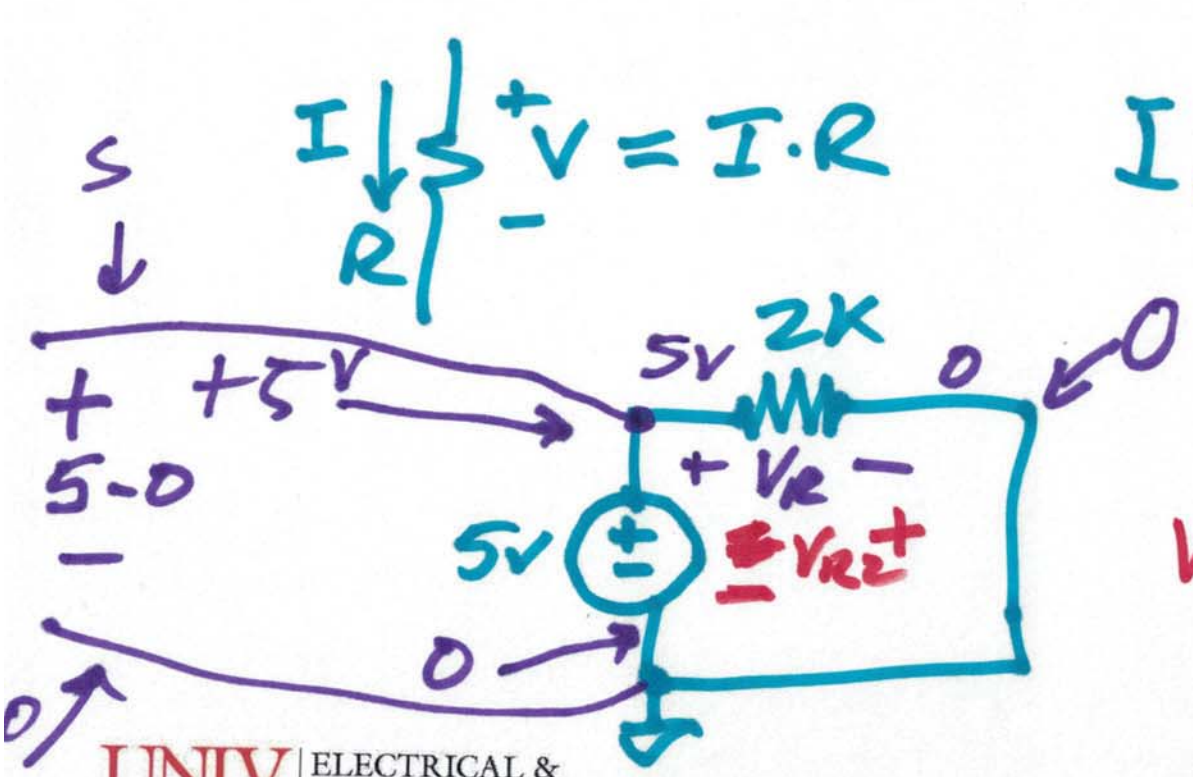
EE 220 circuits 1

August 28, 2019

Lecture 2



$5 - 0 = V_R = 5$

$V_{R2} = 0 - 5 = -5$

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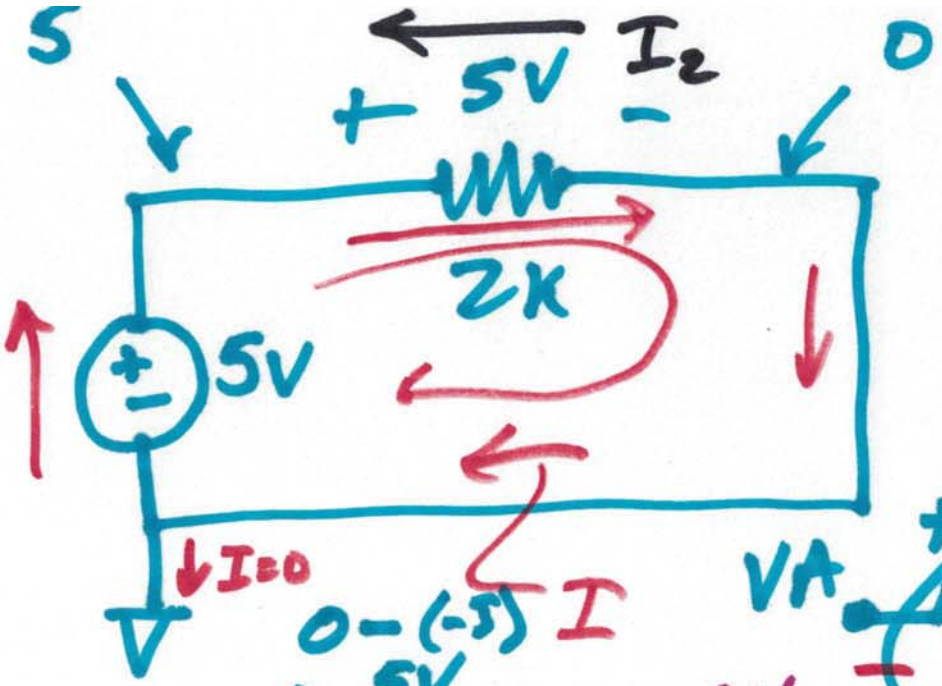
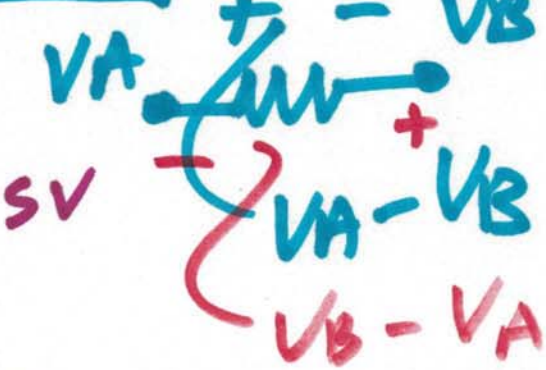


