Lecture/Lab 9  
Time Constant measurement

Construct the circuit below being careful about the polarity of the electrolytic capacitor.

1. Begin by setting \( R = 10\, \text{K}\Omega \). Close the switch and measure the capacitor voltage. After a short time the capacitor voltage will be approximately equal to the power supply voltage (12 volts). With the capacitor fully charged, open the switch and measure and record the capacitor voltage and the time at which each measurement is taken. Use the second hand on your watch and make a measurement every 5 seconds until the capacitor voltage has dropped below 1 volt.

2. Repeat the measurement procedure in part 1 with the value of \( R \) set equal to \( 30\, \text{K}\Omega \) and \( R = 60\, \text{K}\Omega \).

3. On graph paper make a plot of your measurements and label each curve with the value of \( R \) used.

4. Each curve can be fitted to curve given by \( V_c = V_0 e^{t/\tau} \). For each of your graphs determine the value of \( \tau \) that best fits each of your three curves and relate this value to that of \( R \) and \( C \).