2DT901 : Lab 2

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Task 1

1a

A	B	C	OUT
0	0	0	1
0	0	1	1
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0

1b

`(A * (B + C))'` or `~(A * (B + C))`

1c : Practical 1

Build Guide

Note: 1 NAND, 1 OR, 3 in, 1 out

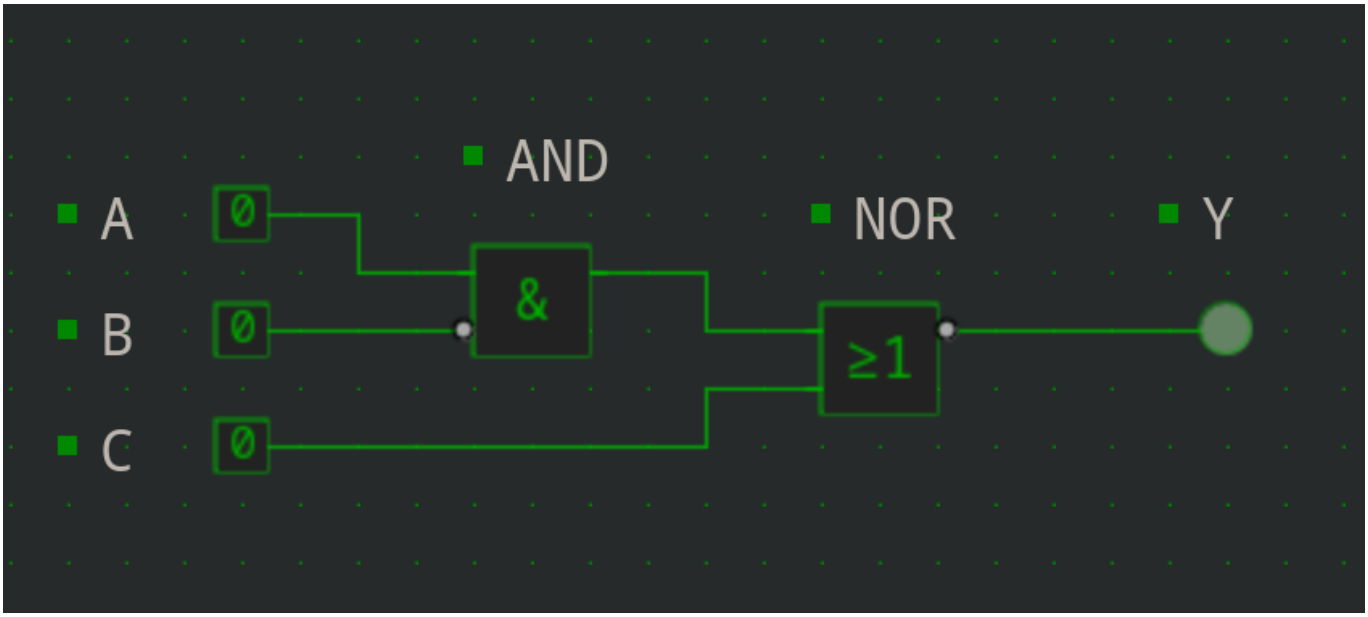
Task 2

2a

A	B	C	OUT
0	0	0	1
0	0	1	0
0	1	0	1
0	1	1	0
1	0	0	0
1	0	1	0

A	B	C	OUT
1	1	0	1
1	1	1	0

2b



Task 3

3a

`A' * B' + A * C` or `~A * ~B + A * C`

3b

A\B,C	00	01	11	10
0	1	1	0	0
1	0	1	1	0

Task 4

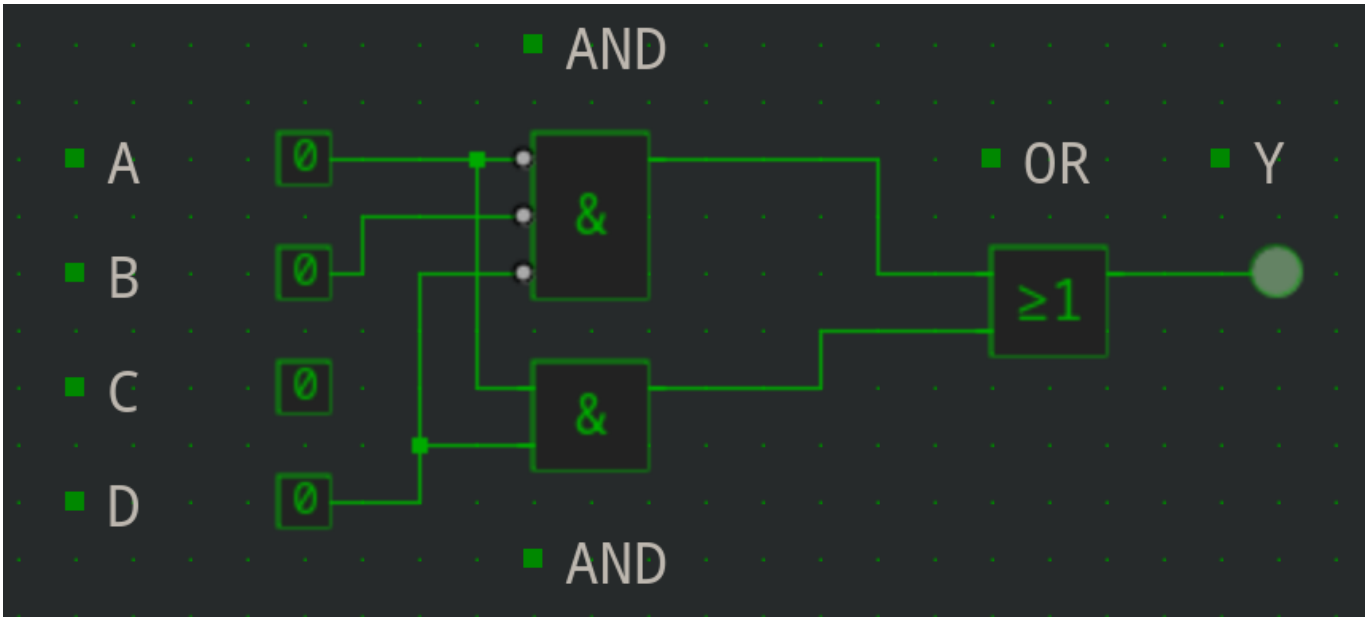
4a

A,B\C,D	00	01	11	10
00	1	0	0	1
01	0	0	0	0
11	0	1	1	0
