HOMEWORK 3

9.76 The sinusoidal voltage source in the circuit seen in Fig. P9.76 is operating at a frequency of 200 krad/s. The coefficient of coupling is adjusted until the peak amplitude of i_1 is maximum.

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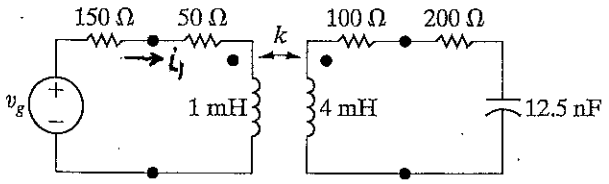
a) What is the value of k?

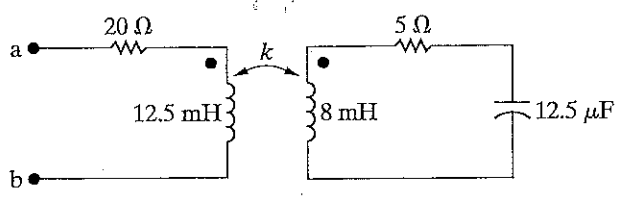
b) What is the peak amplitude of i_1 if $v_g = 560\cos(2 \times 10^5 t)$ V?

Figure P9.76



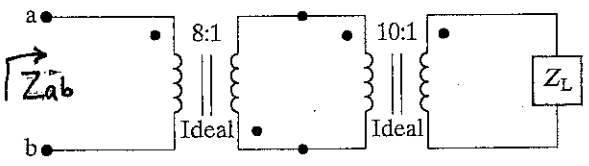
9.79 The value of k in the circuit in Fig. P9.79 is adjusted so that Z_{ab} is purely resistive when $\omega = 4$ krad/s. Find Z_{ab}.

Figure P9.79



9.83 Find the impedance Z_{ab} in the circuit in Fig. P9.83 if $Z_L = 80\angle 60^\circ\ \Omega$.

Figure P9.83



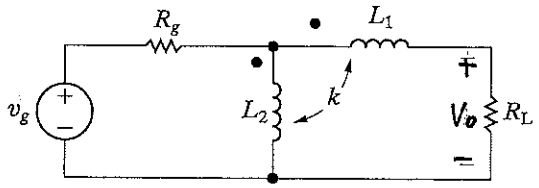
10.51 The values of the parameters in the circuit shown in Fig. P10.51 are $L_1 = 8$ mH; $L_2 = 2$ mH; $k = 0.75$; $R_g = 1\ \Omega$; and $R_L = 7\ \Omega$. If $v_g = 54\sqrt{2}\cos 1000t$ V, find

a) the rms magnitude of v_o

b) the average power delivered to R_L

c) the percentage of the average power generated by the ideal voltage source that is delivered to R_L.

Figure P10.51



10.58 The sinusoidal voltage source in the circuit in Fig. P10.58 is operating at a frequency of 20 krad/s. The variable capacitive reactance in the circuit is adjusted until the average power delivered to the 100 Ω resistor is as large as possible.

a) Find the value of C in microfarads.

b) When C has the value found in (a), what is the average power delivered to the 100 Ω resistor?

c) Replace the 100 Ω resistor with a variable resistor R_o. Specify the value of R_o so that maximum average power is delivered to R_o.

d) What is the maximum average power that can be delivered to R_o?

Figure P10.58