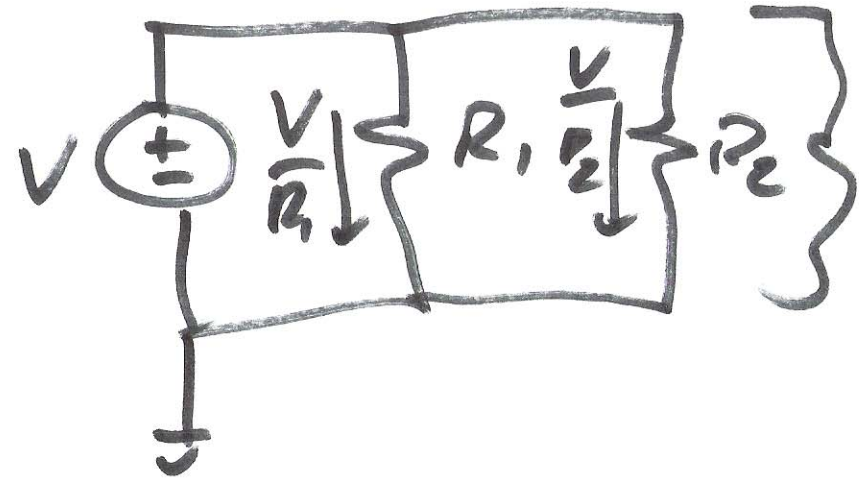
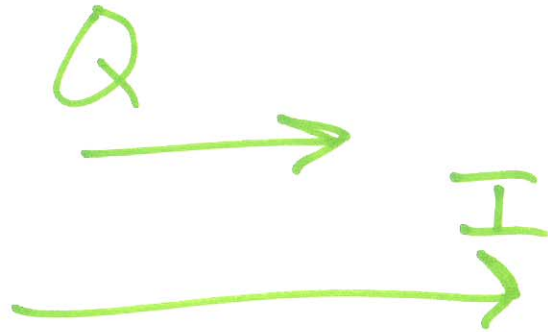


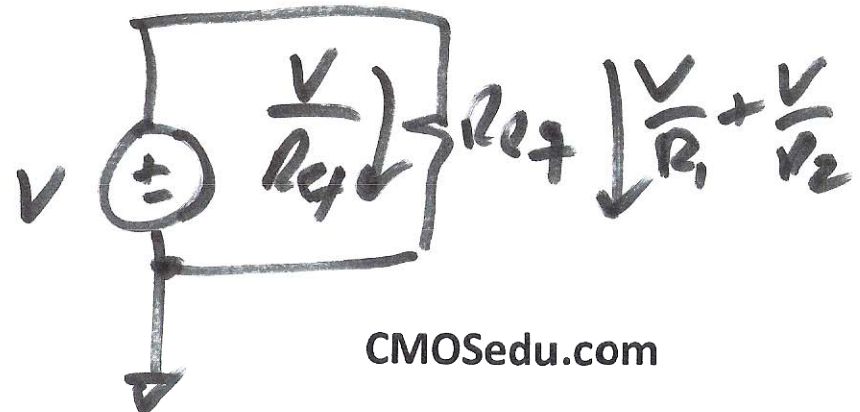
Lecture 2

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \quad \text{--- } 6/10/14$$



$$\frac{V}{R_{eq}} = \frac{V}{R_1} + \frac{V}{R_2} \quad \text{--- } Q$$

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} \quad \text{--- } I$$



17

$$\left(\frac{1}{R_{eq}}\right)^{-1} = \left(\frac{1}{R_1} + \frac{1}{R_2}\right)^{-1}$$

$$R_{eq} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}} \cdot \frac{R_1 R_2}{R_1 R_2}$$

10
20

$$R_1 = R_2$$

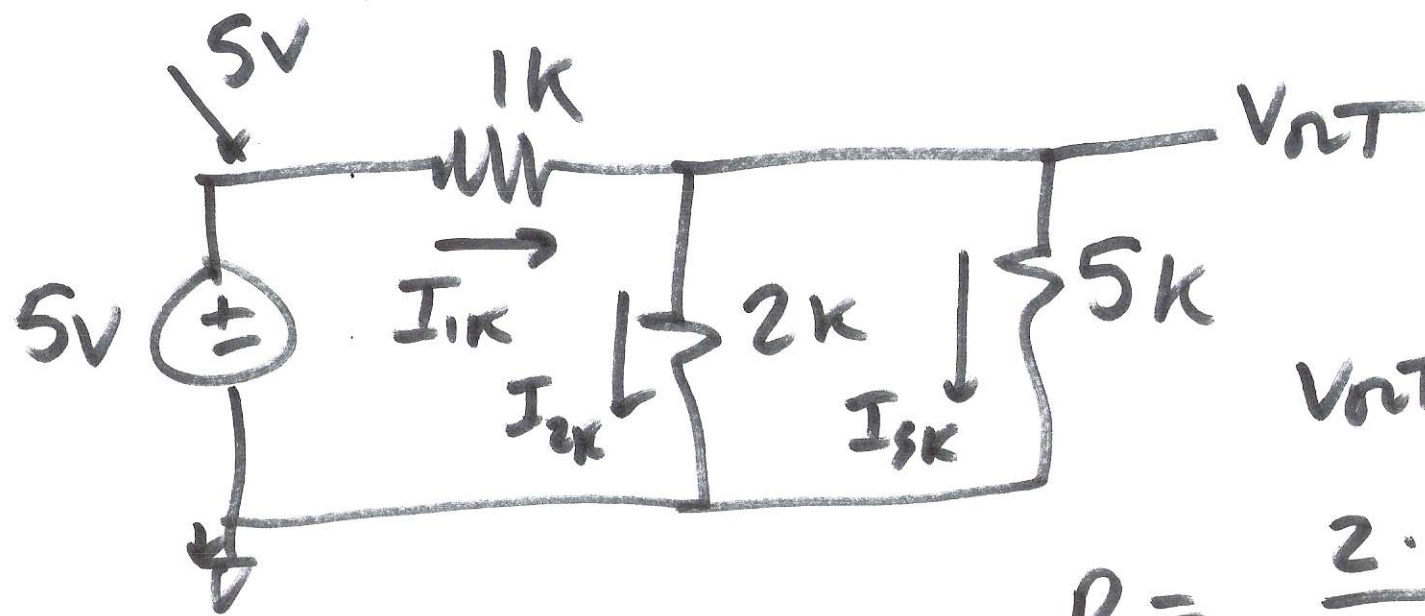
$$R_{eq} = \frac{R_1}{2} = \frac{R_2}{2}$$