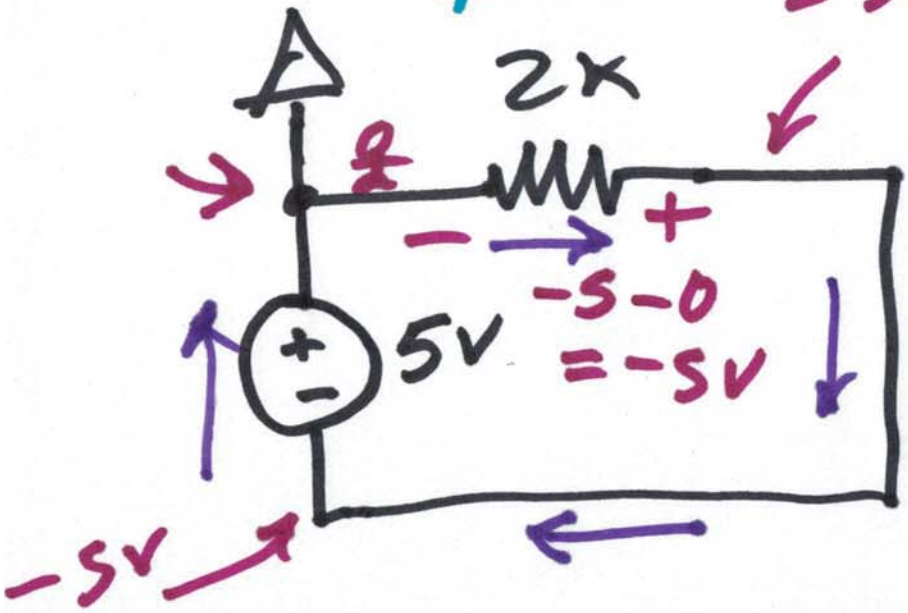
$$I = \frac{5}{2k} = 2.5mA$$

$$-I_2 = \frac{5}{2k} \Rightarrow$$

$$I_2 = -I$$

$$= -2.5mA$$

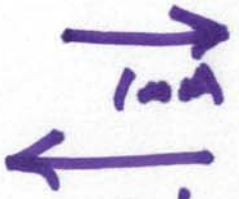


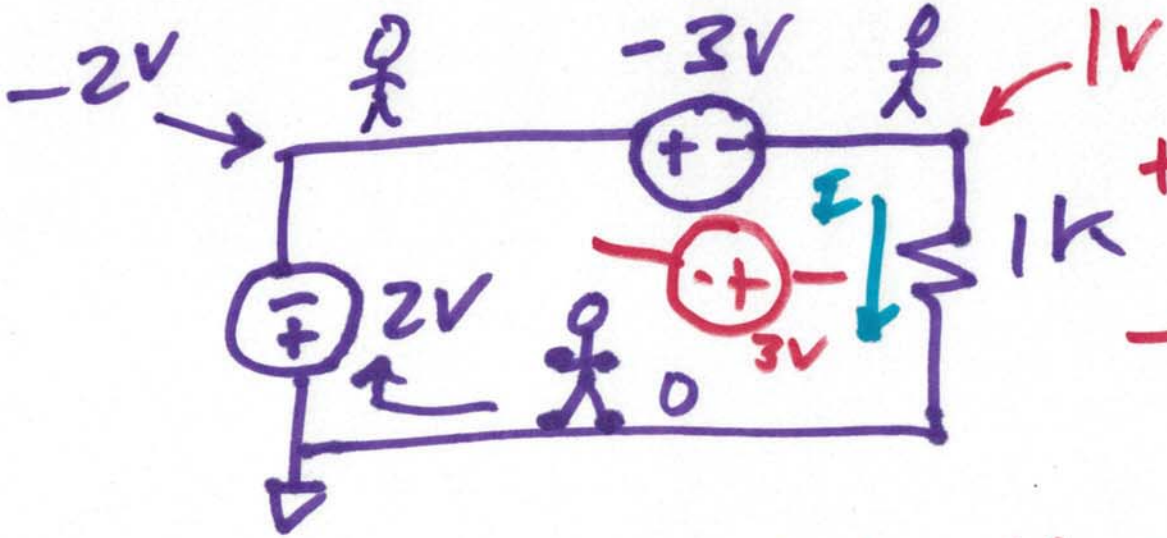


$$V = -I \cdot R$$

$$-5 = -I \cdot 2k$$

$$\boxed{I = 2.5mA}$$





$V_R = I \cdot 1k$

