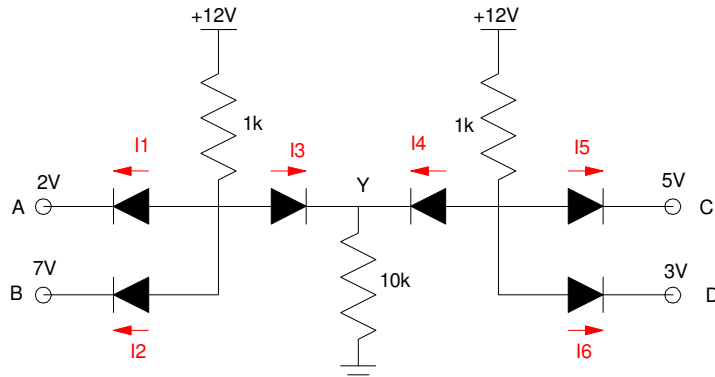


ECE 320 - Homework #4

Max/Min Circuits, Clipper Circuits, Transistor Theory. Due Monday, February 8th

Max/Min:

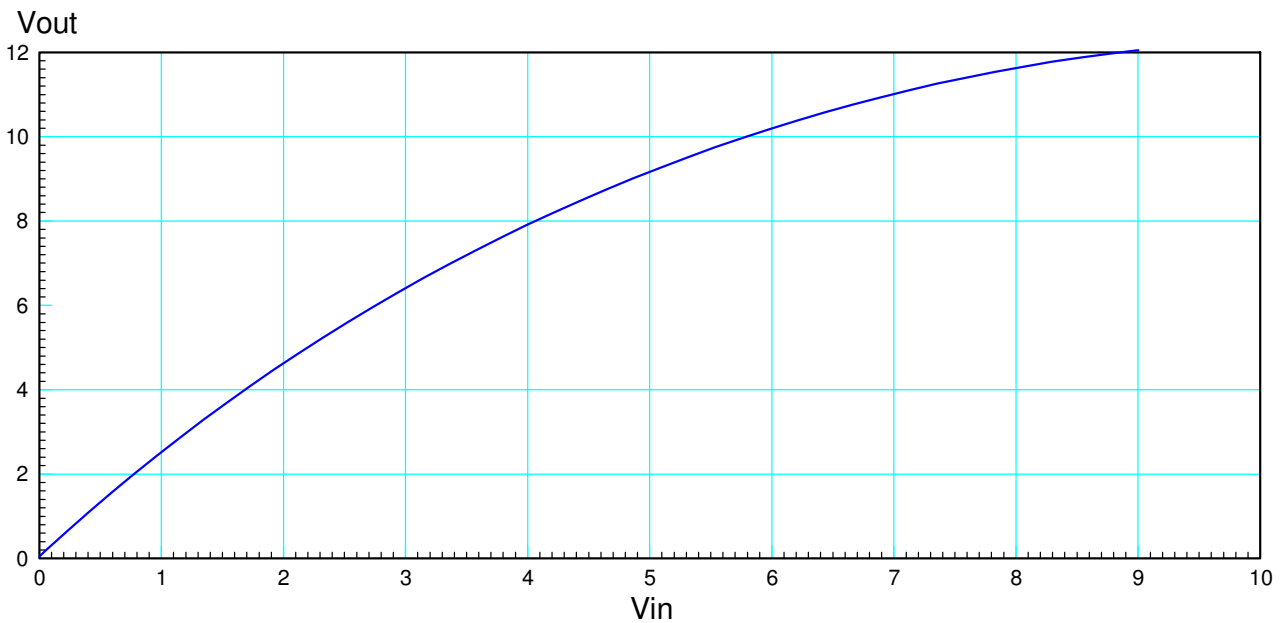
- 1) Determine the voltages and currents for the following max/min circuit. What function does this circuit implement? $Y = f(A, B, C, D)$
- 2) Check your results in CircuitLab (or similar program)



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:

