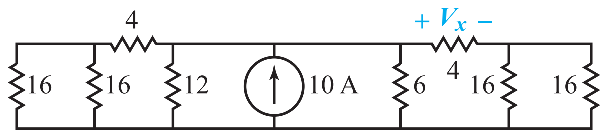
Problem 2.31 Use resistance reduction and source transformation to find V_x in the circuit of Fig. P2.31. All resistance values are in ohms.

Solution:



Problem 2.37 Find R_{eq} for the circuit in Fig. P2.37. All resistances are in ohms.

Solution:

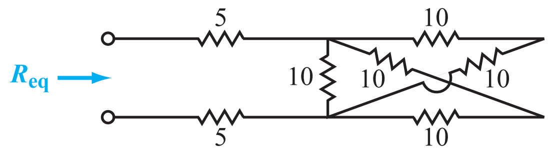


Figure P2.37: Circuit for Problem 2.37.

Problem 3.25 Apply mesh analysis to find I_x in the circuit of Fig. P3.25.

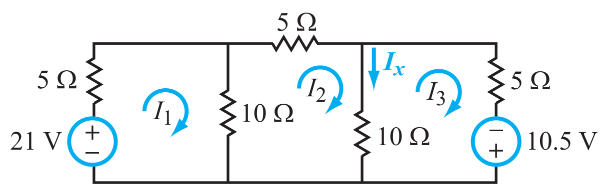


Figure P3.25: Circuit for Problem 3.25.

Problem 3.26 Apply mesh analysis to determine the amount of power supplied by the voltage source in Fig. P3.26.

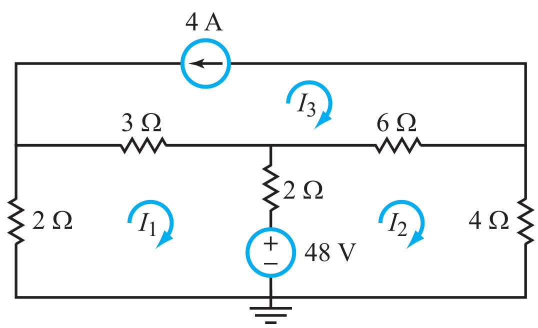


Figure P3.26: Circuit for Problem 3.26.

Problem 3.4 For the circuit in Fig. P3.4:

(a) Apply nodal analysis to find node voltages V_1 and V_2.

(b) Determine the voltage V_R and current I.

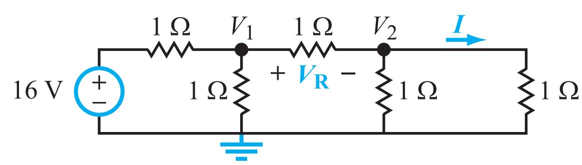


Figure P3.4: Circuit for Problem 3.4.

Problem 3.5 Apply nodal analysis to determine the voltage V_R in the circuit of Fig. P3.5.

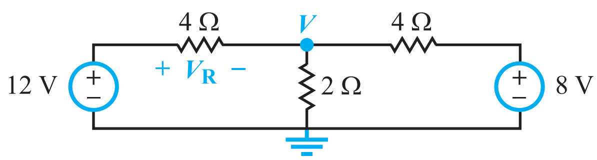


Figure P3.5: Circuit for Problem 3.5.

Problem 3.55 Find the Thévenin equivalent circuit at terminals (a, b) for the circuit in Fig. P3.55.

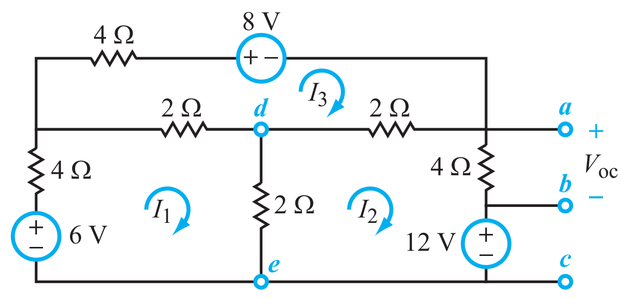


Figure P3.55: Circuit for Problem 3.55.

Problem 3.71 Determine the maximum power extractable from the circuit in Fig. P3.71 by the load resistor R_L.

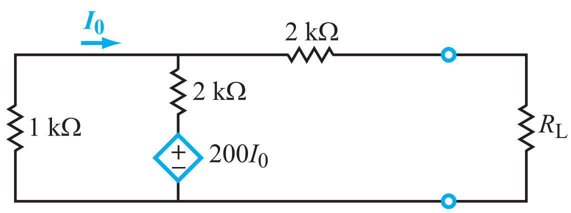


Figure P3.71: Circuit for Problem 3.71.

Problem 4.26 Relate v_o in the circuit of Fig. P4.26 to v_s and specify the linear range of v_s. Assume $V_0 = 0$.

