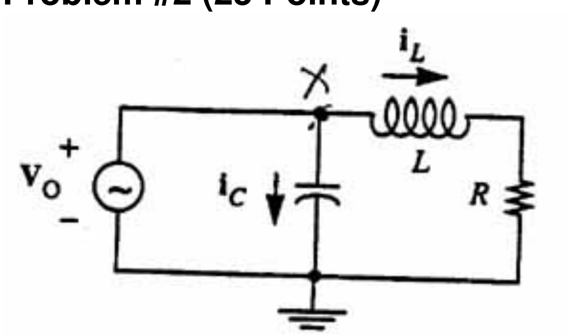
EE 40, Spring 1998
Midterm 2
Professor S. Schwarz, Professor R. M. White

Problem #1 (25 Points)

The phasor representing the sinusoid v(t) is **v** = (1+2j)/1-3j). The angular frequency omega is 100 radians/sec.

[8 pts.] a) Find the amplitude of the sinusoid.
[8 pts.] b) Find the phase angle of the sinusoid.
[9 pts.] c) Find the first time after t = 0 at which v has its maximum value.

Problem #2 (25 Points)

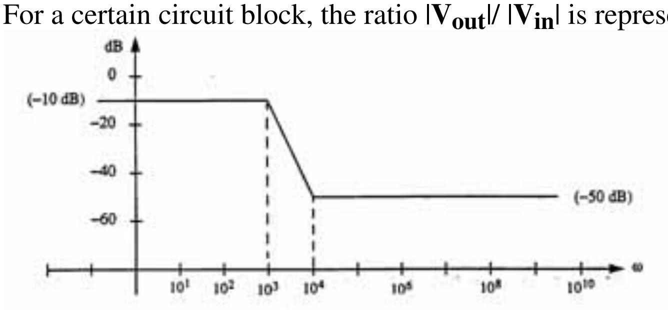


In the above circuit, $\mathbf{V_0}$ = 10 V (real, C = 10^-8 F, L = 2X10^-4 H, R = 100 ohms, omega = 10^6 radians/sec.

[5 pts.] a) Find the numerical value of the phasor $\mathbf{i_C}$. Express answer in simplest rectangular form A + jB.
[10 pts.] b) Find the numerical value of the phasor $\mathbf{i_L}$. Express answer in simplest rectangular form A + jB.
[10 pts.] c) Find the time-averaged power produced by the voltage source. (That is, find the power that comes out of the voltage source and goes into the rest of the circuit.)

Problem #3 (25 Points)

For a certain circuit block, the ratio $|\mathbf{V_{out}}|/|\mathbf{V_{in}}|$ is represented by the following:

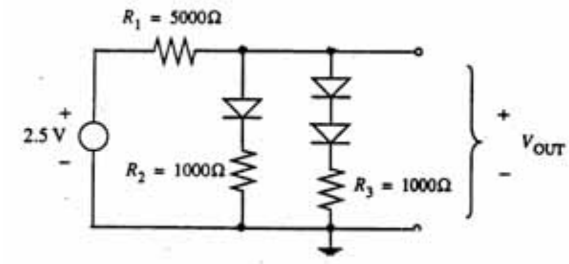


The general expression for this transfer function is

$$\frac{|\mathbf{V_{out}}|}{|\mathbf{V_{in}}|} = \frac{(1 + A\ \text{omega})^M}{(B + C\ \text{omega})^N}$$

Find A,B,C,M and N. Note: 0 dB corresponds to $|\mathbf{V_{out}}|/|\mathbf{V_{in}}|$ = 1.

Problem #4 (25 Points)



Find V_{out} in the above circuit. The diodes are to be represented by the large-signal diode model (including the 0.7 V drop across a forward-biased diode.) **Make sure your answer is reasonable and consistent.** Explain your reasoning.
