Lab 6 Rubric (32 points total)

6-1 The FET as an Uncompensated Attenuator (4 points)

3 points for 3 screenshots of 0.2V 1kHz sine wave input and output with peak-to-peak measurements on screen. For each screenshot, specify the value of V_GS (the position of the potentiometer). (You can do this by measuring the mean on the scope.)
1 point for commenting on the amount of distortion as VGS is varied

6-2 The FET as an Uncompensated Attenuator (2 points)

2 points for 1 screenshot of 0.2V 1kHz triangle wave input and output. Specify the value of VGS corresponding that you used.

6-3 Modulation (8 points)

3 points for 1 screenshot of <1V 500kHz sine wave V(carrier), 0.2V 2kHz sine wave V(modulation), and output all on the screen. For each screenshot, specify the value of VGS (the position of the potentiometer). (You can do this by measuring the mean on the scope.)
3 points for three more screenshots illustrating the modulation. (Your screenshots should resemble wave packets if your circuit is working. Try to make the three screenshots look different.)
2 points for "When does the circuit fail to function properly?" Come up with two different ways to make it fail.

Do NOT dismantle your modulation circuit. You will use this 3 weeks later, in Lab 9.

6-4 Power MOSFETs (4 points)

2 points for whether or not the gate stays on if you unplug it from the 5V input
2 points for estimating how long the charge will remain on from the manufacturer's specifications

6-5 CMOS as Solid State Switches (4 points)

For this part, make sure you're using the scope probes with 10X voltage setting.

1 point for demonstrating that the switch turns on. Take a screenshot of a 1 kHz sine wave input (at S1), +5 (connected to a switch), and D1 output. Your screenshot should capture the moment you turn on the switch to show that the switch only passes in put when the switch is on.
1 point for sketch for how to measure R(On)
1 point for screenshot of 1 KHz sine wave input and "to scope" with peak-to-peak measurement on screen (when the switch is on)
1 point for calculating R(On) from your screenshot

6-6 Feed-through for a CMOS Analog Switch (5 points)

1 point for screenshot of sine wave input and "to scope" with peak-to-peak measurement on screen (when the switch is on)
1 point for indicating from your screenshot (without referring to your previous measurement of R(On)) whether or not your R(On) is negligible compared to the 100K resistor.
1 point for "When the switch is OFF, does the signal pass through the switch?"

1 point for screenshot of high frequency (> 100 kHz) sine wave input and "to scope" with peak-to-peak measurement on screen (when the switch is off)
1 point for explaining why the signal passes through.

6-7 Sample and Hold (7 points)

1 point for screenshot of "signal in", "manual switch", and output. When you take this screenshot, make sure the part where you press the button is on the screen.
1 point for inferring from the droop of the signal which leakage paths dominate; remember the I_bias of the op-amp
1 point for why you believe the leakage paths you selected dominate
1 point for setting up a test to confirm your idea (and document this test with a screenshot)
1 point for "How does one choose the value of the storage capacitor (100 pF above)?"
1 point for explaining capacitor choice and effects (1/2 point for large and 1/2 point for small)
1 point for a screenshot of the charge injection effect and indicating how it relates to the specification of Q_inject < 60 pC for the CMOS switch(Use a low frequency, low amplitude square wave for this.)