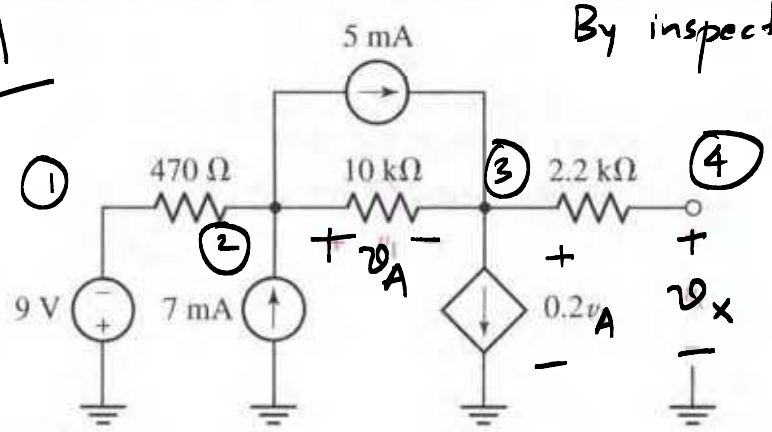
Tutorial 1: Electric & Magnetic Circuits

Many of these are textbook problems. I have scanned and pasted them here for the benefit of students

13. Employ nodal analysis to obtain a value for v_x as indicated in Fig. 4.43.

Problem 1

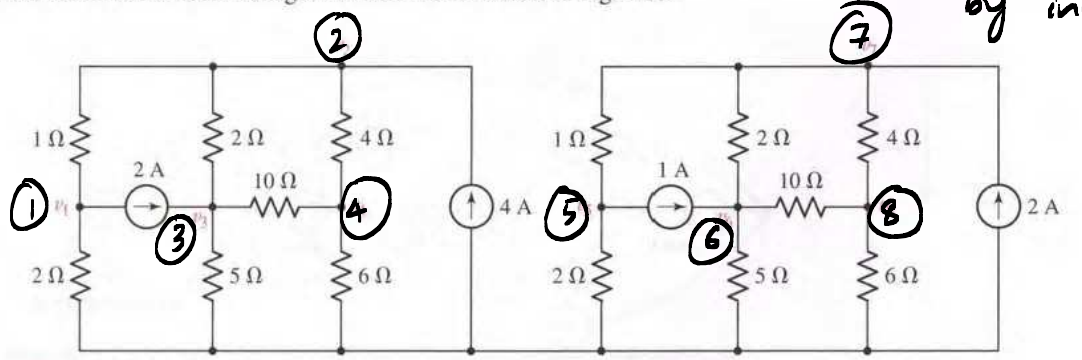
By inspection, write the MNA equations.



■ FIGURE 4.43

15. Determine the nodal voltages indicated in the circuit of Fig. 4.45.

Write the MNA equations by inspection.

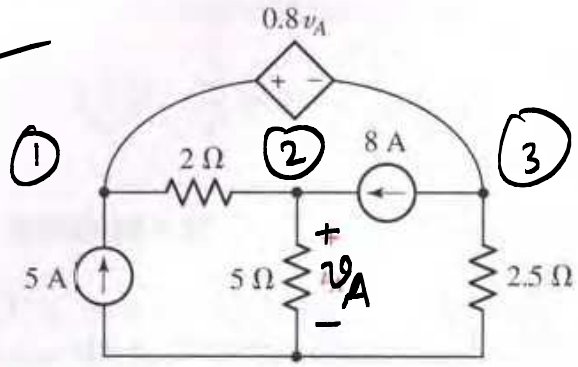


■ FIGURE 4.45

Modified

~~17~~. With the help of nodal analysis on the circuit of Fig. 4.47, find (*a*) v_A; (*b*) the power dissipated in the 2.5 Ω resistor.

