UNIVERSITY OF UTAH
ELECTRICAL AND COMPUTER ENGINEERING DEPARTMENT

ECE 1270 HOMEWORK #8 Summer 2007

1. Give numerical answers to each of the following questions:

a) Rationalize $\dfrac{-80 - j60}{28 - j96}$. Express your answer in rectangular form.

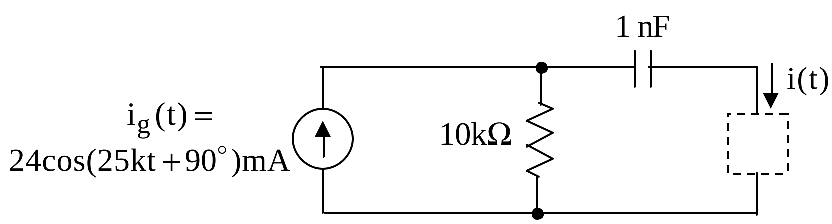
b) Find the polar form of $(1+j)^*\left(\sqrt{1+\dfrac{\sqrt{3}}{2}} - j\sqrt{1-\dfrac{\sqrt{3}}{2}}\right)^*$. (Note: the asterisk means "conjugate".)

c) Find the following phasor: $\mathrm{P}|3\sin(25\mathrm{kt}-120^\circ)|$.

d) Find the magnitude of $\dfrac{(1-j7)e^{-j10^o}}{1-e^{j90^o}}$.

e) Find the imaginary part of $\dfrac{1+\mathrm{j}\sqrt{3}}{\mathrm{e}^{-\mathrm{j}30^\circ}}$.

2.



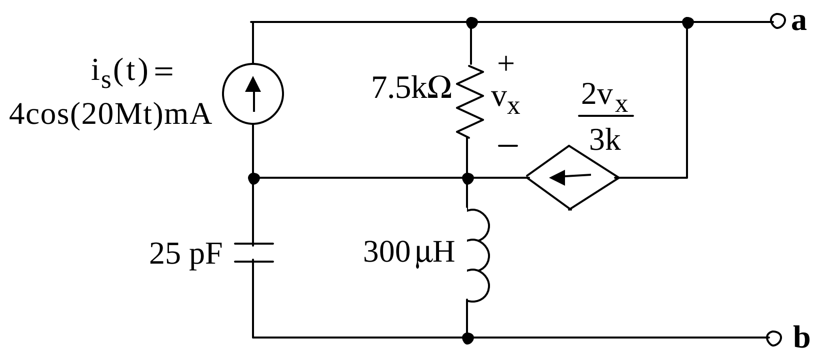
a) Choose an R, an L, or a C to be placed in the dashed-line box to make

$$i(t) = I_o \cos(25kt + 135^\circ)$$

where I_o is a positive, (i.e., nonzero), real constant. State the value of the component you choose. Hint: Use a Thevenin equivalent.

3. With your component from problem 2 in the circuit, calculate the resulting value of I_o.

4.



a) Draw a frequency-domain equivalent of the above circuit. Show a numerical phasor value for $i_s(t)$, and show numerical impedance values for R, L, and C. Label the dependent source appropriately.

b) Find the Thevenin equivalent (in the frequency domain) for the above circuit. Give the numerical phasor value for $\mathbf{V}_{Th}$ and the numerical impedance value of z_{Th}.