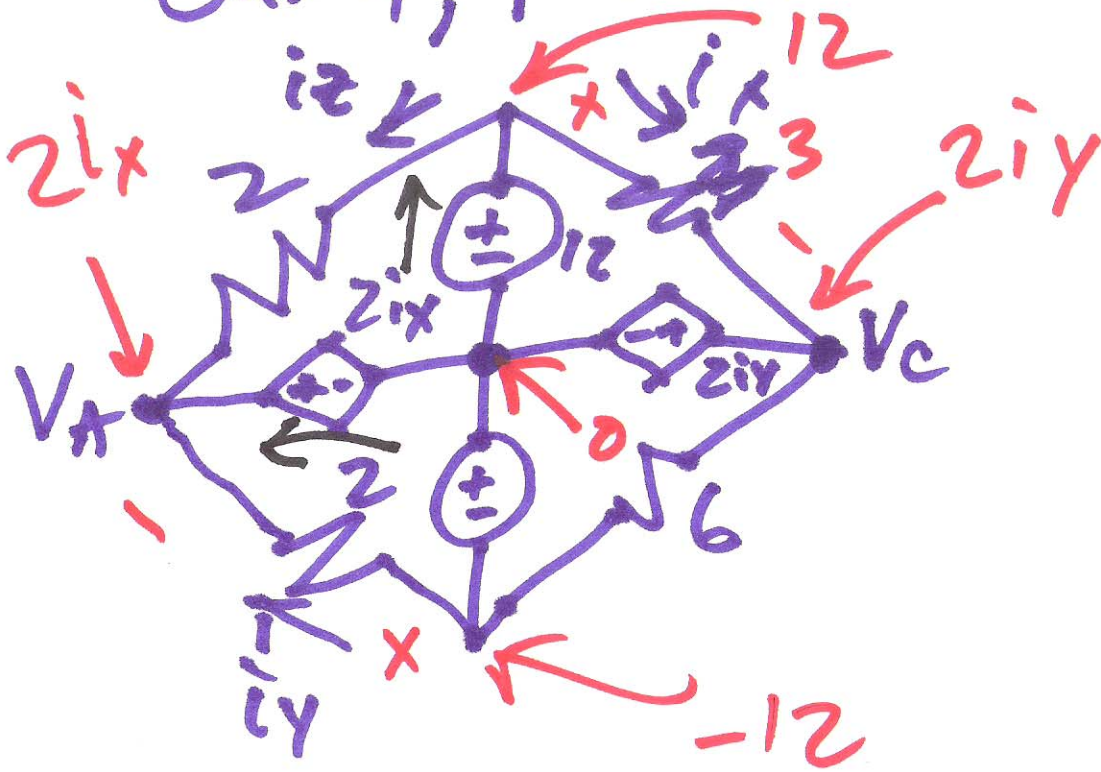


Lecture 10

EE 220

June 20, 2014

Ch. 4, problem 9



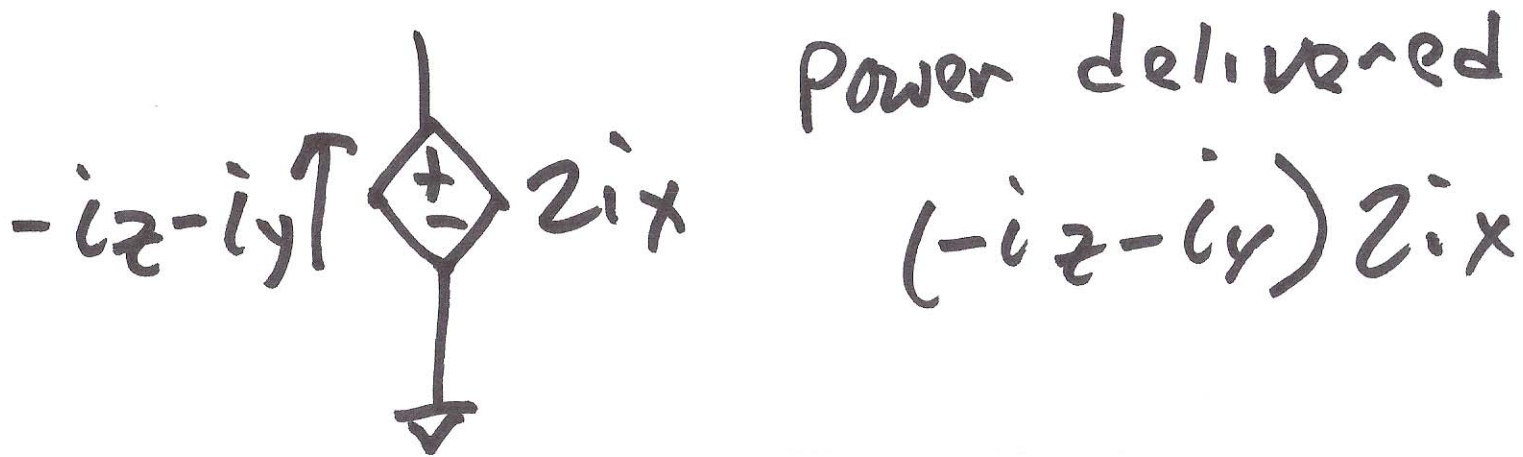
$$\frac{12 - 2i_y}{3} = i_x$$

$$-12 - 2i_x = i_y$$

12(i\_z + i\_x)