Problem 2

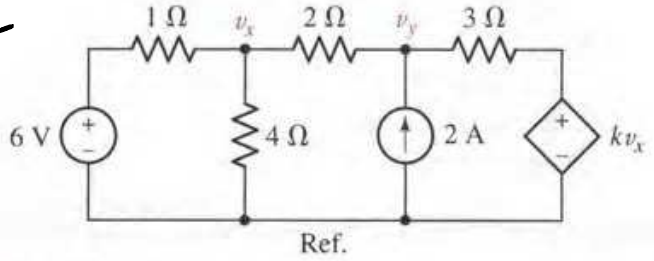


■ FIGURE 4.47

Problem 3

Modified

~~19.~~ In Fig. 4.49, use nodal analysis to find the value of k that will cause v_y to be zero.

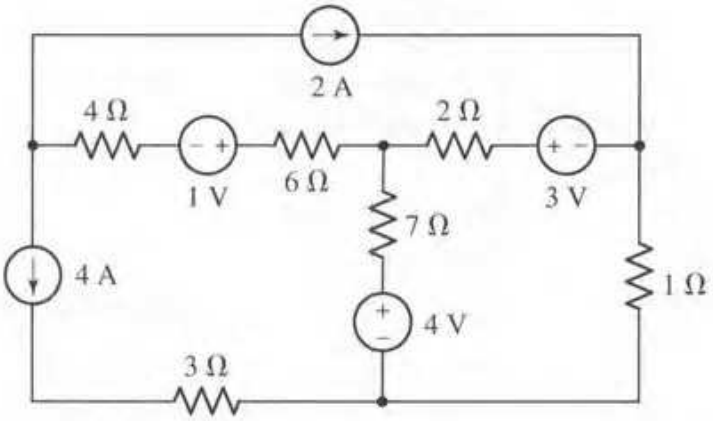


■ **FIGURE 4.49**

Problem 4

~~21.~~ Determine the power supplied by the 2 A source in the circuit of Fig. 4.54.

Use your favorite method of analysis.

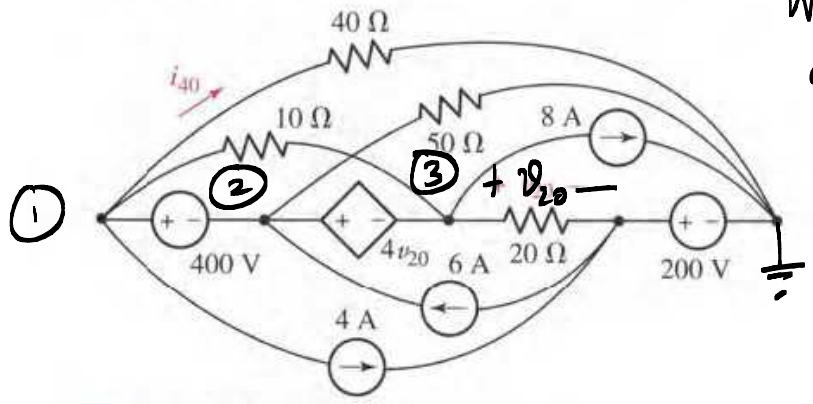


■ **FIGURE 4.54**

Problem 5

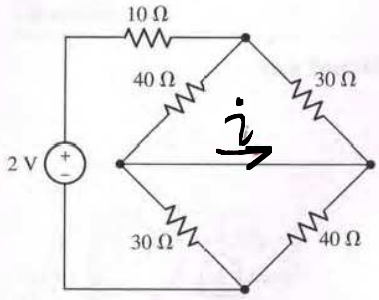
~~21.~~ Make use of the supernode concept to assist in the determination of the voltage labeled v_{20} in Fig. 4.51. Crossed wires not marked by a solid dot are not in physical contact.

Write the MNA equations. The node are numbered.



