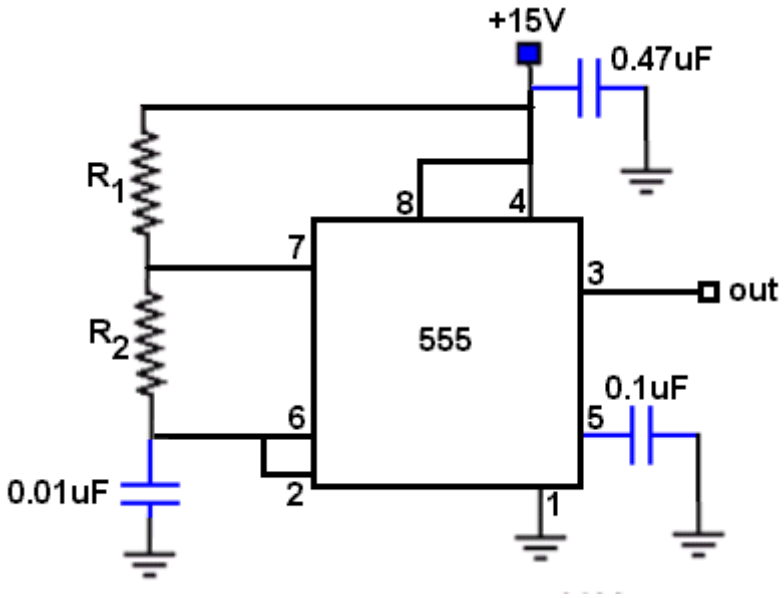
Electronics Lab

LM555

Experiment 1: *Astable 555.*
- Connect the circuit shown in the figure with R_1=10kΩ and R_2=100kΩ



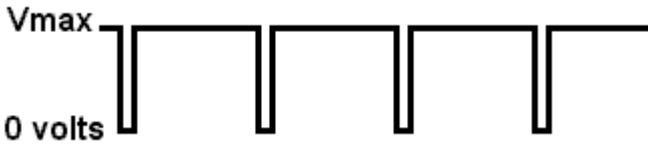
Calculate the frequency and duty cycle for this circuit.
Use the oscilloscope to measure frequency and duty cycle and compare with your predictions.
Observe the voltage at pin 6 with the oscilloscope. Confirm that it oscillates between Vcc/3 and 2Vcc/3. Make a sketch of your observations.

Repeat for R_1=100kΩ and R_2=10kΩ and for R_1=10kΩ and R_2=10kΩ.

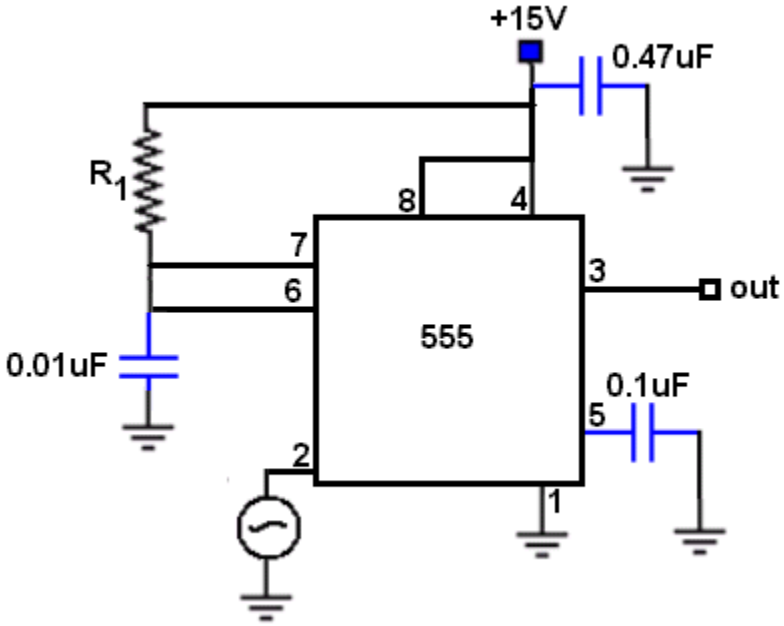
Variation to Experiment 1: *Access to pin 5*:

With R_1=10kΩ and R_2=100kΩ, disconnect the 0.1uF capacitor from the ground and connect it to the output of the signal generator. This will effectively couple an oscillating signal to pin 5.
Notice the jitter in the output signal and record your observations as you change the frequency and amplitude of the coupled oscillation.

Experiment 2: *Monostable 555*.
- First of all, we will need to generate a trigger signal with a shape similar to the one shown in the figure:



Adjust the signal generator controls until you get such a shape. Then, build the circuit shown with R_1=33 kΩ:



Calculate and measure width of the pulse obtained.
Repeat for R_1=47kΩ and R_1=68kΩ

Variation to Experiment 2: *Long timer*:
With R_1=10kΩ and replacing the 0.01uF capacitor by a 470uF capacitor, the pulse width will be several seconds.
Connect a 330Ω resistor in series with an LED at pin3 to be able to observe the pulse.
Instead of triggering the 555 with the signal generator, use a wire to ground pin2 and then connect it to Vcc.
Measure the pulse width with a chronometer and compare to the theoretical value.

Experiment 3: *Alarm with constant frequency:*
Build the circuit shown in the figure and calculate the maximum and minimum frequencies that it can generate.
Test the circuit and measure the frequencies at the two extremes.