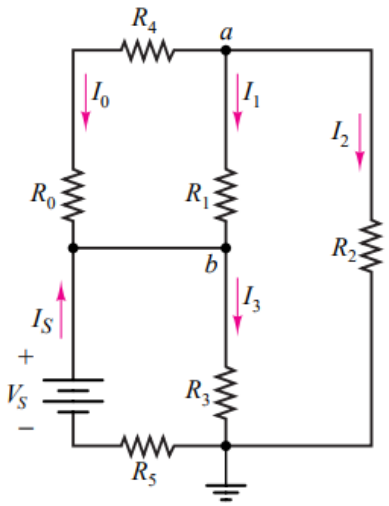
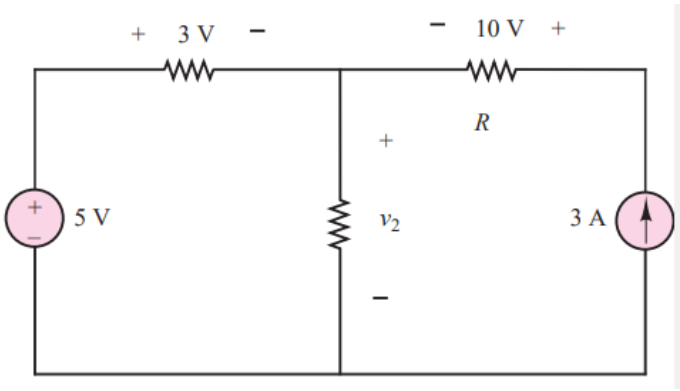
1. **Problem # 2.13**

Use Kirchhoff's current law to determine the unknown currents in the circuit of Figure P2.13. Assume that $I_o = -2$ A, $I_1 = -4$ A, $I_S = 8$ A, and $V_S = 12$ V.



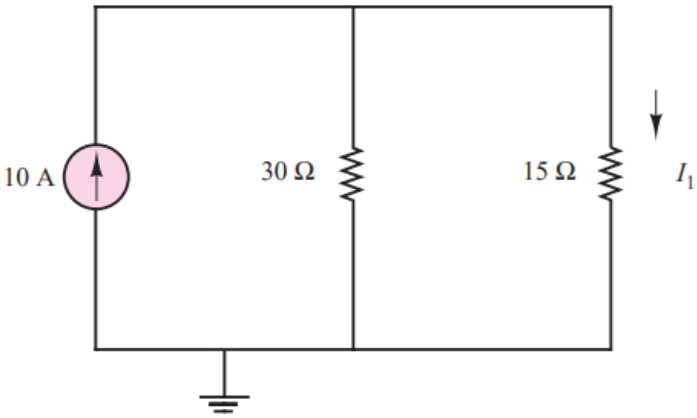
2. **Problem # 2.16**

Apply KVL to find the voltages v_1 and v_2 in Figure P2.16.



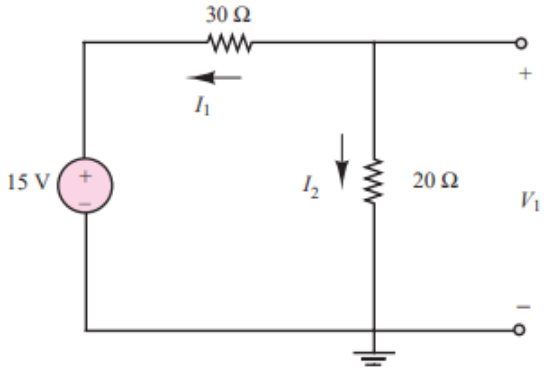
3. **Problem # 2.16**

Use Ohm's law and KCL to determine the current I_1 in the circuit of Figure P2.17.