■ **FIGURE 4.51**

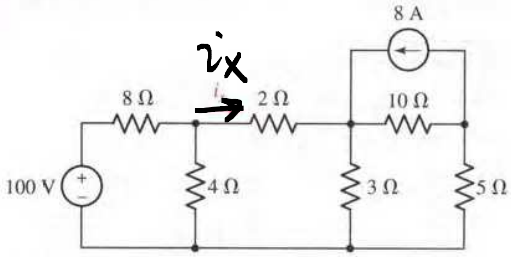
Problems 6 & 7



■ FIGURE 4.60

6. Use mesh analysis to determine the current labeled i in the circuit of Fig. 4.60.

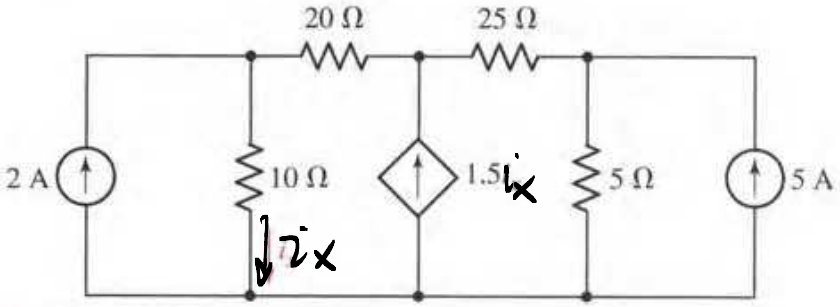
7. Use mesh analysis to find i_x in the circuit shown in Fig. 4.61.



■ FIGURE 4.61

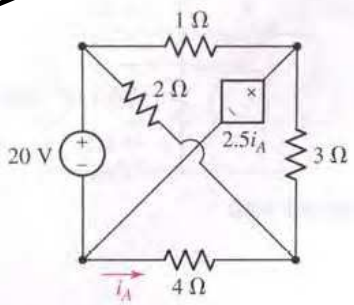
Problem 8

8. Use mesh analysis to find i_x in the circuit shown in Fig. 4.63.



■ FIGURE 4.63

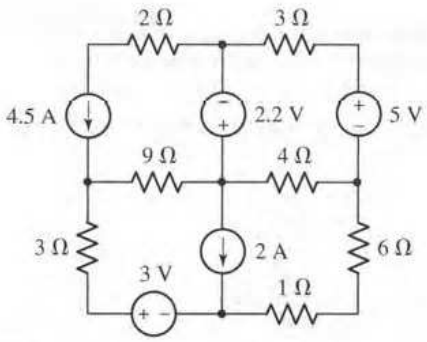
Problem 9 & 10



■ FIGURE 4.71

9. Find i_A in the circuit of Fig. 4.71.

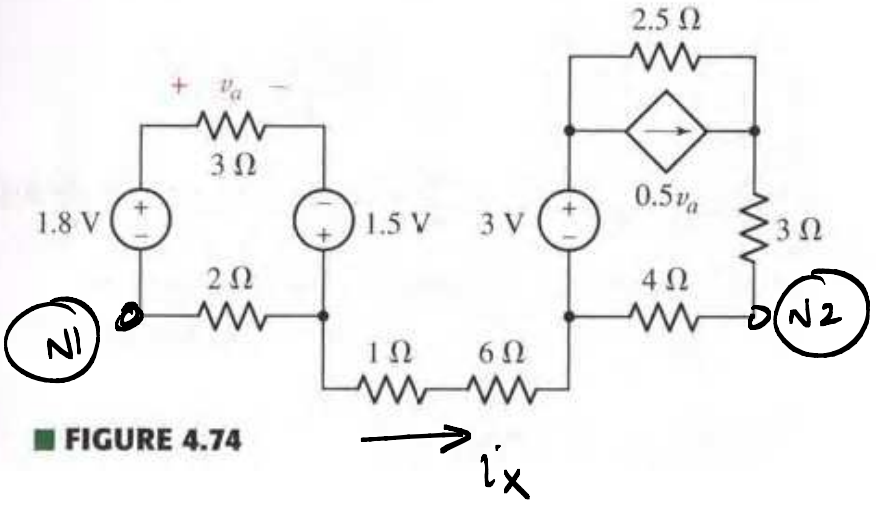
10. Use the supermesh concept to determine the power supplied by the 2.2 V source of Fig. 4.72.



