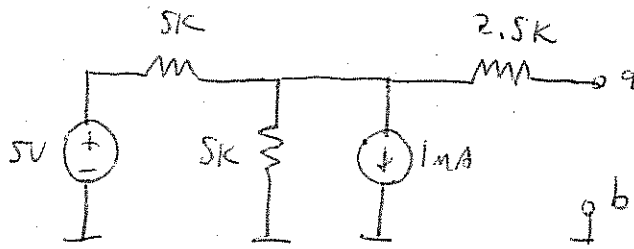


LECTURE 1

EXAMPLE 1:

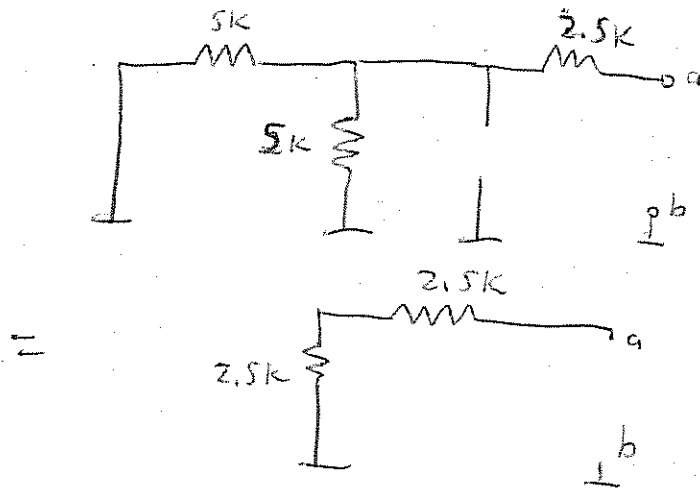


CALCULATE V_{TH} (OPEN CIRCUIT VOLTAGE) USING SUPERPOSITION:

$$V_{ab} |_{\text{OPEN CIRCUIT}} = 5V \left(\frac{5k}{5k+5k} \right) + (-1mA) 5k \parallel 5k$$

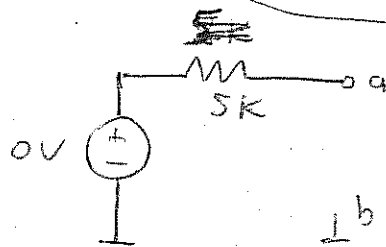
$$= 2.5V - 2.5V = \boxed{0V} = V_{TH}$$

CALCULATE R_{TH} BY SETTING INDEPENDENT SOURCES TO ZERO

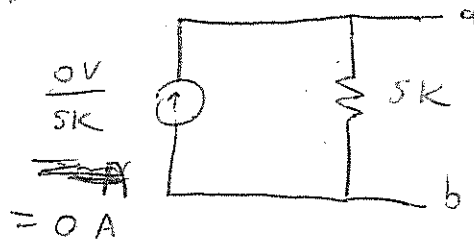


$$\Rightarrow \boxed{R_{TH} = 5k}$$

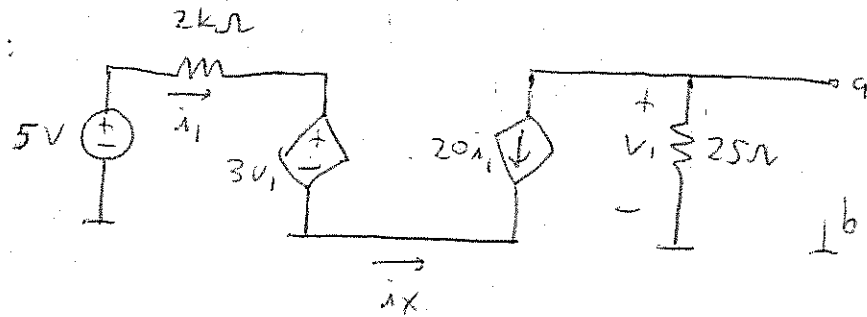
THEVENIN MODEL:



NORTON MODEL:



EXAMPLE 2:

