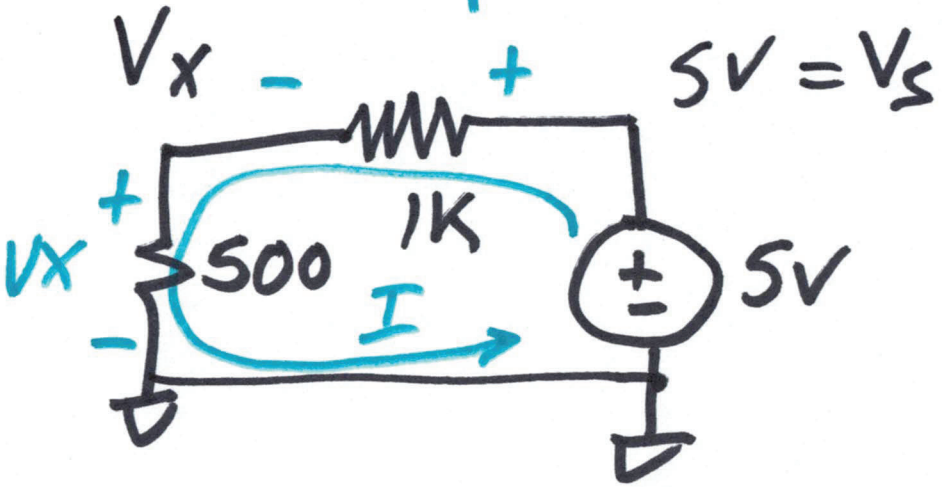
EE 220 circuits I

Lecture 4

Sept. 2, 2020



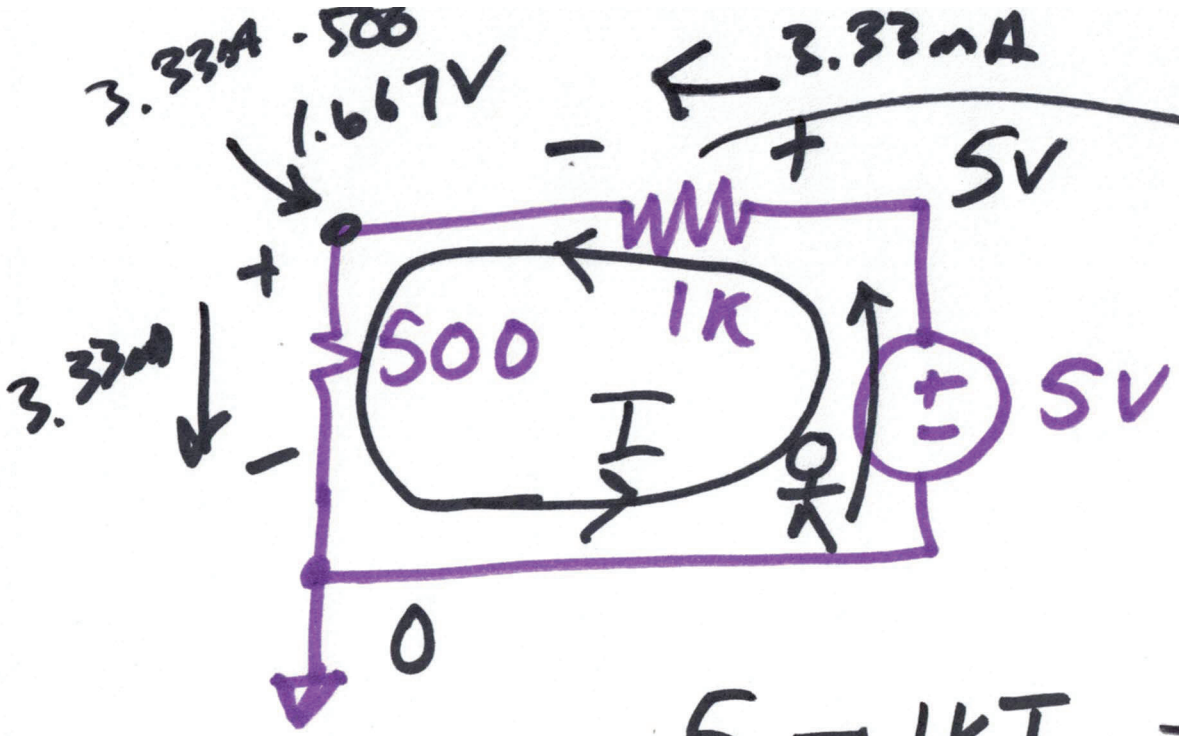
$$V_x = 5 \cdot \frac{500}{1K + 500}$$

$$V_x = \frac{5}{3} = 1.667V$$

