CMSC 313 Lecture 18

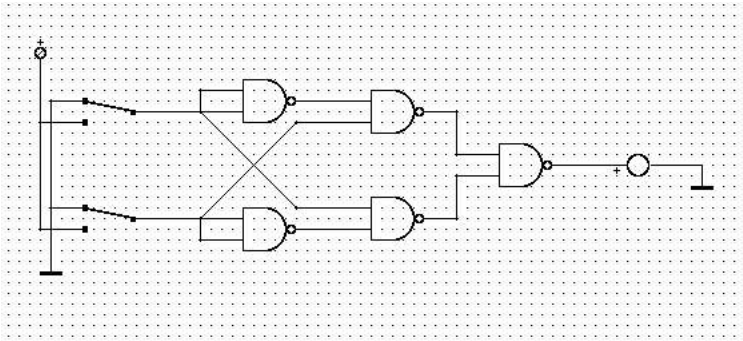
- Homework 3 Due
- Homework 4 Assigned
- In-class lab #1

Due: Thursday, November 6, 2003

1. (10 points) Question 3.8, page 96, Murdocca & Heuring
2. (10 points) Question 3.9, page 96, Murdocca & Heuring
3. (20 points) Read the instructions on how to run the DigSim digital simulator on the course web page:

   `http://www.csee.umbc.edu/~chang/cs313.f03/digsim-info.shtml`

   Using DigSim, wire up the following circuit diagram, play with the switches, create a text box with your name, and save the circuit diagram. (This is the same as the circuit we used in the in-class lab.)



   The file which has your circuit diagram should be a plain text file that starts with something like:

```
# Digsim file
version 1 0
describe component TwoNandPort
 pos 23 13
```

   Use a text editor to look at the file and make sure that the file is not empty and has some data similar to the above. Next, use DigSim to load the file and make sure that this still works. If all is well, submit the circuit file using the Unix `submit` command as in previous assignments. The submission name for this assignment is: `digsim0`.The UNIX command to do this should look something like:

```
submit cs313_0101 digsim0 xor.sim
```

CMSC313 Fall 2003
In Class Lab #1
Transistors & Logic Gates

Goals

Verify and implement a simple but well known logic function. Generate its complement.

Objectives

[1] Identify the function C being produced from input literals A and B as shown in the truth table of figure 1.

[2] Verify that the schematic (based on the sole use of NAND gates) is capable of developing the required function. Do this by assigning values of A and B and see how the circuit processes each combination. You can use the attached sheet in Appendix A to work through each of the 4 input literal combinations.

[3] Check that you have the following items for building the circuit:

Universal electronic breadboard	Battery pack with switch
DIL quad switch module	LED
Diode 1N4148 or equivalent	Two (2) off 74LS00 Quad NAND gate IC's
Two (2) off 4.7 kΩ resistors	One (1) off 270 Ω resistor
Prototyping wire	

[4] Connect up (DO NOT POWER UP) the circuit shown in figure 2. Use the copy of the schematic shown in Appendix B to record each step of your breadboard circuit build.

[5] Establish the initial state of the input literals A and B in your circuit.

[6] Carefully check the rest of the circuit's connections. You may want to check that the LED is connected the right way round by testing it separately with the battery and the 270 Ω series resistor.

[7] Power up the circuit.

[8] Feed it with different values of the logic literals A and B; Record a test output truth table that is being produced corresponding with the values of A and B.

[9] Verify that this is function C.

[10] Rig an unused NAND gate as an inverter and connect the verified output C to its input port.

[11] Repeat step [8]. Verify that the output from this gate is NOT(C).

