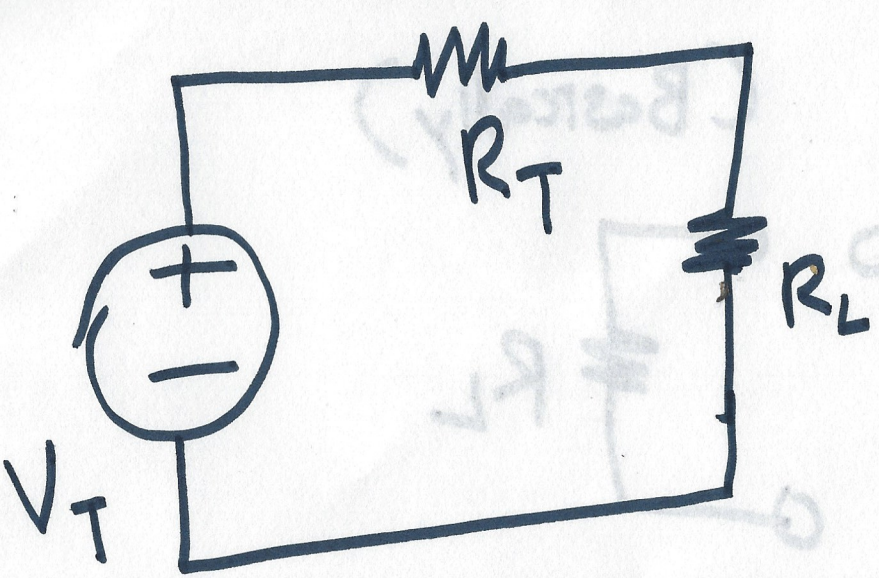
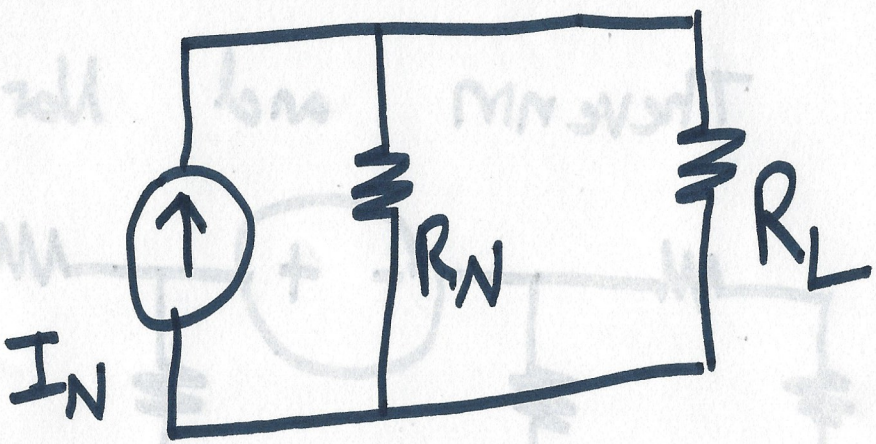
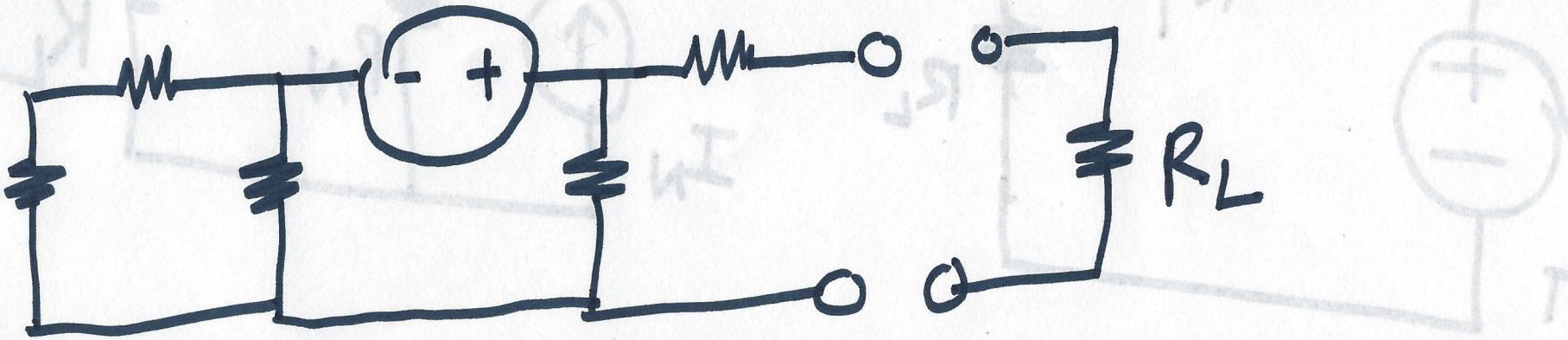
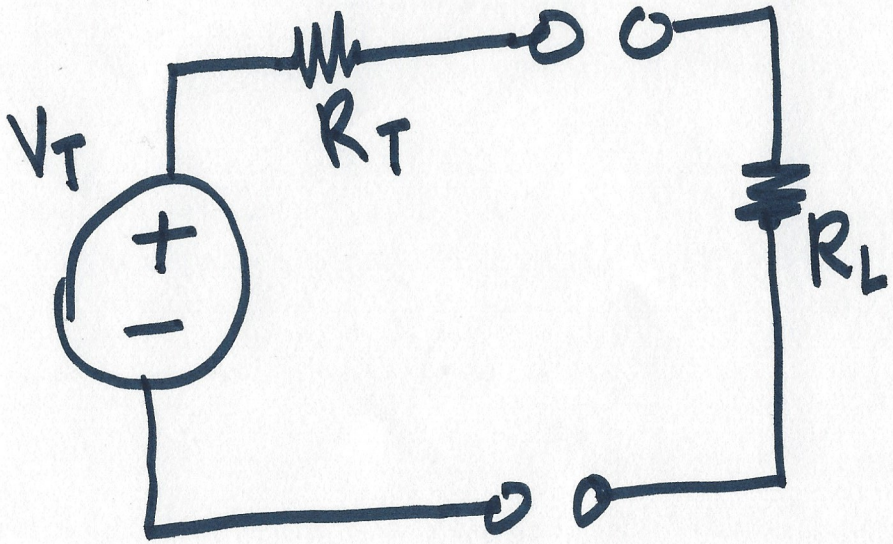
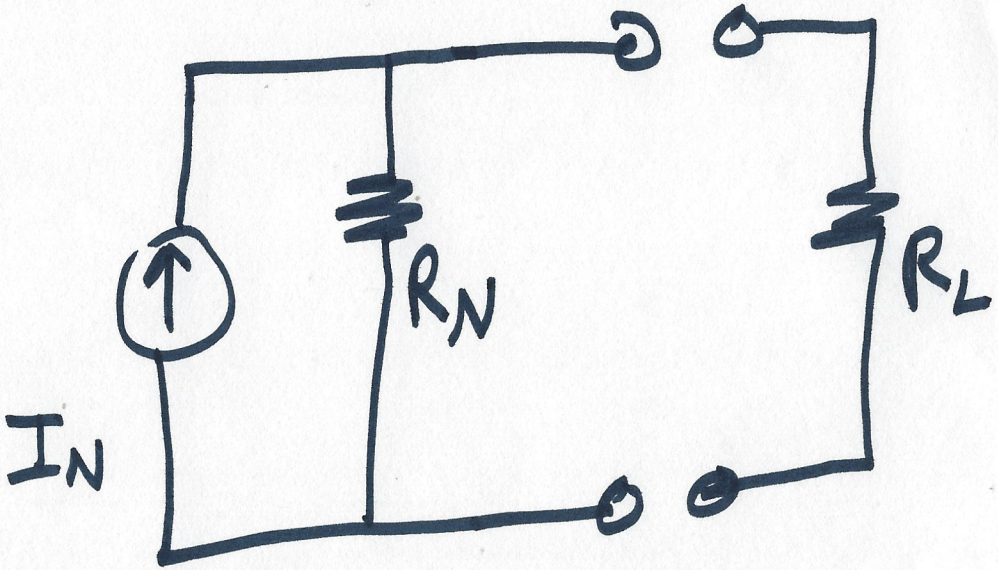