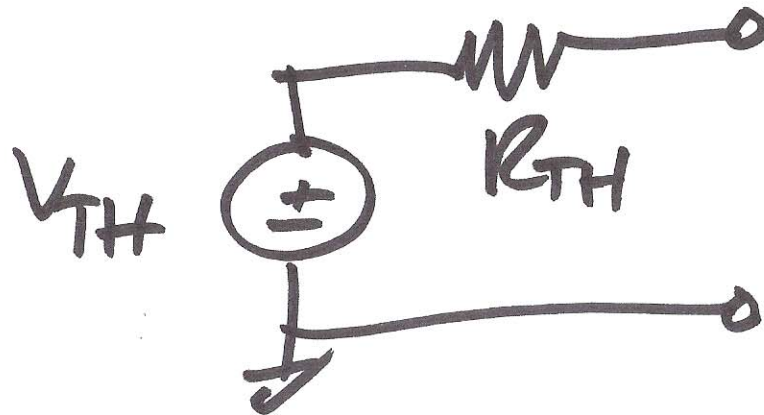
i\_z + i\_x

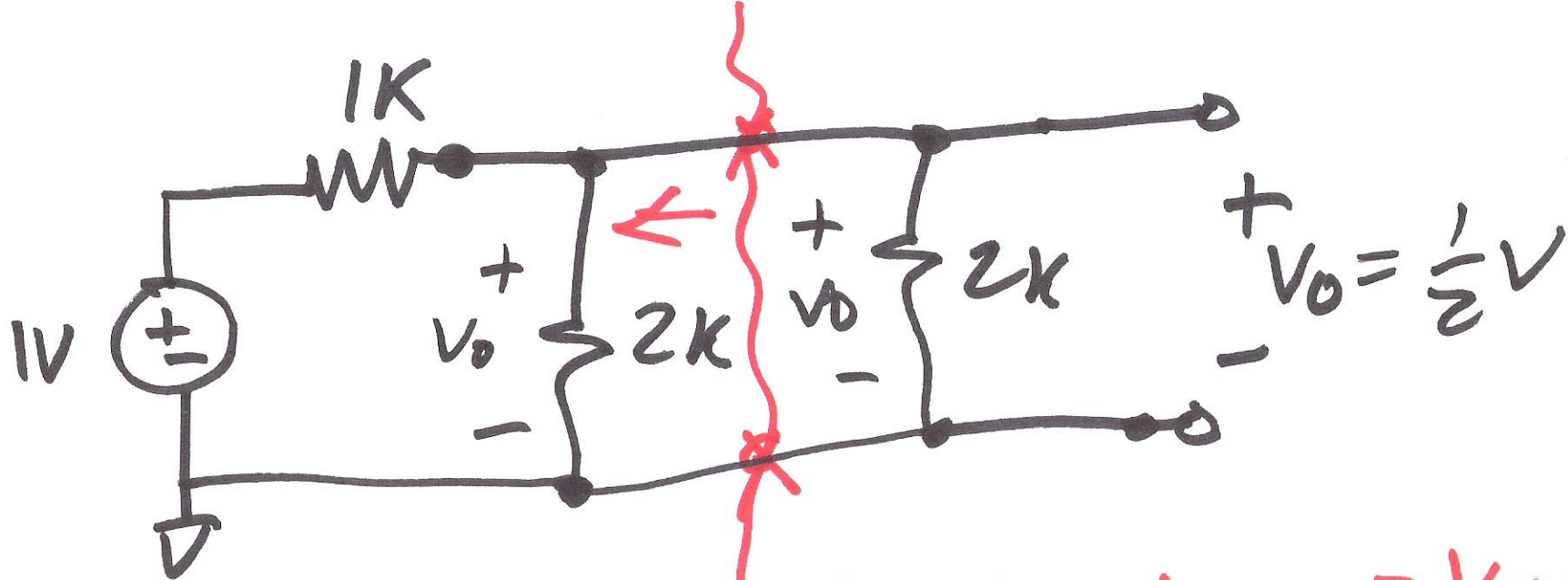
$$i_z = \frac{12 - 2i_x}{2}$$



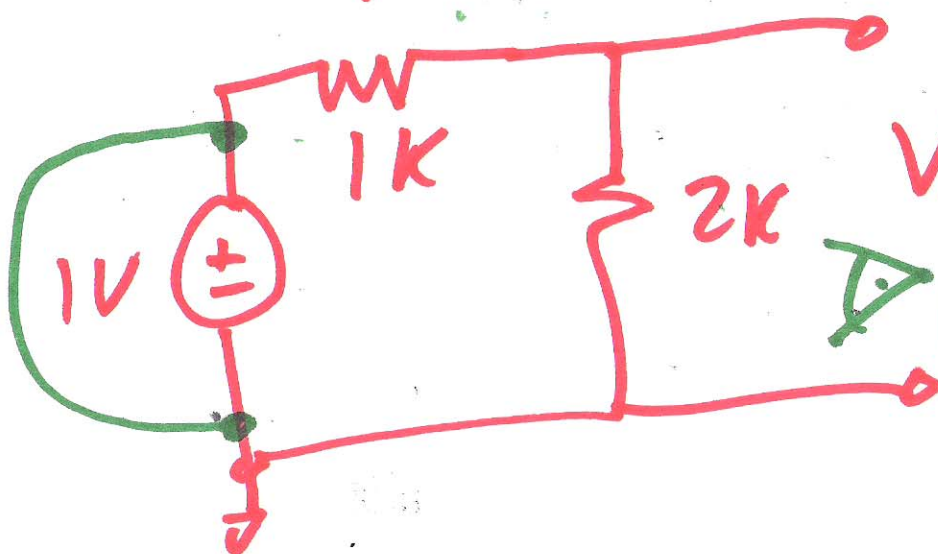
THEVENIN'S theorem

reduce