$$R_{eq} = \frac{R_1 R_2}{R_2 + R_1}$$

$$\frac{10 \cdot 20}{10 + 20} = \frac{200}{30} = 6.67 \text{ HOS}$$

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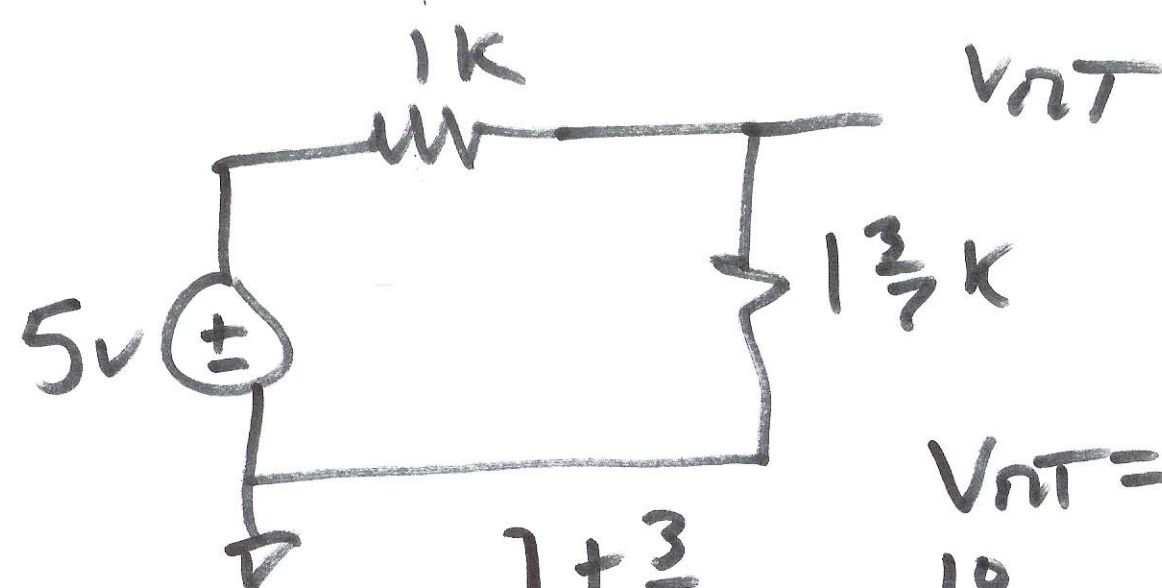
2)



$V_{\Omega T} = ?$

$$R = \frac{2 \cdot 5}{2 + 5} \text{ k} = \frac{10}{7} \text{ k}$$

$$= 1 \frac{3}{7} \text{ k}$$



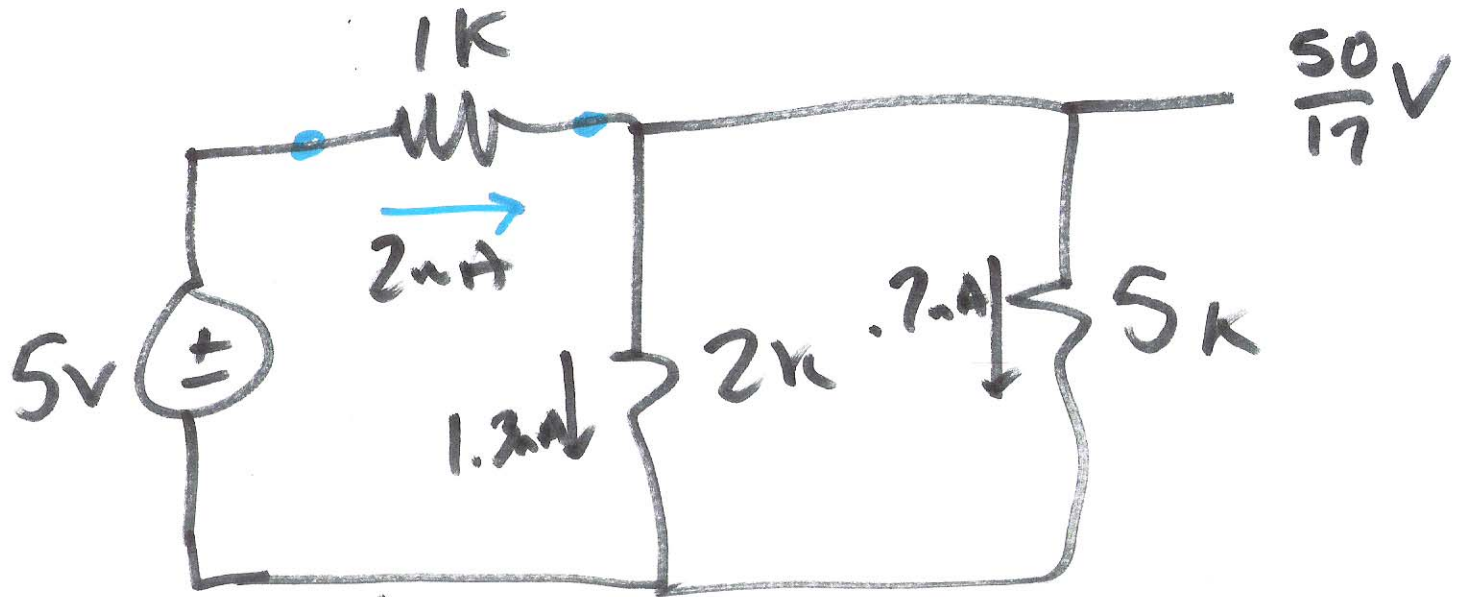
$$\frac{\frac{1 + \frac{3}{7}}{2}}{\frac{14 + \frac{3}{7}}{7}} = \frac{10}{7} = 5$$