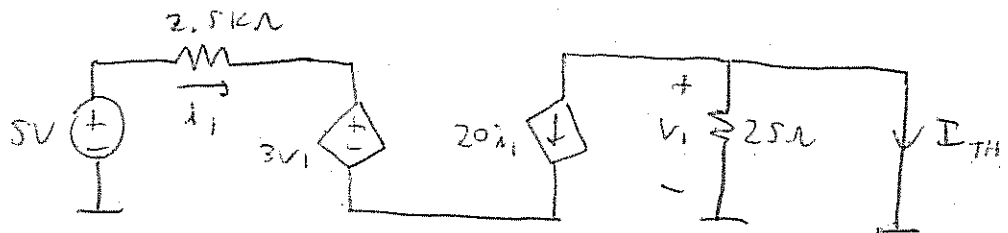


$i_x = 0$ SINCE NO RETURN PATH FOR CURRENT

THEVENIN MODEL:

CALCULATE V_{TH} → NEED TO SOLVE SIMULTANEOUS EQUATIONS

CALCULATE I_{TH} → MUCH EASIER



$$\Rightarrow V_1 = 0 \Rightarrow 3V_1 = 0 \Rightarrow i_1 = \frac{5V}{2.5k} \approx 2mA$$

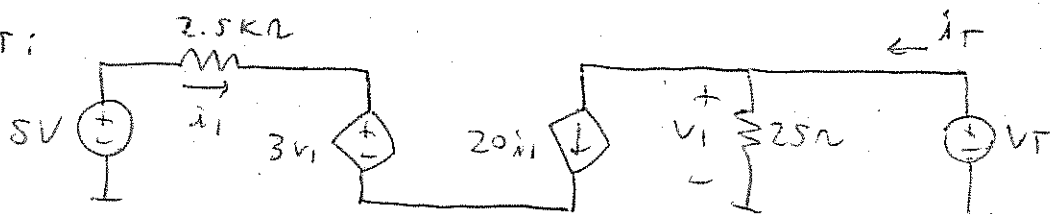
$$\Rightarrow I_{TH} = -20(2mA) = \boxed{-40mA}$$

CALCULATE R_{TH} :

USE TEST CURRENT SOURCE → HARD TO DETERMINE V_1

USE TEST VOLTAGE SOURCE → MUCH ~~EAS~~ EASIER

INCORRECT:



$$V_1 = V_T \Rightarrow i_1 = \frac{5 - 3V_T}{2.5k} \Rightarrow i_T = \frac{V_T}{25} + 20 \left(\frac{5 - 3V_T}{2.5k} \right)$$

$$\Rightarrow i_T = 0.016V_T + 0.04 \quad ?? \quad \text{WHAT WENT WRONG?}$$

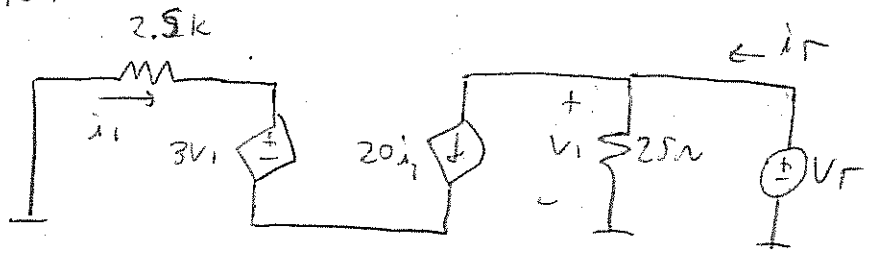
* MUST SET INDEPENDENT SOURCES TO ZERO! *

LECTURE 1

EXAMPLE 2:

RTH CALCULATION:

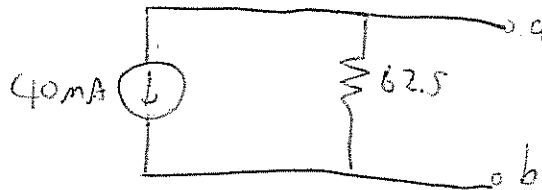
CORRECT:



$$V_1 = V_T \Rightarrow i_1 = \frac{0 - 3V_T}{2.5k} \Rightarrow i_T = \frac{V_T}{25} + 20 \left(\frac{-3V_T}{2.5k} \right)$$

$$\Rightarrow i_T = 0.016 V_T \Rightarrow R_{TH} = \frac{V_T}{I_T} = \frac{1}{0.016} = \boxed{62.5 \Omega}$$

NORTON MODEL:



THEVENIN MODEL