$$I = \frac{5}{1.5k} = \frac{5}{\frac{3}{2}k} = \frac{10}{3}\,mA = 3.33\,mA$$

$$V_x = 3.33\,mA \cdot 500 = 3.33\,mA \cdot \frac{1}{2}k$$

$$V_x = 1.667V$$

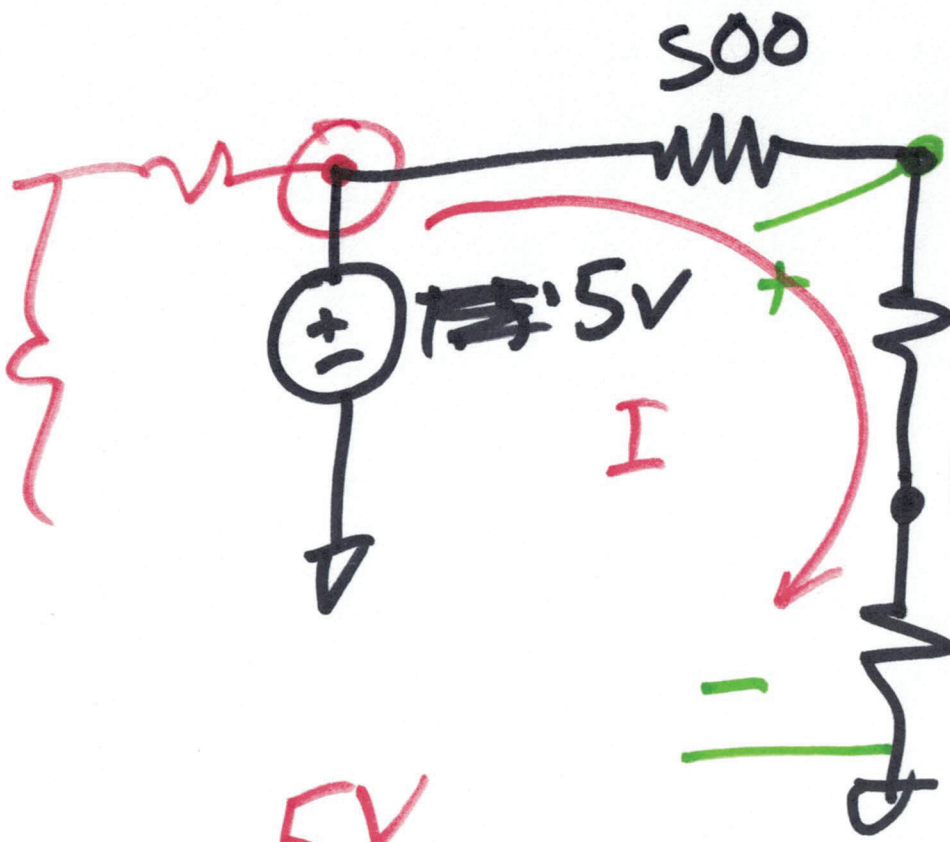


$3.33mA \cdot 1k = 3.33V$

$$5 - 1kI - I \cdot \frac{1}{2}k = 0$$

