Duke University
Department of Physics

Physics 271 Spring Term 2017

HOMEWORK 6

Available: February 16
Due: February 23, at the beginning of class.

Reading: Eggleston 2.8, 3.1-3.2

Problem 1:

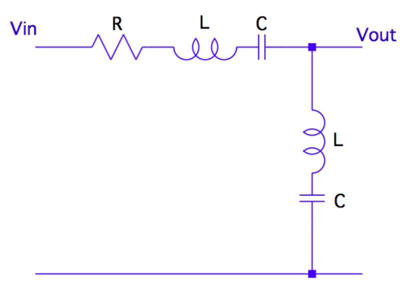
Show that the form of the Fourier theorem, $f(t) = a_0 + 2\sum_{n=1}^{\infty}[a_n \cos(n\omega_1 t) - b_n \sin(n\omega_1 t)]$, where the Fourier coefficients are given by $a_n = \frac{1}{T}\int_{t'}^{t'+T} f(t)\cos(n\omega_1 t)dt$ (even contributions) and $b_n = -\frac{1}{T}\int_{t'}^{t'+T} f(t)\sin(n\omega_1 t)dt$ (odd contributions), where $\omega_1 = \frac{2\pi}{T}$,

is equivalent to

$f(t) = \sum_{n=-\infty}^{\infty} \hat{c}_n e^{j\omega_n t}$,

where the Fourier coefficients are given by $\hat{c}_n = \frac{1}{T}\int_{t'}^{t'+T} f(t)e^{-j\omega_n t}dt$.

Problem 2: For $R = 2\sqrt{\frac{L}{C}}$, write the transfer function for the network shown. Find the zeroes and poles and draw them on the complex plane. Draw the Bode plot.



Text Problems:
Eggleston 2.18, 3.1