■ FIGURE 4.72

Prob. 11

48. Employ mesh analysis to obtain the voltage across the 2.5 Ω resistor of Fig. 4.74.

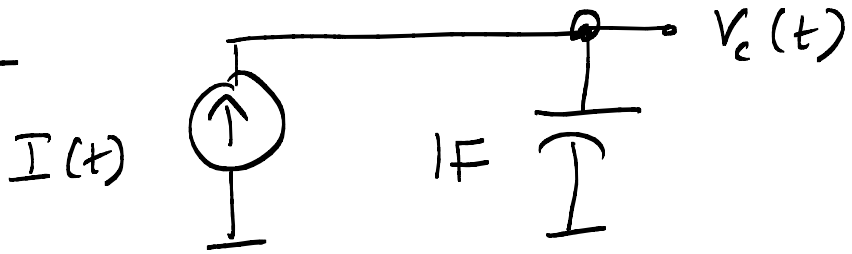


■ FIGURE 4.74

Prob. 12

Determine i_x above if (N1) & (N2) are grounded.

Prob. 13



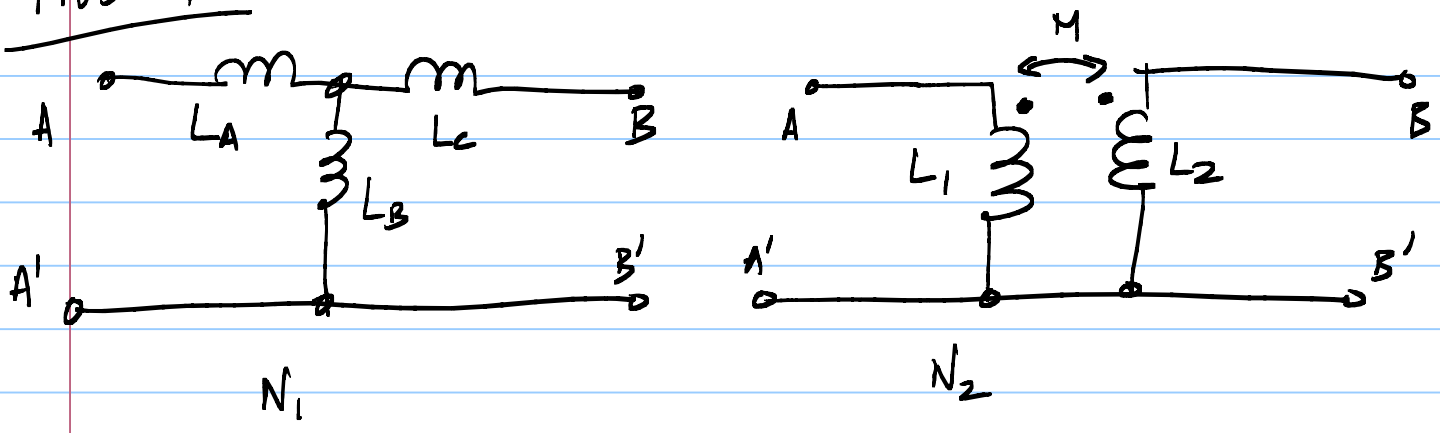
Sketch $V_c(t)$ if $I(t)$ is given by the following.

$$I(t) = 0, \quad t < 0$$

$$= \cos(2\pi t), \quad t \geq 0$$

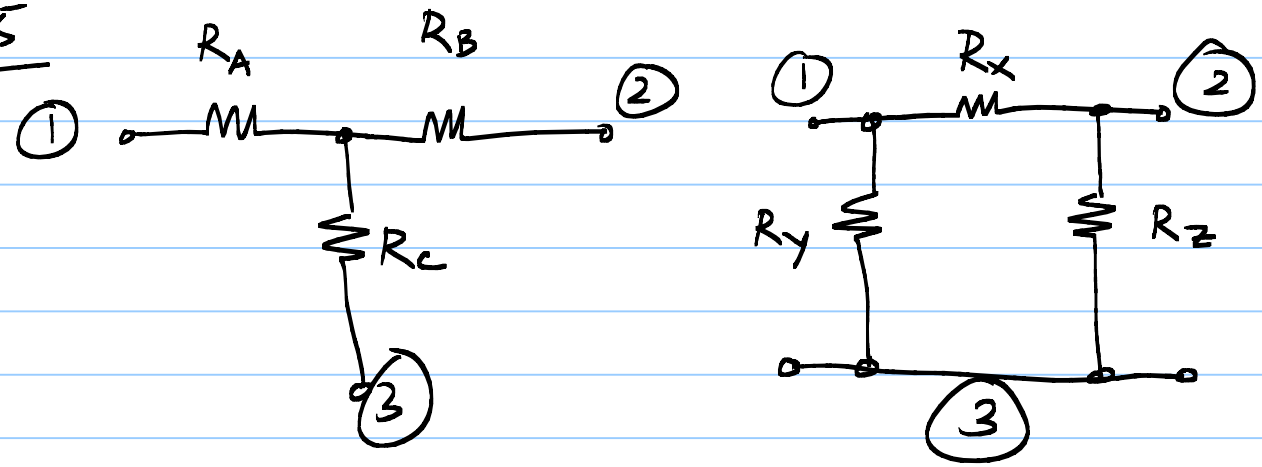
The capacitor is initially uncharged.

