Lab 8 (30 points)

8-1 Transistor Junctions are Diodes (2 points)

1 point for measuring V(BC)
1 point for measuring V(BE)

8-2 Emitter Follower (6 points)

1 point for screenshot of 1V 1kHz no offset sine wave input and output
1 point for explaining why the emitter follower is getting cut off
1 point for screenshot of higher amplitude input and output that has bumps below ground
1 point for explaining the bumps below ground (see the hint)
1 point for screenshot of higher amplitude input with V(EE)=-15V and output
1 point for explaining why the emitter follower is now giving the full wave. Also explain the voltage drop.

8-3 Input and Output Impedance of Follower (7 points)

a) Output Impedance

1 point for explaining the purpose of using a blocking capacitor
1 point for screenshot of <1V input and output (don't forget to include the capacitor and 1K load) with voltage measurements on screen
1 point for calculating R(Out) from the measurements from your screenshot

b) Input Impedance

1 point for screenshot of <1V input and output (make sure you remove the capacitor and 1K from your previous circuit) with voltage measurements on screen
1 point for calculating R(In) from the measurements from your screenshot

2 points for inferring your transistor's fl value

8-4 Transistor Current Gain (8 points)

Resistor values you need: 1 MOhm, 500 kOhm, 200 kOhm, 100 kOhm, and 50 kOhm

1 point for finding the limiting IC current for all the above resistors
2 points for estimating the base current IC for all different IBs (Hint: Assume VBE = 0.6 V and calculate IB as (5.0V - 0.6V) / (R + 4.7kOhm))
5 points for plotting IC vs IB (for all five resistors) with and
fitting the line in order to infer the $f_l$ value

8–5 Common-Emitter Amplifier (7 points)

1 point for gain of the amplifier
1 point for screenshot of a few hundred mV input at ~ 1 kHz and output (Do NOT use AC coupling on your oscope.)
2 points for quiescent operating point based on the value of the resistors
1 point for selecting a good load value
1 point for screenshot of <1V input and output (don't forget to include the capacitor and 1K load) with voltage measurements on screen (Hint: This is very similar to Section 6–3.)
1 point for calculating $R(\text{out})$ from the measurements from your screenshot