R_T
R_L
V_T


R_N
R_L
I_N

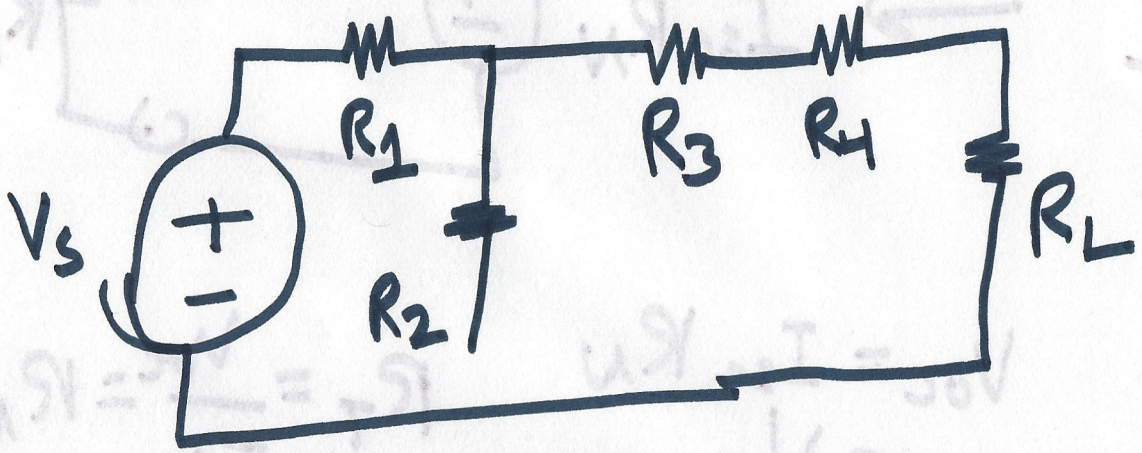
(2) Thevenin and Norton (Basically)







#1 Thevenin is always

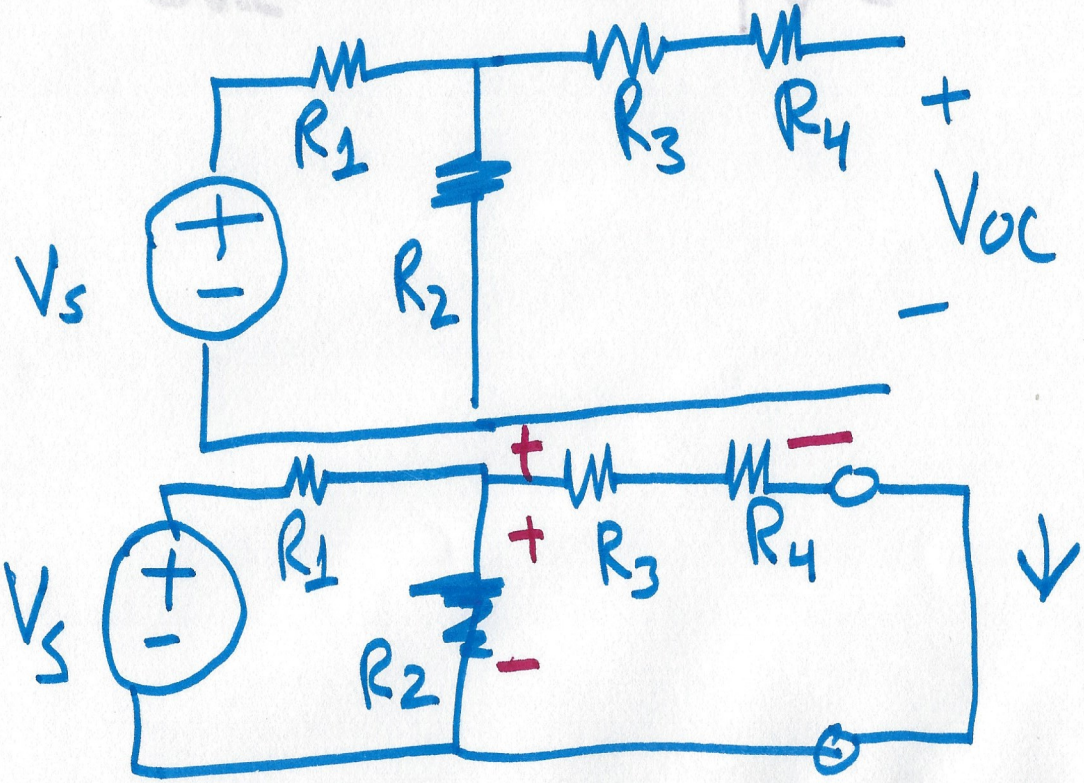


$$V_{OC} = I_{SC} R_T$$

$$V_T = V_{OC}$$

$$I_N = I_{SC}$$

$$R_T = \frac{V_{OC}}{I_{SC}}$$

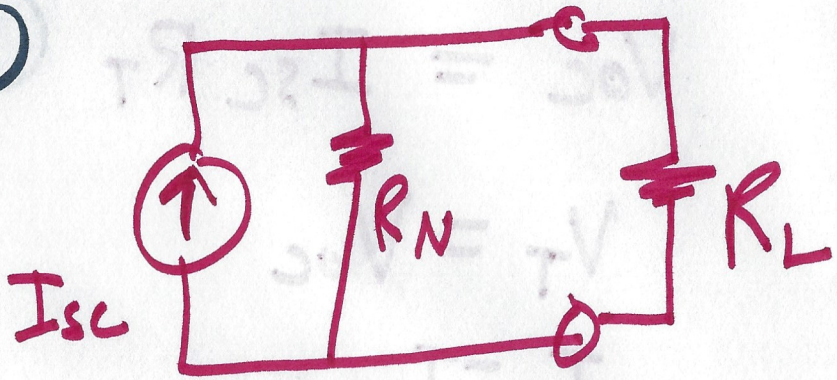


$$V_{OC} = \frac{R_2}{R_1 + R_2} V_S$$

$$R_{eq} = (R_3 + R_4) \,||\, R_2$$

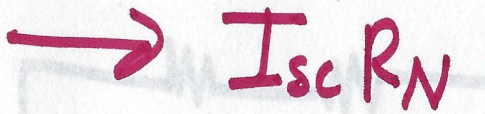
$$I_{SC} = \left[\frac{R_{eq}}{R_1 + R_{eq}} V_S\right]\left[\frac{1}{R_3 + R_4}\right]$$