$$5 = 1.5k \cdot I$$

$$I = 3.33mA$$



$$V_y = \frac{500+500}{500+500+500} \cdot 5V$$

$$V_z = \frac{500}{500+500+500} \cdot 5V$$

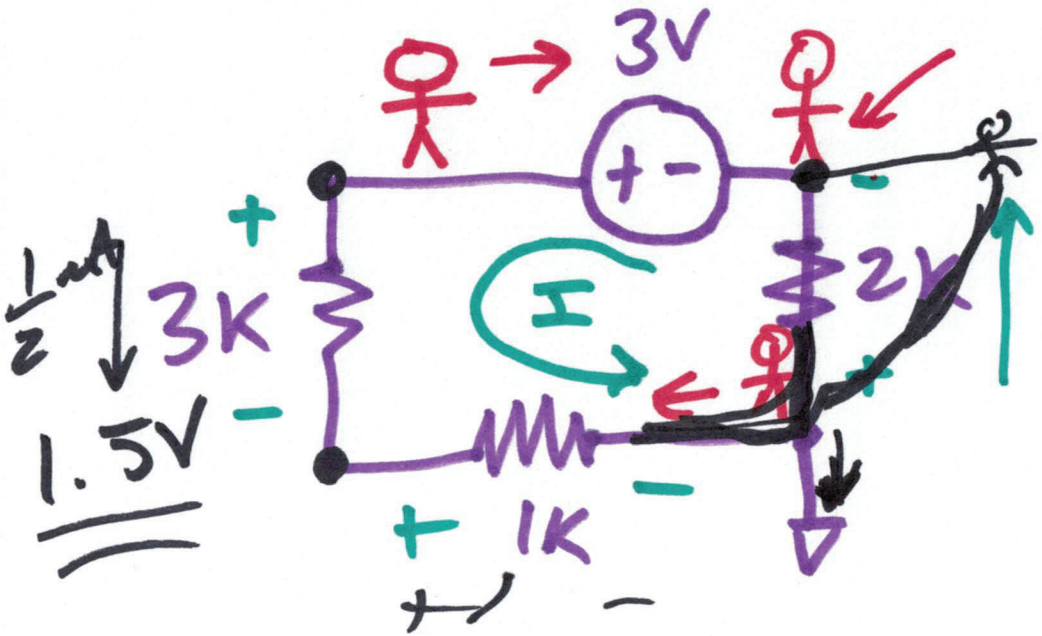
$$V_y - V_z = \frac{500}{500+500+500} \cdot 5$$