$$V_{\Omega T} = 5 \cdot \frac{1 \frac{3}{7} \text{ k}}{1 \text{ k} + 1 \frac{3}{7} \text{ k}}$$

$$= 5 \cdot \frac{\frac{13}{7} \text{ k}}{2 \frac{3}{7} \text{ k}}$$

$$V_{\Omega T} = \frac{10}{17} \cdot 5 = \frac{50}{17} \approx 2.94$$

3)



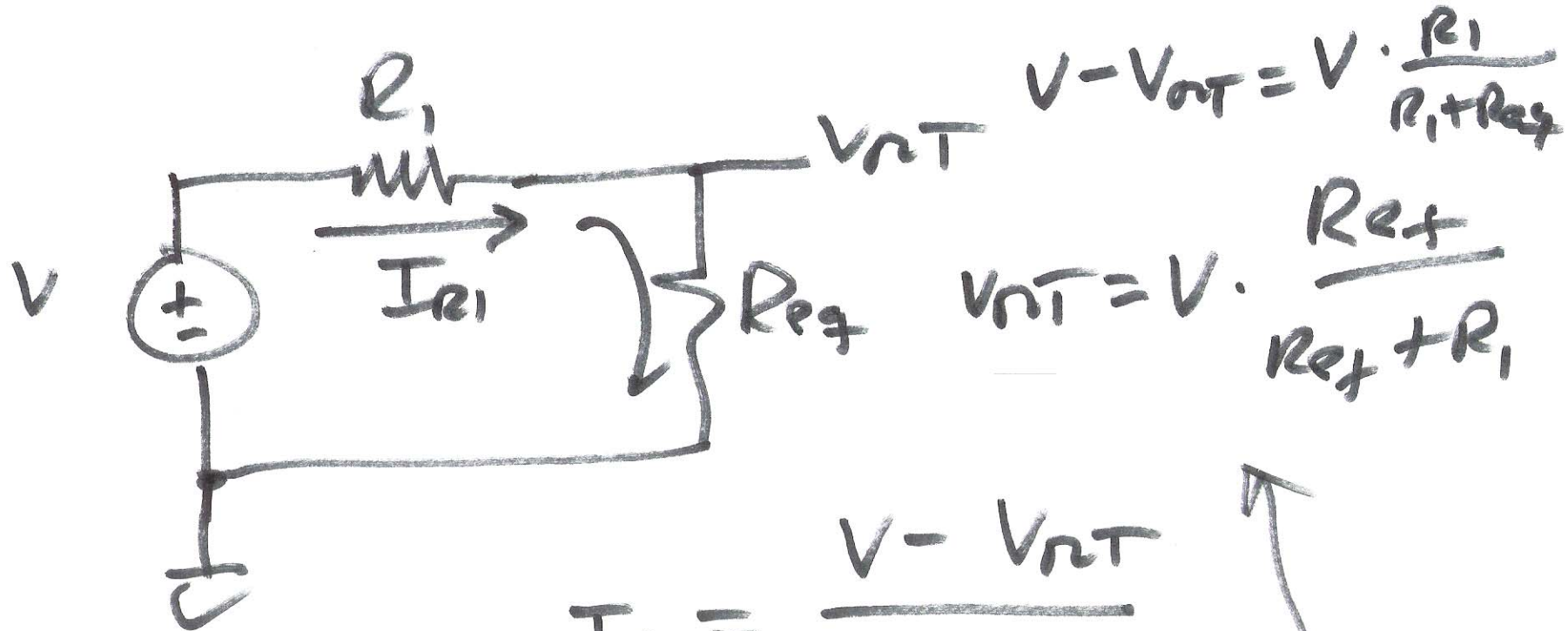
$$1.3 \mu\text{A} = 1 \frac{10}{34} \mu\text{A} = I_{2k} = \frac{50/17}{2k} = \frac{50}{38k} = 1.316 \mu\text{A}$$

$$1.47 \mu\text{A} \quad .588$$

$$\frac{10}{17} \mu\text{A} = I_{5k} = \frac{50/17}{5k} = \frac{50}{85k} = \frac{10}{17} \mu\text{A}$$

$$2 \mu\text{A} = \frac{35}{17k} = I_{1k} = \frac{5 - \frac{50}{17}}{1k} = \frac{85 - 50}{17} = \frac{35}{17} \mu\text{A}$$