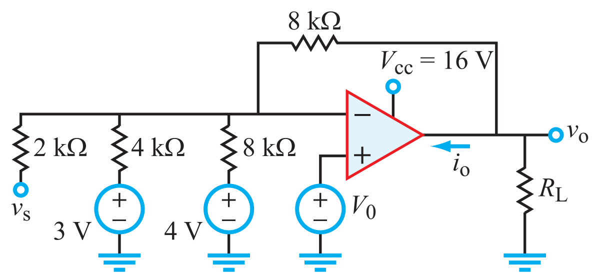


Figure P4.26: Circuit for Problem 4.26.

Problem 4.34 The circuit in Fig. P4.34 contains two single-pole single-throw switches, S_1 and S_2. Determine the closed circuit gain $G = v_o/v_s$ for each of the four possible closed/open switch combinations.

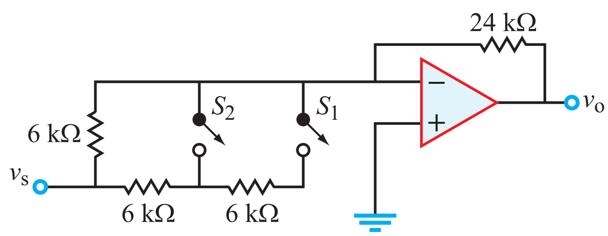


Figure P4.34: Circuit for Problem 4.34.

Problem 4.41 Relate v_o in the circuit of Fig. P4.41 to v_s.

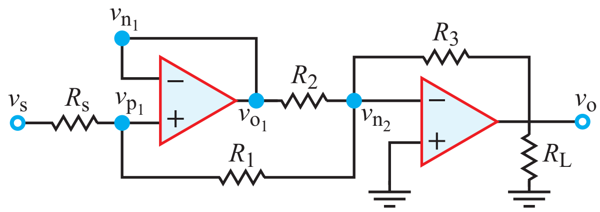
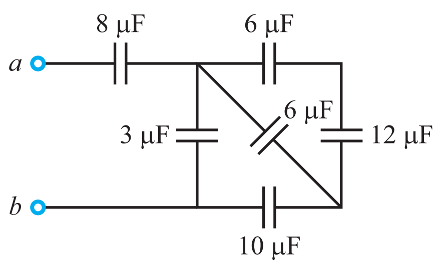


Figure P4.41: Circuit for Problem 4.41.

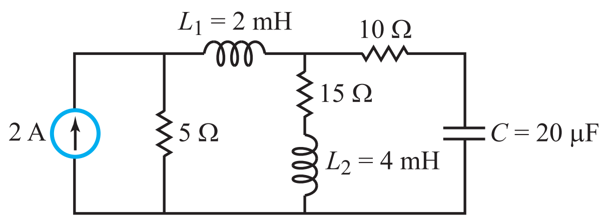
Problem 5.17 Reduce the circuit in Fig. P5.17 into a single equivalent capacitor at terminals (a,b). Assume that all initial voltages are zero at $t = 0$.

Solution:



Problem 5.28 For the circuit in Fig. P5.28, determine the voltage across C and the currents through L_1 and L_2 under dc conditions.

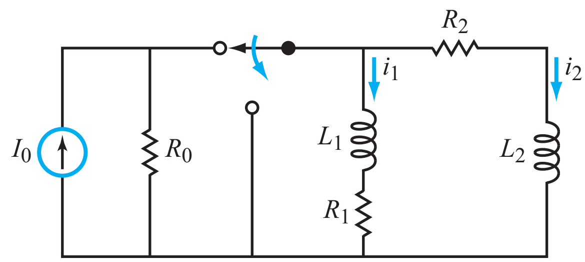
Solution:



Problem 5.49 After having been in position 1 for a long time, the switch in the circuit of Fig. P5.49 was moved to position 2 at $t = 0$. Determine $i_1(t)$ and $i_2(t)$ for $t \geq 0$ given that $I_0 = 6$ mA, $R_0 = 12\ \Omega$, $R_1 = 10\ \Omega$, $R_2 = 40\ \Omega$, $L_1 = 1$ H, and $L_2 = 2$ H.

Solution:

(a) Circuit



Problem 6.7 For the circuit of Fig. P6.7, determine $i_1(0)$ and $i_2(0)$.

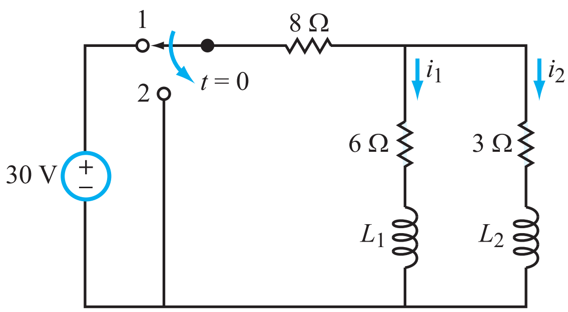


Figure P6.7: Circuit for Problem 6.7.

