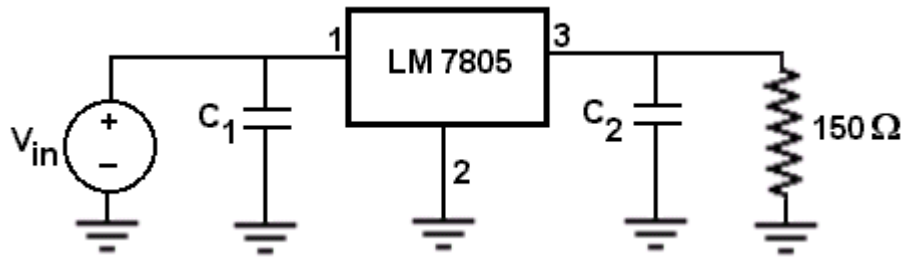
Electronics Lab

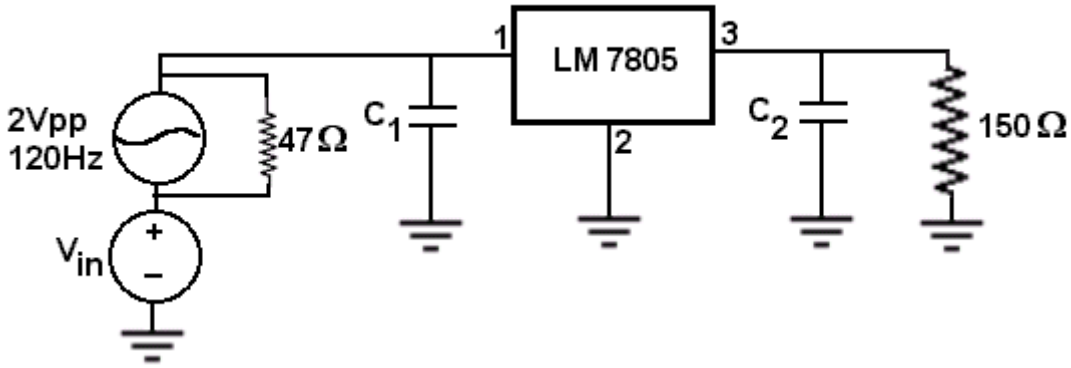
Regulator and gates

Experiment 1: *Integrated circuit voltage regulator.*
- Connect the circuit shown in the figure with and C_1=0.22μF and C_2=0.1μF:



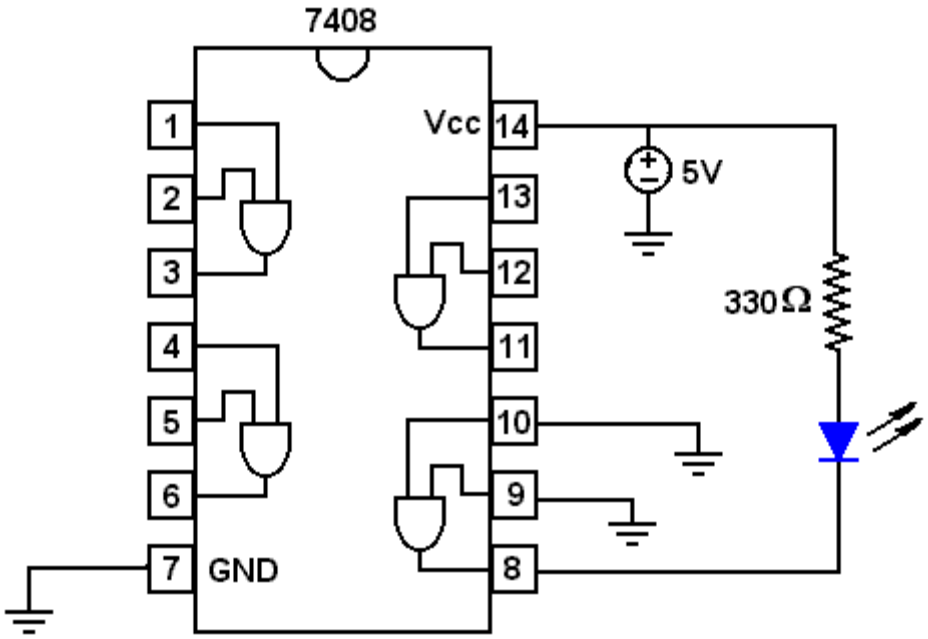
Record the output voltage across the load resistor for V_{in} between 1V and 15V. Be as precise as possible in recording the output voltage and estimate the error in percentage.