4)



$$I_{R_1} = \frac{V - V_{OUT}}{R_1}$$

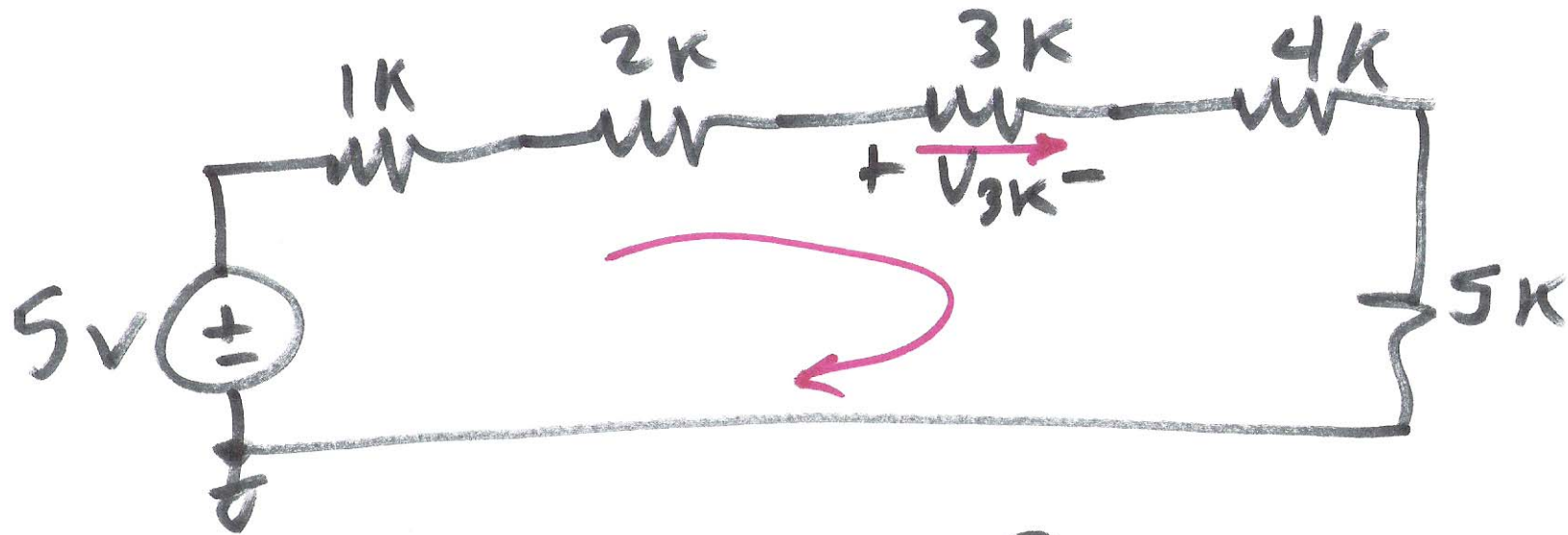
$$V_{OUT} \left(1 + \frac{R_{eq}}{R_1}\right) = V \frac{R_{eq}}{R_1}$$

$$V_{OUT} = I_{R_1} \cdot R_{eq}$$

$$V_{OUT} = \frac{V - V_{OUT}}{R_1} \cdot R_{eq}$$

$$V_{OUT} + V_{OUT} \frac{R_{eq}}{R_1} = V \cdot \frac{R_{eq}}{R_1}$$

5)



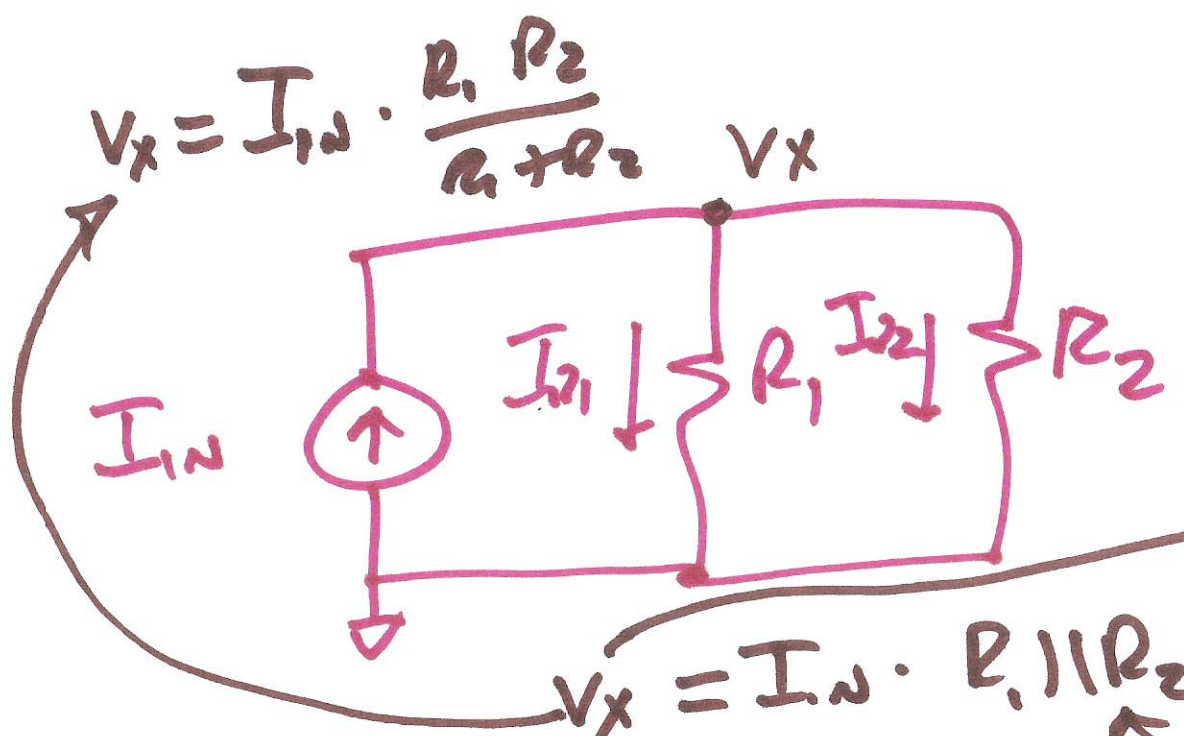
$$V_{3k} = 5 \cdot \frac{3k}{(1+2+3+4+5)k}$$

