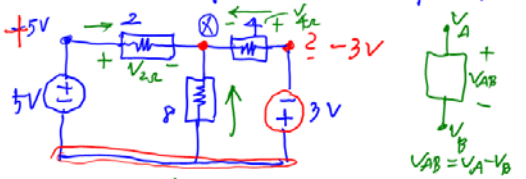
EE103 Lecture #5 Jan 19, 2018



KCL at ⊗ $\quad i_{2\Omega} + i_{4\Omega} + i_{8\Omega} = 0$

$$\frac{5 - V_x}{2} + \frac{-3 - V_x}{4} + \frac{0 - V_x}{8} = 0$$

$$4(5 - V_x) + 2(-3 - V_x) - V_x = 0$$

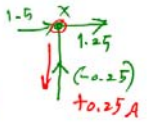
$$14 - 7V_x = 0 \quad \boxed{V_x = 2\,V}$$

$$i_{2\Omega} = \frac{5 - 2}{2} = 1.5\,A$$

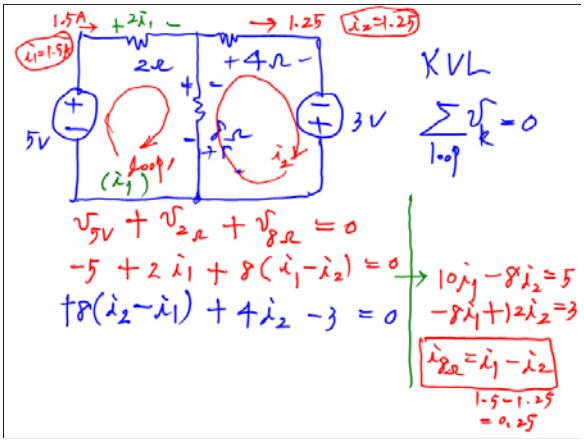
$$i_{4\Omega} = \frac{-3 - 2}{4} = -1.25\,A$$

$$i_8 = \frac{0 - 2}{8} = -0.25$$

$i_8 \left(\downarrow\right) = +0.25\,[A]$ (due)



Power $= V_x i_8 = 2(0.25) = 0.5\,W$ (abs)



KVL

$$\sum_{\text{loop}} v_k = 0$$

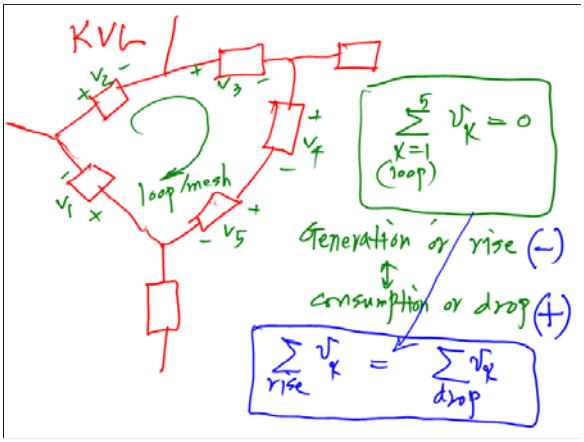
$$v_{5V} + v_{2\Omega} + v_{8\Omega} = 0$$

$$-5 + 2i_1 + 8(i_1 - i_2) = 0 \quad \rightarrow \quad 10i_1 - 8i_2 = 5$$

$$+8(i_2 - i_1) + 4i_2 - 3 = 0 \quad \rightarrow \quad -8i_1 + 12i_2 = 3$$

$\boxed{i_{8\Omega} = i_1 - i_2}$

$1.5 - 1.25 = 0.25$

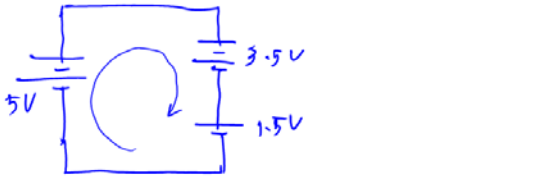


$$\sum_{k=1}^{5} v_k = 0 \quad \text{(loop)}$$

Generation or rise (−)

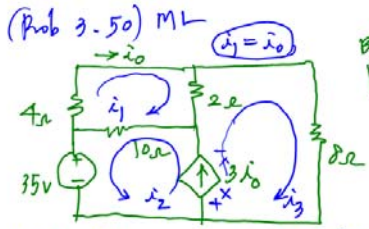
consumption or drop (+)

$$\sum_{\text{rise}} v_k = \sum_{\text{drop}} v_k$$



KVL $\quad -5 + 3.5 + 1.5 = 0$

(Prob 3.50) ML



By Mesh(=loop) analysis

Find i_0

Loop, KVL $\quad 4i_1 + 2(i_1 - i_3) + 10(i_1 + i_2) = 0$

2 $\quad 35 + 10(i_1 + i_2) + x = 0$

3 $\quad 2(i_3 - i_1) + 8i_3 + x = 0$

$\boxed{3i_0 = i_2 + i_3}$