(4)

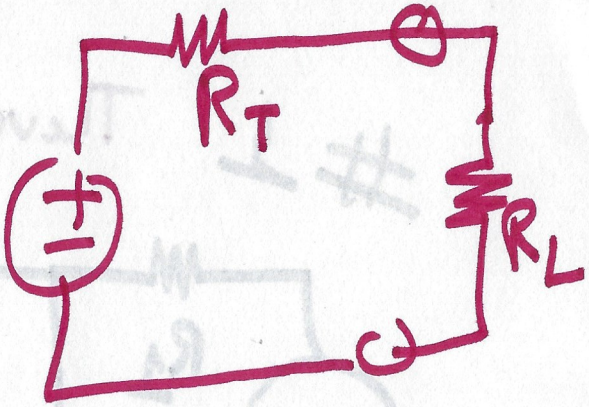


I_N

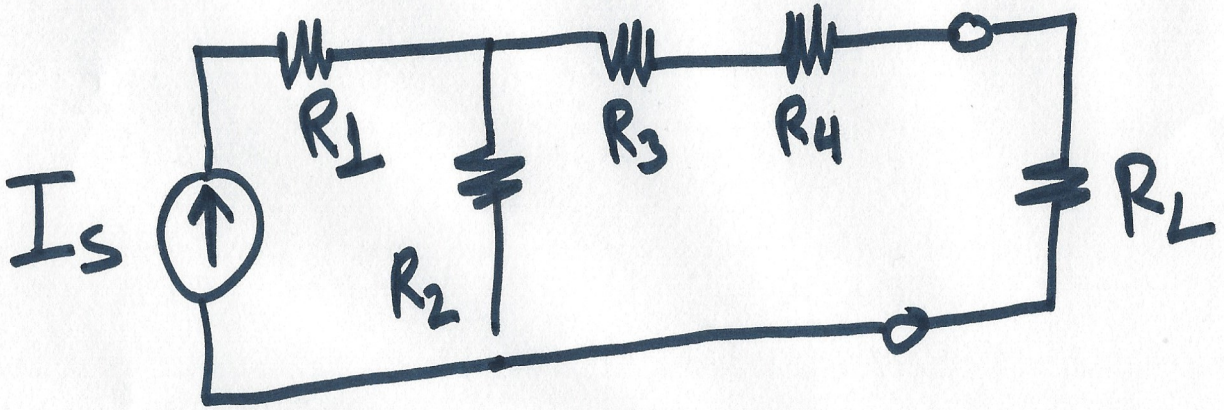
$$R_N = \frac{V_{oc}}{I_{sc}}$$

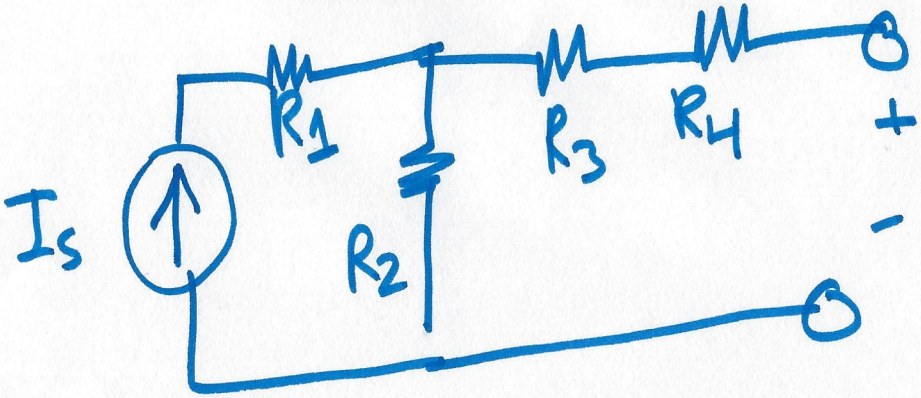


$$V_{oc} = I_{sc} R_N$$
$$= V_T$$

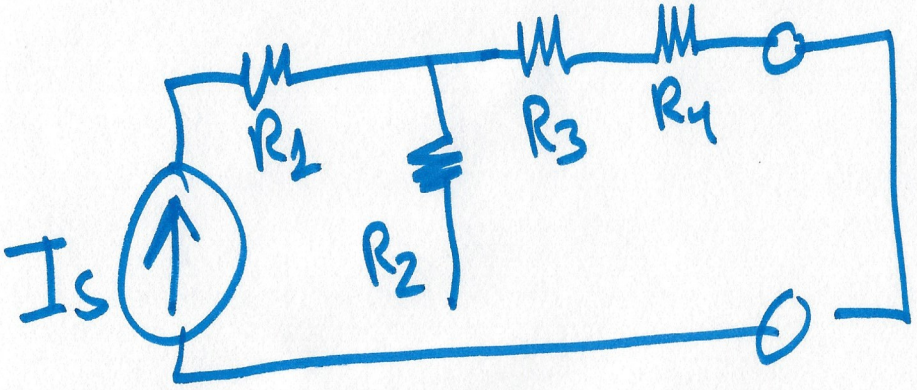


$$R_T = \frac{V_{oc}}{I_{sc}} = R_N$$