$$I = \frac{5}{(1+2+3+4+5)k}$$

$$V_{3k} = I \cdot 3k = 5 \cdot \frac{3k}{(1+2+3+4+5)k}$$

6)

Current divider



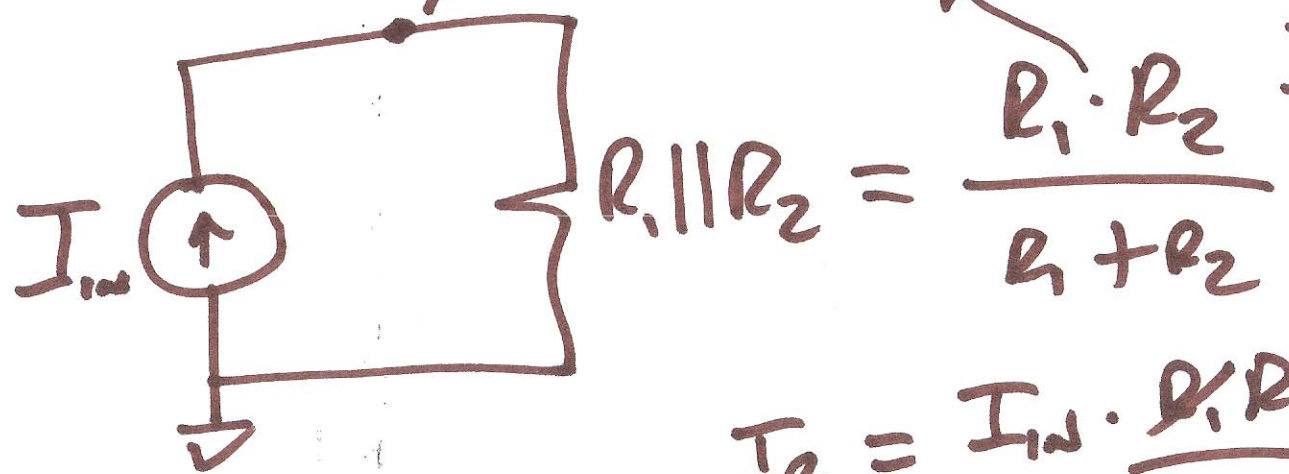
$$I_{R2} = I_{in} \cdot \frac{R_1}{R_1 + R_2}$$

