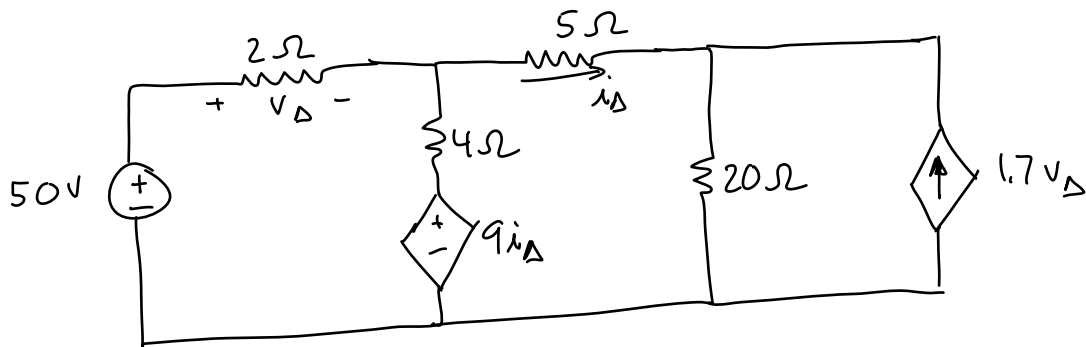
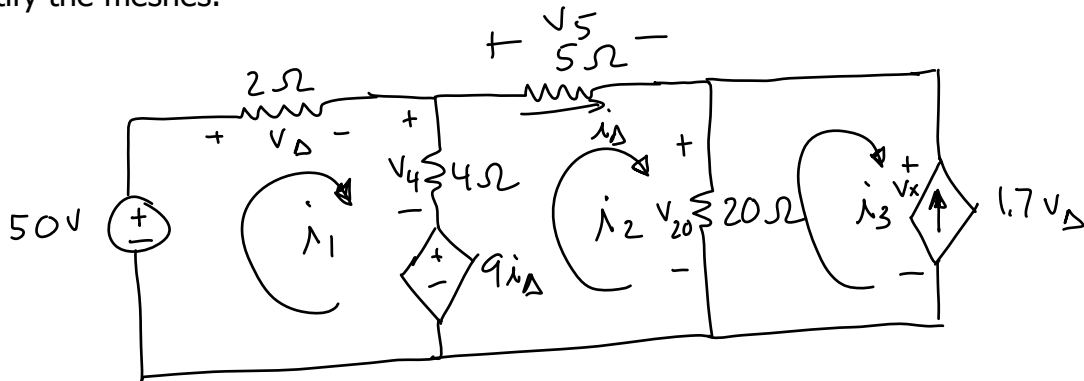


Mesh Current Method

Problem Statement: Determine the mesh current equations and any needed constraint equations.



1.) Identify the meshes.



2.) Label the mesh currents.

See diagram in Step 1

3.) Label the voltages across every circuit element.

See diagram in Step 1

4.) Determine the voltages in terms of the mesh currents.

$$v_{\Delta} = i_1 (2 \Omega)$$

$$v_4 = (i_1 - i_2)(4 \Omega)$$

$$v_5 = i_2 (5 \Omega)$$

$$v_{20} = (i_2 - i_3)(20 \Omega)$$

$$v_x = v_x$$

5.) KVL for each mesh.

①

$$-50V + i_1(2\Omega) + (i_1 - i_2)(4\Omega) + 9i_\Delta = 0$$

②

$$-9i_\Delta - (i_1 - i_2)(4\Omega) + i_2(5\Omega) + (i_2 - i_3)(20\Omega) = 0$$

③

$$i_3 = -1.7V_\Delta$$

$$-(i_2 - i_3)(20\Omega) + V_x = 0$$

6.) Determine any constraint equations for dependent sources and current sources.

$$i_\Delta = i_2$$

$$V_\Delta = i_1(2\Omega)$$

7.) Solve for the mesh currents and any other quantities.

Not required