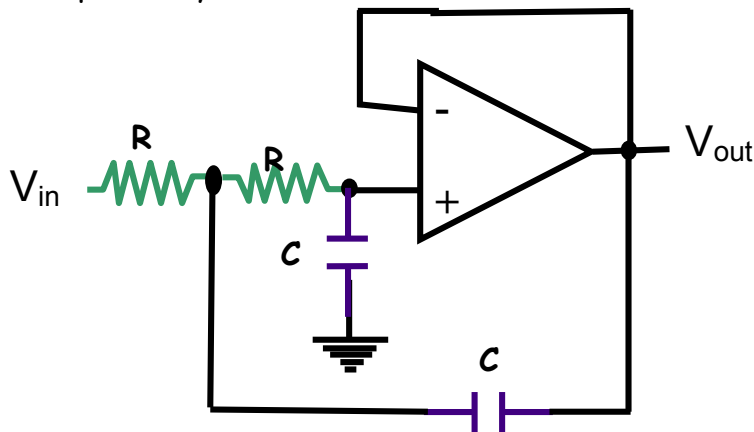


1. Design and construct a low pass, active Sallen Key filter (circuit shown below) with  $f = 1/2\pi RC = 750$  Hz. It doesn't need to be exact, but you should measure your resistors and capacitors and determine what frequency you have. You will need to pick the values of the resistors and capacitors. Start by picking the capacitor because you have fewer choices there. Make sure that your resistor obeys the impedance rule where the function generator has an output resistance of  $\sim 50\Omega$ .
2. **Carefully** test the circuit's performance ( $V_{out}/V_{in}$ ) as a function of frequency. Pay special attention to the frequency region where the signal rolls off (near the  $f_{3dB}$  point where  $V_{out}/V_{in} = 0.707$ ). You should also pay attention to the "pass" frequencies in this circuit, so make sure you take data both below and above the  $f_{3dB}$  point-- frequencies between 10 Hz and 30 kHz.
3. Plot  $\frac{V_{out}}{V_{in}}$  vs. frequency on a log-log plot.
4. Does this circuit behave like a 1 pole or a 2-pole filter (one or two RC filters)? To be sure compare your data to the theory of one and two RC filters connected in series by plotting the theory with the data where for one filter  $V_{out}/V_{in} = 1/(1+(\omega RC)^2)^{1/2}$  and for two filters  $V_{out}/V_{in} = 1/(1+(\omega RC)^2)$ .
5. Explain why  $V_{out}/V_{in}$  is not 0.707 at  $f = 1/(2\pi RC)$ . What is  $V_{out}/V_{in}$  at this frequency? Explain why.



6. Sketch in your notebook what you think a Sallen Key 2-pole high pass filter would look like.