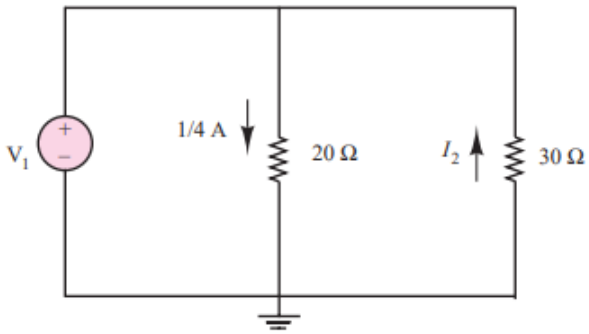


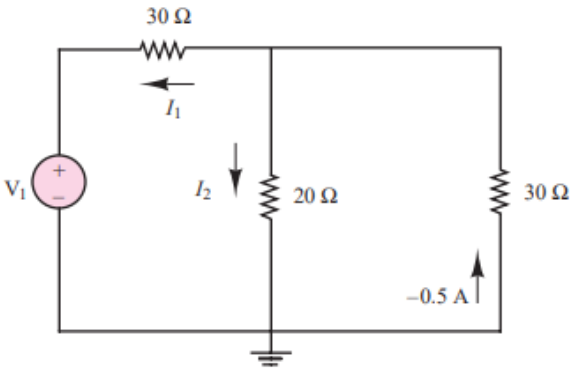
4. **Problem # 2.18**

In the circuits of Figure P2.18, the directions of current and polarities of voltage have already been defined. Find the actual values of the indicated currents and voltages.



(a)

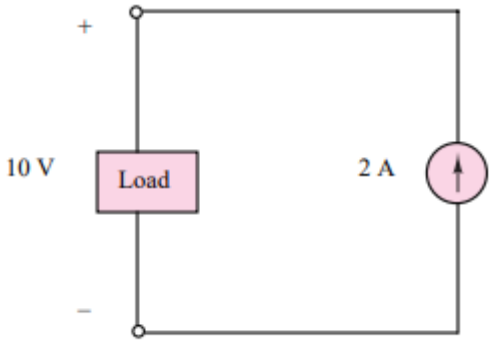




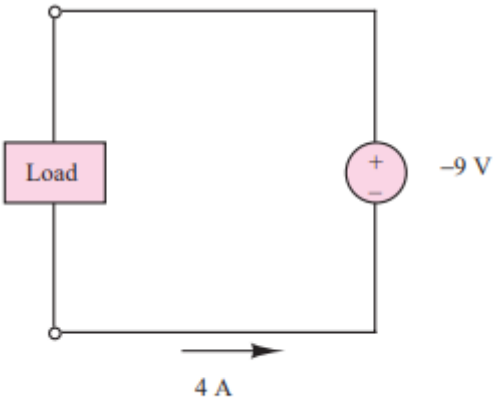
(c)

5. **Problem # 2.19**

Find the power delivered by each source in the circuits of Figure P2.19.



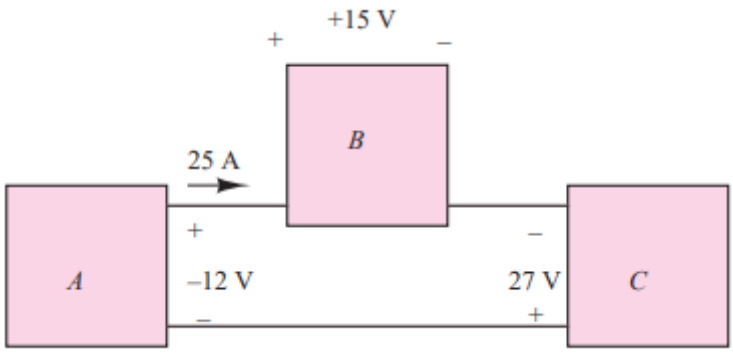
(a)



(b)

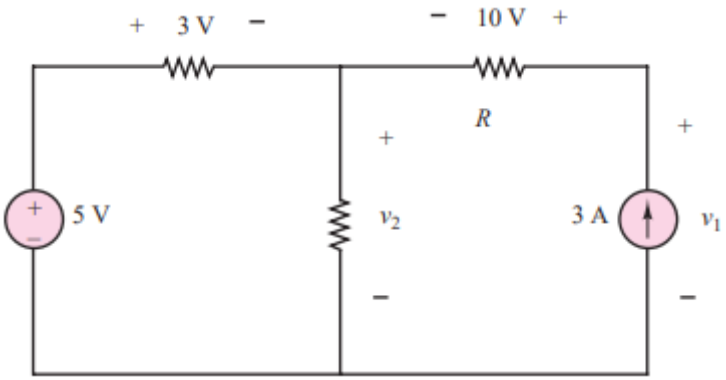
6. **Problem # 2.20**

Determine which elements in the circuit of Figure P2.20 are supplying power and which are dissipating power. Also determine the amount of power dissipated and supplied.



7. **Problem # 2.21**

In the circuit of Figure P2.21, determine the power absorbed by the resistor *R* and the power delivered by the current source.

