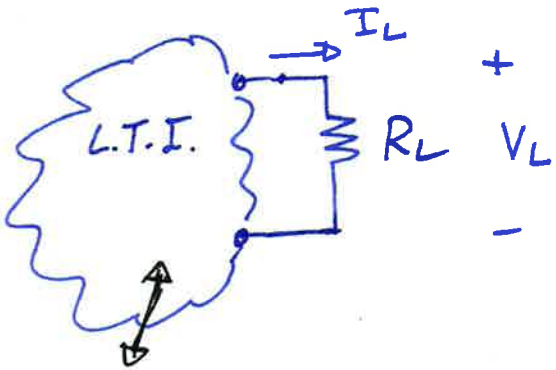
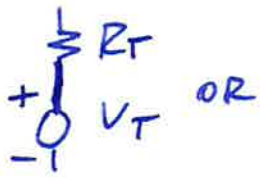
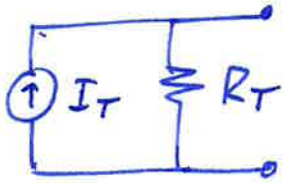
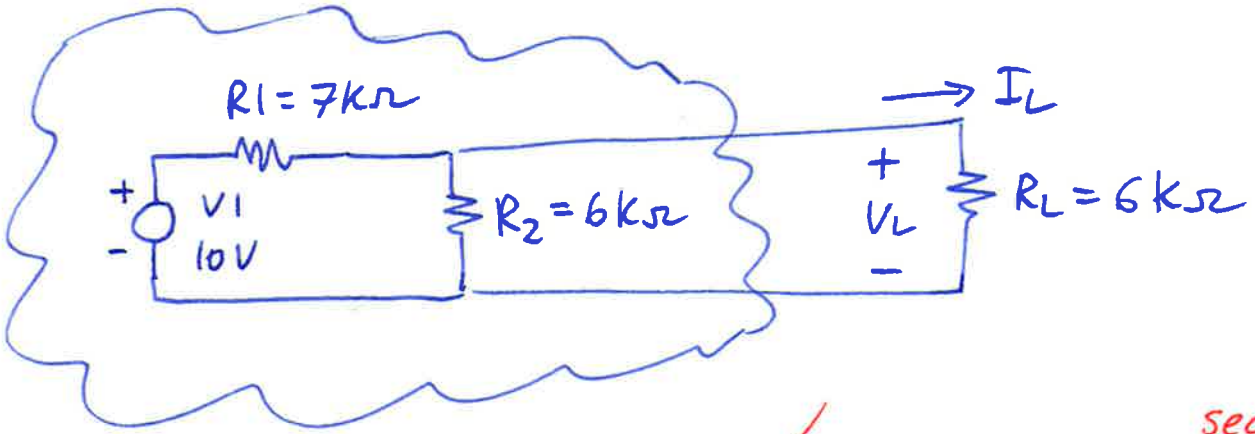
THEVENIN AND NORTON TRANSFORMATIONS



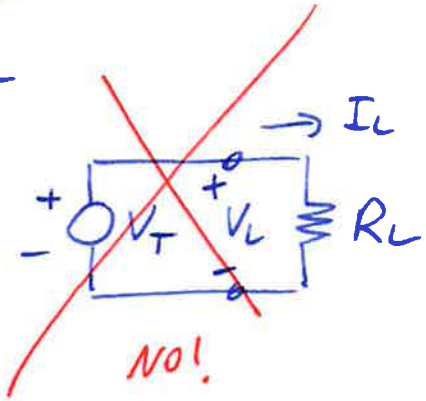


OR

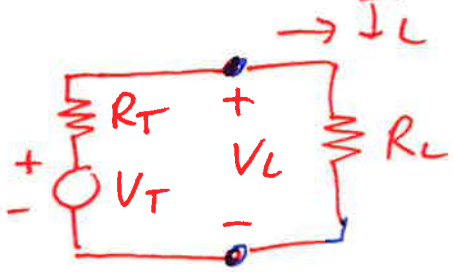




First attempt

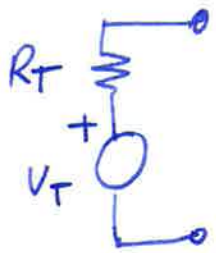


second attempt



2 cases (extremes)

