Prep Work:

- Watch all the instructional videos posted on Canvas. This semester we will be using a setup with an ESP32 board instead of the MyRio setup
- Setup Arduino IDE
    - The ESP32 in your kit comes preloaded with code so the only thing you need to download is the Arduino IDE. This IDE will allow you to control inputs via serial when the ESP32 is connected to your computer.
    - Download the Arduino IDE for your respective system here
        - https://www.arduino.cc/en/software/
        - Use the default install options

- Read through the Circuitverse getting started guide: https://docs.circuitverse.org/#/getting_started
- **Join the ECE 2214 Circuitverse group here:**

Lab Work:

This lab will focus on using Circuitverse to simulate logic gates. This same lab will be repeated in lab 2 with your ESP32. Sometimes the website does not display properly in Internet Explorer, use Chrome, Firefox, etc. instead.

In the circuitverse group, select lab 1 and then click on launch simulator to test different logic gates.

The groups tab can be found by clicking on your name in the upper right and then clicking on my groups and then clicking view on ECE2214.

Testing a logic gate:

1) Add an AND gate to your simulation. Hook up two inputs to the gate and an output and digital LED to the output of the gate.
2) By clicking on the inputs, you can change what goes into the chip. Set both inputs to 1s. We would expect that this would set the output to 1, turning on the virtual LED.
3) Test the other input patterns (00, 01, 10) and make sure the output is correct (for the AND gate, they should all be 0 or dark). Record your measurement in the Measurement section at the back of this lab.
4) Repeat steps 1-3 for the OR gate.
5) Repeat steps 1-3 for the NOT gate.

6) Repeat steps 1-3 for the XOR gate.

Here you can see an example of the four gates hooked up in Circuitverse. This is a powerful tool that you can use to create structured schematics for labs in this course as well as to help understand the digital logic happening in different circuits.
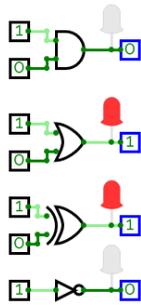
When you complete this lab or when the lab session is over, the lab TA should enter your score into Canvas. Do not leave the lab until you verify that the lab TA has entered the score correctly by checking your score on Canvas.

Measurements:

Exercise 1: Testing the AND Gate (SN74HC08N)

Gate	Input A	Input B	Measured Output Y	Expected Output
1	0	0		0
1	0	1		0
1	1	0		0
1	1	1		1

Exercise 2: Testing the OR Gate (SN74HC32N)

Gate	Input A	Input B	Measured Output Y	Expected Output
1	0	0		0
1	0	1		1
1	1	0		1
1	1	1		1

Exercise 3: Testing the NOT Gate (SN74HC04N)

Gate	Input A	Measured Output Y	Expected Output
1	0		1
1	1		0

Exercise 4: Testing the XOR Gate (SN74HC86N)

Gate	Input A	Input B	Measured Output Y	Expected Output
1	0	0		0
1	0	1		1
1	1	0		1
1	1	1		0