10	0	1	1	0

4b

`A' * B' * D' + A * D` or `~A * ~B * ~D + A * D`

4c



Task 5

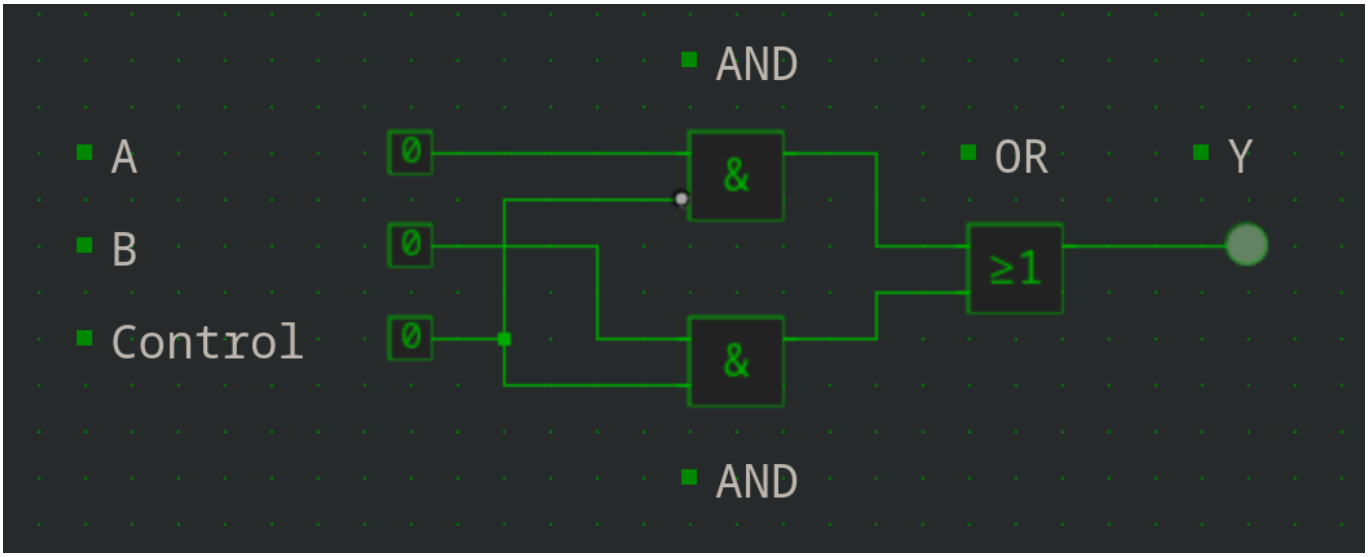
5a

A multiplexer or "mux" for short, is a fundamental digital component used in electronic circuits. It is used to select one of several input signals and route it to a single output. It functions like a switchboard, where multiple input lines are connected to a single output line. The selection of which input to transmit to the output is controlled by a set of control signals. Multiplexers are crucial in digital systems for data routing, signal switching, and data transmission.

