Lab 5. (37 points)

5-1 Op-amp Limitations

NOTE: Amplitude is defined as half the peak-to-peak value. Do NOT use the measurement labeled "Amplitude" in the "Measure" menu on the oscilloscope.

a. Slew Rate

Part 1 (10 points)

1 point for a screenshot of a 0.1V square wave at 1 kHz input and output for LM741 op amp
1 point for using your screenshot to find the slew rate of LM741 op amp at 0.1V
1 point for a screenshot of a 10V square wave at 1 kHz input and output for LM741 op amp
1 point for using your screenshot to find the slew rate of LM741 op amp at 10V

1 point for a screenshot of a 0.1V square wave at 1 kHz input and output for LF411 op amp
1 point for using your screenshot to find the slew rate of LF411 op amp at 0.1V
1 point for a screenshot of a 10V square wave at 1 kHz input and output for LF411 op amp
1 point for using your screenshot to find the slew rate of LF411 op amp at 10V

2 points for indicating what happens to the slew rate as the input amplitude is varied. Eg: "As input amplitude increases, slew rate (increases/decreases)

Part 2 (4 points)

1 point for screenshot of 0.1V sine wave input and output with frequency at which the output amplitude begins to drop for LM741 op amp
1 point for screenshot of 0.1V sine wave input and output with frequency at which the output amplitude begins to drop for LF411 op amp
2 points for indicating how your measurements are consistent with the slew rate measured in part 1.

b. Offset Voltage (5 points)

1 point for indicating how you got rid of the bias current
1 point for screenshot of the amplified offset voltage
1 point for using your screenshot to find the offset for your LM741 op

amp
1 point for comparing the measurement to the given specifications for the 741 op amp
1 point for screenshot documenting your attempt to zero the offset voltage

5–2 Integrator (3 points)

1 point for screenshot of 1 kHz square wave and triangle wave output with peak–to–peak output measurement
1 point for doing a calculation that gives you the peak–to–peak voltage of your triangle wave based on your input (Hint: Do NOT use the impedances.)
1 point of the function of the 10M resistor and what happens when it is removed.

5–3 Differentiator (2 points)

2 points for screenshot of 1 kHz 1V triangle wave input and square wave output

5–4 AC amplifier: Microphone amplifier (4 points)

2 points for screenshot of traces of your voice or music fed into the microphone and output of amplifier
2 points for calculation (or estimating through your measurements) the frequency response of the microphone system

5–5 Current Source (5 points)

1 point for calculation of what the current through the ammeter should be
1 point for measurements on multimeter
1 point for "What feature of the amplifier limits the maximum load (maximum resistance) the source can supply with current?"
1 point for "What is the maximum load for this circuit?"
1 point for "What happens to the voltage on the inverting input (pin 2) as the load is varied? Why?"

5–6 Current Driver for LED (4 points)

1 point for screenshot of 0 V to 1V peak–to–peak 2Hz triangle wave input and output
1 point for "What is the polarity of the LED?"
1 point for "Why is it good to run an LED from a current source rather than a voltage source?"
1 point for "At what frequency does the light appear to go from flickering to fusion?". This is psychophysics!