Introduction to Filtering and Bode' Plots
Homework

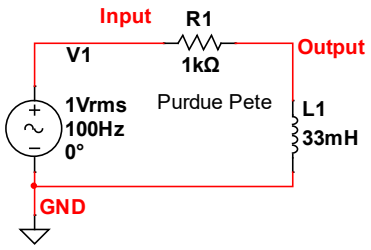

Figure 1 RL circuit

1. What is the *equation* for the time constant in terms of R and L?

2. Derive the transfer function of this circuit in terms of τ and s. Show *all* of the intermediate steps. Simply submitting the transfer function without derivation steps is *wrong*.

3. Calculate the values for τ, ω_o, and f_o. Show the component values used and the equations. Simply submitting the answers is *wrong*.

4. **a.** Create the Matlab Bode' plots for the gain magnitude (in dB) and phase. Submit the code.

b. Place cursors on the two plots at f_o. On the plots manually compare the calculated value of f_o from step 3 to the values shown on the plots. Submit these plots and notes.

5. Using a resistor and an inductor, use Multisim to verify the Matlab Bode' plot by completing an AC Sweep across the same values as done with Matlab. Submit the following:

a. the schematic

b. the two plots with cursors and the values at f_o (not the big table of values). On the plots manually compare the calculated value of f_o from step 3 to the values shown on the plots.