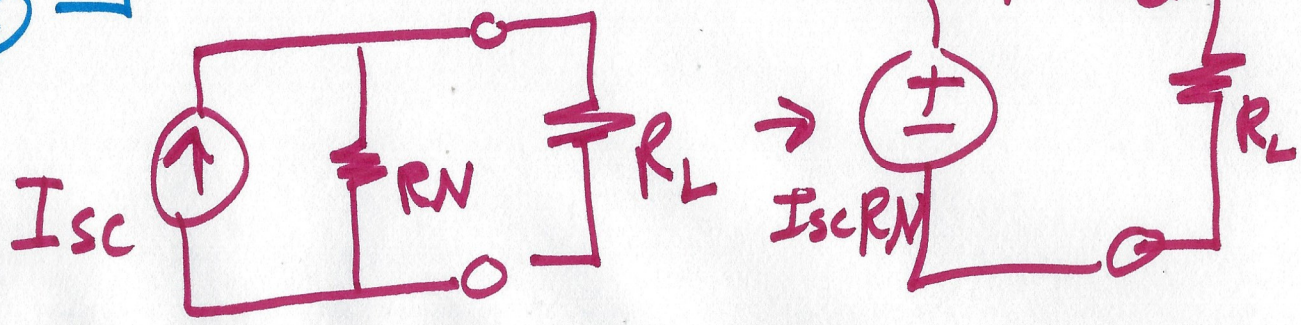


$$V_{OC} = R_2 I_S$$

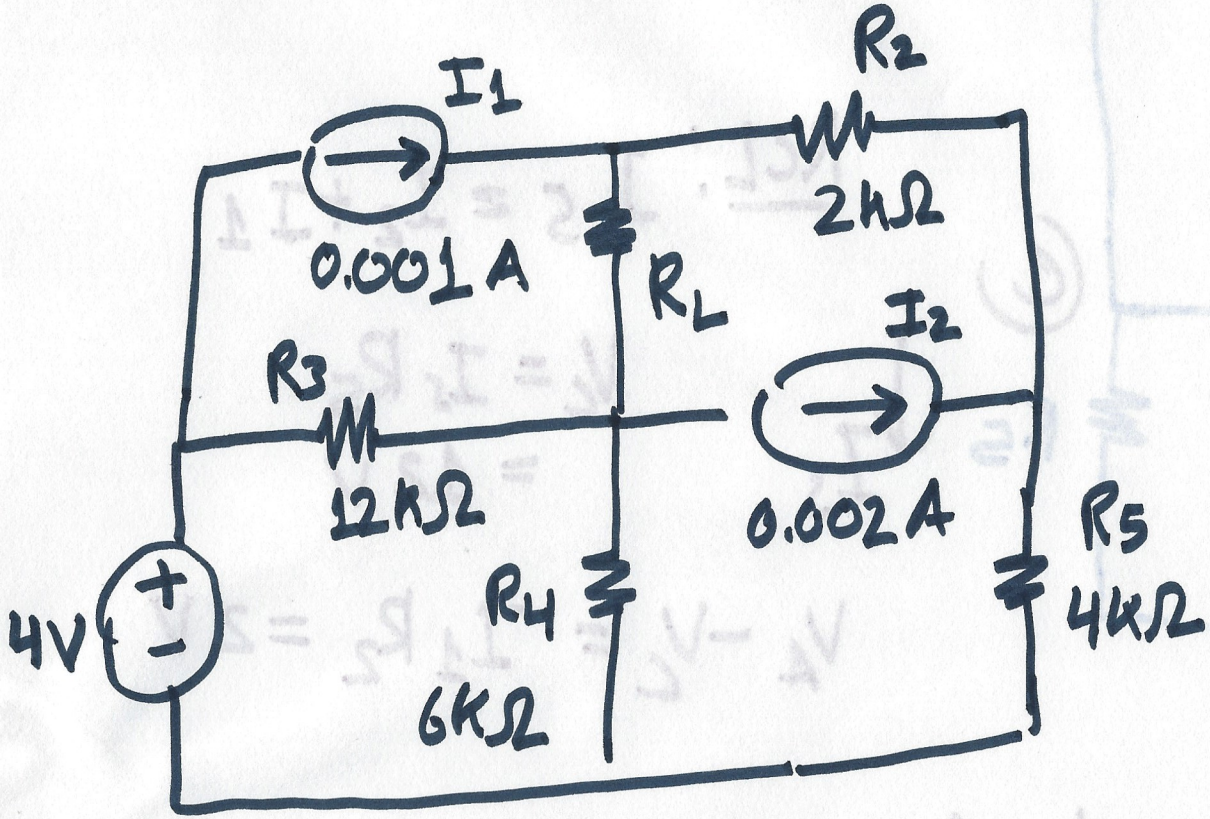


$$I_{SC} = \frac{\frac{1}{R_3 + R_4}}{\frac{1}{R_2} + \frac{1}{R_3 + R_4}} I_S$$

$$R_N = \frac{V_{OC}}{I_{SC}}$$



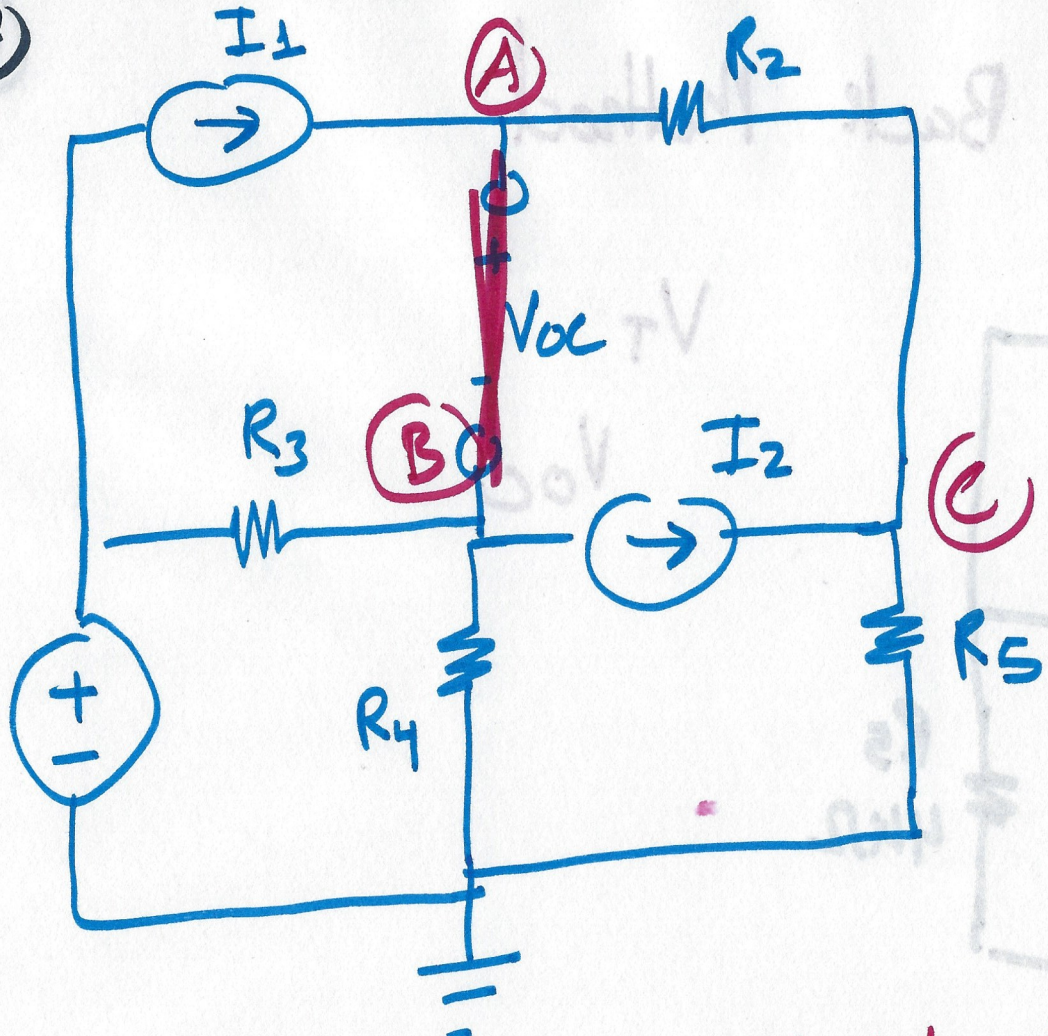
#2) The Look Back Method



V_T

V_{OC}

(7)



