

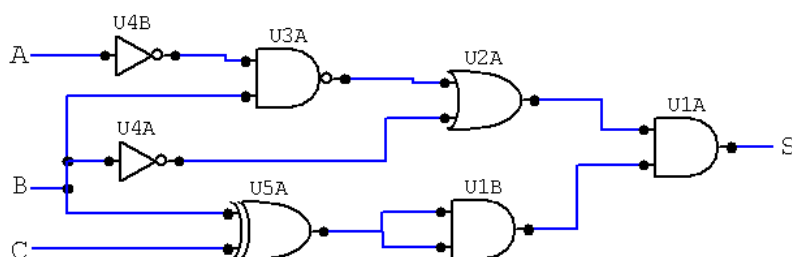
## Lab. Script 2

Truth Tables, Boolean functions and Logic Gates.

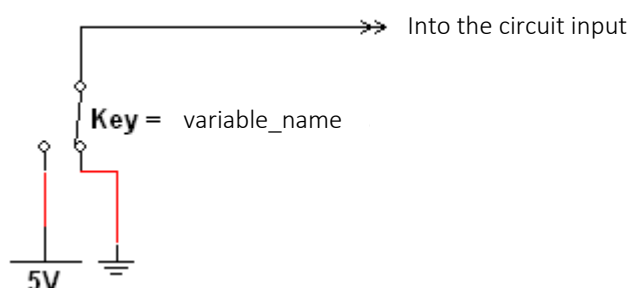
Introduction to MultiSim®

### Logic Functions

1. Observe the following logic diagram:

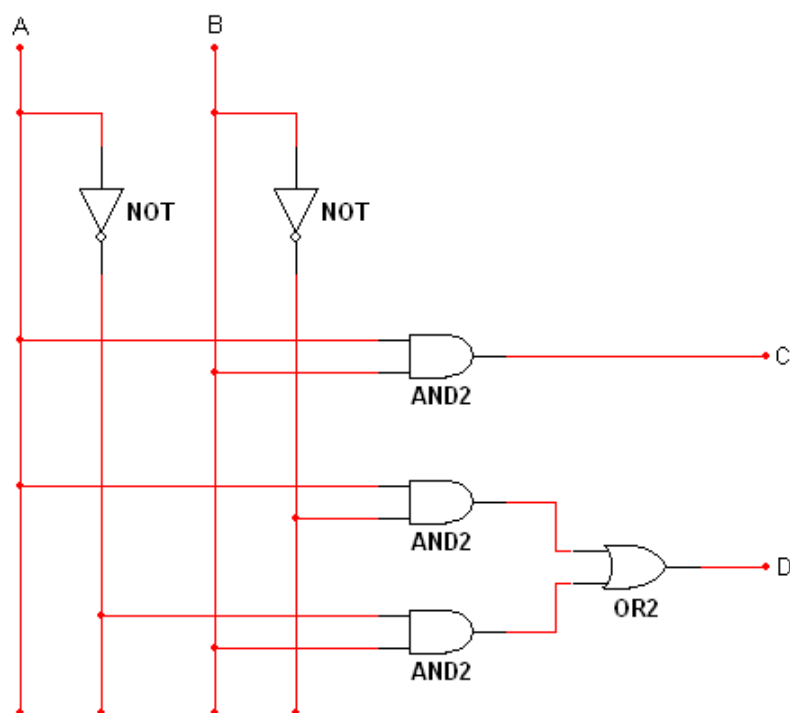


- a) Identify each one of the logic operations present in the circuit.
- b) Present a Boolean function  $S(A,B,C)$  in the algebraic form.
- c) Establish the truth table associated to the logic diagram.
- d) Using the MultiSim® implement the former circuit. Assign to each input variable the following circuit:



Connect the output to a **Logic Probe**. Confirm the result obtained in (c) simulating the behaviour of the circuit to several logic combinations of the input variables.

2. Consider the following logic diagram:



- Determine the number of inputs and outputs of the combinatorial circuit.
  - Fill the truth table associated to the circuit.
  - Using the strategy adopted in exercise 1, implement the circuit in MultiSim® and validate the result obtained in (b).
3. Assume the following logic expression:

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

- Do a sketch of the associated logic diagram. What the fewest number of gates to use (elementary or not)?
- Implement the circuit in MultiSim®.
- Confirm, using the circuit implementation in MultiSim®, that  $\overline{\overline{C}} = C$ .