$$I_{R1} = I_{in} \cdot \frac{R_2}{R_1 + R_2}$$

$$V_x = I_{in} \cdot R_1 || R_2$$

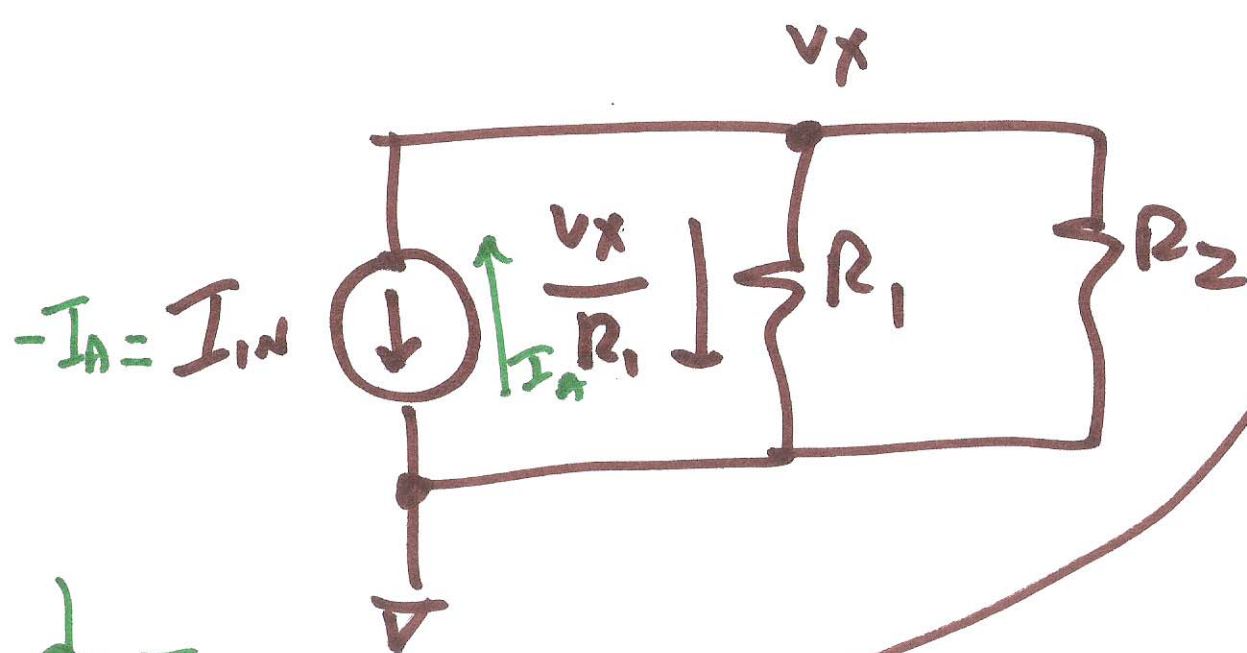
$$I_{R1} = \frac{V_x}{R_1}$$

$$I_{R2} = \frac{V_x}{R_2}$$



$$I_{R1} = I_{in} \cdot \frac{R_1 \cdot R_2}{R_1 + R_2} \cdot \frac{1}{R_1}$$





$$V_x = -I_{in} \cdot \frac{R_1 R_2}{R_1 + R_2}$$

$$I_{R_1} = \frac{V_x}{R_1}$$

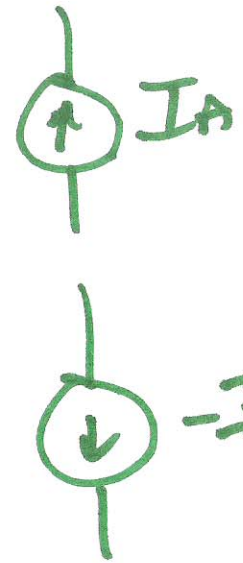
$$I_{R_2} = -I_{in} \cdot \frac{R_1 R_2}{R_1 + R_2} \cdot \frac{1}{R_1}$$