$$I = \frac{5V}{500+500+500}$$

$$= 3.33\ mA$$

$$V_z = 3.33mA \cdot 500 = I \cdot 500$$

$$V_y = 3.33mA\,(500+500)$$



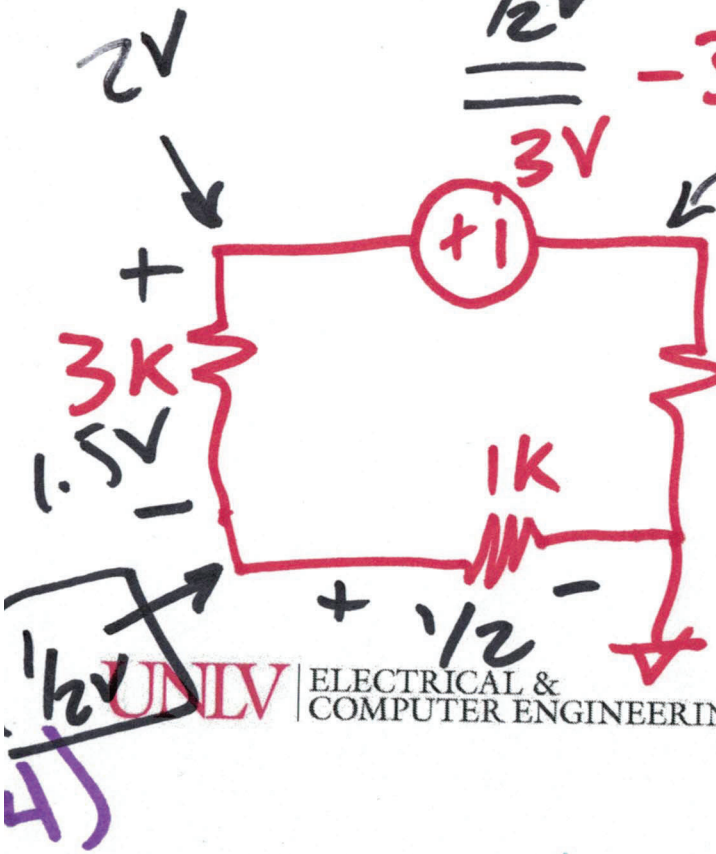
$\frac{5}{8}$ $\frac{9}{16}$

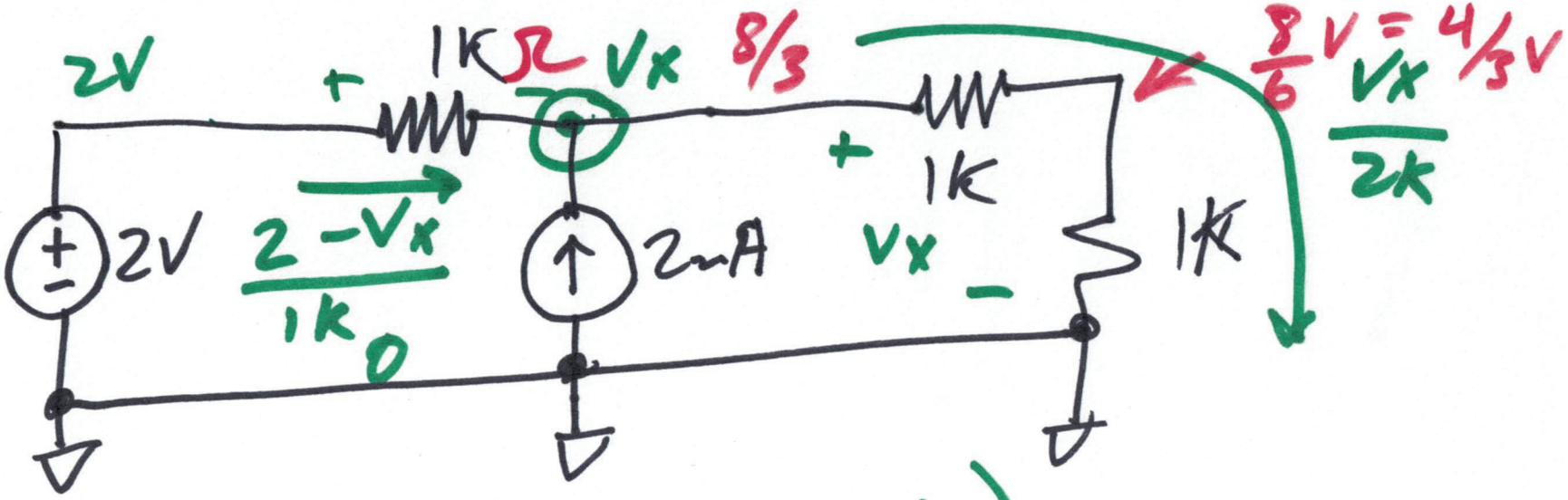
$2K \cdot \frac{1}{2}mA = 1V$

$-3 + 2K \cdot I + 1K \cdot I + 3KI = 0$