Kirchhoff's voltage Law

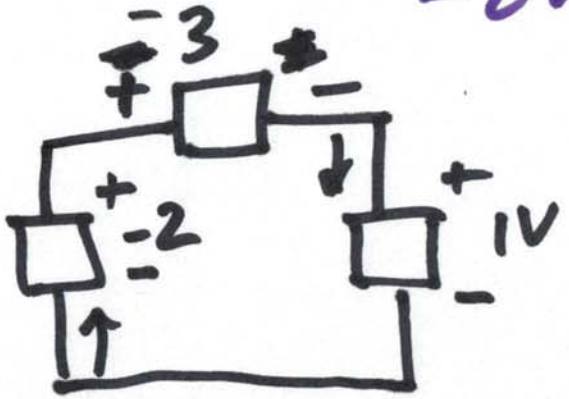
KVL

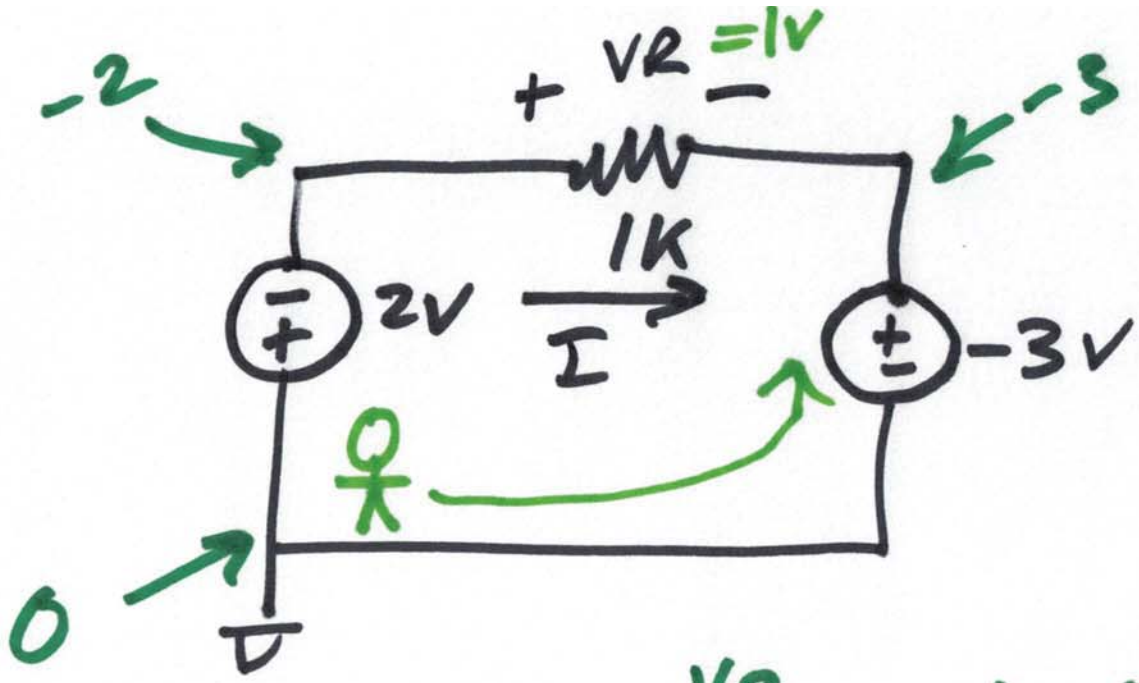
$-2V - (-3) - V_R = 0$

$1 - I \cdot 1k = 0$

$I = \frac{1}{1k} = 1mA$

$V_R = I \cdot 1k = 1mA \cdot 1k = 1V$



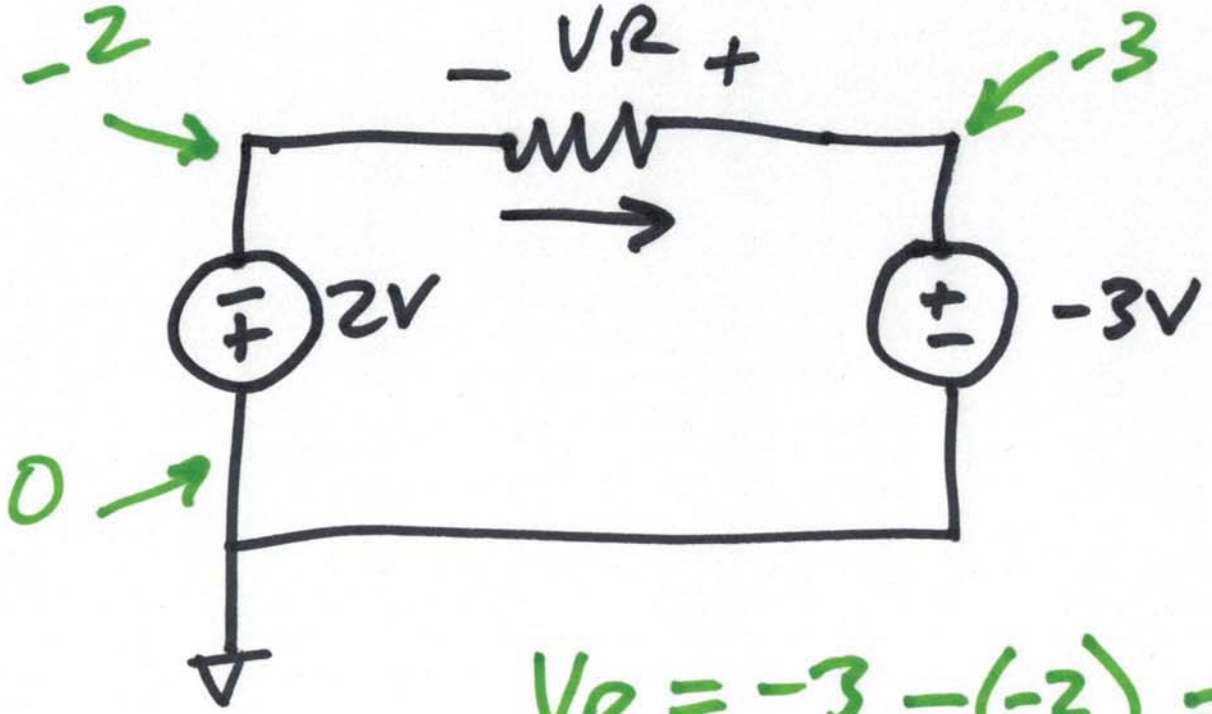


$$V_R = -2-(-3)$$
$$= 1V$$

$$I = \frac{V_R}{1K} = 1mA$$

