	SANTA CLARA UNVERSITY
ELEN/COEN 21L	**Fatemeh Tehranipoor, James Lewis, and Tokunbo Ogunfunmi**

Laboratory #1: Introduction to Logic Gates
For lab sections Monday-Friday Sept. 28 – Oct. 2, 2020

I. OBJECTIVES
- To translate a problem statement into a logic circuit.
- To design, test, and implement a logic circuit based on a functional specification.
- To explore simple logic circuits implemented with standard logic chips.

PROBLEM STATEMENT

You are to design the controller for an outdoor light that functions both as an ordinary light and also as a motion activated light and alarm. This is how it should operate:
- o If the manual switch S is on, then the outdoor light, L, is on.
- o In addition to the manual switch input, there is a motion detector, M. When M is activated the light turns on.
- o If motion is detected but the light is already on because S is on, then a second output A, an alarm, is turned on.

II. PRE-LAB

1. Based on the problem statement:

    (a) Make a truth table for the two outputs L and A from inputs M and S. The inputs and outputs are 1 when active or "on" and 0 when not active or "off". List all possible combinations of input values for M and S.
    (b) For each input combination in the truth table, figure out what the output should be from the operational description of the controller function.
    (c) Implement the **logic** circuit using **NOT, OR,** and **AND gates** to obtain the outputs. Draw the logic schematic for your design.

III. LAB PROCEDURE

For this lab, all you need to do is show your schematic to your TA and answer questions that they ask of you regarding the functionality of the circuit. The questions they ask may very well lead you to realize that your schematic is incorrect. The goal is to ultimately make sure you understand how the circuit would work under various circumstances.

IV. REPORT

Your report should address the following:

o Was the schematic you created in your pre-lab correct or not? If it was incorrect, in what way was it incorrect? What do you think led you to your incorrect schematic?

o If your pre-lab schematic was incorrect, provide a corrected schematic