ECE 320 - Homework #4

Max/Min Circuits, Clipper Circuits, Transistor Theory. Due Monday, September 21st

Max/Min:

1) Determine the voltages and currents for the following max/min circuit. What function does this circuit implement? Y = f(A, B, C, D)

2) Check your results in CircuitLab (or similar program)



Problem 1-2.

Clipper Circuits:

3) Design a circuit to approximate the following function subject to the following requirements:

- Input: 0.. 10V, capable of 100mA
- Output: 100k resistor
- Relationship: Graph below, +/- 200mV

4) Check your design in CircuitLab



- 5) Design a circuit which meets the following requirements:
 - Input: -10 .. +10V, capable of 100mA
 - Output: 1k resistor
 - Relationship:

$$V_{out} = \begin{cases} +6V & V_{in} > +6V \\ V_{in} & -6V < V_{in} < +6V \\ -6V & V_{in} < -6V \end{cases}$$

Transistors

- 6) Determine the current gain, β , for the transistor show below. Also label the off, active, and saturated regions.
- 7) Draw the load-line and determine the Q-point for
 - Vin = 0V
 - Vin = 3V
 - Vin = 6V



Lab (over)

Lab: Please include a photo of your circuit to receive credit for problems 8-10

8-10) Build the following circuit with your electronics kit.

- Measure Vce and Ic for 1k < Rb < infinity.
- Determine the operating point for each conidition and the current gain for your 3904 transistor
- Draw the load line on the graph below and mark each point you measured

Rb	lb	Vce	lc	Current Gain (Ic/Ib)	Operating Region (off / active / saturated)
1k br - bl - re					
10k br - bl - or					
100k br - bl - ye					
1M br - bl - gr					
infinity					

