Lab 7
Logic Probe

Prelab Exercises

THIS PRELAB EXERCISE WILL BE COMPLETED AS A CLASS THE DAY OF THE LAB. PLEASE READ THROUGH THE ENTIRE LAB PRIOR TO YOUR LAB SESSION.

You should bring your class notebook and take good notes, the intro to this lab is complex and you will need to know the information for your formal report.

Using the general layout in Figure 1, design a circuit, which will check to see if the probe is HI or LO and turn on a corresponding LED. This operation is accomplished by the second NOR gate's output value, HI(Positive supply) or LO(Ground). We will discuss how NOR gates operate in lab. The two NOR gates check the probe's status and will turn on one LED for a HI or LO signal. Think of which LED will turn on for each output of the NOR gate. We will work through the circuit together in lab.

Your pre-lab should include a completed schematic with all circuit element values along with the math you used to design all aspects of your circuit.

Lab Exercises

In this lab exercise you will complete the first stage of your EE101 semester project. Later in the semester you will need the schematic and results from today's lab. Therefore, it is important that you keep all of this today's work in a safe, easy to find location. It is highly recommended that you create a separate subdirectory in the network drive for this lab. You may also wish to backup this work on a USB drive when you have the chance.

For this lab, you will use Multisim to simulate your design, and to verify that your design is valid. It is absolutely critical that you get a working design today, because this schematic will be used later to generate a printed circuit board for your final project. Settling for a non-working design today will result in constructing a non-functional final project!

1. Using the Multisim schematic capture program, enter the circuit that you designed in the pre-lab. Refer to Figure 1 to help you with parts placement and attributes. Think of how you will simulate an input for your probe. We have used a pulse voltage supply in a previous lab. You might also use a DC supply and a switch to toggle between inputs. Please use red and green LEDs in your simulation and MAKE SURE THEY ARE IN THE CORRECT PLACE.
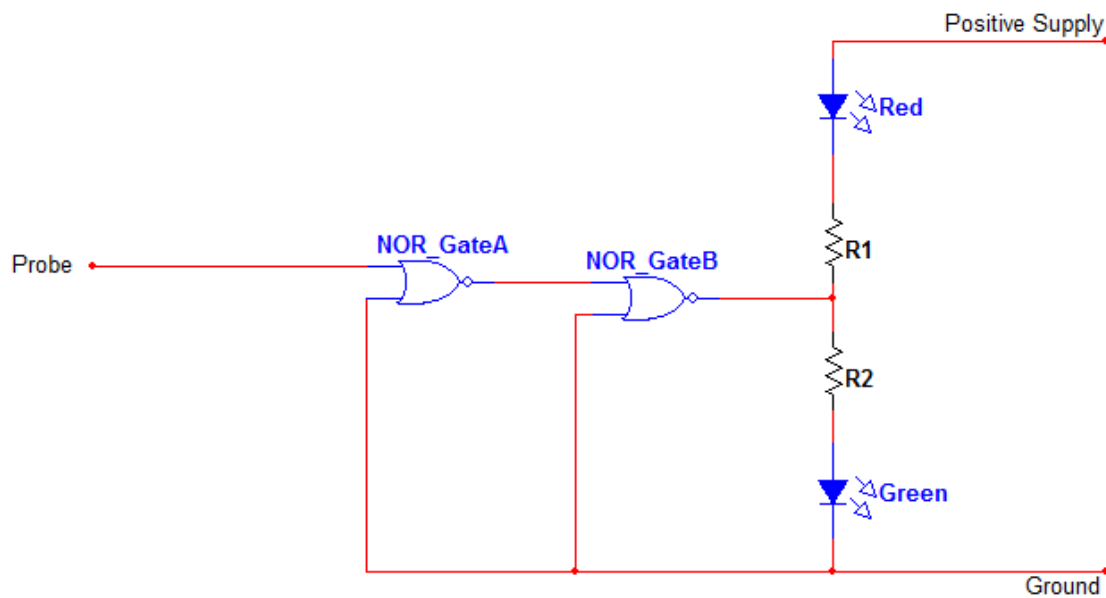
Figure 1: Logic probe circuit
.

2. Simulating Your Design:

- We want to know the voltage of the outputs of the NOR gates. Take measurements and record them in your lab book.
- Measure the current through the resistors to ensure that the LEDs will not be damaged.

3. Prototyping your design

- After successfully simulating your design, get the parts to build the circuit from the TA.
- Build your circuit on the protoboard. Remember, NOR gate chips require supply lines to operate. Have a TA check your circuit before you turn it on.
- Detail in your lab book the wiring process and operation of your circuit.