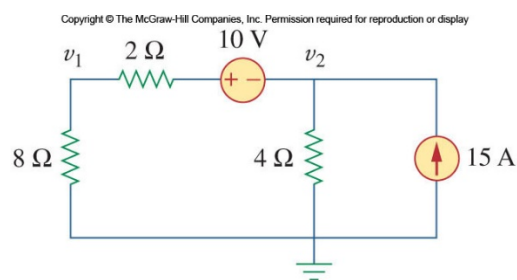
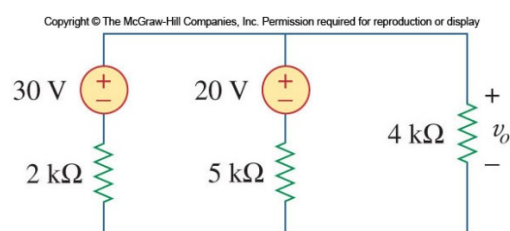


Question 1

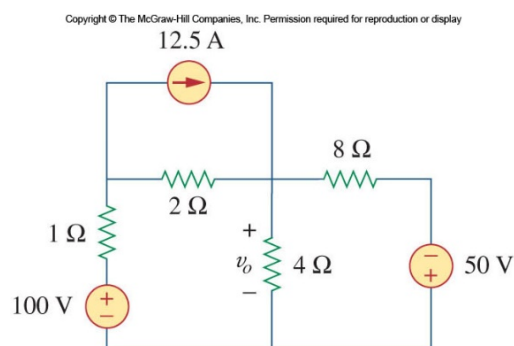
Find v_1 and v_2 in the circuit below by applying nodal analysis.

**Question 2**

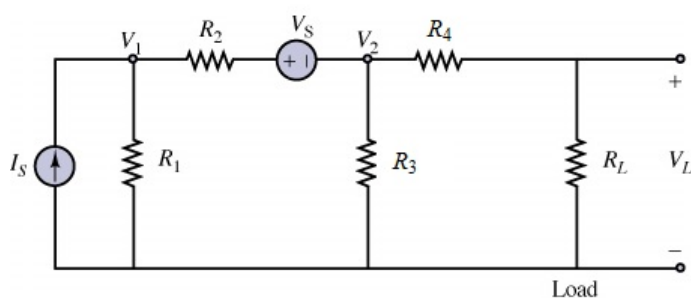
Find v_o in the circuit below by applying nodal analysis.

**Question 3**

Find v_o in the circuit below by applying nodal analysis.

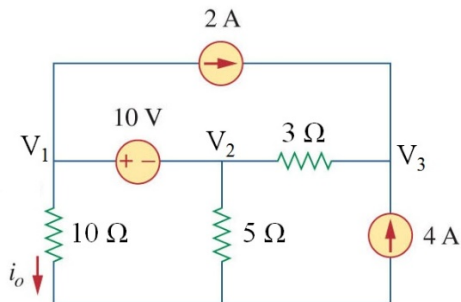
**Question 4**

Find V_1 and V_2 in the circuit below using nodal analysis. Hence, find V_L and the power dissipated in R_L .
Given: $R_1 = 8\ \Omega$, $R_2 = 2\ \Omega$, $R_3 = 5\ \Omega$, $R_4 = 6\ \Omega$, $R_L = 4\ \Omega$, $V_S = 4\text{ V}$, $I_S = 3\text{ A}$.

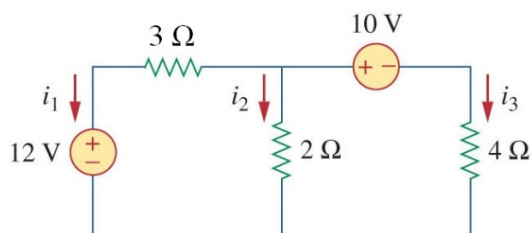


Question 5

Find i_o in the circuit below using mesh analysis. Hence, find the nodal voltages V_1 , V_2 , V_3 .

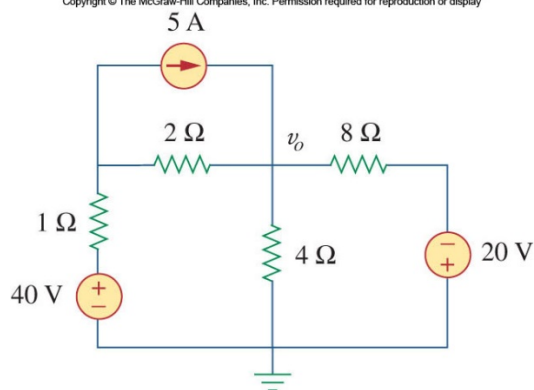
**Question 6**

For the circuit below, apply mesh analysis to find currents i_1 , i_2 , and i_3 .

**Question 7**

Find v_o in the circuit below by applying mesh analysis.

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Numerical Answers

Question 1: $V_1 = 40\text{V}$, $V_2 = 40\text{V}$

Question 2: $V_o = 20\text{ V}$

Question 3: $V_o = 50\text{V}$

This problem involves two independent equations as follows:

At node on left (v_1): $[(v_1-100)/1] + [(v_1-v_o)/2] + 12.5 = 0 \Rightarrow 3v_1 - v_o = 175$

At node on right (v_o): $[(v_o-v_1)/2] - 12.5 + [(v_o-0)/4] + [(v_o+50)/8] \Rightarrow -4v_1 + 7v_o = 50$

For checking: $v_1 = 75\text{V}$

Question 4: $V_1 = 12\text{ V}$, $V_2 = 5\text{ V}$, $V_L = 2\text{V}$, Power delivered to $R_L = 1\text{ W}$

This problem involves two independent equations as follows:

Apply KCL at node V_1 : $\frac{V_1}{R_1} + \frac{V_1 - V_s - V_2}{R_2} = I_s \Rightarrow 5V_1 - 4V_2 = 40$

Apply KCL at node V_2 : $\frac{V_1 - V_s - V_2}{R_2} = \frac{V_2}{R_3} + \frac{V_2}{R_4 + R_L} \Rightarrow 5V_1 - 8V_2 = 20$

Question 5: $i_o = 2\text{A}$, $V_1 = 20\text{V}$, $V_2 = 10\text{V}$, $V_3 = 28\text{V}$

Question 6: $i_1 = -2\text{A}$; $i_2 = 3\text{A}$; $i_3 = -1\text{A}$

Question 7: $v_o = 20\text{ V}$