$I = \frac{3}{6K} = \frac{1}{2}mA$

$0 - (-1V) = 1V$





$$2k\left(2mA + \frac{2-V_x}{1K} - \frac{V_x}{2K}\right) = 0 \cdot 2k$$

$$4V + 4V - 2V_x - V_x = 0$$

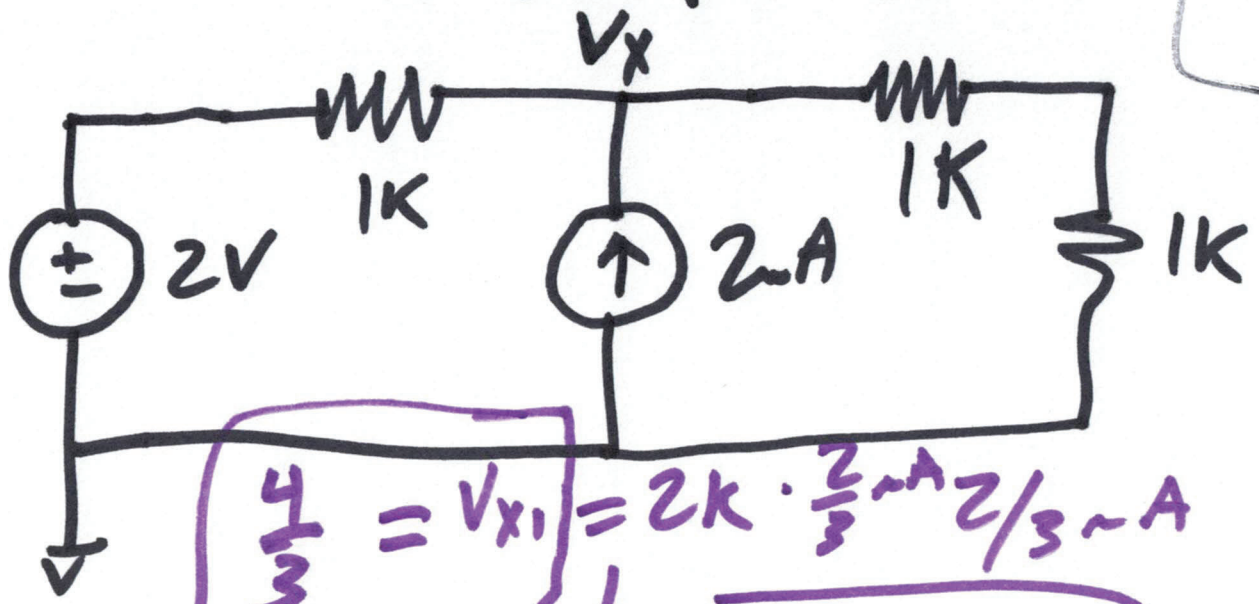
$$3V_x = 8$$

$$\boxed{V_x = \frac{8}{3}V}$$

Superposition

