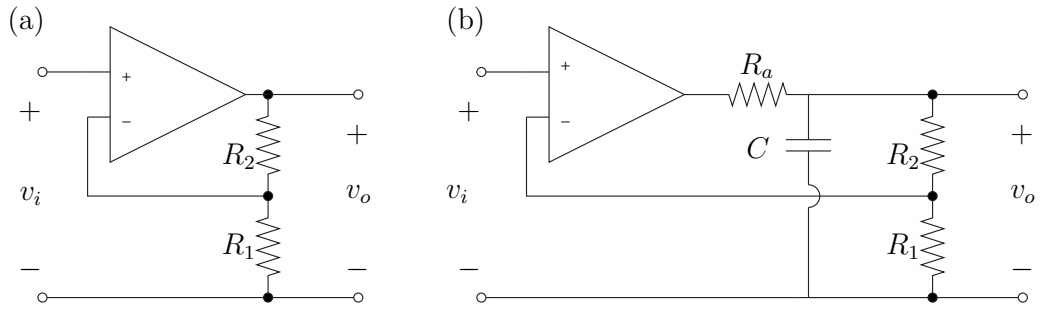

In this lab, you will measure the step and frequency responses of the circuits shown above. As in the prelab, we will fix $R_2 = 470$ kΩ, $R_a = 1$ kΩ, and $C = 0.1$ μF.

1. Construct circuit (a) with R_1 set to produce a gain of 11. Measure the step response, and from it, determine the time constant and the value of the gain G (defined in the prelab).

2. Now change the value of R_1 so that the circuit has a gain of 110. Based on the value of G that you determined in Problem 1, what do expect the circuit's time constant to be? Measure the step response and compare.

3. Next, construct circuit (b) using the same op amp that you used for circuit (a). Choose the value of R_1 that produces a gain of 11 in circuit (a).

4. Measure the step response and determine the pole locations. Compare these to the pole locations that you would compute from the value of G that you determined in Problem 1.

5. Based on the pole locations that you measured in Problem 4, derive expressions for the magnitude and phase of the response of circuit (b) and plot the results in Matlab®.

6. Measure the frequency response of circuit (b). Overlay this data with the frequency response that you computed in Problem 5.

7. If time permits, change the value of R_1 used in circuit (b) to the value that produced a gain of 110 in circuit (a). Repeat Problems 4 through 6.