$$I_{R_2} = -I_{in} \cdot \frac{R_2}{R_1 + R_2}$$

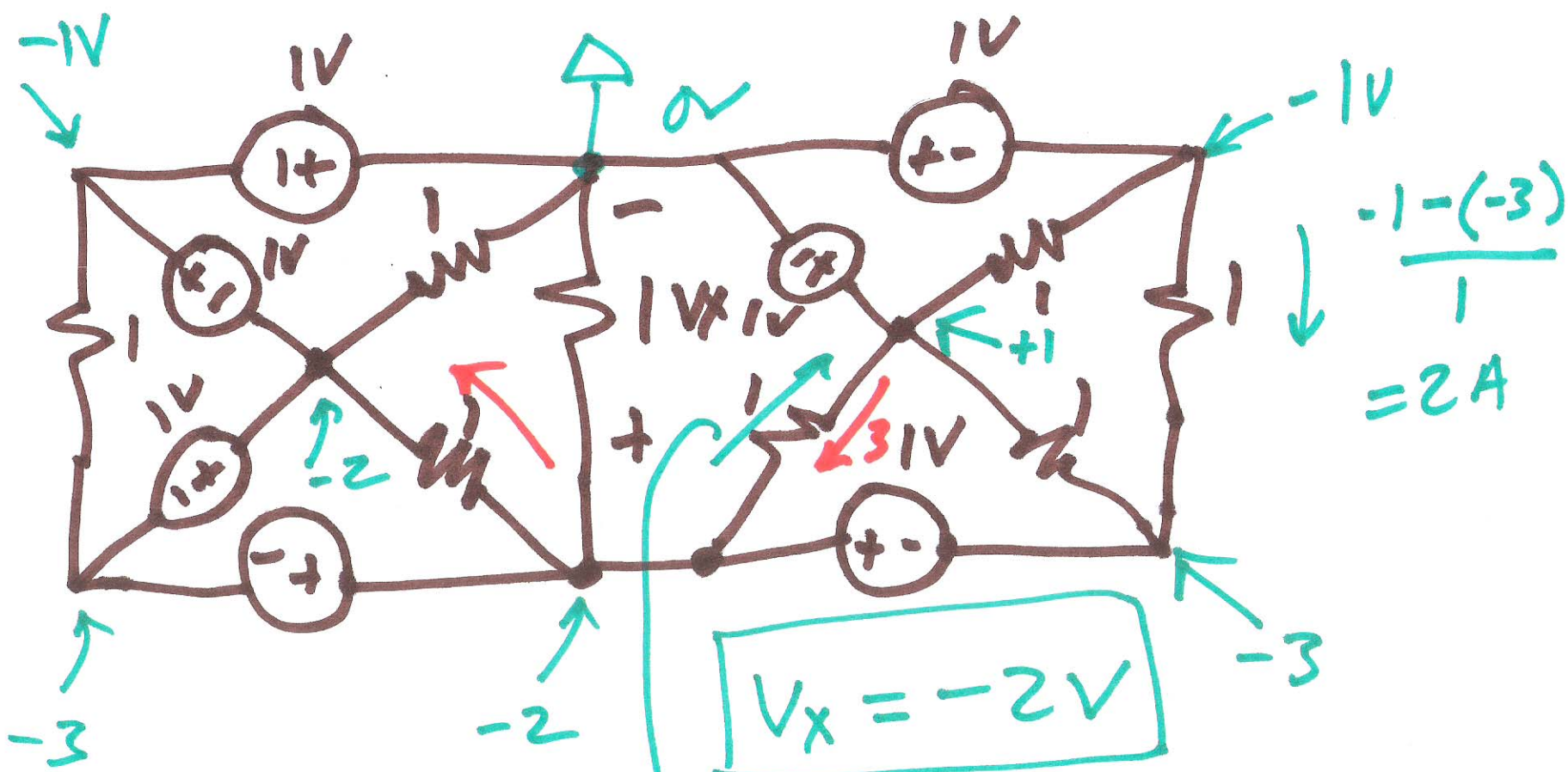
$$I_{R_2} = \frac{V_x}{R_2}$$

$$I_{R_2} = -I_{in} \cdot \frac{R_1}{R_1 + R_2}$$

$$I_{R_1} = I_A \cdot \frac{R_2}{R_1 + R_2}$$

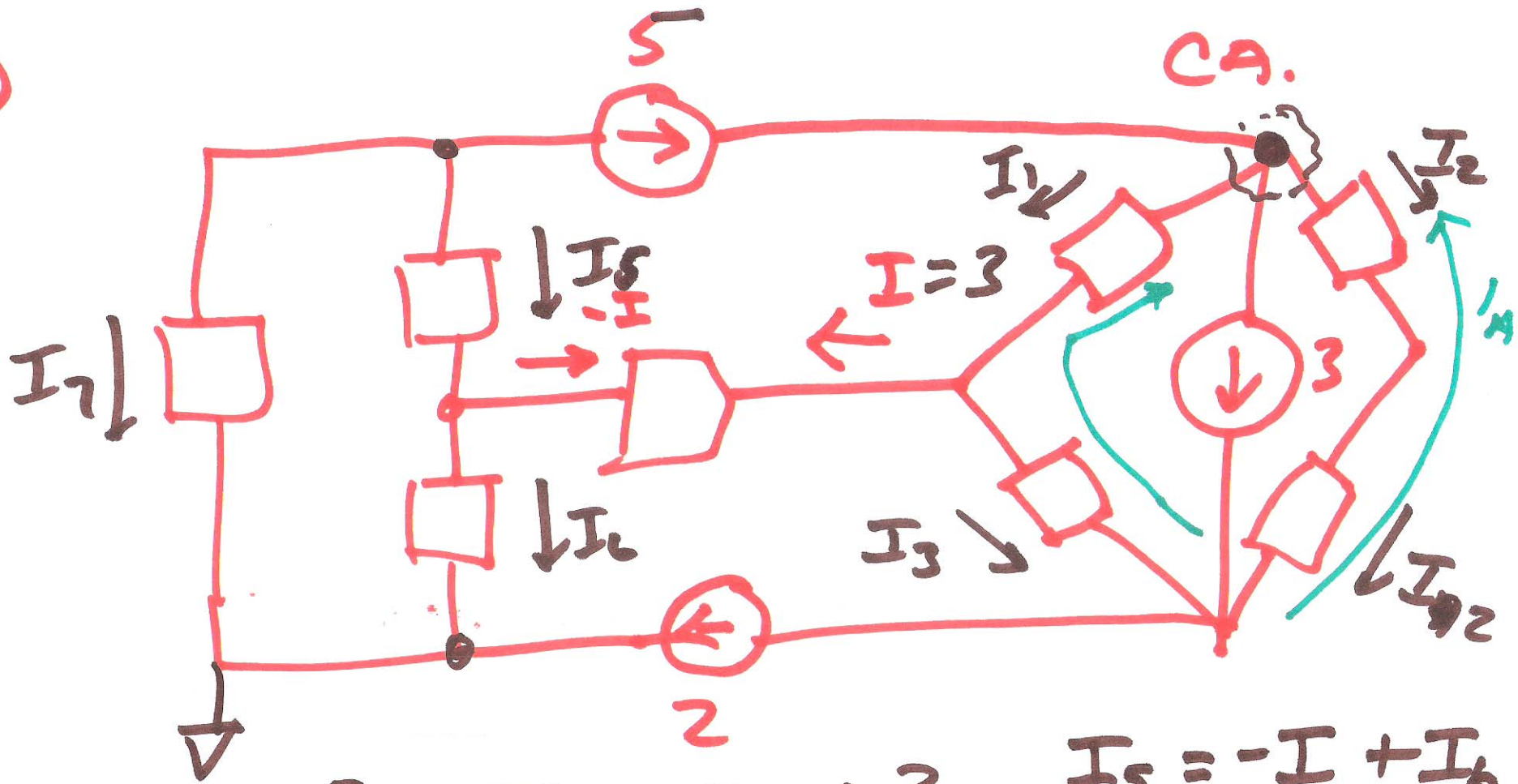


8)



1) from book

2)