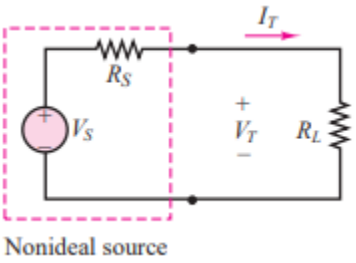


8. **Problem # 2.25**

If an electric heater requires 23 A at 110 V, determine
a. The power it dissipates as heat or other losses.
b. The energy dissipated by the heater in a 24-h period.
c. The cost of the energy if the power company charges at the rate 6 cents/kWh.

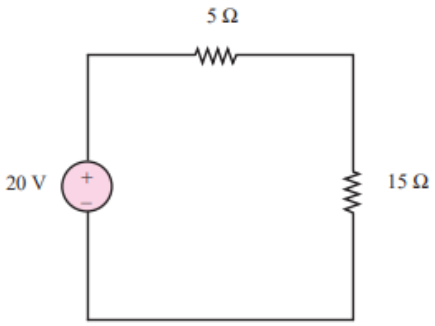
9. **Problem # 2.28**

Refer to Figure P2.28. If V_S = 12 V, I_T = 10 A and R_S = 0.3 Ω, find
a. the total power supplied by the ideal source.
b. the power dissipated and lost within the nonideal source.
c. the power supplied by the source to the circuit as modeled by the load resistance.



10. **Problem # 2.33**

For the circuit shown in Figure P2.33, determine the power absorbed by the 5-Ω resistor.



11. **Problem # 2.30**

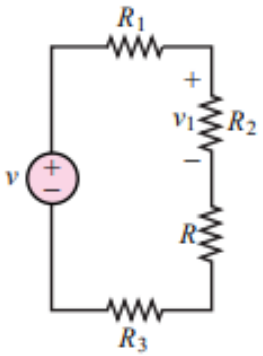
An incandescent lightbulb rated at 100 W will dissipate 100 W as heat and light when connected across a 110-V ideal voltage source. If three of these bulbs are connected in series across the same source, determine the power each bulb will dissipate.

12. **Problem # 2.32**

A 220-V electric heater has two heating coils which can be switched such that either coil can be used independently or the two can be connected in series or parallel, yielding a total of four possible configurations. If the warmest setting corresponds to 2,000-W power dissipation and the coolest corresponds to 300 W, find the resistance of each of the two coils.

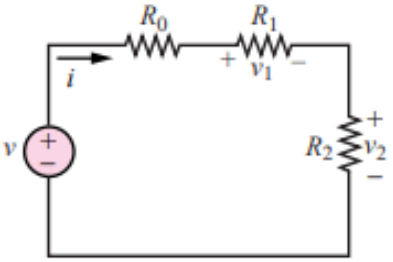
13. Problem # 2.36

In the circuit of Figure P2.36, if $v_1 = v/4$ and the power delivered by the source is 40 mW, find R, v, v_1, and i. Given: $R_1 = 8$ kΩ, $R_2 = 10$ kΩ, $R_3 = 12$ kΩ.



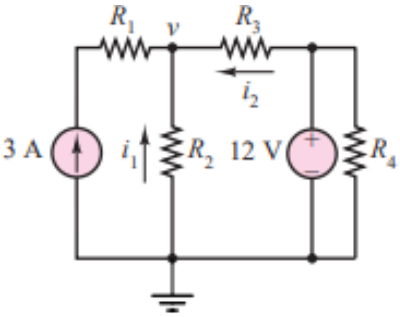
14. Problem # 2.37

For the circuit shown in Figure P2.37, if $v = 24$ V, $R_0 = 8$ Ω, $R_1 = 10$ Ω, $R_2 = 2$ Ω, find
a. The equivalent resistance seen by the source.
b. The current i.
c. The power delivered by the source.
d. The voltages v_1 and v_2.
e. The minimum power rating required for R_1.



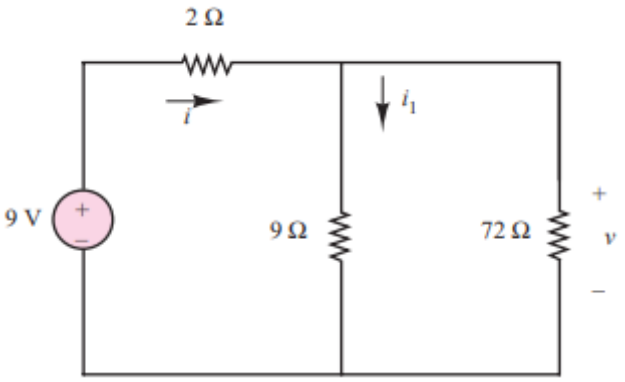
15. Problem # 2.38

For the circuit shown in Figure P2.38, let $R_1 = 25$ Ω, $R_2 = 10$ Ω, $R_3 = 5$ Ω, $R_4 = 7$ Ω, find
a. The currents i_1 and i_2.
b. The power delivered by the 3-A current source and by the 12-V voltage source.
c. The total power dissipated by the circuit.