5b

A	B	Control	OUT
0	0	0	0
0	1	0	0
1	0	0	1
1	1	0	1
0	0	1	0
0	1	1	1
1	0	1	0
1	1	1	1

5c



5d

One application of a multiplexer is in telecommunications systems, specifically in digital telephony. In a telephone network, multiple voice signals from different callers need to be transmitted over a limited number of transmission lines. A multiplexer is used to combine these voice signals into a single stream of data, which can then be transmitted over the network more efficiently.

For example, a multiplexer is required to route voice signals from various phone lines to a shared transmission line leading to the central office. Without a multiplexer, each phone line would require its dedicated transmission line, which would be highly inefficient and impractical in terms of both cost and resource utilization. By using a multiplexer, multiple voice signals can be multiplexed onto a single transmission line, maximizing the utilization of the communication infrastructure.

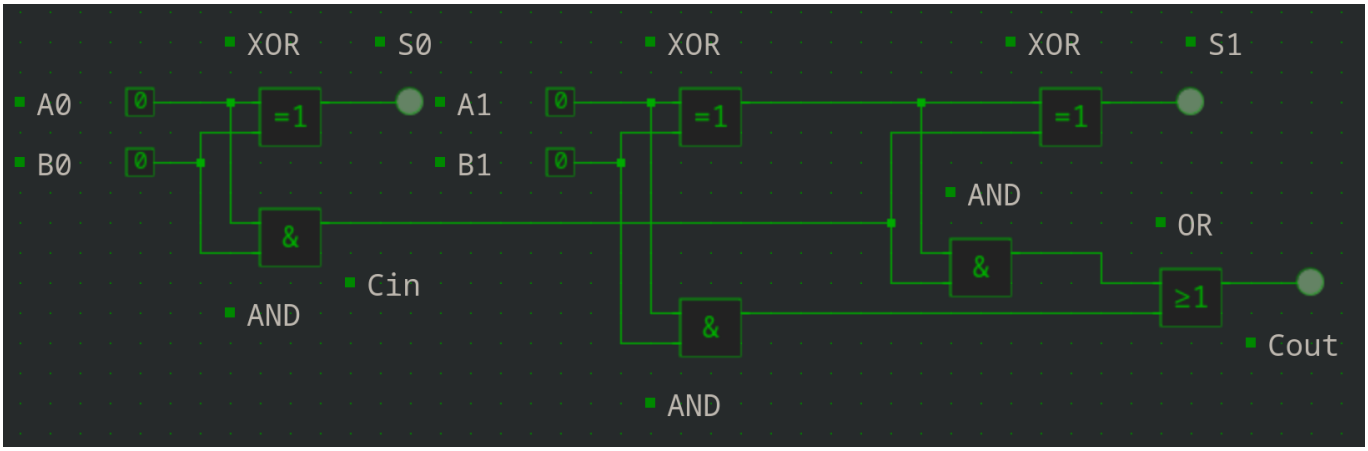
Task 6

6a

A1	A0	B1	B0	Cin	S1	S0	Cout
0	0	0	0	0	0	0	0
0	0	0	1	0	0	1	0
0	0	1	0	0	1	0	0
0	0	1	1	0	1	1	0
0	1	0	0	0	0	1	0
0	1	0	1	1	1	0	0
0	1	1	0	0	1	1	0
0	1	1	1	1	0	0	1
1	0	0	0	0	1	0	0

A1	A0	B1	B0	Cin	S1	S0	Cout
1	0	0	1	0	1	1	0
1	0	1	0	0	0	0	1
1	0	1	1	0	0	1	1
1	1	0	0	0	1	1	0
1	1	0	1	1	0	0	1
1	1	1	0	0	0	1	1
1	1	1	1	1	1	0	1