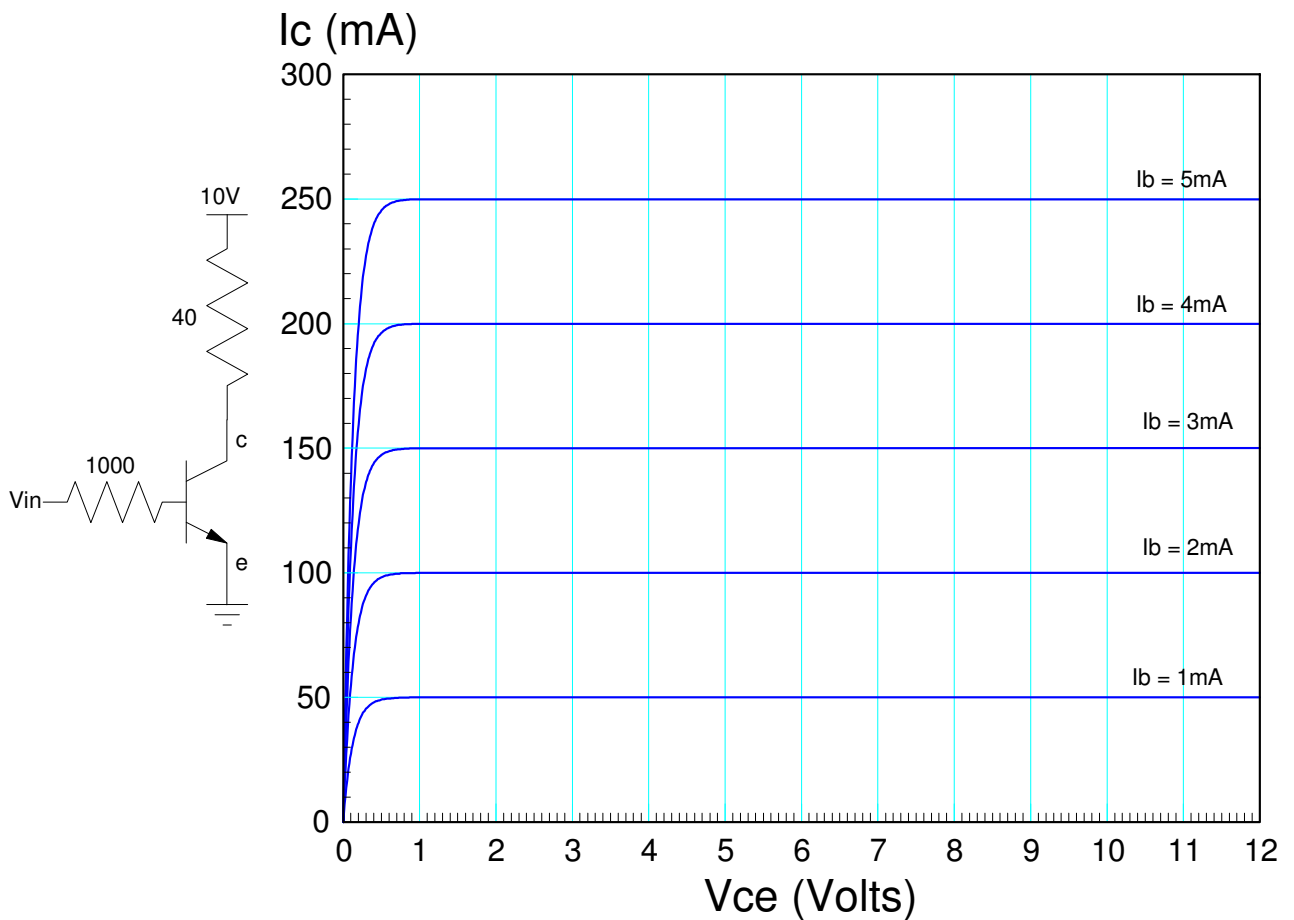
$$V_{out} = \begin{cases} +7V & V_{in} > +7V \\ V_{in} & -7V < V_{in} < +7V \\ -7V & V_{in} < -7V \end{cases}$$

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

- $V_{in} = 0V$
- $V_{in} = 3V$
- $V_{in} = 6V$



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 V_{ce} and I_c for $1k < R_b < \text{infinity}$.
- Determine the operating point for each condition and the current gain for your 3904 transistor
- Draw the load line on the graph below and mark each point you measured

R_b	I_b	V_{ce}	I_c	Current Gain (I_c/I_b)	Operating Region (off / active / saturated)
1k br - bl - re					
10k br - bl - or					
100k br - bl - ye					
1M br - bl - gr					
infinity					