$V_A - V_B = V_{oc}$

KCL: $I_5 = I_2 + I_1$

$V_C = I_5 R_5$
$= 12\,V$

$V_A - V_C = I_1 R_2 = 2\,V$

$V_A = 14\,V$

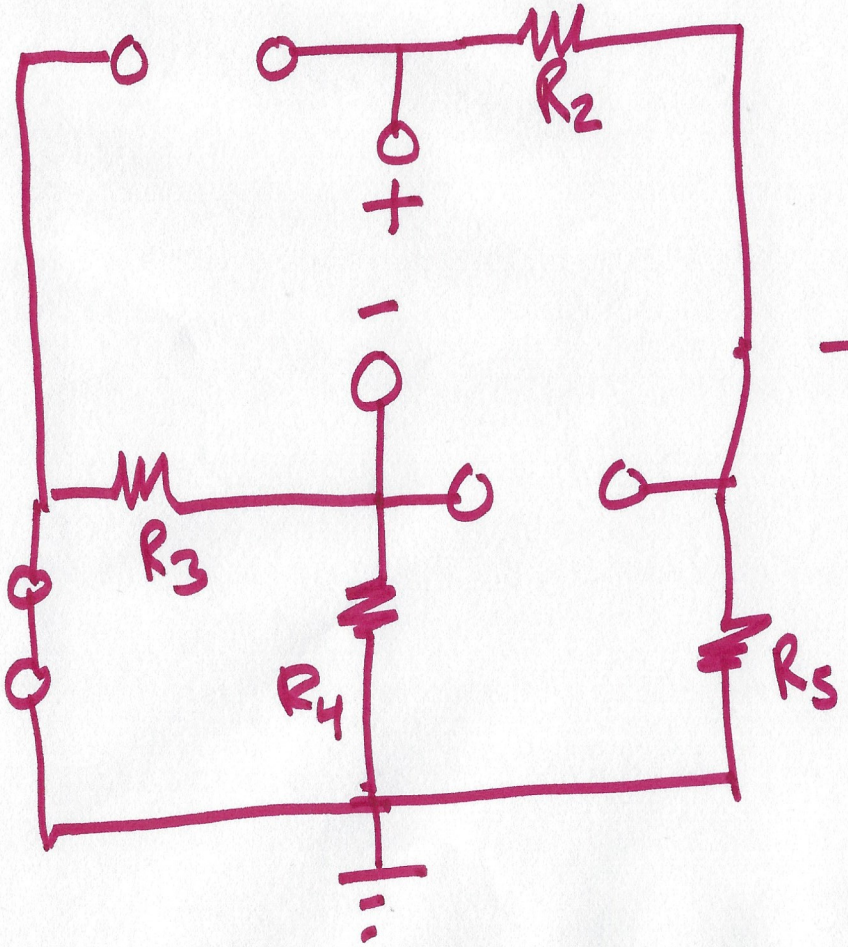
B: Node Analysis

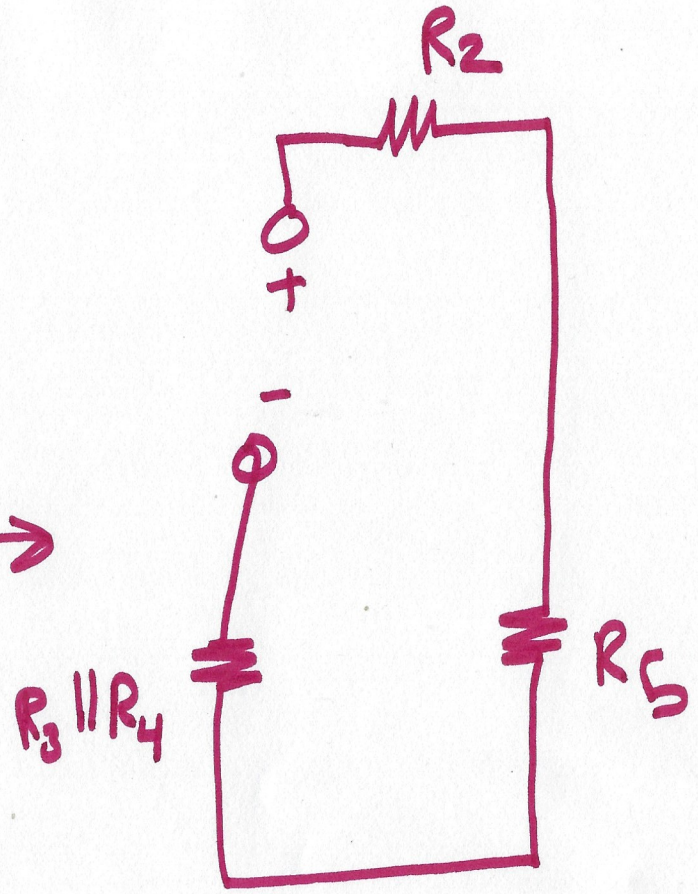
$-\left(\frac{1}{R_3} + \frac{1}{R_4}\right) V_B + \frac{4}{R_3} = I_2$

