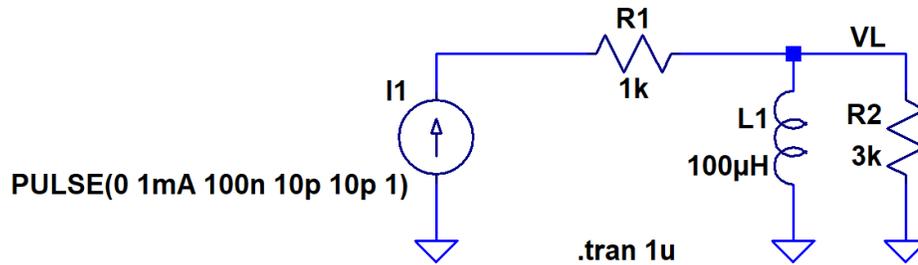
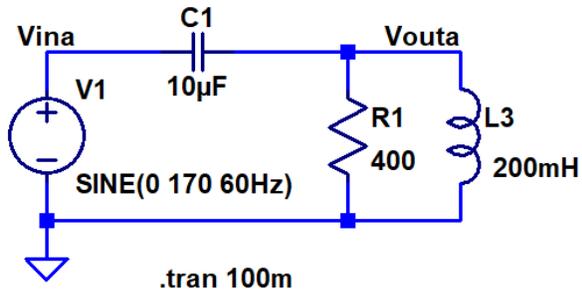


Closed book and notes. No extra paper, do your work on this exam, use the back if needed.
Show your work for credit and be neat! Place a box around each of your answers. No Laplace transform table is allowed or (again) any other extra material (scratch paper).

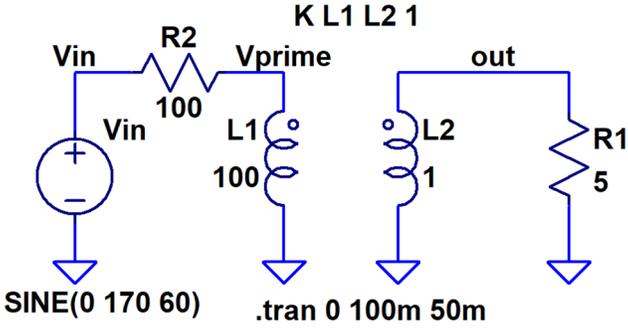
1. Find VL (an equation that includes the input current pulse's delay) in the following circuit using the Laplace transform. Sketch VL from 0 to 1 us ensuring you label the axis. (15 points)



2. Assuming the circuit seen below is operating in steady-state, use AC analysis to determine V_{out} . Sketch V_{out} and V_{in} on the same plot ensuring to label times (phase shift) and voltages. (15 points)

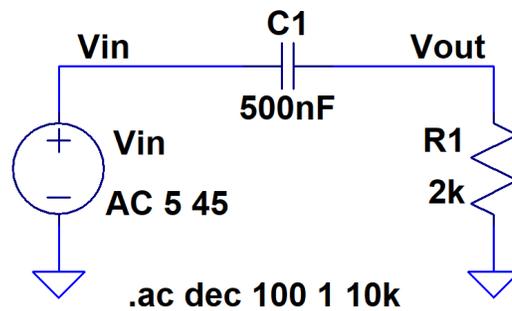


3. Find the voltages and currents in the following circuit. How much power does R1 dissipate? (20 points)

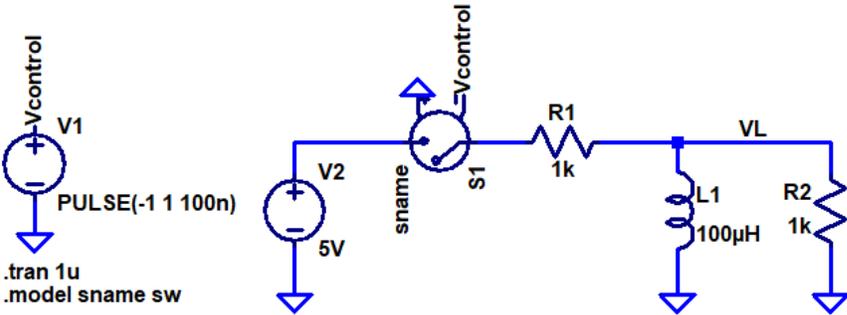


$$\frac{V_1}{V_2} = \frac{N_1}{N_2} = \sqrt{\frac{L_1}{L_2}} = \frac{1}{N}$$

4. In the following circuit the input voltage is 5V with a phase shift of 45 degrees. If the input frequency is swept determine equations for the magnitude and phase of the output voltage $V_{out}(f)$. Plot the magnitude and phase responses of V_{out} from 1 Hz to 10 kHz. (15 points)



5. Using the Laplace transform show how to find the current through L1 in the following circuit. Ensure you place a box around your answer (the equation in the time domain you've derived using the Laplace transform). Plot this current in the time domain. (15 points)



6. Determine the frequency when the output voltage is 1V peak in the following integrator circuit. Again, show your work and place a box around your answer. (20 points)

