# Electronics Lab

Opamps

**Experiment 1:** *Bandwidth of an amplifier based on op-amps.*

- Connect the circuit with R=4.7kΩ

- Adjust the input level so the output is 5V$_{pp}$ at 100Hz. Use a voltage divider if necessary.

- Calculate and measure the gain.

- Increase the frequency until you reach the upper cutoff frequency (f$_2$), which is the point where the output drops 6dB (so the output becomes $\frac{5V_{pp}}{\sqrt{2}} = 3.5V_{pp}$) and record this value.

- Check that the gain at f=10f$_2$ is -20dB (so the output becomes $\frac{5V_{pp}}{10} = 0.5V_{pp}$)

- Check that the product of gain times bandwidth is equal to f$_{unity}$.

- Repeat for R=6.8kΩ, 10kΩ, 22kΩ, 33kΩ and 47kΩ.
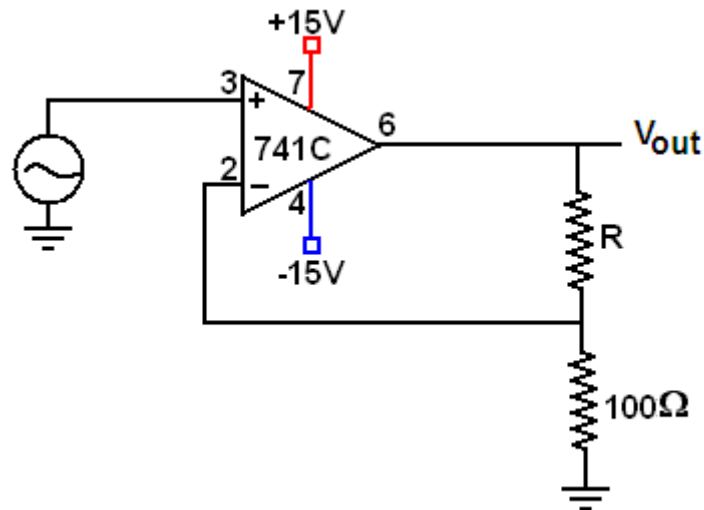
Experiment 2: *Adjustable gain amplifier.*

Connect the circuit shown in the figure. Predict the gain of the circuit at the two extremes of the potentiometer. Observe the input and output of the circuit as you sweep the resistance and record your observations.
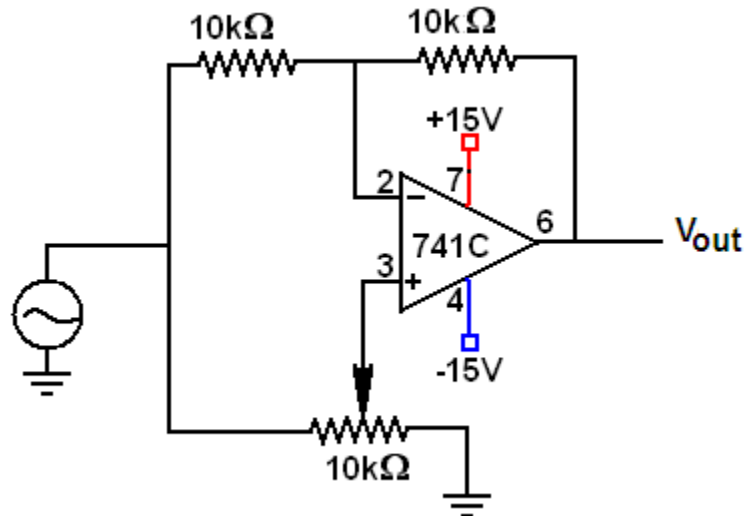
Experiment 3: *Phase shifter.*

Connect the circuit shown in the figure.
Monitor the input and output with the oscilloscope as you change the resistance and record your observations.
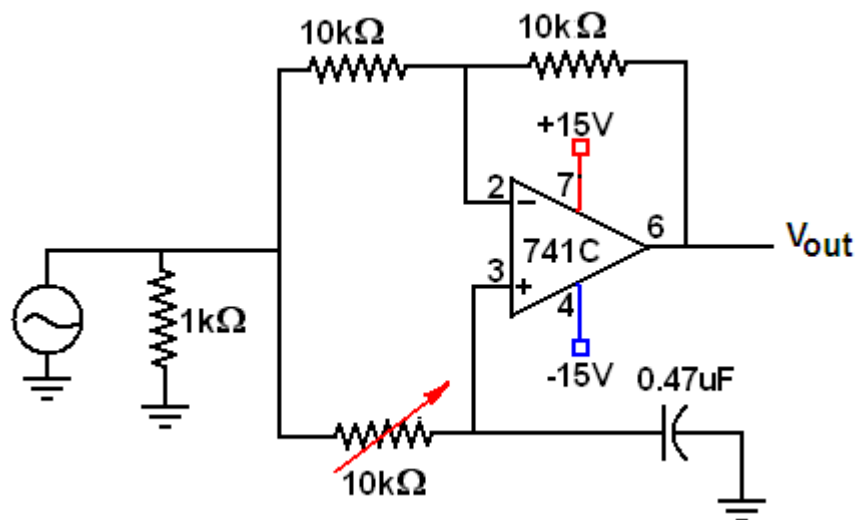
Experiment 4: *Half wave rectifier.*

Connect the circuit shown in the figure.
Observe the output, compare it to the input and record your observations.