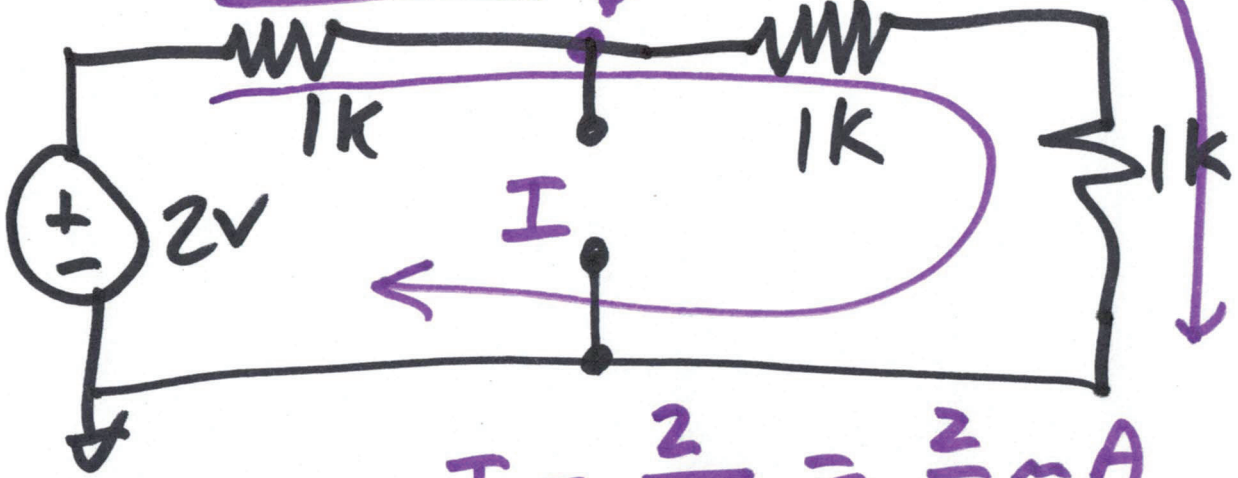
Replace current with open

Replace voltage source with short



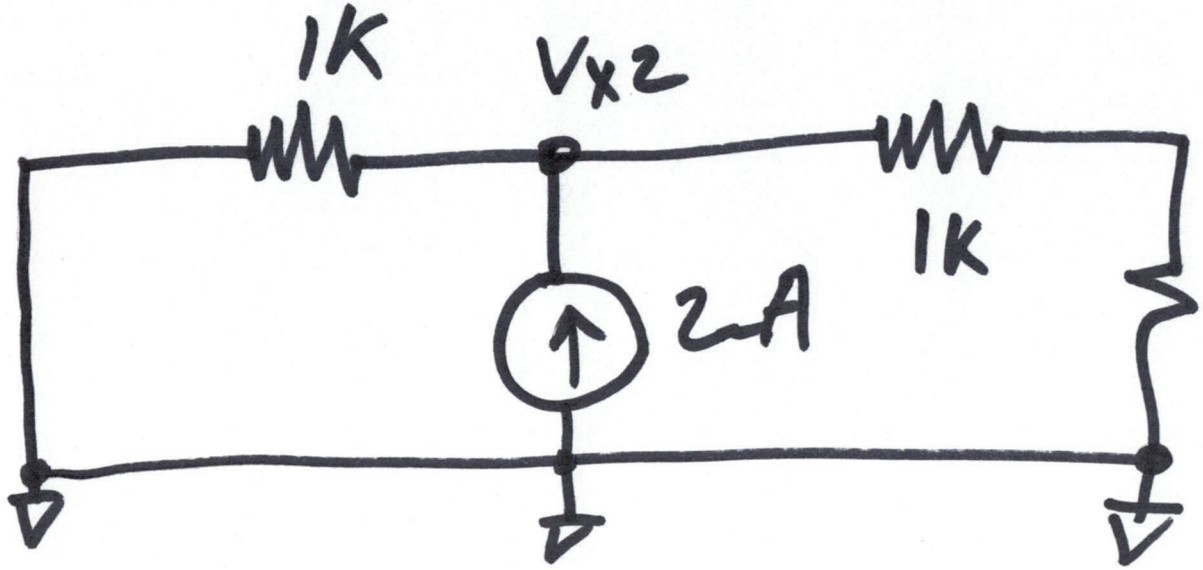
$\frac{4}{3} = V_{x1} = 2k \cdot \frac{2}{3}mA \; 2/3 \sim A$

(1)



$$I = \frac{2}{3k} = \frac{2}{3} \sim A$$

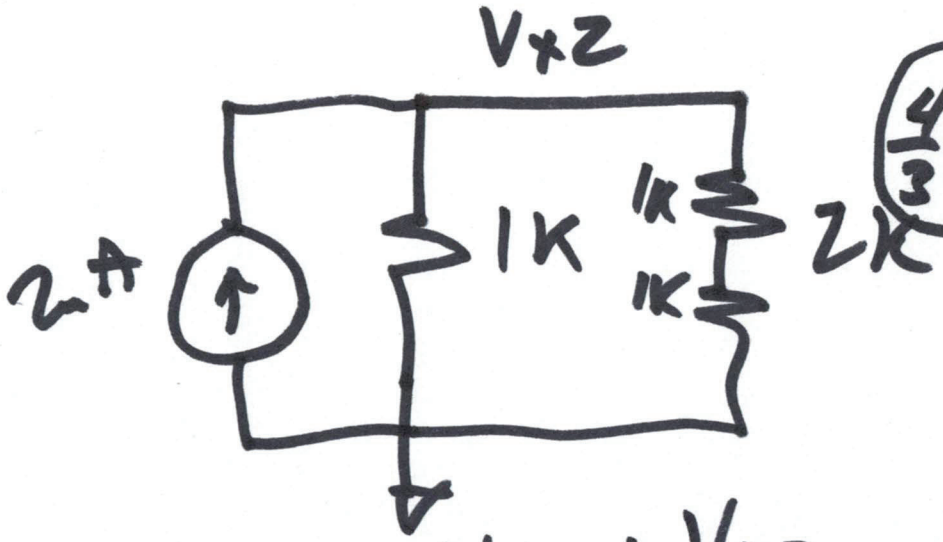
o)