Problem 7.27 Determine the equivalent impedance:

(a) $\mathbf{Z}_1$ at 1000 Hz (Fig. P7-27)(a))

(b) $\mathbf{Z}_2$ at 500 Hz (Fig. P7-27)(b))

(c) $\mathbf{Z}_3$ at $\omega = 10^6$ rad/s (Fig. P7-27)(c))

(d) $\mathbf{Z}_4$ at $\omega = 10^5$ rad/s (Fig. P7-27)(d))

(e) $\mathbf{Z}_5$ at $\omega = 2000$ rad/s (Fig. P7-27)(e))

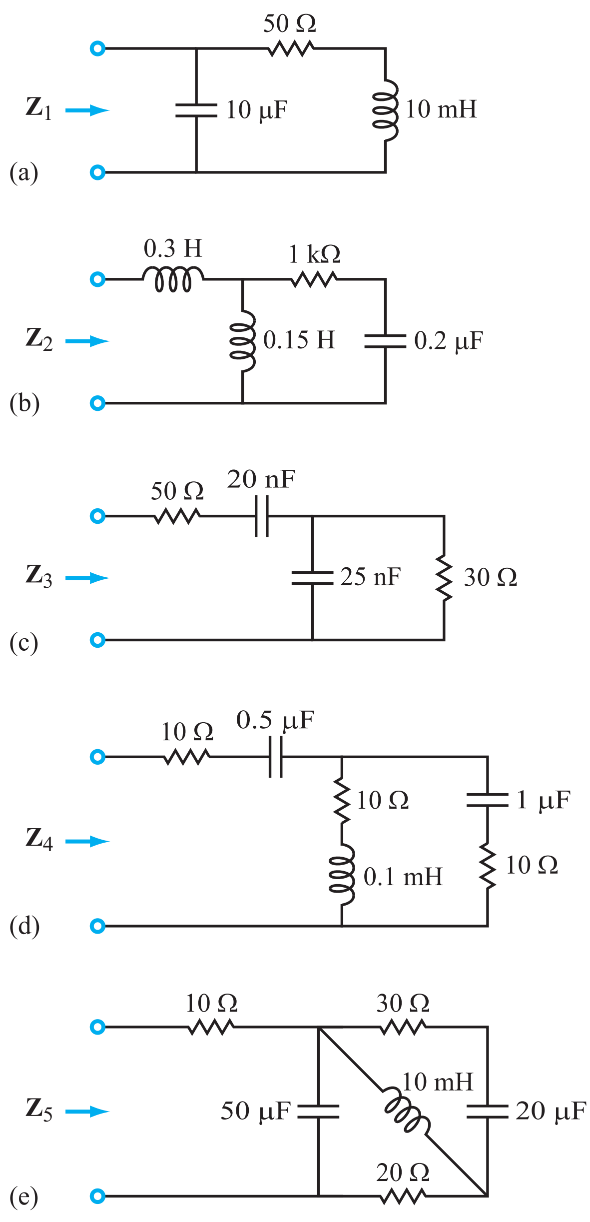


Figure P7.27: Circuit for Problem 7.27.

Problem 7.34 At what angular frequency ω is the current $i(t)$ in the circuit of Fig. P7.34 in-phase with the source voltage $v_s(t)$?

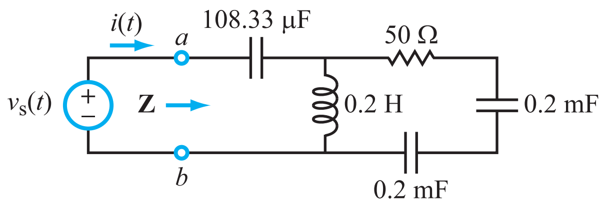


Figure P7.34: Circuit for Problem 7.34.

Problem 8.13 Determine the average power dissipated in the load resistor R_L of the circuit in Fig. P8.13, given that $\mathbf{V}_s = 100$ V, $R_1 = 1$ kΩ, $R_2 = 0.5$ kΩ, $R_L = 2$ kΩ, $\mathbf{Z}_L = j0.8$ kΩ, and $\mathbf{Z}_C = -j4$ kΩ.

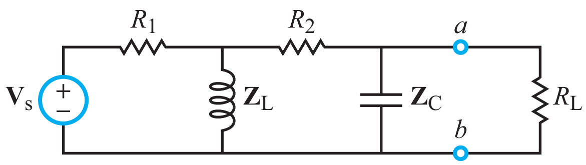


Figure P8.13: Circuit for Problem 8.13.

Section 8-4: Power Factor

Problem 8.22 The RL load in Fig. P8.22 is compensated by adding the shunt capacitance C so that the power factor of the combined (compensated) circuit is exactly unity. How is C related to R, L, and ω in that case?

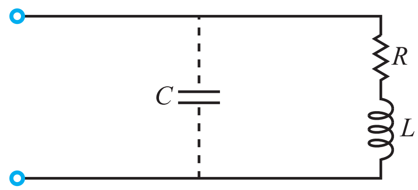


Figure P8.22: Circuit for Problem 8.22.