ECE 320 - Homework #4

AC to DC Converters, Max/Min Circuits, Clipper Circuits. Due Monday, September 17th, 2018

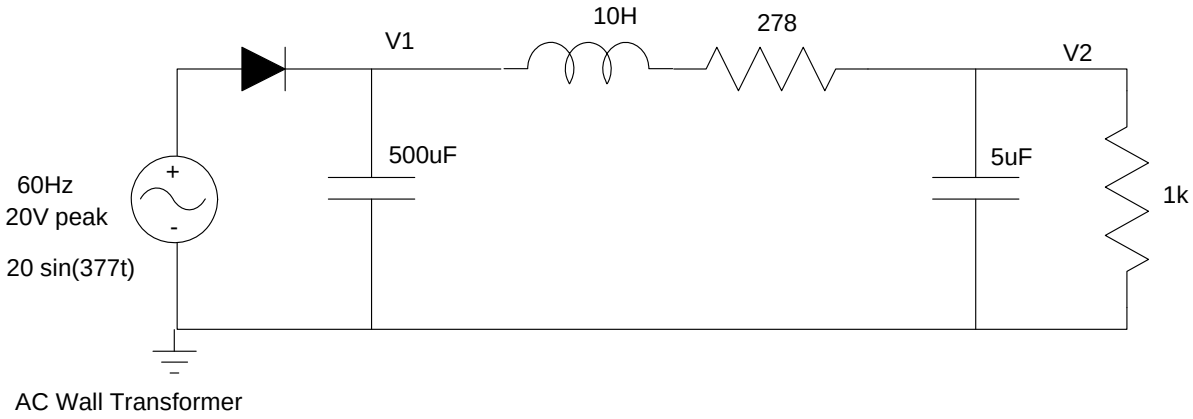
AC to DC Circuits

1) Determine the DC voltage and the peak-to-peak ripple at V1 and V2 for the following AC to DC circuit.

2) Determine R, L, and C so that the circuit

- Draws 10mA at the load
- Has a 2Vpp ripple at V1, and
- Has a 500mVpp ripple at V2

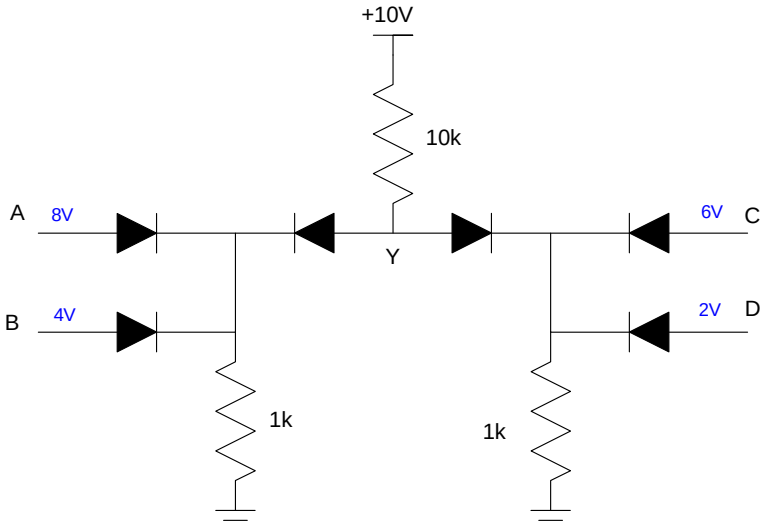
3) Check your answer for problem #2 in PartSim using a 4007 diode.



Max/Min:

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

5) Check your results in PartSim



Clipper Circuits:

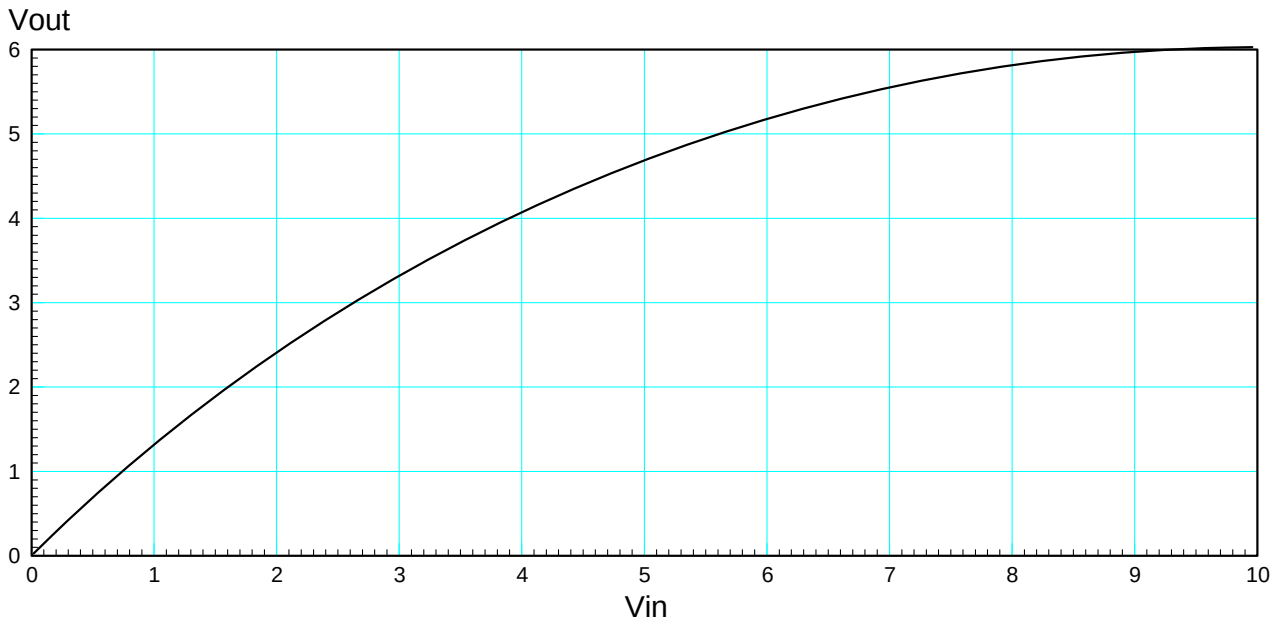
6) Design a circuit which meets the following requirements:

- Input: -10 .. +10V, capable of 100mA
- Output: 1k resistor
- Relationship:

$$V_{out} = \begin{cases} +4V & V_{in} > +4V \\ V_{in} & -3V < V_{in} < +4V \\ -3V & V_{in} < -3V \end{cases}$$

7) 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



8) Check your design in PartSim.

Lab:

9) Build one of these circuits in lab and collect data to verify your design.