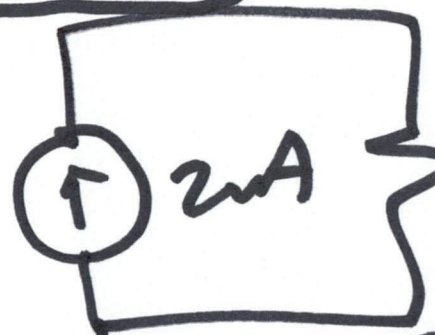
$1k \,//\, 2k$

$$R_{eq} = \frac{1k \cdot 2k}{1k + 2k}$$

$$= \frac{2}{3}k = 666\,\Omega$$



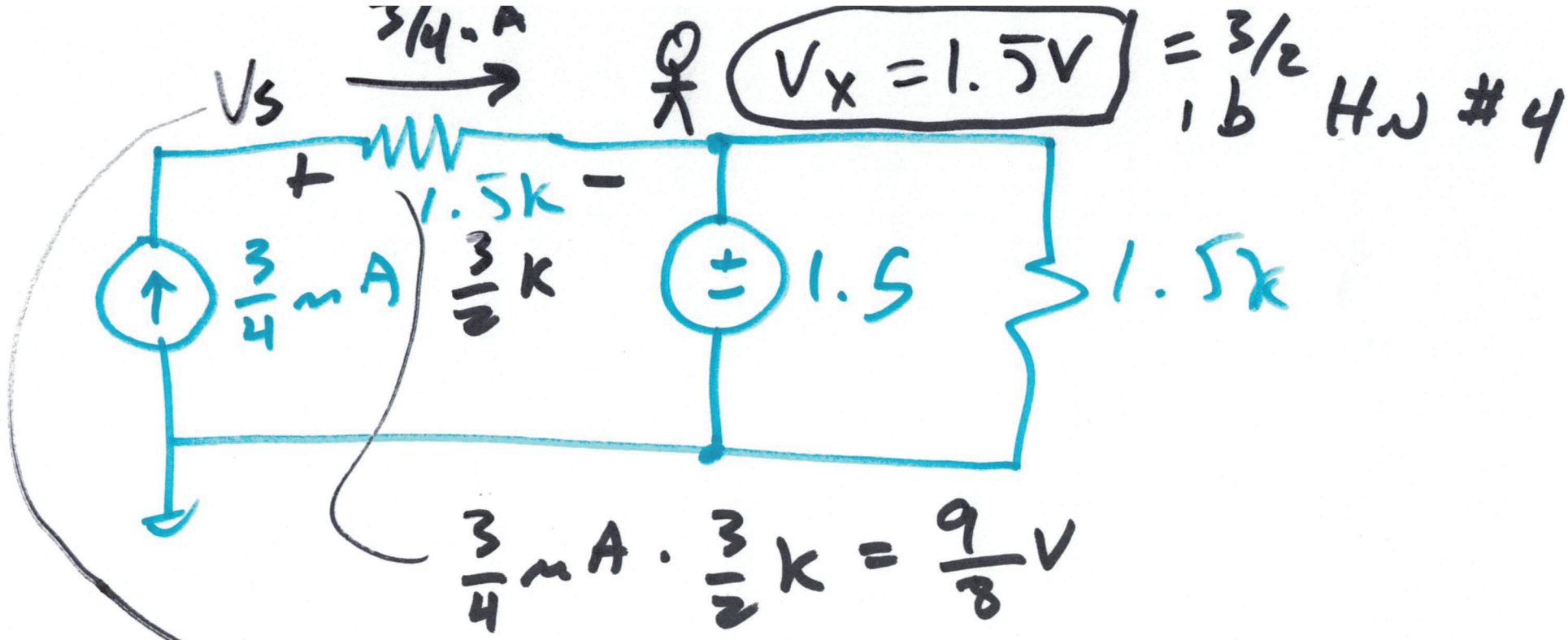
$\frac{4}{3}V = Ux2 = \frac{2}{3}k \cdot 2A$