$$+(-3)+1+2=0$$

KVL

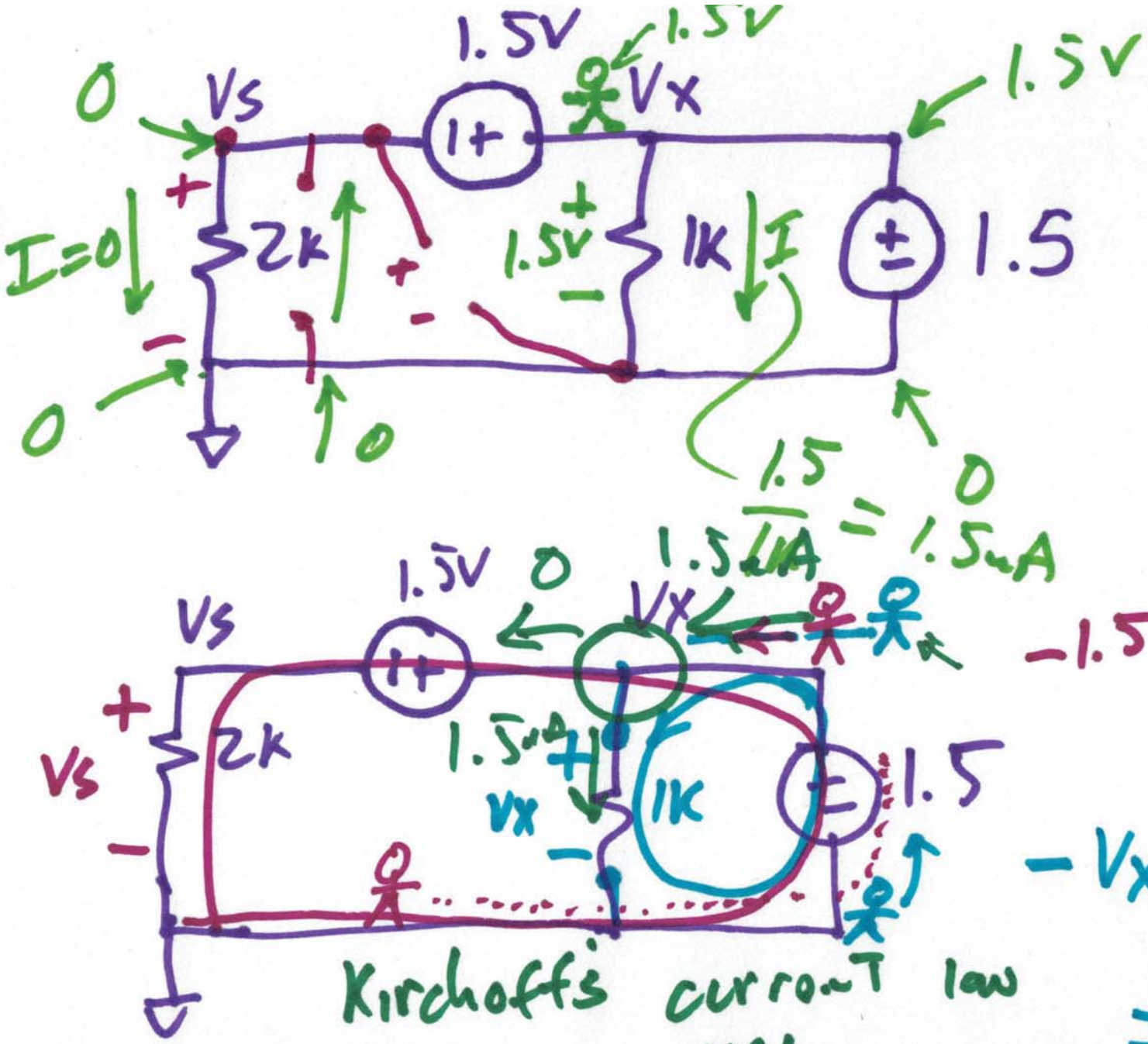


$$V_R = -3 - (-2) = \underline{\underline{-1V}}$$

$$V = -I \cdot R = -1V \qquad (R = 1K)$$

$$-I = \frac{-1V}{1K}$$

$$I = 1mA$$



$-1.5 - V_S + 1.5 = 0$

$V_S = 0$

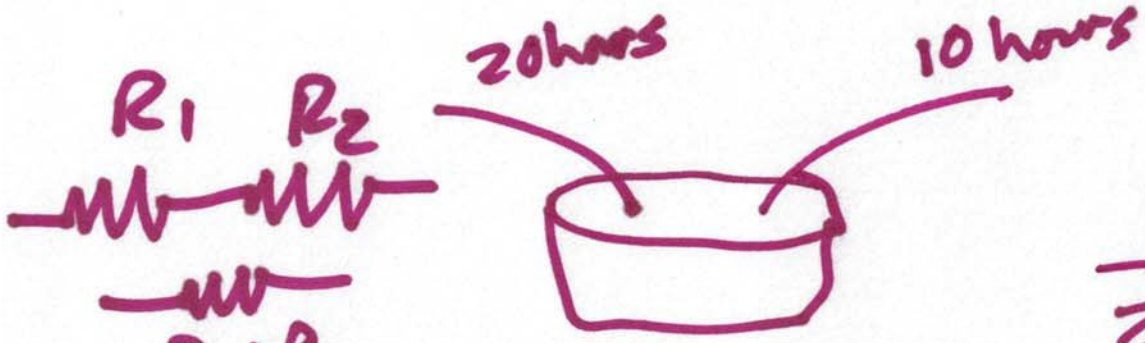
$-V_X + 1.5 = 0$

$V_X = 1.5V$