$V_B = \underline{-6.667\,V}$

$$V_A - V_B = V_{oc} = V_T = 20.667\ V$$

$$I_N = I_{sc}$$

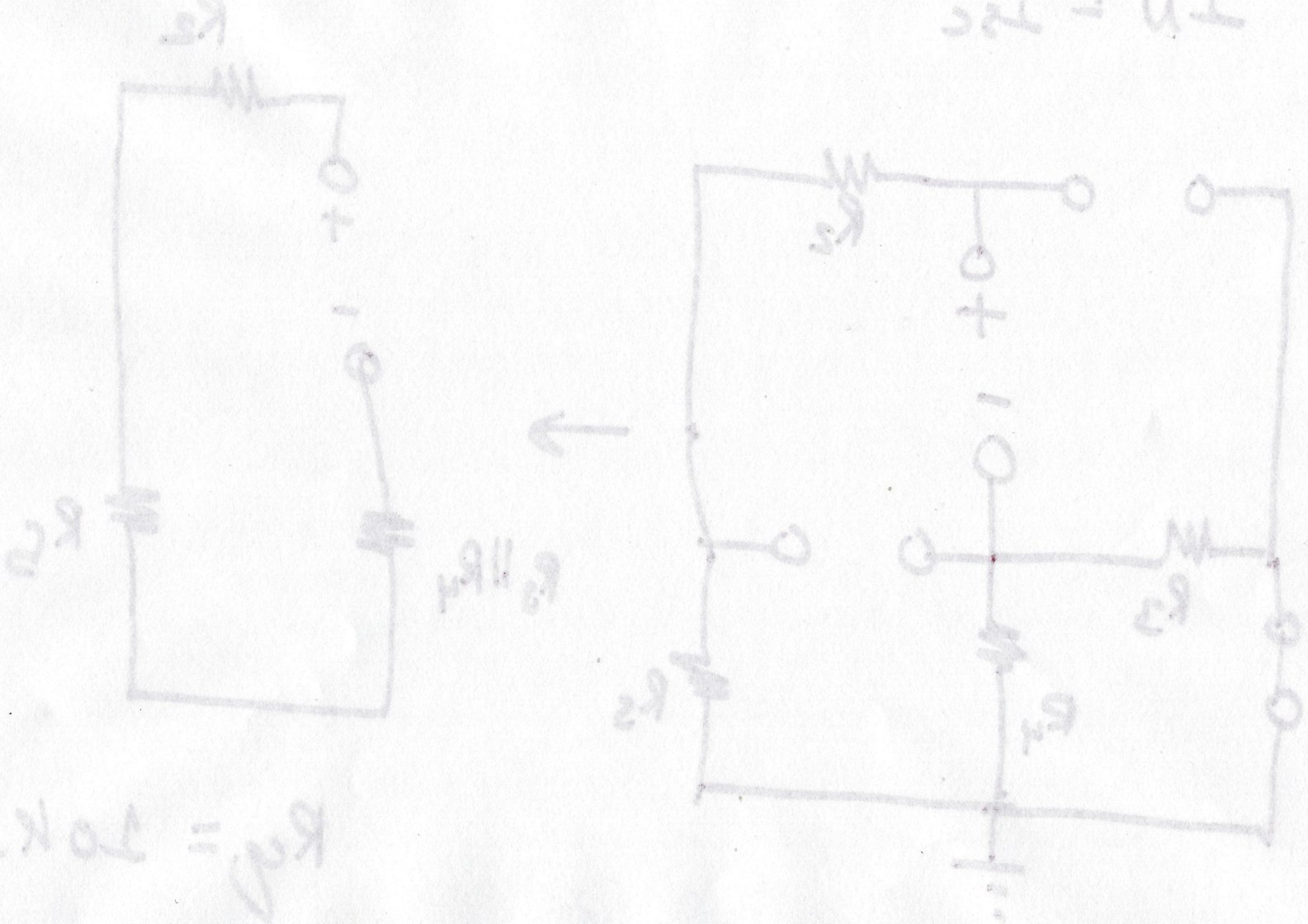




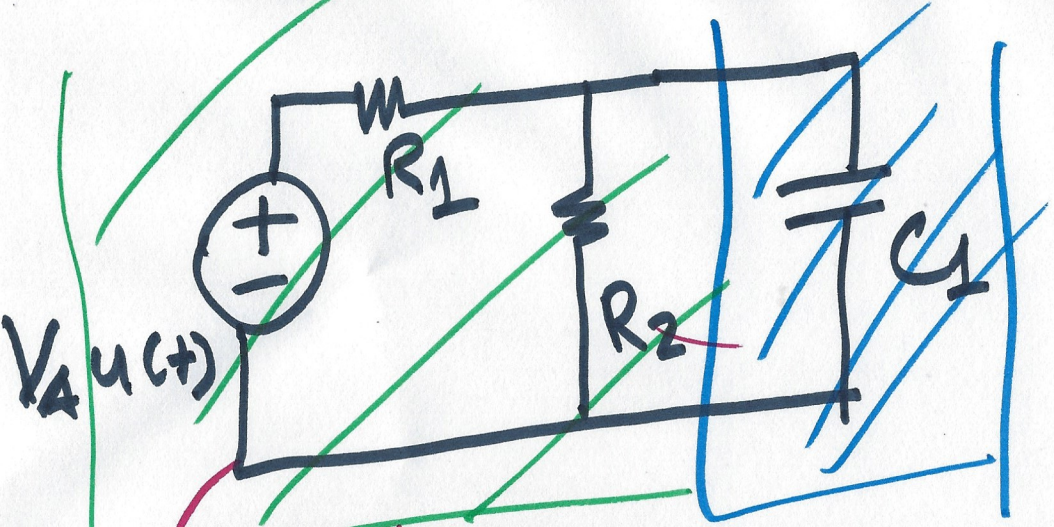
$$R_{eq} = 10k\Omega = R_T$$

(9)