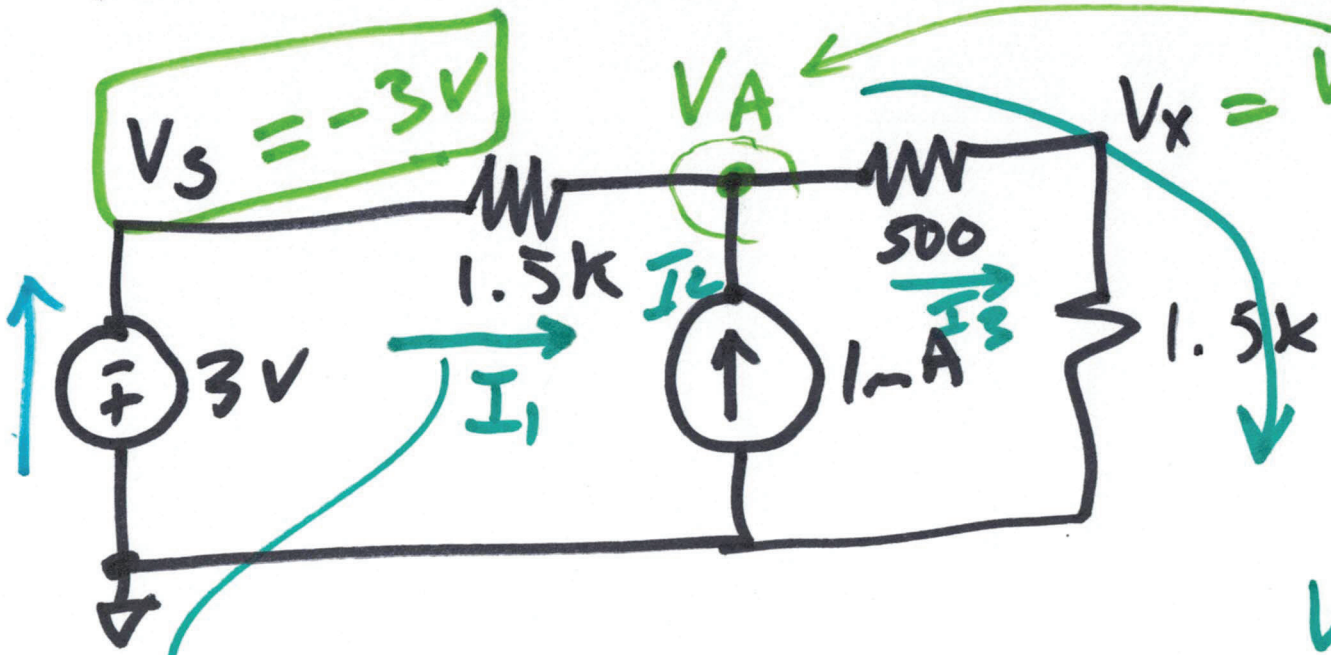
$Vx = V_{x1} + V_{x2}$

$= \frac{4}{3}V + \frac{4}{3}V =$ **$\frac{8}{3}V = Vx$**

7)


3/4 mA
Vs
+
1.5k
−
3/2 k
1.5
1.5k
$V_x = 1.5V$
$= 3/2$
1b HW #4
$\frac{3}{4}$ mA · $\frac{3}{2}$ k = $\frac{9}{8}$ V
$V_s = 1.5 + \frac{9}{8} = \frac{3}{2} + \frac{9}{8} = \frac{12}{8} + \frac{9}{8}$
$V_s = \frac{21}{8} V$

2b Hw #4



$$\frac{-3 - V_A}{1.5k} + 1mA = \frac{V_A}{500 + 1.5k}$$

$$I_1 + I_2 = I_3$$