Computer logic

Date: 22 – 26 March 2021 **Week:** 7

Task I: Tutorial questions

1. Describe the three steps to design a circuit, given the specification.
2. Explain the difference between a sequential logic circuit and a combinational logic circuit.
3. Describe the Set-Reset Flip-Flop. What is its problem?

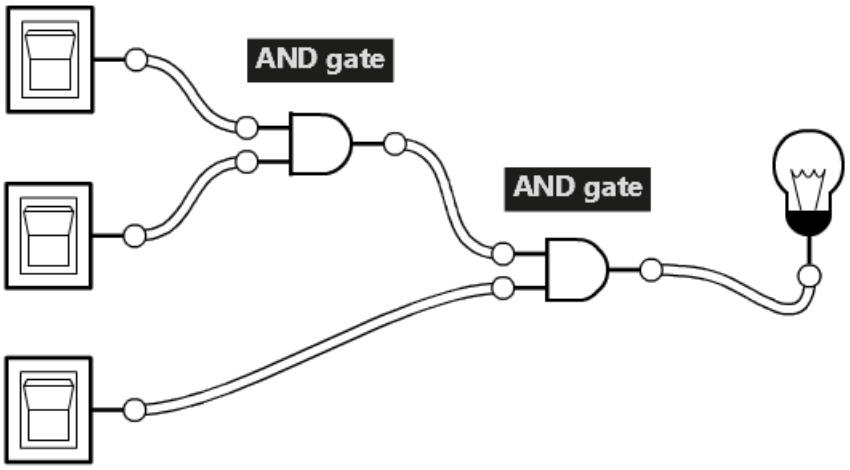
Task II: Practical exercises

In this lab, we practise building some logic circuits.

1. Opening Logic.ly online simulator at:

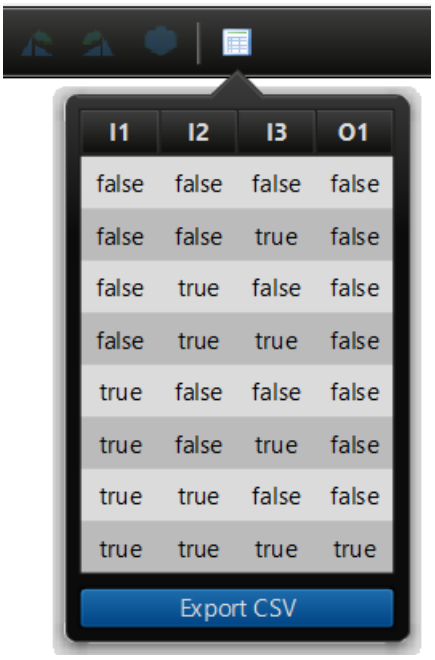
   https://logic.ly/demo

2. Build the following circuit that only turns on the light, if all 3 switches are on, as described in the lecture.



Turn on the switches to verify that the circuit works correctly.

Click on the “Generate truth table” icon to generate the truth table for this circuit (a very useful feature to check the circuit’s functionality).



3. Build a circuit from the following truth table.

Input A	Input B	Input C	Output
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	1

Hints:

- Step 1: Deriving the Boolean expressions (see lecture slide #12).
- Step 2: Write the sum of the products (see lecture slide #13).
- Step 3: Build the circuit in Logic.ly. For each dot “.” use the AND gate. For each plus “+” use the OR gate. Turn on the switches to verify that your circuit works as intended.

4. (Optional) Simplify the sum of the products above, using the Axioms and Laws provided in lecture slide #14. Re-build the (simplified) circuit.

Document your answers in the learning journal, including screenshots of the Logic.ly circuits