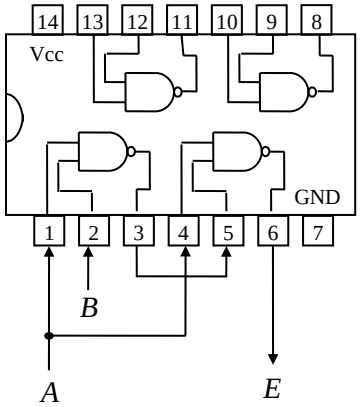
Remember to bring this along to your lab!

CS2100 Logic Trainer Guidelines

[This document is available on LumiNUS and module website http://www.comp.nus.edu.sg/~cs2100]

IMPORTANT NOTES

- You are supposed to do the lab by yourself. You should check your circuit and try as much as possible to identify the problem yourself first before you ask your lab TA for advice. Use the logic probe to help you debug the circuit.
- Check the chips before you start the lab.
- Switch off the power while you are connecting the circuit.
- Place the IC chips in the correct orientation – the notch of the IC chip should be at the top.
- Do not force down the IC chip onto the breadboard. If anything gets stuck (e.g. broken wire or pin), do not force it too hard. Call for the Lab TA.
- Do not use your hand to remove the chips from the circuit board. Use the IC extractor.
- Always check the circuit before turning on the power, to avoid burning the IC chips.
- Do not dismantle the circuit until it has been checked and graded by your lab TA.
- Make sure that the wire connections are neat to ease checking and debugging.
- Define a personal colour code for wires (e.g. green for inputs, blue for outputs, etc.). This is especially useful for debugging. The standard wire colours for power and ground are red and black respectively.
- Familiarize yourself with the logic probe and use it. Always attempt to debug yourself with the logic probe. Trace through the circuit carefully.
- Once completed, get the circuit accessed by the Lab TA. Do not wait until the end of the lab session. You may leave after your Lab TA has assessed your circuit and you have submitted your lab report.
- Please prepare layout diagrams before the lab for your own use. See Figure 1 below. You need not hand in these diagrams if they are not asked for, but they are useful for wiring up your circuit, especially for complex ones.



Wiring for the expression

$E = ((A \cdot B)' \cdot A)'$

Figure 1.

- Please write and draw clearly and neatly. You may use pencil for logic diagrams. Untidy writing or drawing will be penalized.
- Please draw large and neat circuit diagrams. See some real students' samples below.

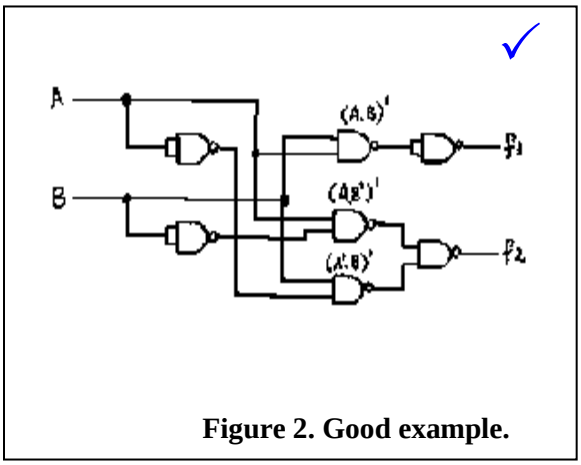


Figure 2. Good example.

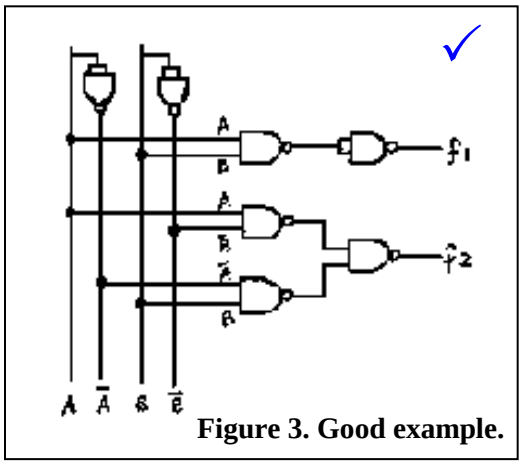


Figure 3. Good example.

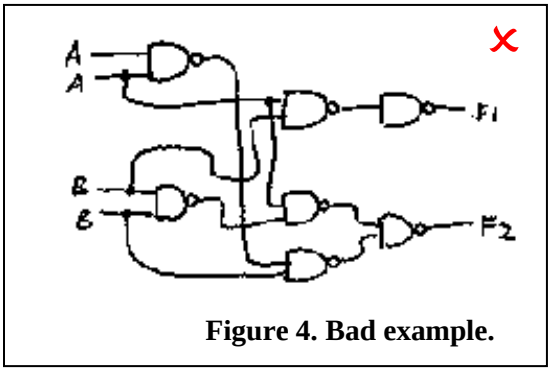


Figure 4. Bad example.

