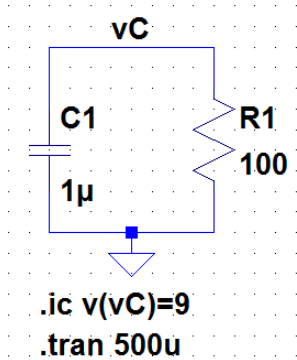


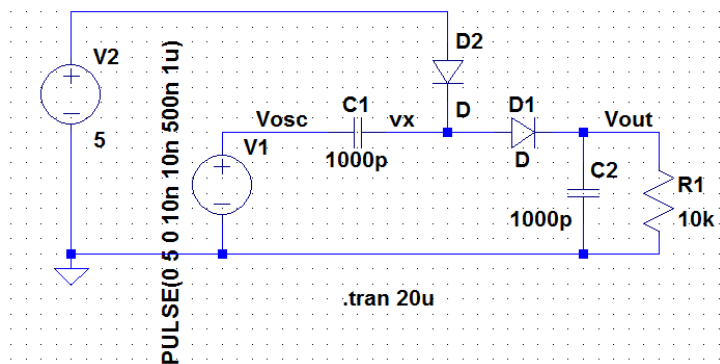
HW#4 – ECE 5/472 Power Electronics

Boise State University, due Friday, September 10, 2010

- Review of RC circuits. Determine (sketch and equations for the current in the circuit and  $v_C$ ), using circuit analysis in the time domain (show the differential equations or solution via Laplace transforms don't just write the result) the response of the following circuit. Note that the initial voltage (.ic is an initial condition) across the capacitor and resistor is 9V. It's important to understand this circuit forwards and backwards since we'll use it often. Verify your answers using LTspice.



- Explain the operation of the following circuit. Verify your explanation using LTspice. If the load resistor, R1, is infinite what is the output voltage? What is the minimum value of R1 if the maximum ripple allowed on  $V_{out}$  is 1V? Use LTspice to verify your hand calculations? At this minimum value what is the average current supplied to the load?



- Design, using the NE555, 1N914, a single 9-V transistor battery and any resistors/capacitors you may need, a circuit that can supply  $>100 \mu A$  of current at DC voltages  $> 8 V$  and  $< -6V$ . What is the ripple on your DC voltages? Use LTspice to verify your design. Note that the design of the positive DC voltage source is trivial.
- Problem 2-13 from the book.
- Problem 2-15 from the book.

