

## Diode Clamping and Half/Full Wave Signal Rectification

Get one of the lab's signal generators to generate a 1 kHz 5 V peak-to-peak sine wave. Make sure your sine wave has no DC offset. If you need a transformer to get rid of the DC offset, your TA should have one.

**Task 1:** Rectify the signal using a single 1N4148 diode and a load resistor so that only the positive half of the wave is passed. Design your circuit such that the peak current through the diode is 1 mA. Observe both, the input and the output signal, simultaneously on the scope and sketch them in your lab notes. Explain the small change in peak voltage between input and output signal. You must be able to display the 1 mA current to the TA.

**Task 2:** Place the 0.1  $\mu\text{F}$  capacitor in parallel with the load resistor. Sketch the resulting output waveform that appears across your load resistor.

**Task 3:** Replace the 0.1  $\mu\text{F}$  capacitor with a 47  $\mu\text{F}$  one. Sketch your output waveform and compare to Task 1 and 2.

**Task 4:** Make a full-wave bridge rectifier from the appropriate number of 1N4148 diodes and load it with the same load resistor you used in task 1. Sketch the voltage as measured across the load resistor.

**Task 5:** Place the 0.1  $\mu\text{F}$  capacitor in parallel with the load resistor. Sketch the resulting output waveform that appears across your load resistor.

**Task 6:** Replace the 0.1  $\mu\text{F}$  capacitor with a 47  $\mu\text{F}$  one. Sketch your output waveform and compare to Task 4 and 5.

**Task 7:** Start from the 0 to 5 V, 1 kHz clock signal on the breadboard to produce a  $(5 \pm 0.6)$  V to  $(10 \pm 0.6)$  V output signal of the same shape as the clock signal. Think clamping... You may use the +5 V supply on your board to clamp to.