Lab 13: Comparators and Oscillators

1. Connect a LM2903 comparator to measure where a sinewave crosses +2.5 V, with no feedback. Use +5 V and ground for your supply voltages. Remember that the output must use a "pull-up" resistor. Use a 4.7 KΩ pull up resistor tied to +5 V. Observe and characterize its output when driven by a 1 kHz sine wave with a 1 V amplitude and a DC offset larger than +0.5 V.

   Add positive feedback to your comparator to generate a total hysteresis of 0.2 V and observe its effect.

2. Build a square wave oscillator with 10 Hz frequency that drives a green or red LED. Examine the voltage across the capacitor and the output voltage on your scope at the same time to understand the switching structure.

   Construction mini-project: You should build the circuit directly onto a prototyping board with all components connected via solder. The webpage has an image of the prototyping board layout. The LED flasher will be powered by a +9 V battery in combination with a +5 V voltage regulator (MC7805, see datasheet for more details). You should use the regulated +5 V output to power your circuit. The regulator guarantees a voltage of +5 V even if the input voltage is not +9 V volts, while also providing additional protection for the rest of the circuit. Also, you should use an IC socket for your LM2903 comparator IC. You may use lab components to construct your circuit.