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

Figure 1 Target Truth Table

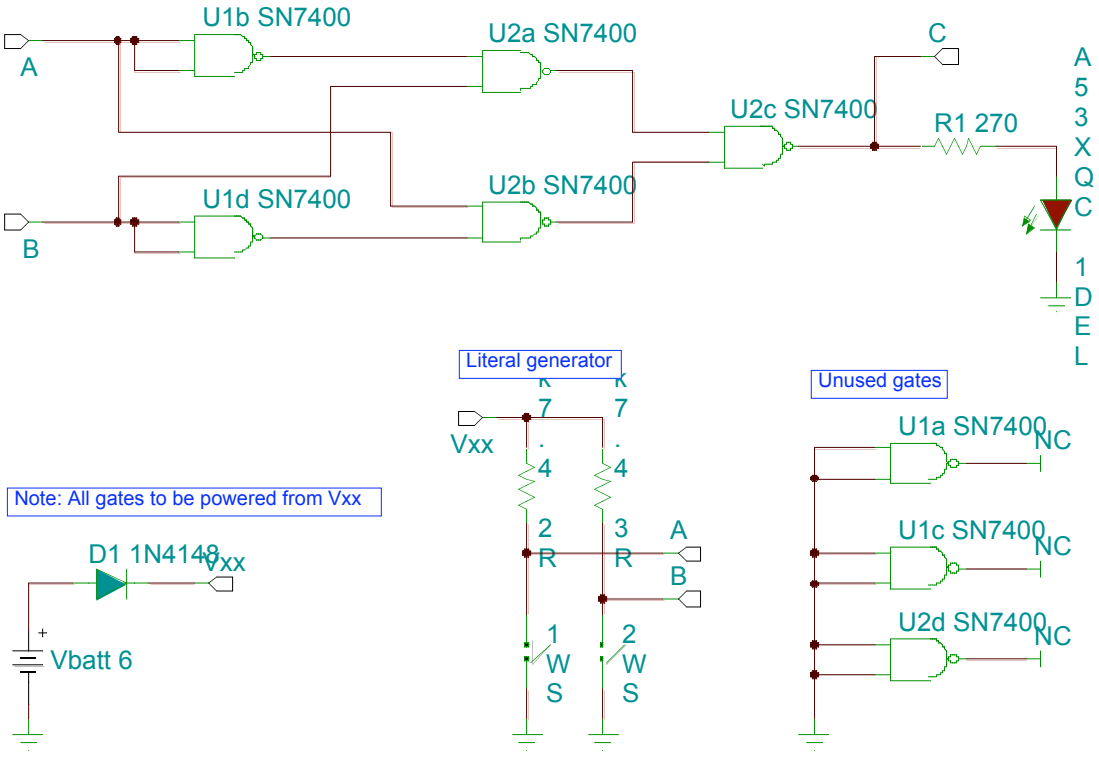
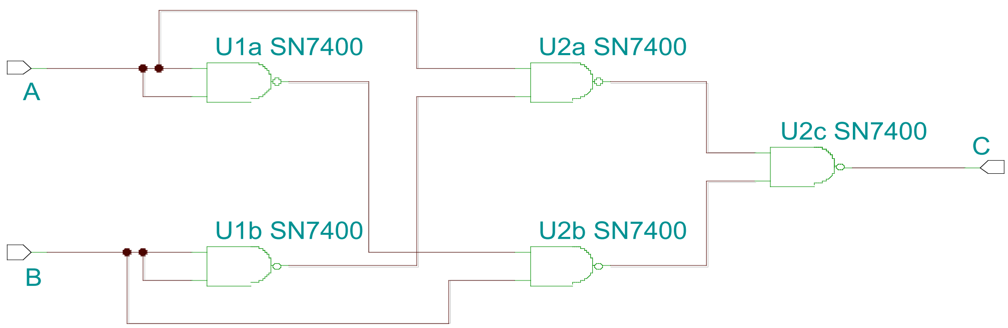
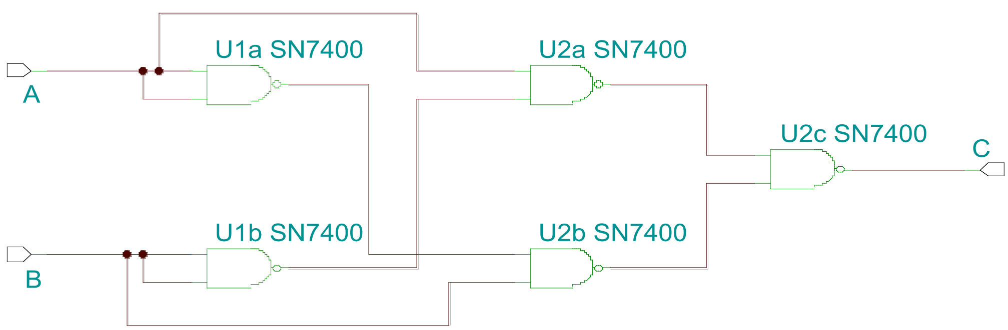
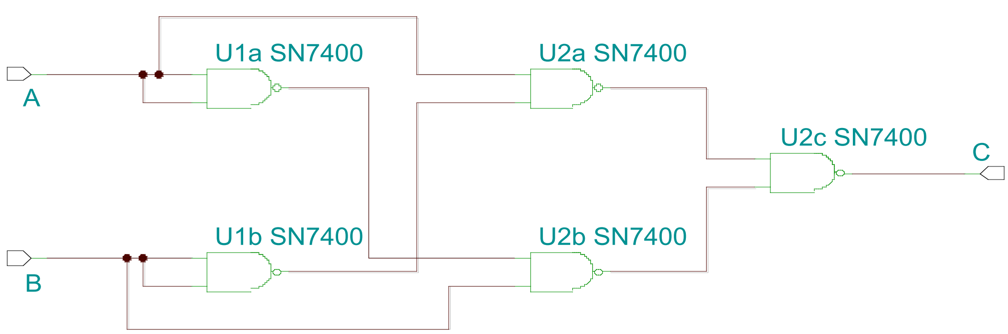


