

CDA 3201L

Combinational Logic Circuits (II)

Lab 2

Demonstration Due Date: Friday, January 30th by end of class.

Report Due Date: Sunday, February 1st by 11:59PM.

Part A

Implement the following Boolean expression using only NAND gates. Your implementation should be minimal – use no more than 4 NAND gates. Use DeMorgan's law and the axioms and theorems of Boolean algebra to transform this expression to a NAND representation.

$$F = X \bar{Y} + \bar{X} Y$$

Hint: Implement functionality of an XOR with NAND gates.

Part B

Design a logic circuit for your car's signal lights as follows:

1. Left turning light is on when turning on left turn switch.
2. Right turning light is on when turning on right turn switch.
3. Taillights are on when hitting the brake.
4. Both left turning light and right turning light are on when emergency switch is turned on.
5. The turning switches cannot control the turning lights when emergency switch is turned on.

Hint: Start this section by determining what the inputs and outputs of the system are.

IMPORTANT: You must demonstrate your solution to part A and B on the breadboard. Lab grade will depend on the working of the circuit and will be checked off by the lab instructor. This demonstration must be completed within the window of your lab section meeting.

Note: Use the sheet posted in the lab (to the left of the circuit bins) to find the location of the chip you are looking for. All of the bins are labeled. To find datasheets for a particular chip, use the product search on [Jameco](http://www.jameco.com). Once you have found the chip, click on the datasheet PDF to find the pin mappings.