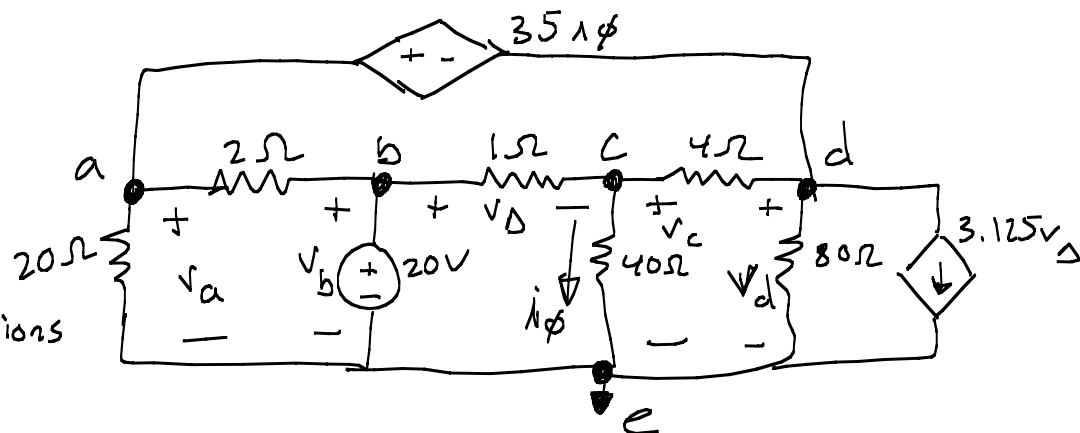


Problem 1

Determine

The node-voltage equations and any needed constraint equations



$$V_b = 20V$$

Node c

$$\frac{V_c - 20V}{1\Omega} + \frac{V_c}{40\Omega} + \frac{V_c - V_d}{4\Omega} = 0$$

Supernode (ad)

$$\frac{V_a}{20\Omega} + \frac{V_a - 20V}{2\Omega} + \frac{V_d - V_c}{4\Omega} + \frac{V_d}{8\Omega} + 3.125V_\Delta = 0$$

Constraint Equations

$$-V_a + 35i_\phi + V_d = 0$$

$$i_\phi = \frac{V_c}{40\Omega}$$

$$-20V + V_D + V_c = 0$$

$$V_D = 20 - V_c$$