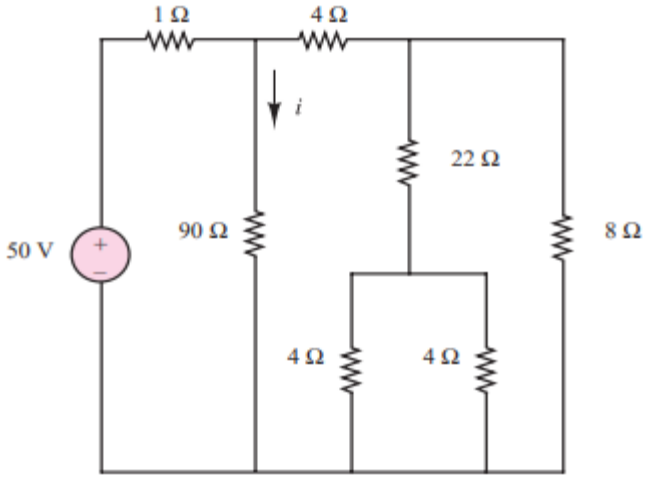
16. Problem # 2.44

Find the equivalent resistance seen by the source in Figure P2.44, and use result to find i, i_1, and v.



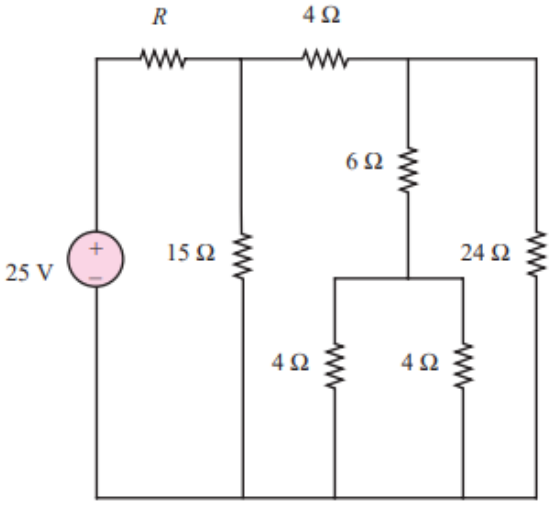
17. Problem # 2.45

Find the equivalent resistance seen by the source and the current *i* in the circuit of Figure P2.45.



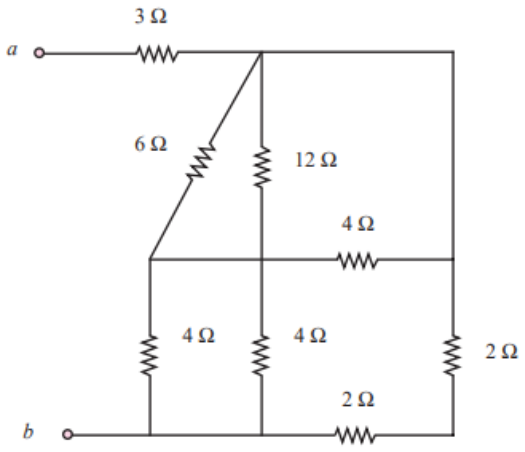
18. Problem # 2.46

In the circuit of Figure P2.46, the power absorbed by the 15-Ω resistor is 15 W. Find *R*.



19. Problem # 2.47

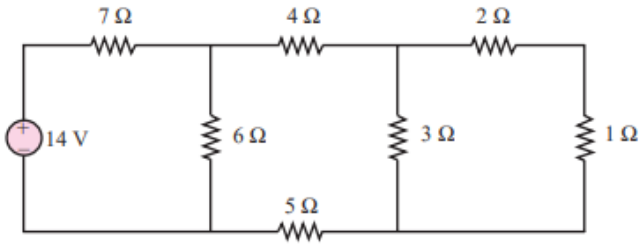
Find the equivalent resistance between terminals a and b in the circuit of Figure P2.47.



