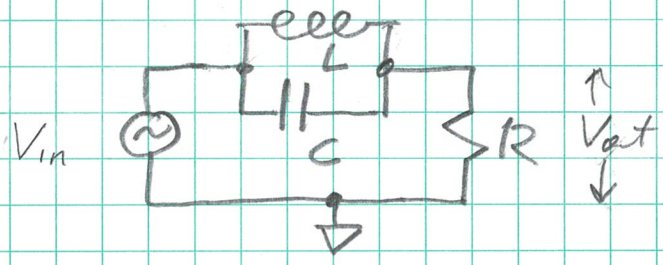
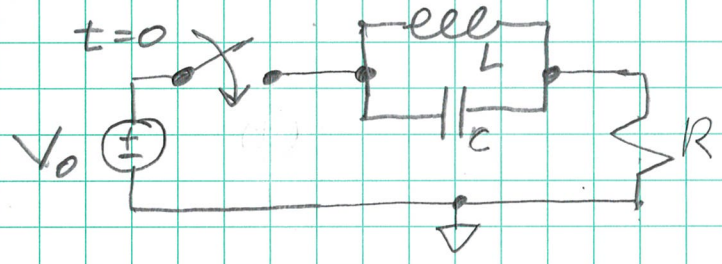
(1)



Find $\frac{\hat{V}_{out}(\omega)}{\hat{V}_{in}(\omega)}$ and plot the magnitude (log-log) and the phase (linear-log) as a function of frequency.

For $V_{in}(t) = V_0 \sin \omega_0 t$, find $V_{out}(t)$ in steady state.
Hint: See equations 1.10-1.13 in "Notes on Spetral Domain..."

(2)



- The switch is closed at $t=0$
- $V_C(0^-) = 0$

Draw the circuit at $t=0^+$, i.e., just after the switch is closed.

Draw the circuit as $t \to \infty$.

Write down the circuit equation, take the Laplace transform, and derive an expression for $V(s)$.

Solve for $V(t)$ by taking the inverse Laplace transform of $V(s)$. Hint: see section 1.2 in "Notes on Laplace..."

(3) A "switched" power supply makes use of the truncated waveform $V(t) = \begin{cases} V_0 \sin \omega_0 t & 0 < t \le T/4 \\ 0 & T/4 < t \le T \end{cases}$

with $\omega_0 = 2\pi/T$.

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Calculate the coefficients $\hat{c}_k$ in its Fourier series.
Hint: See equation 1.8 in "Notes on Fourier Series" and recall $e^{\pm i\pi k} = (-1)^k$, etc.

Read and Understood By

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