I_1
 I_2
 I_3
 I_5
 I_6
 I_7

$$5 = I_1 + I_2 + 3,$$

$$2 = I_3 + I_2 + 3,$$

$$I = I_1 - I_3,$$

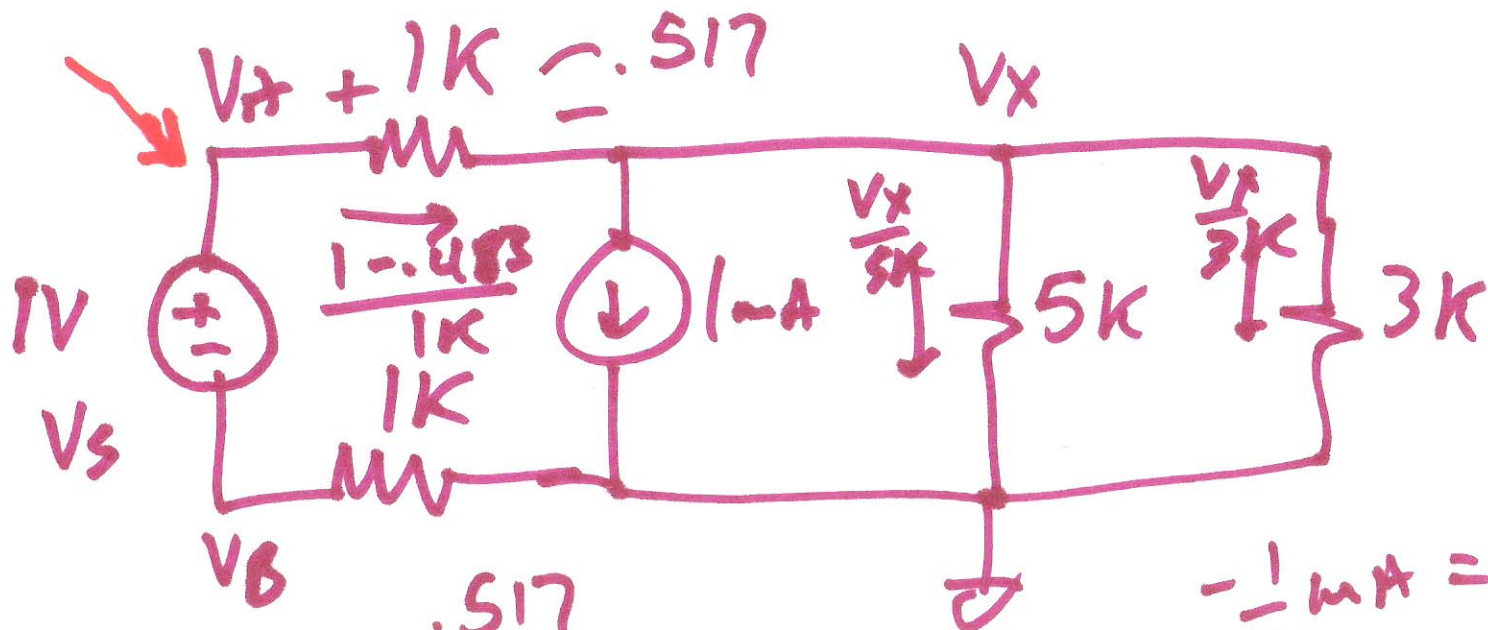
$$I_5 = -I + I_6$$

$$5 + I_7 + I_5 = 0$$

$$2 + I_6 + I_7 = 0$$

$I = 3$

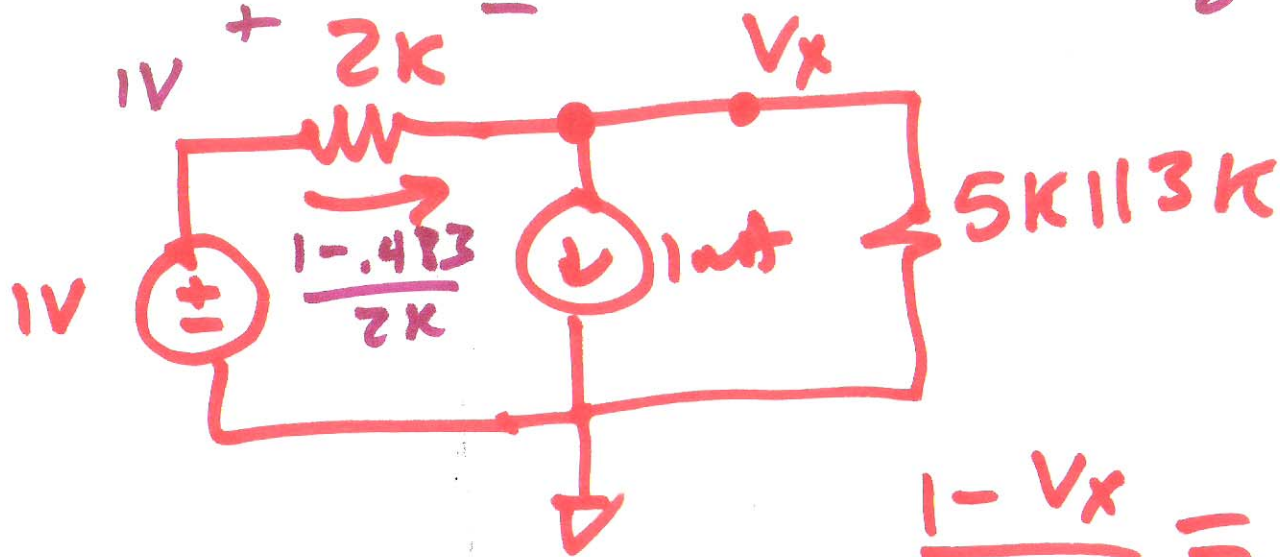
10)



$$-\frac{1}{2} mA = V_x \left(\frac{1}{2k} + \frac{1}{1.875k} \right)$$

$$V_x = \frac{.0005}{\left(\right)}$$

$$V_x = \underline{\underline{.483V}}$$



$$\frac{1 - V_x}{2k} = 1mA + \frac{V_x}{5k + 3k}$$

$$\frac{1}{2} mA - \frac{V_x}{2k} = 1mA + \frac{V_x}{1.875k}$$

11)