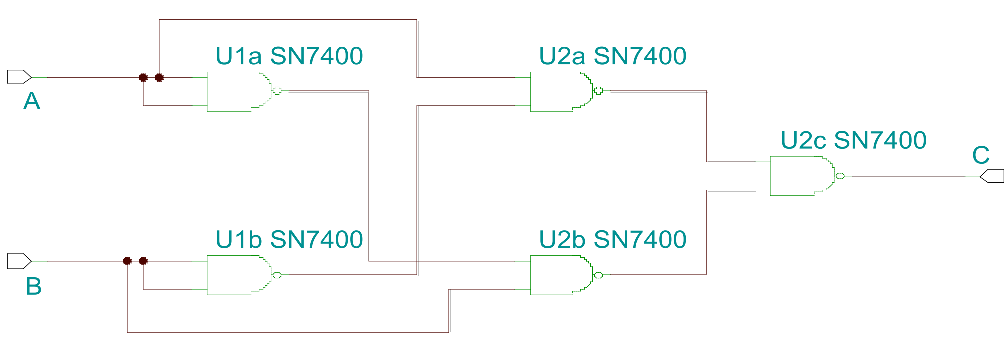
Figure 2 Experimental Logic Schematic

Appendix A Checking Circuit Response

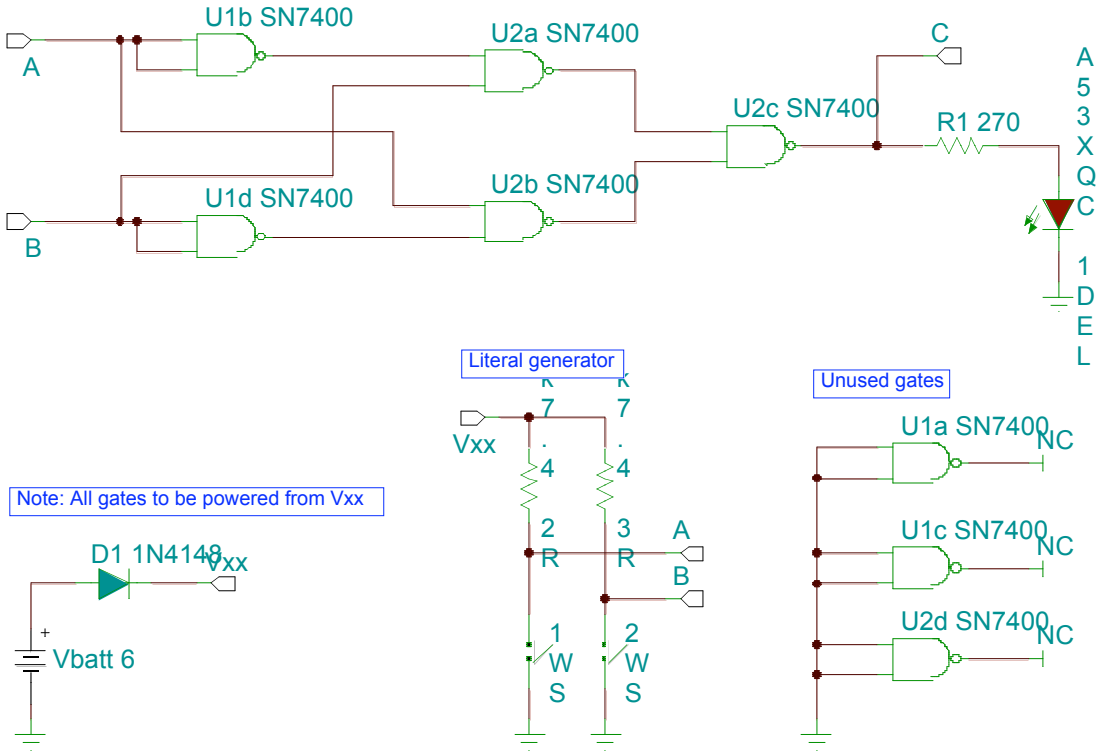




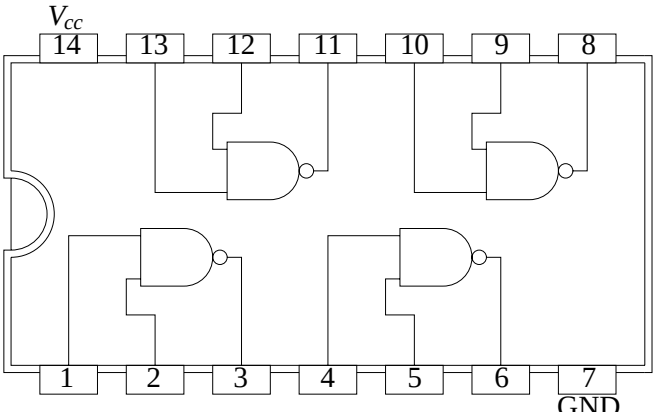




Appendix B Circuit Build Checking Schematic



2 74LS00 Quadruple 2-Input NAND Gates



Next time

- Combinational Logic Components
- Circuit Simplification