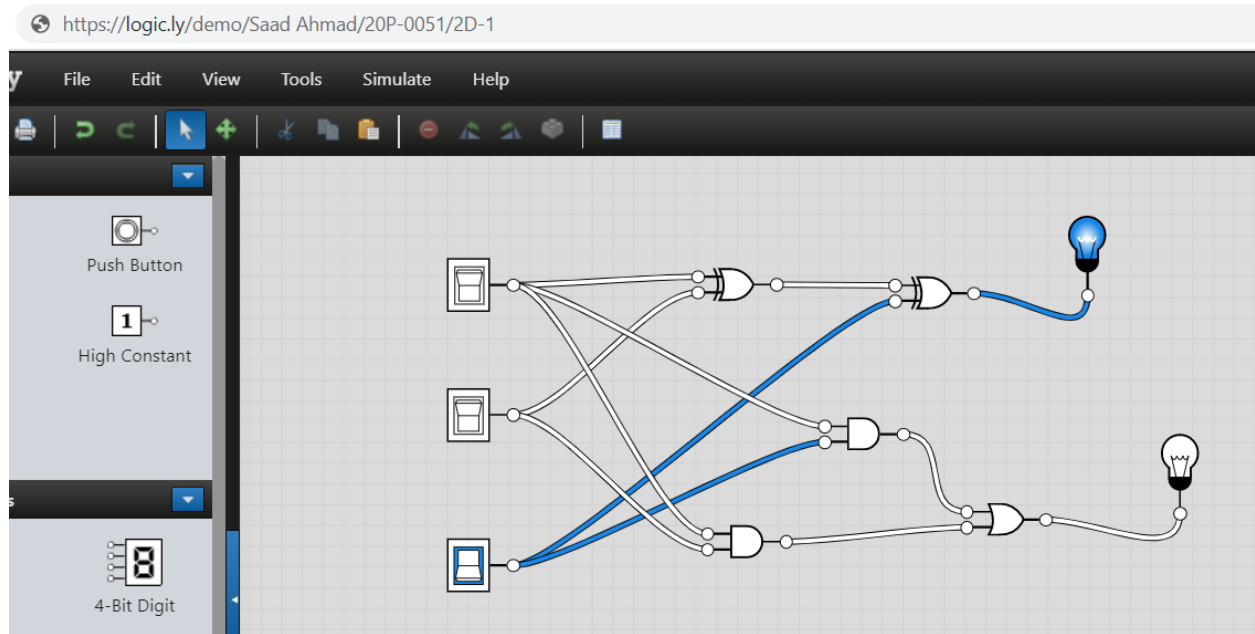


2. A full adder can be implemented using 2-half adders. Demonstrate the logic diagram for the said circuit. Simulate your circuit for the verification of results.

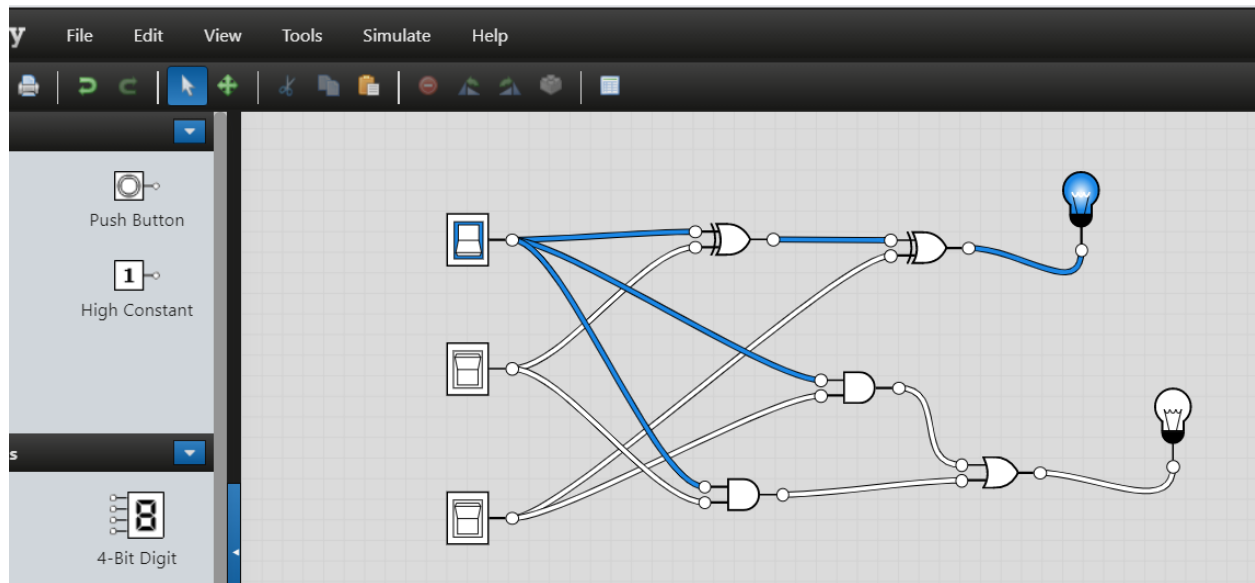
a) Logic Diagram of Full Adder using 2-Half Adders



b) Software Simulation (Show here your results for each combination that gives a high output)



[https://logic.ly/demo/Saad Ahmad/20P-0051/2D-1](https://logic.ly/demo/Saad%20Ahmad/20P-0051/2D-1)



[https://logic.ly/demo/Saad Ahmad/20P-0051/2D-1](https://logic.ly/demo/Saad%20Ahmad/20P-0051/2D-1)