20. Problem # 2.48

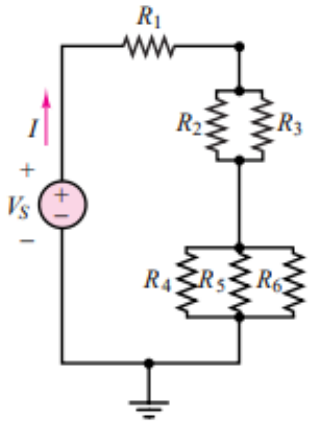
For the circuit shown in Figure P2.48,

a. find the equivalent resistance seen by the source.
b. how much power is delivered by the source?



21. Problem # 2.52

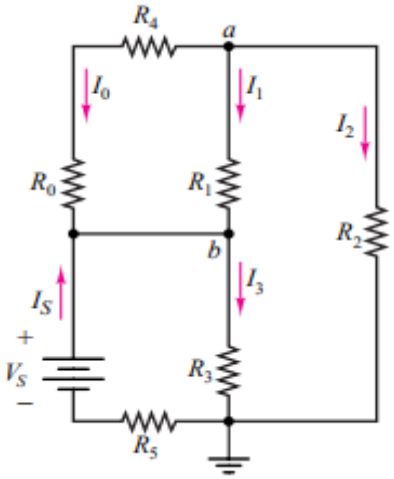
Use Kirchhoff's current law and Ohm's law to determine the current in each of the resistors R_4, R_5, and R_6 in the circuit of Figure P2.52. V_S = 10 V, R_1 = 20 Ω, R_2 = 40 Ω, R_3 = 10 Ω, $R_4 = R_5 = R_6$ = 15 Ω.



22. Problem # 2.54

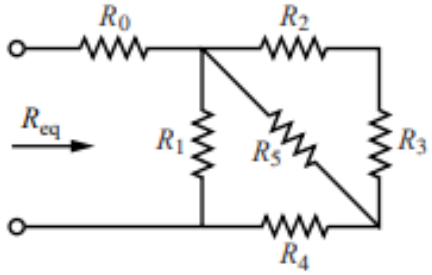
Assuming R_1 = 2 Ω, R_2 = 5 Ω, R_3 = 4 Ω, R_4 = 1 Ω, R_5 = 3 Ω, I_2 = 4 A, and V_S = 54 V in the circuit shown below, use Kirchhoff's current law and Ohm's law to find

a. I_0, I_1, I_3, and I_S .
b. R_0.



23. Problem # 2.59

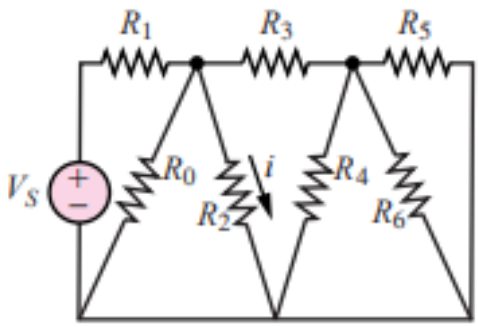
Find the equivalent resistance of the circuit of Figure P2.59 by combining resistors in series and in parallel. R_0 = 4 Ω, R_1 = 12 Ω, R_2 = 8 Ω, R_3 = 2 Ω, $R4$ = 16 Ω, R_5 = 5 Ω.



24. Problem # 2.60

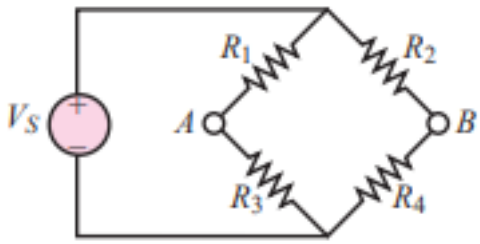
Given $V_S = 12$ V, $R_0 = 4\ \Omega$, $R_1 = 2\ \Omega$, $R_2 = 50\ \Omega$, $R_3 = 8\ \Omega$, $R_4 = 10\ \Omega$, $R_5 = 12\ \Omega$, $R_6 = 6\ \Omega$. Find in the circuit of Figure P2.60 the following:

a. the equivalent resistance seen by the source.
b. the current i.



25. Problem # 2.67

Given $V_S = 12$ V, $R_1 = 11$ kΩ, $R_3 = 6.8$ kΩ, $R_2 = 220$ kΩ, $R_4 = 0.22$ MΩ, determine the voltage between nodes A and B in the circuit shown in Figure P2.67.



26. Problem # 2.55

Assuming $R_0 = 2\ \Omega$, $R_1 = 1\ \Omega$, $R_2 = 4/3\ \Omega$, $R_3 = 6\ \Omega$, and $V_S = 12$ V in the circuit of Figure P2.55, use Kirchhoff's voltage law and Ohm's law to find i_a, i_b, and i_c.