Objective 1: Measure the RC time constant, varying only the capacitance

Exercise 1.1: Using a 1 kΩ resistor choose one of the listed capacitor values (10 uF, 4.7 uF, 3.3 uF, 1 uF, 0.47 uF, 0.1 uF). What is the τ time constant value? Using a square wave with a period of 20τ, measure the voltage drop across the capacitor using the oscilloscope. Using the capacitor charging/discharging equation and the cursors feature on the oscilloscope determine what the actual τ value is. Record the data on the oscilloscope.

Exercise 1.2: Repeat this twice more, each time with a new capacitor.

Exercise 1.3: Plot all three data sets on the same plot using Python.

Objective 2: Measure the damped oscillations produced by an RLC circuit

Exercise 2.1: Create a RLC series circuit with a 10 mH inductor and a 0.1 uF capacitor. Measure the internal resistance of the inductor. Do not add a resistor to this circuit. What is the resonant frequency of this circuit? Apply a square wave with a 20τ period. On the oscilloscope, zoom in to look at the oscillatory behavior after the edge of the wave. Record this data using the oscilloscope.

Exercise 2.2: Repeat this one more with a 0.01 uF capacitor.

At home:

Home: Perform fittings to the RC measurements and plot the fits on the same plot as the data. Be sure that the fits are distinguishable from the data. Perform a fit to the RLC data. On the same plot as the data, include the fits for both the oscillatory behavior as well as for the damping envelope.