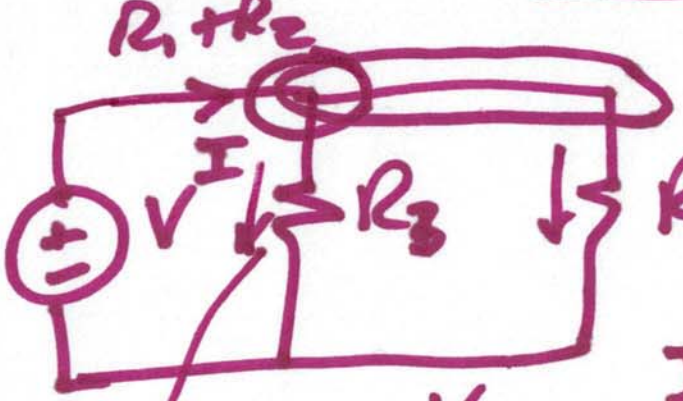
Kirchoffs current law

KCL

current in = current out



$$\frac{1}{20} + \frac{1}{10} = \frac{1}{T}$$

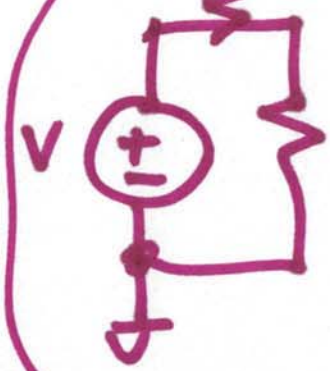


$$I = \frac{V}{R_4}$$

$$\frac{10}{20\cdot 10} + \frac{20}{20\cdot 10} = \frac{10+20}{20\cdot 10}$$

$$I = \frac{V}{R_T}$$

