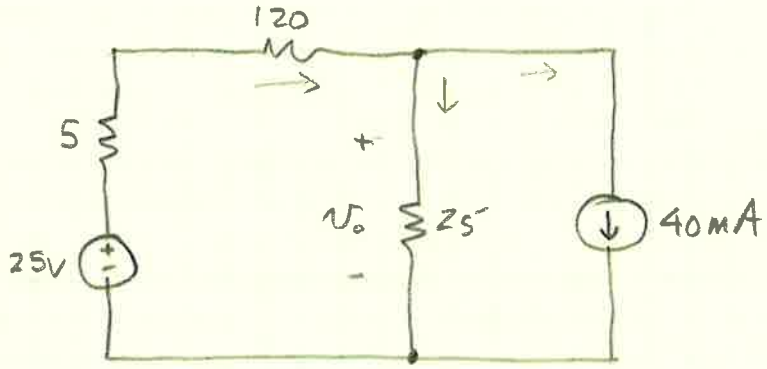
FIND v_o using the node-voltage method.

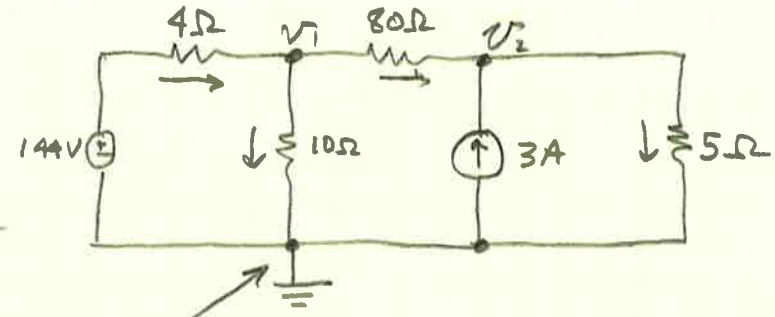


NODE A: $\Sigma i_{IN} = \Sigma i_{OUT}$

$$\frac{25 - V_o}{125} = \frac{V_o}{25} + 40\,mA$$

$$V_o = 3.33V$$

Use the node-voltage method to find v_1 & v_2



1. assign reference node
2. Label currents
3. Solve

@ node v_1: $\Sigma i_{in} = \Sigma i_{out}$

$$\frac{144 - V_1}{4} = \frac{v_1 - v_2}{80} + \frac{v_1}{10} \quad (1)$$

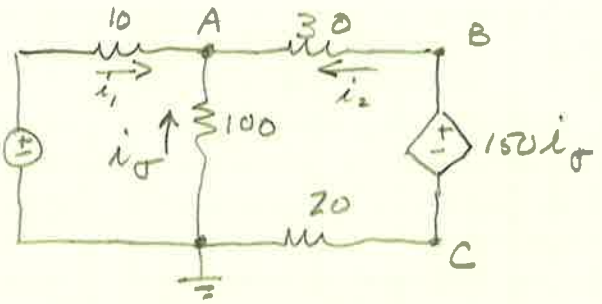
@ node v_2: $\Sigma i_{in} = \Sigma i_{out}$

$$\frac{v_1 - v_2}{80} + 3 = \frac{v_2}{5} \quad (2)$$

Solving (1) + (2):

$$v_1 = 100\ v$$
$$v_2 = 20\ v$$

use the node-voltage method & find $P_{150 i_\sigma}$ source.



$V_C = -20 i_2$

$V_B = -20 i_2 + 150 i_\sigma$

NODE A: $i_1 + i_2 + i_\sigma = 0$

$$\frac{160 - V_A}{10} + \frac{(-20 i_2 + 150 i_\sigma) - V_A}{30} + \frac{(0 - V_A)}{100} = 0$$

$$i_\sigma = \frac{-V_A}{100}$$

$$i_2 = \frac{V_B - V_A}{30} = \frac{-20 i_2 + 150 i_\sigma - V_A}{30} \Rightarrow i_2 = 3 i_\sigma - \frac{V_A}{50}$$

Substituting + Solving:

$i_\sigma = -1\,A$

$i_2 = -5\,A$

$V_A = 100\,V$

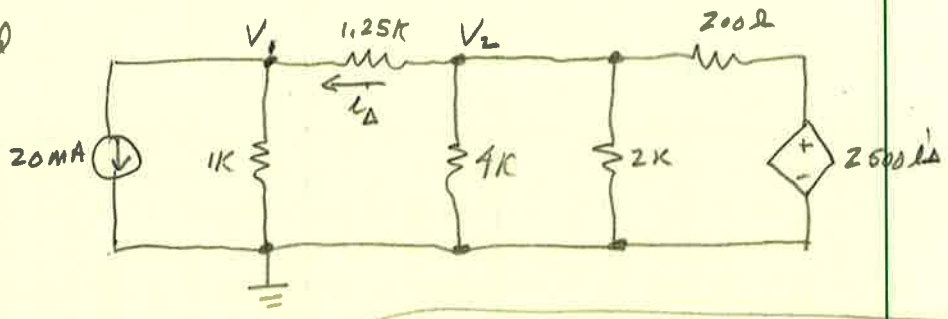
So i_σ + i_2 are actually going the other way.

$P_{150 i_\sigma} = iV = i_2 (150 i_\sigma) = 5(150(-1)) = \boxed{-750\,W}$

The dependent source is delivering power to the circuit.

a) Find Power developed using node voltage method

b) Find power absorbed



assign all currents positive down and to the left.

node V_1: $\frac{V_2 - V_1}{1.25K} = \frac{V_1}{1K} + 20mA$

node V_2: $\frac{2500\, i_\Delta - V_2}{200} = \frac{V_2}{2K} + \frac{V_2}{4K} + \frac{V_2 - V_1}{1.25K}$

$$i_\Delta = \frac{V_2 - V_1}{1.25K}$$

Solving: $V_1 = 60V$
$V_2 = 160V$
$i_\Delta = 80mA$

FIND P_{dev}.

$P_{20mA} = 60(.02) = 1.2W$ (absorbed)

$V_{DS} = 2500\, i_\Delta = 200$

$i_{ds} = \frac{200 - 160}{200} = 0.2A \uparrow$

$P_{dev} = (.2)(200) = 40W$ developed or $\boxed{-40W}$