6b



6c : Practical 2

Showcase

Task 7 : Practical 3

7a

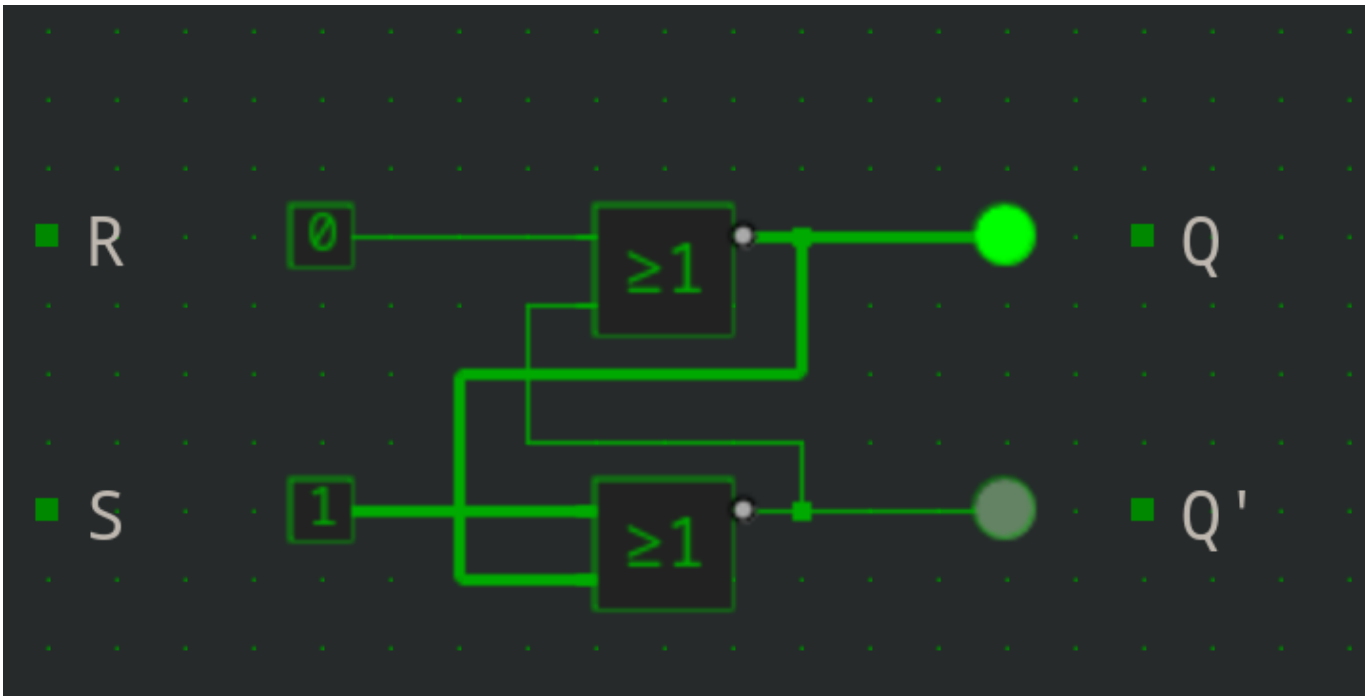
Build Guide

Note: 2 NOR gates, 2 in, 2 out

7b

Q lit