$$T = \frac{20\cdot 10}{20+10} = \frac{200}{30}$$



$$R_T = \frac{R_3 \cdot R_4}{R_3 + R_4}$$

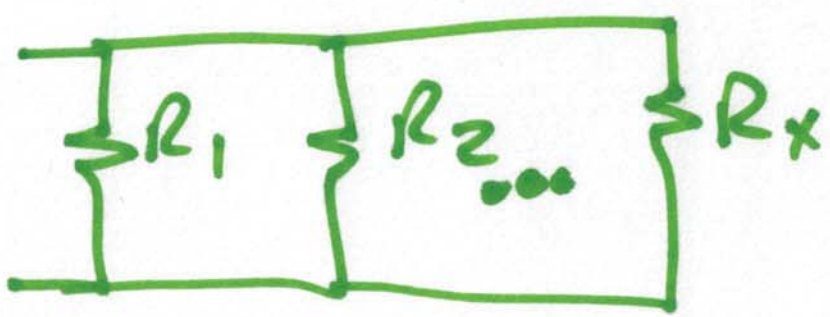
$$T = \frac{20}{3} \text{ hours}$$

$$I = I_{R3} + I_{R4}$$

$$I_{R3} = \frac{V}{R_3}$$

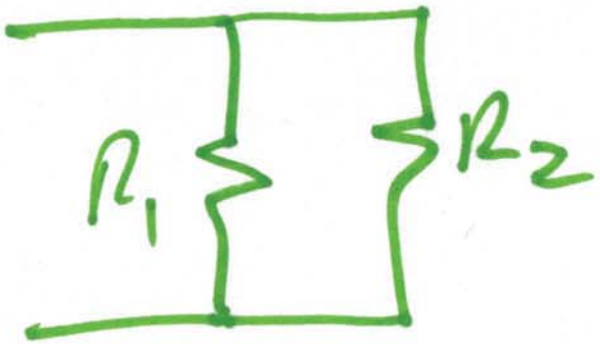
$$I = \frac{1V}{R_3} + \frac{1V}{R_4} = \frac{V}{R_T}1$$

7)