$$I_N = \frac{V_T}{R_T} = 2.06\,mA$$

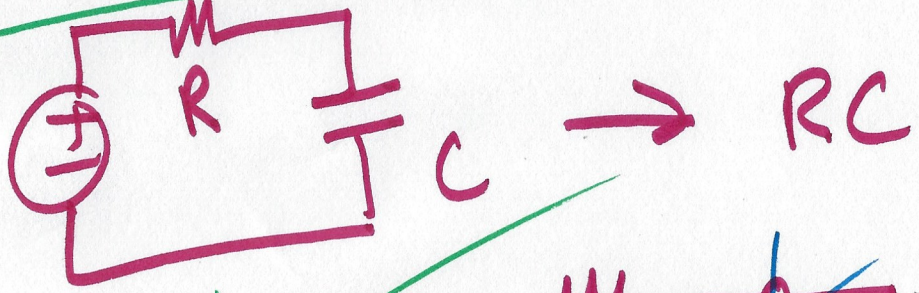


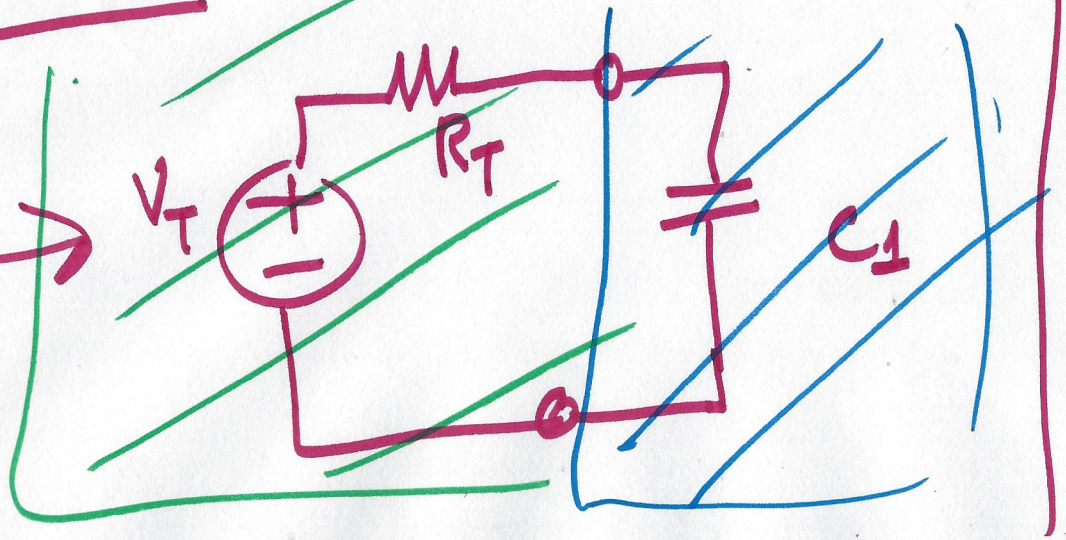
#3) Abstract the Load and Source



RC → Time Constant

$R_2 C_1$ X



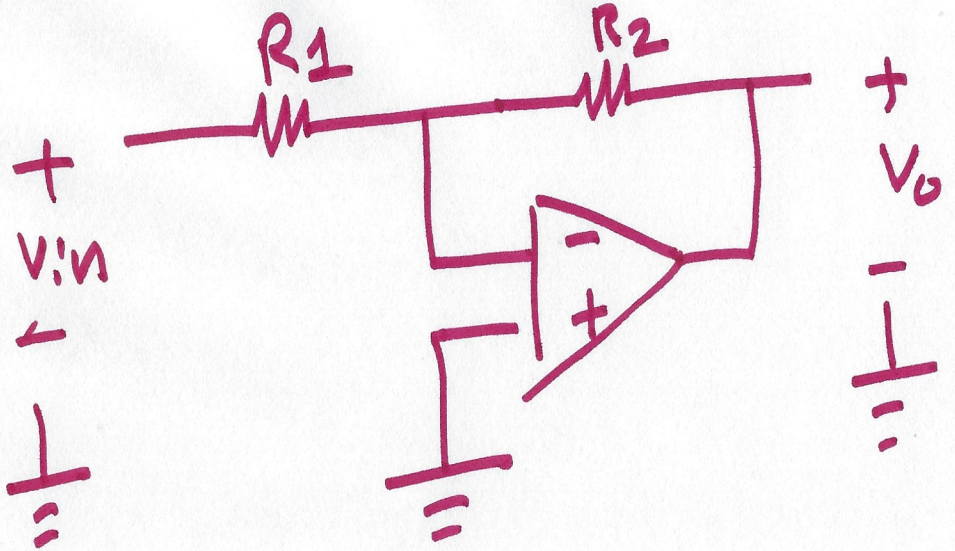


$$V_T = \frac{R_2}{R_1 + R_2} V_A u(t)$$

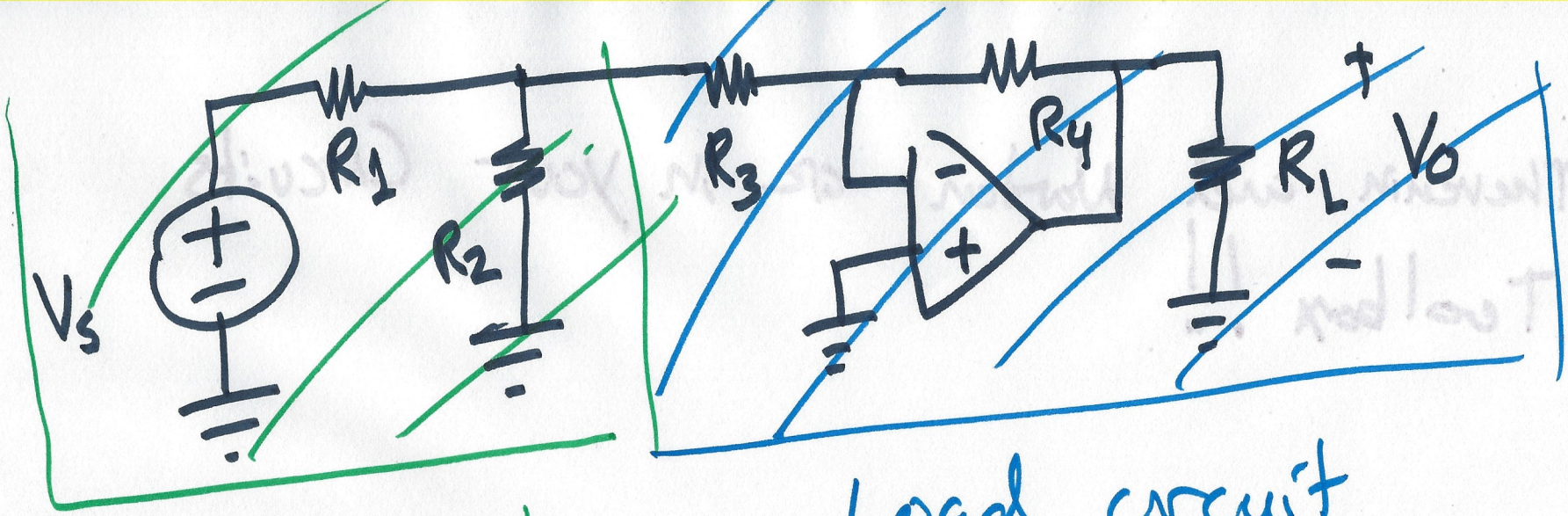
$$R_T = R_1 \| R_2$$

$R_T C_1$

#4) Comprehensive Problems with Thevenin

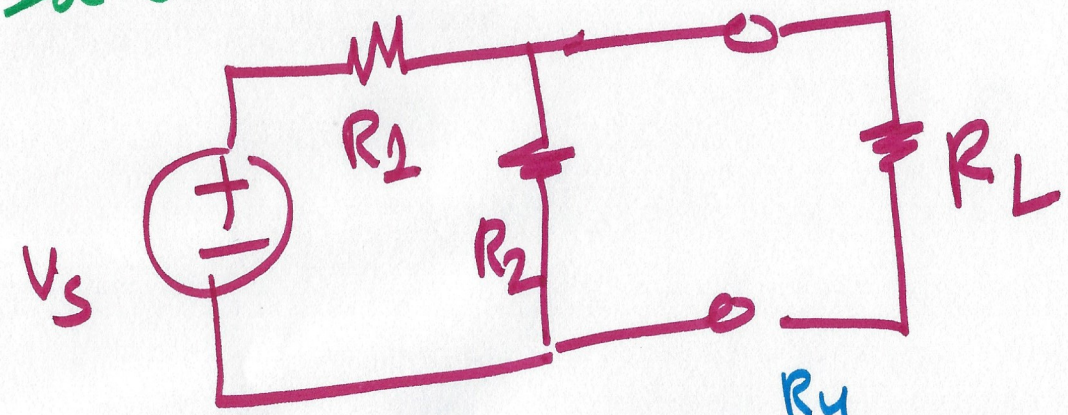


$$\rightarrow V_o = -\frac{R_2}{R_1} V_{in}$$



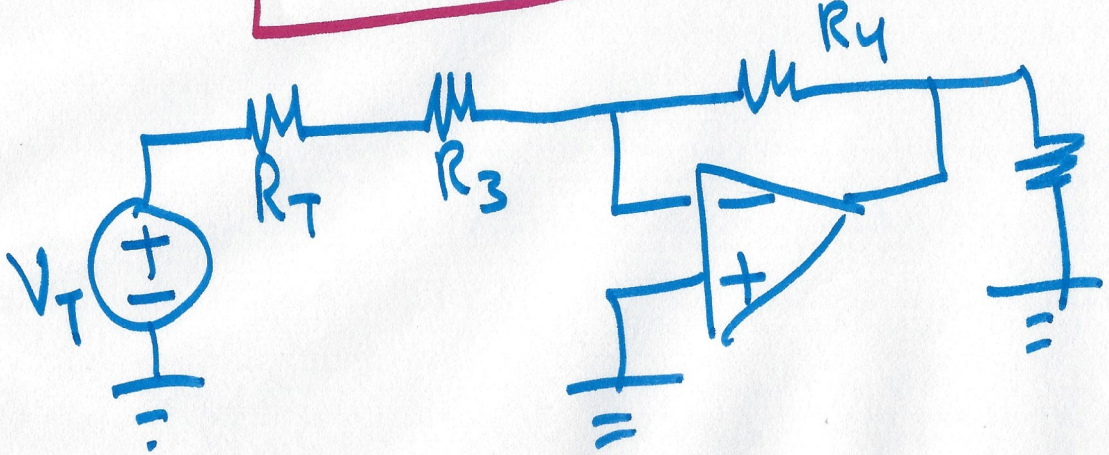