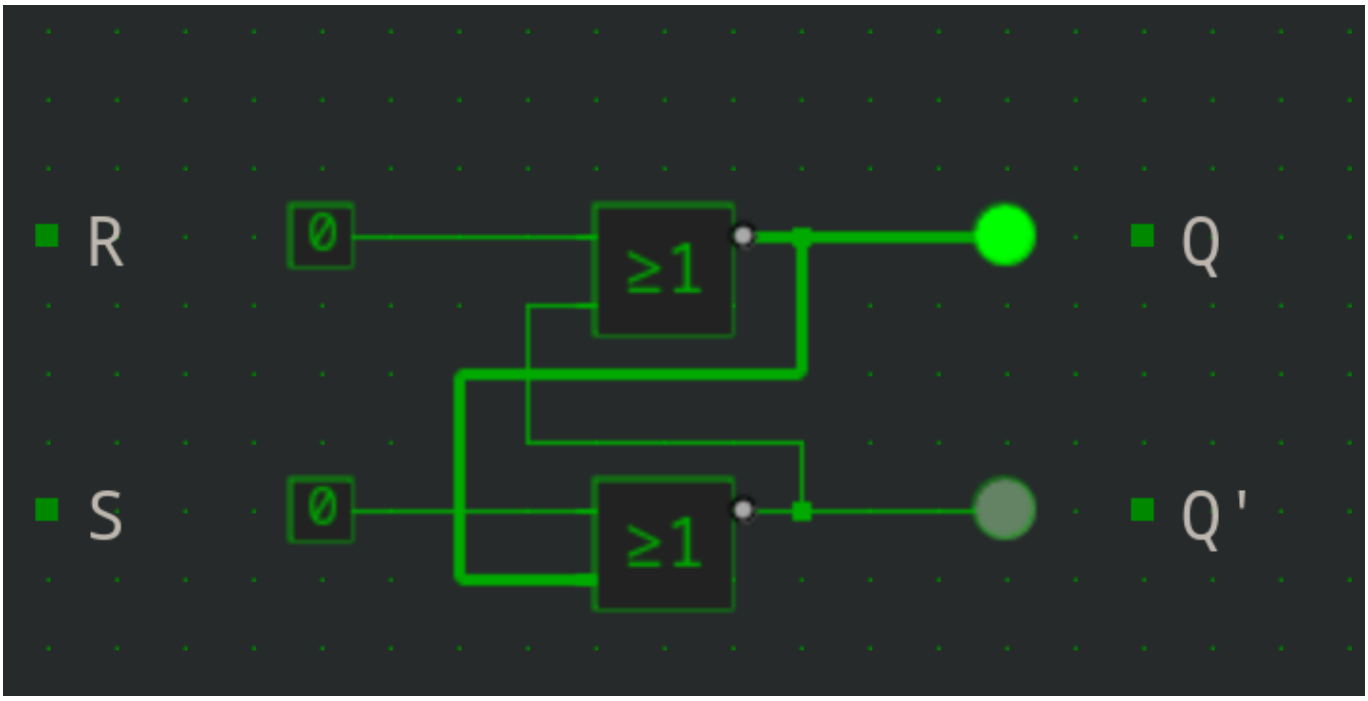
Q' not lit



7c

Q lit

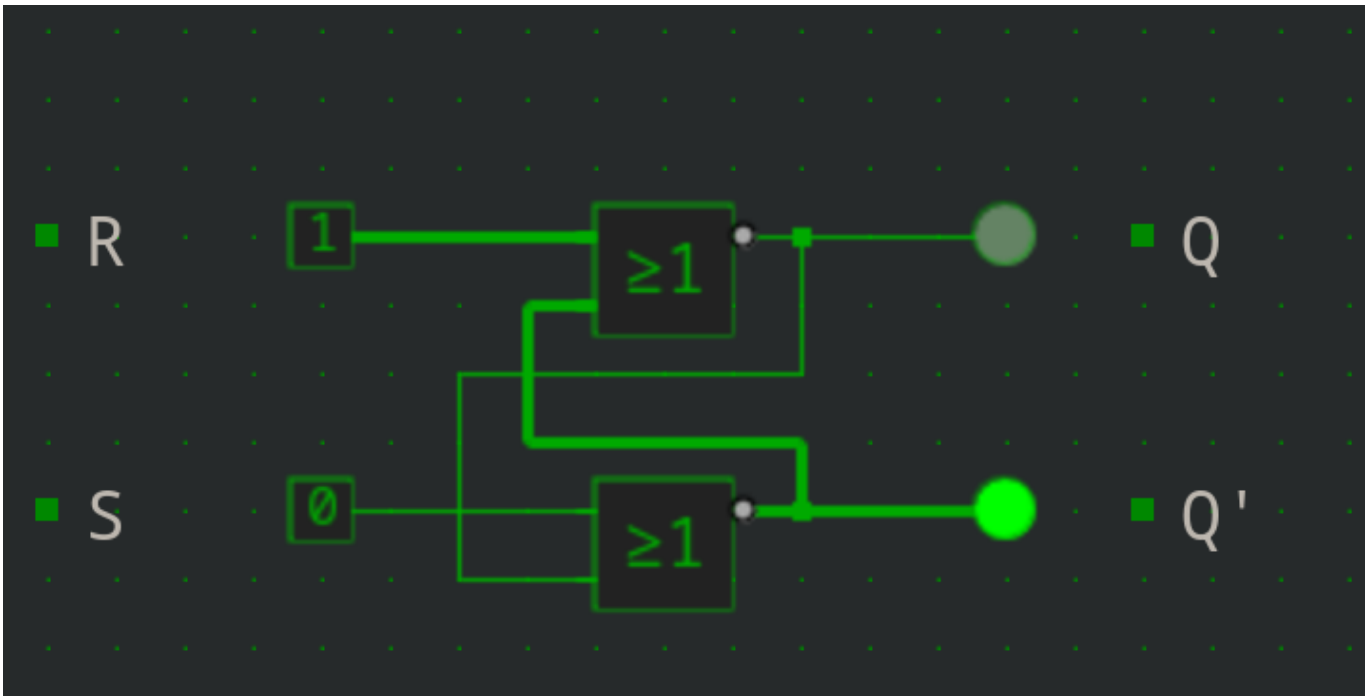
Q' not lit



7d

Q not lit

Q' lit


R
1
≥1
Q
S
0
≥1
Q'