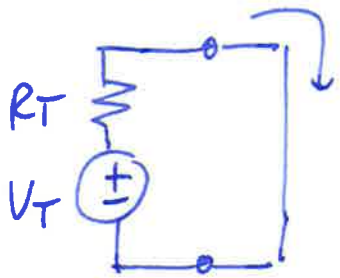
- $R_L = \infty$



$V_{open} = V_T$

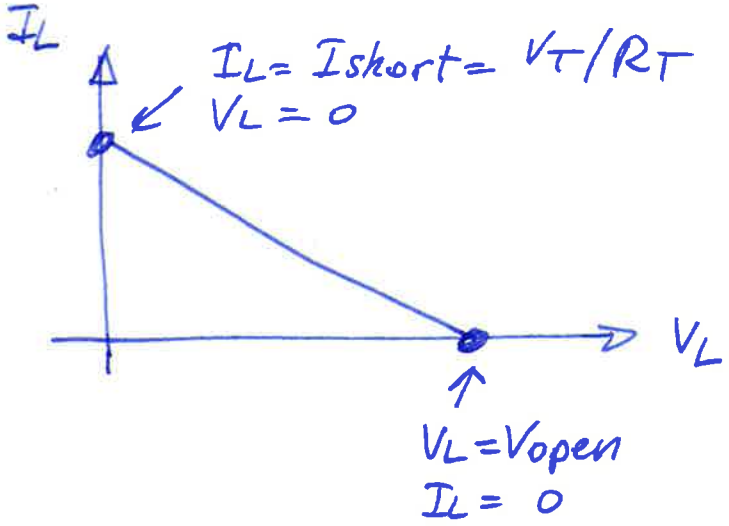
$I_L = 0$

- $R_L = 0$



$I_{short} = \frac{V_T}{R_T}$

$V_L = 0$



straight line between two points:

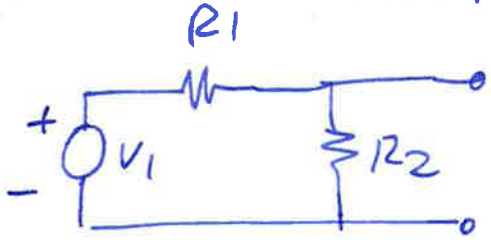
$$I_L - \frac{V_T}{R_T} = -\frac{1}{R_T} \cdot V_L$$

$$\updownarrow$$

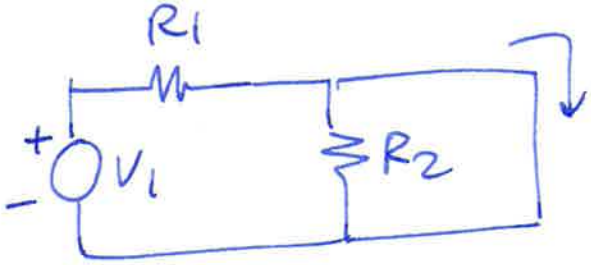
$$I_L = -\frac{1}{R_T} V_L + \frac{V_T}{R_T}$$

$(y = m \cdot x + n)$

back to the example:



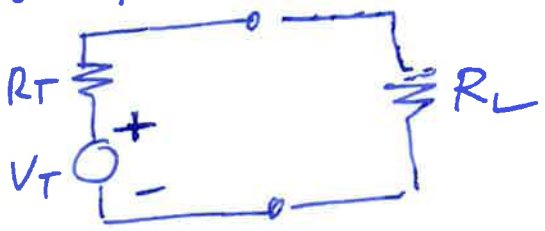
$V_T = V_{open} = \frac{V_1}{R_1 + R_2} \cdot R_2 =$ [redacted] $4.62\,V$



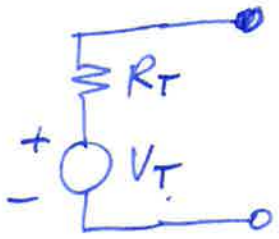
$I_{short} = \frac{V_T}{R_T} = \frac{V_1}{R_1} = \frac{10\,[redacted]}{7\,k\Omega} \approx 1.43\,mA$

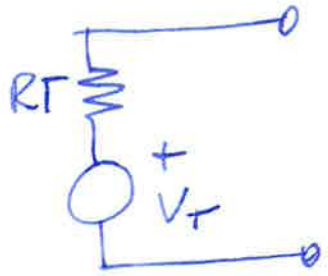
$R_T = \frac{V_T}{I_{short}} = \frac{[redacted]\,4.62\,V}{1.43\,mA} \approx 3.23\,k\Omega$

Thevenin/Norton Transf. rules

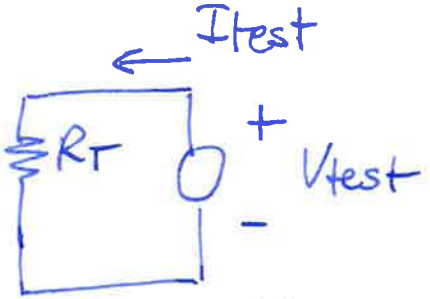


→ remove R_L to find out V_T

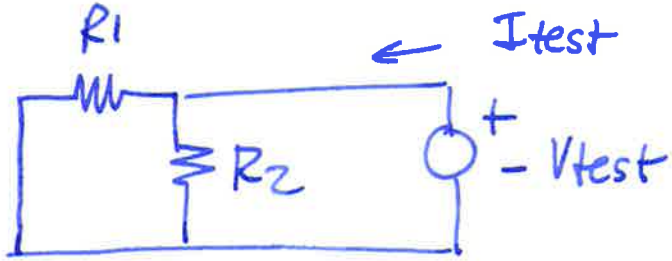




→ remove V_T and apply test voltage



$\frac{V_{test}}{I_{test}} = R_T$



replace indep. voltage source
$V=0 \rightarrow$ short

replace indep. current source
$I=0 \rightarrow$ open

$$\frac{V_{test}}{I_{test}} = R_T = R_1 \| R_2 =$$

$$= 7k\Omega \| 6k\Omega \approx 3.23k\Omega$$

same as using a multimeter in a lab.
(shutdown the supply of the board)