Variation to circuit 1: *Ripple rejection*: Insert a perturbation signal to the input voltage as shown in the figure:



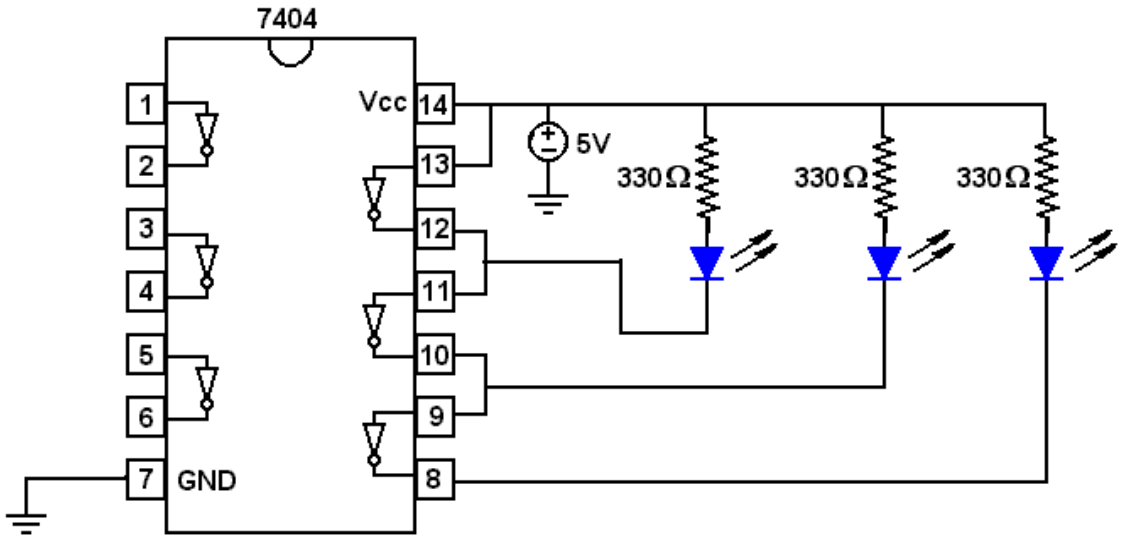
Use the oscilloscope to look at the ripple voltage at the output. You might need to use the AC coupling with the highest sensitivity. Calculate the ripple rejection ratio in dB, which is: $20\log_{10}\left(\frac{V_{pp}in}{V_{pp}out}\right)$ It should be at least 62 dB.

Experiment 2: *Logic gates.*.
We will first look at the truth table of an AND gate (1/4 of a TTL 7408)
- Connect the circuit shown in the figure:



Since the output of the gate should be low, the LED should turn on.
Change the inputs from low to high by connecting them to 5V and confirm the truth table for the gate.
- Similarly repeat the procedure for the truth tables of gates OR (1/4 of TTL 7432), NAND (1/4 of TTL 7400) and NOR (1/4 of TTL 7402). ***Note***: In the case of the NOR gate the inputs are pins 8 and 9 and the output is pin 10.

NOT gate: Build the circuit shown in the figure and observe the outputs for a high input at pin 13 (as shown). Then connect pin 13 to ground, inverting the outputs.



Experiment 3: *Combinatory Logic XOR*.
Build an XOR gate using gates OR, AND and NAND. Confirm that the truth table is correct.