EE202 Homework 2 (Due Tuesday, March 18, 2008)

from Nilsson and Riedel, 7th edition.

9.23  a) Show that, at a given frequency $\omega$, the circuits in Fig. P9.23(a) and (b) will have the same impedance between the terminals $a$ and $b$:

$$R_1 = \frac{\omega^2 L_1 R_2}{R_2^2 + \omega^2 L_2^2}, \quad L_1 = \frac{\omega^2 L_2}{R_2^2 + \omega^2 L_2^2}.$$ 

Figure P9.23

(a)  

(b)  

b) Find the values of resistance and inductance that when connected in series will have the same impedance at a frequency of $3$ krad/s as that of a $6$ kOhm resistor connected in parallel with a $1.25$ H inductor.

9.35  Find $I_1$ and $Z$ in the circuit shown in Fig. P9.35 if $V_1 = 25$ V and $I_1 = 5.00$ A.

Figure P9.35

9.44  Find the Norton equivalent with respect to terminals $a$ and $b$ in the circuit of Fig. P9.44.

Figure P9.44

9.57  Use the node-voltage method to find $V_a$ and $I_1$ in the circuit seen in Fig. P9.57.

Figure P9.57

9.59  The value of $k$ in the circuit in Fig. P9.69 is adjusted so that $Z_{ab}$ is purely resistive when $\omega = 4$ krad/s. Find $Z_{ab}$.

Figure P9.69

11.  Use the concept of the phasor to combine the following sinusoidal functions into a single trigonometric expression:

a) $y = 50 \cos (\omega t + 60^\circ) + 100 \cos (2\omega t - 30^\circ)$.
b) $y = 200 \cos (377t + 90^\circ) - 10 \sin (377t + 30^\circ)$.
c) $y = 80 \cos (100t + 30^\circ) + 100 \sin (100t - 15^\circ) + 50 \cos (300t - 90^\circ)$, and
d) $y = 250 \cos (\omega t + 120^\circ) + 250 \cos (2\omega t - 120^\circ)$. 