Prob. 14



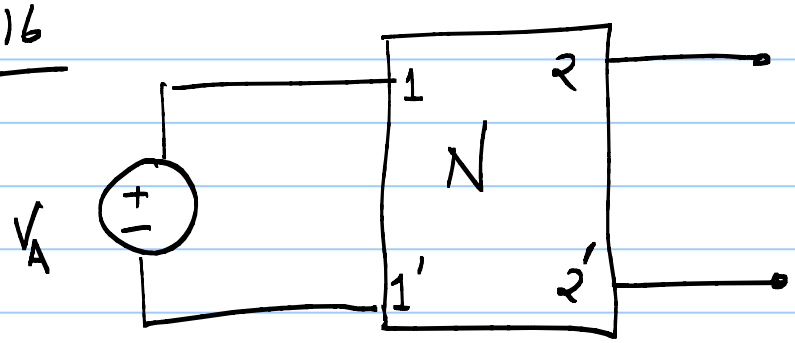
Determine L_A, L_B, L_C if the two networks above are equivalent.

Prob. 15

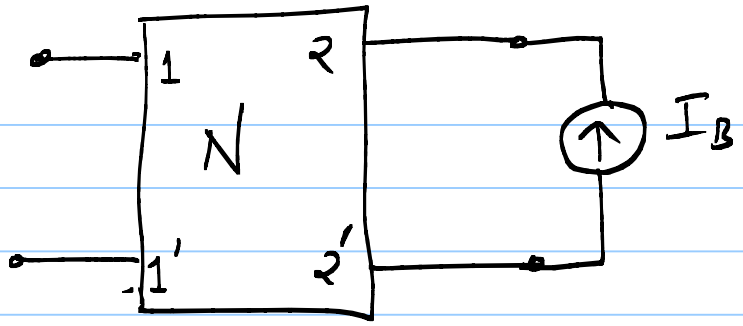


The networks above are equivalent. Determine R_x, R_y & R_z in terms of R_A, R_B, R_C.

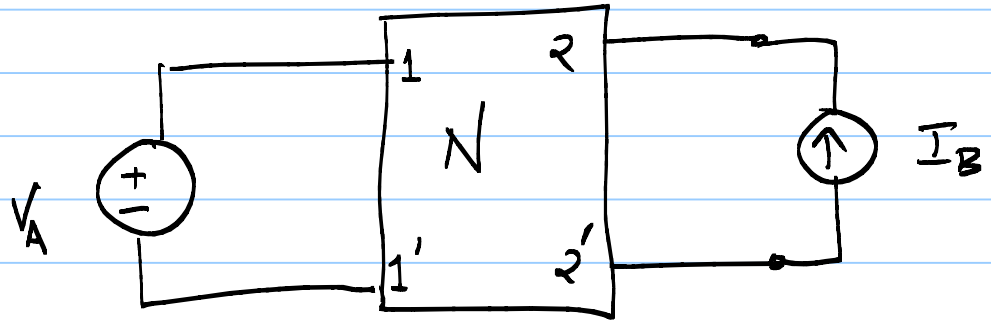
Prob. 16



The network N consists of resistors only. Let P_V denote the power dissipated in N when V_A is present.



Let P_I denote the power dissipation in N when N is excited by I_B.



Determine the power dissipated in N.

Is this result true for any arbitrary network?