Source circuit

Load circuit



$$V_{oc} = \frac{R_2}{R_1 + R_2} V_s$$

$$R_T = R_1 \,||\, R_2$$

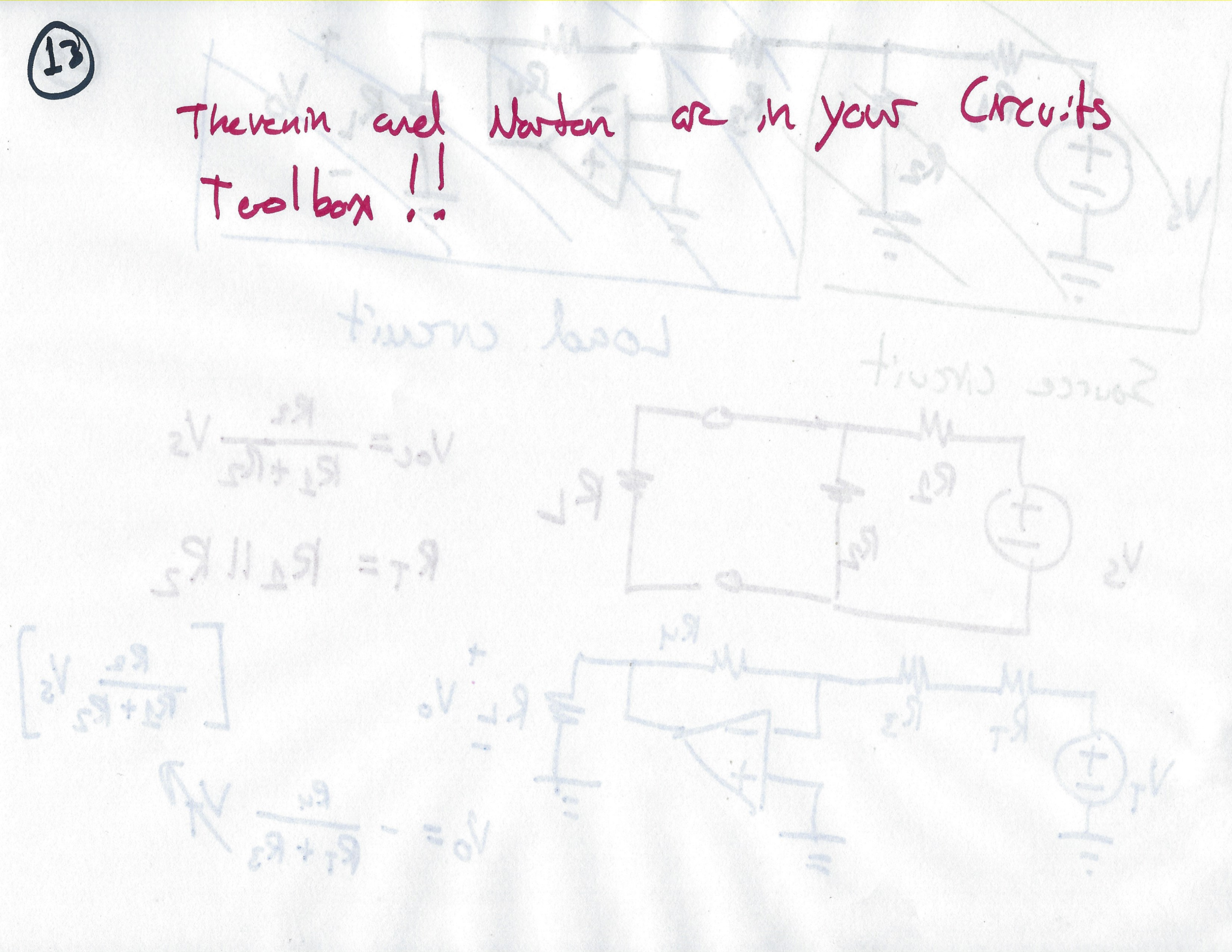


$$\left[\frac{R_2}{R_1 + R_2} V_s \right]$$

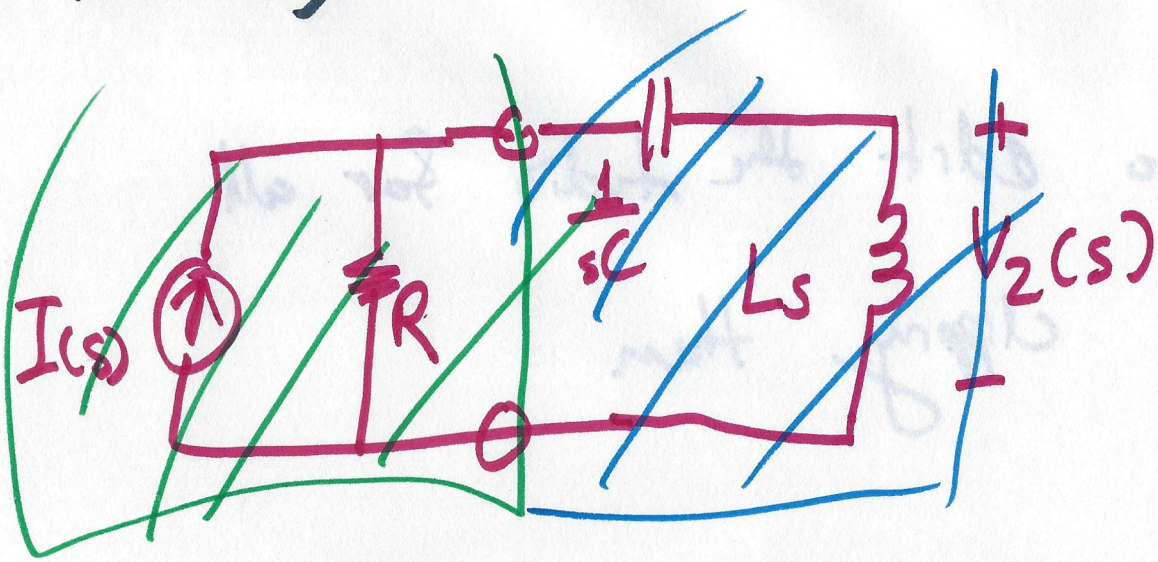
$$V_o = -\frac{R_4}{R_T + R_3} V_T$$

13

Thevenin and Norton are in your Circuits Toolbox !!

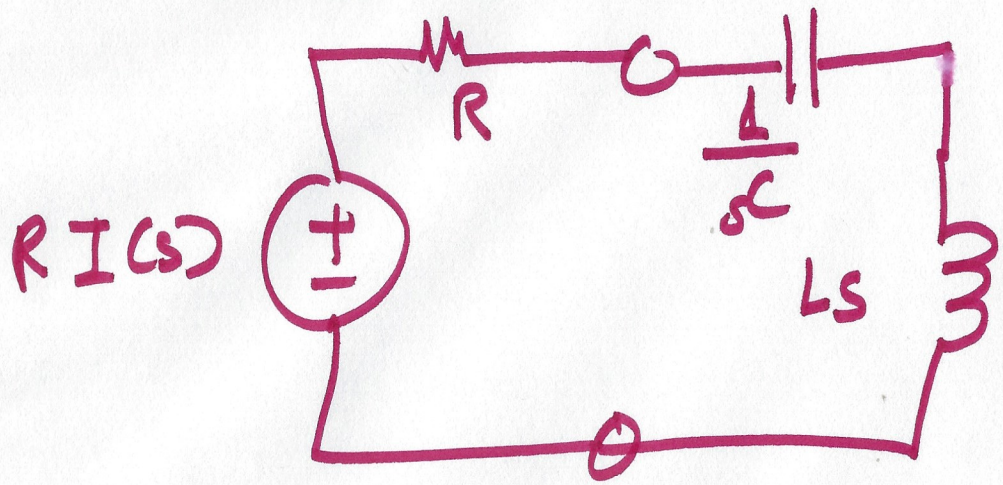


#5) Make a Crib sheet of your Tools



$$\frac{V_2(s)}{I(s)}$$

These are Impedances



$$V_2(s) = \frac{R L s}{Ls + \frac{1}{sC} + R} I(s)$$