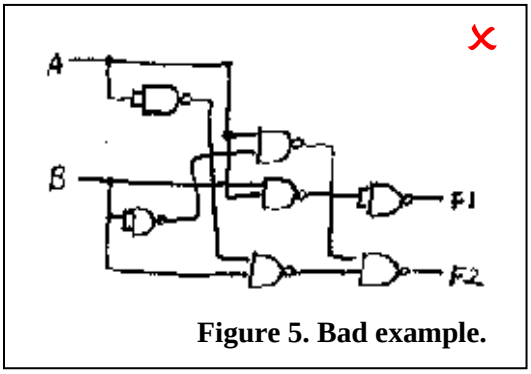


Figure 5. Bad example.

- When you are asked to draw logic diagrams, we are looking for diagrams that look like the one in Figure 6, not Figure 7, which shows the actual connection of the pins of the chip. The diagram in Figure 7 may be used for your own reference.

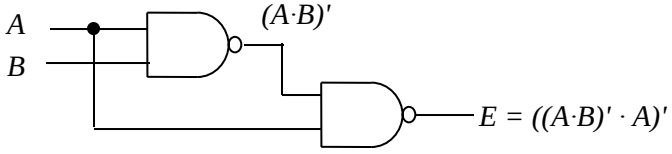


Figure 6. Logic diagram.

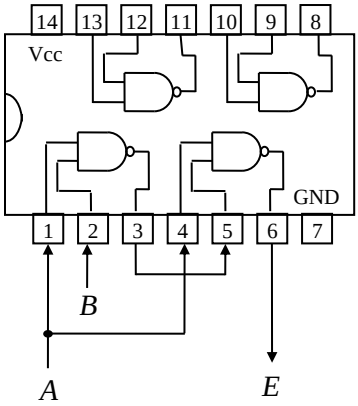


Figure 7. Pin connections.

- For logic diagrams, all lines should be straight. All inputs, outputs and intermediate outputs should be labelled, as shown in Figure 8. Use black dot to indicate a fork.

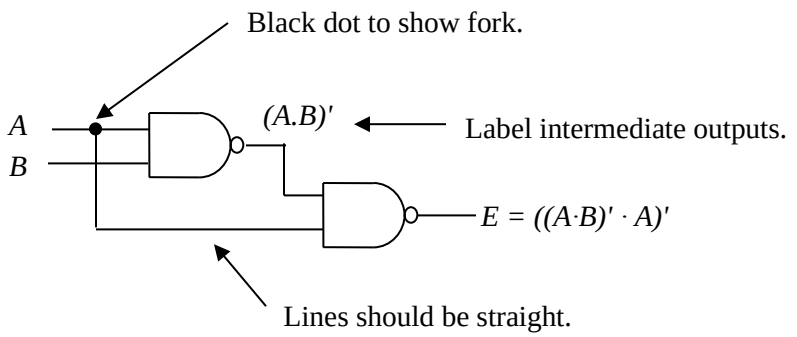


Figure 8.

- All inputs of a gate must be fed with some value. You should not leave any input unconnected. For example, to use a 2-input NAND gate as an inverter, here are two correct methods:

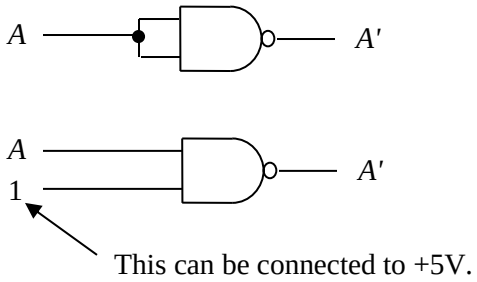


Figure 9.

The following is wrong, even though it may appear to work on the logic trainer:

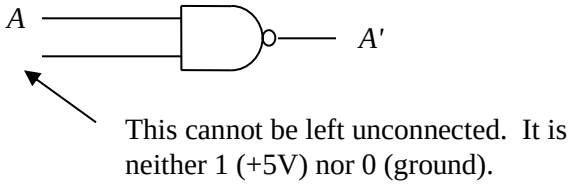


Figure 10.

- A logic gate has only one output. However, in subsequent labs, some devices may have multiple outputs. If you are not using all the outputs of the device, it is fine to leave the unused output unconnected.

Prepared by: Aaron Tan