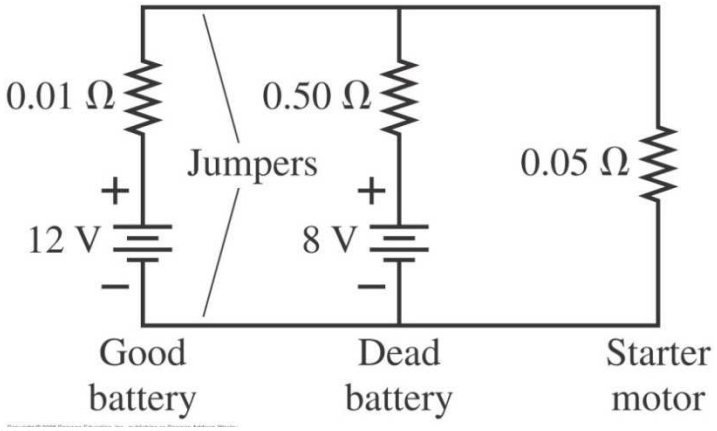
Problem 1

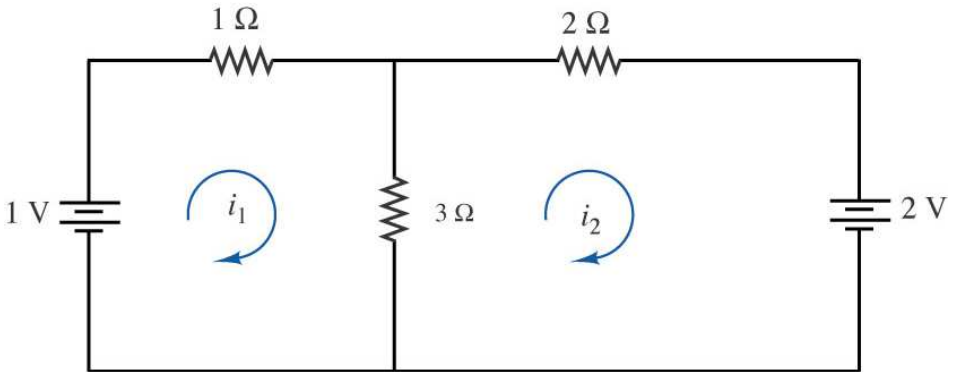
A 12 V car battery dies not so much because its voltage drops but because chemical reactions increase its internal resistance. A good battery connected with jumpers cables can both start the engine and recharge the dead battery. Consider the automotive circuit below.

a. How much current could the good battery alone drive through the starter motor?
b. How much current is the dead battery alone able to drive through the starter cable?
c. With the jumper cables attached, how much current passes through the starter motor?
d. With the jumper cables attached, how much current passes through the dead battery, and in which direction?



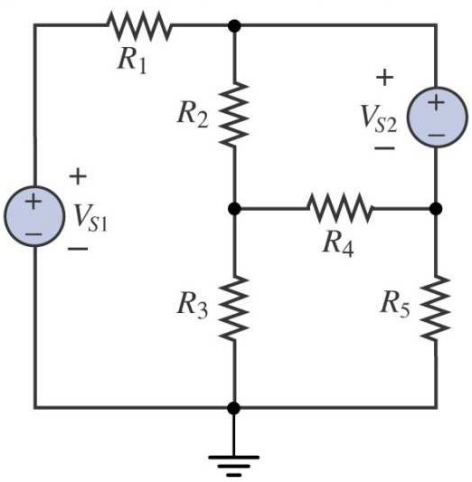
Problem 2

Use mesh analysis, find the mesh currents i_1 and i_2 for the circuit below.



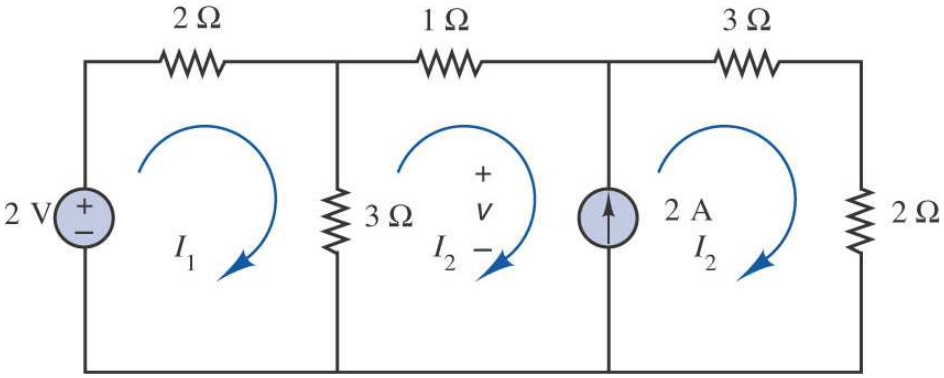
Problem 3

Use mesh current analysis, find the voltage v across R_4 in the circuit below. Let V_{S1}=12V; V_{S2} =5V; R_1 = 50Ω; R_2 = R_3 = 20Ω; R_4 = 10Ω; R_5 = 15 Ω.



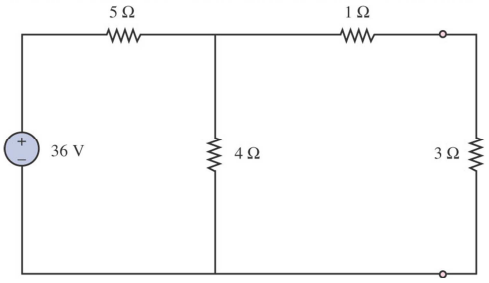
Problem 4

Use mesh current analysis, find the currents I_1, I_2, and I_3 in the circuit below. Assume polarity according to I_2.



Problem 5

Find the Thevenin equivalent circuit as seen by the 3 Ω resistor for the circuit in the Figure below.



Problem 6

Find the Norton equivalent of the circuit to the left of the 2 Ω resistor in the figure below.