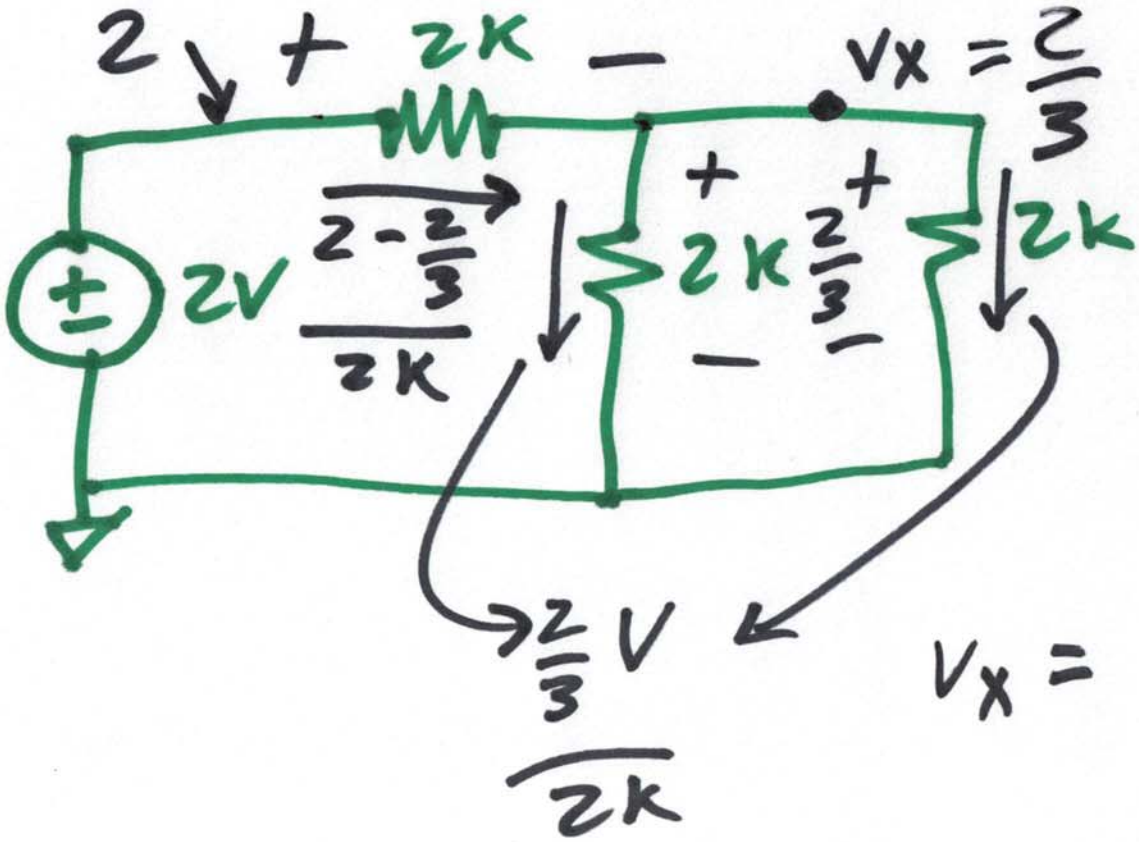


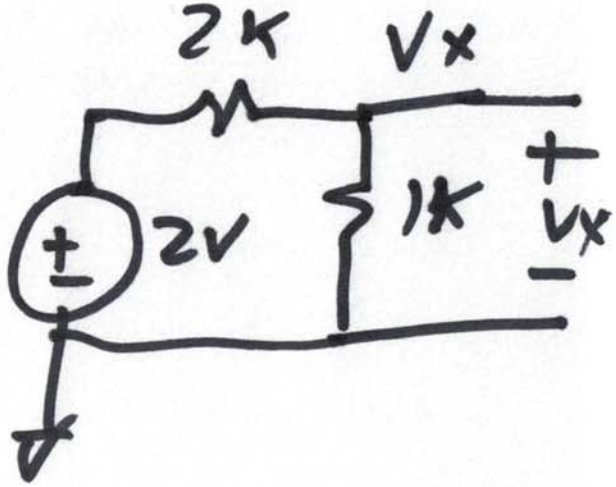
$\Rightarrow$ R_T

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \cdots \frac{1}{R_x}$$

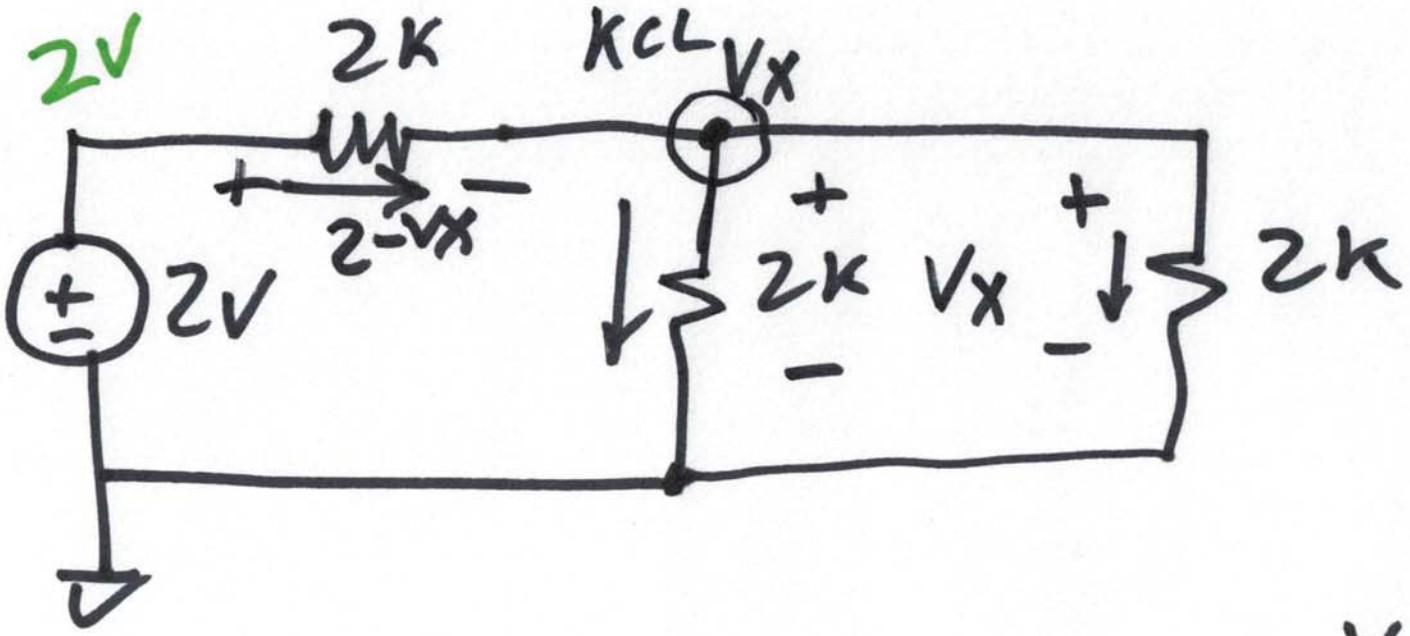


$$\frac{R_1 \cdot R_2}{R_1 + R_2}$$





$$V_x = 2 \cdot \frac{1k}{1k+2k} = \frac{2}{3} V$$



$$\frac{2-V_x}{2K} = \frac{V_x}{2K} + \frac{V_x}{2K}$$

$$2 = 3 \cdot V_x$$

$$V_x = \frac{2}{3} V$$