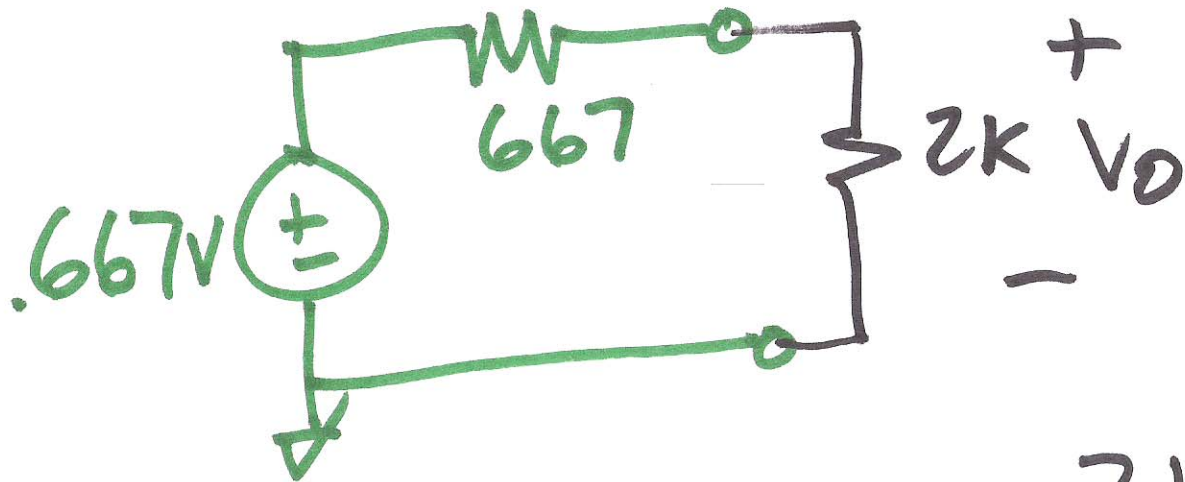
open circuit voltage =  $V_{TH}$



$$V_0 = \frac{2k}{1k+2k} \cdot 1V = 0.667V$$

$$R_{TH} = 667\Omega$$

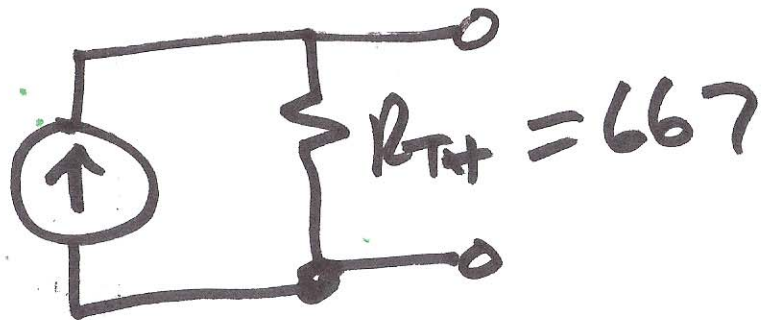
3)



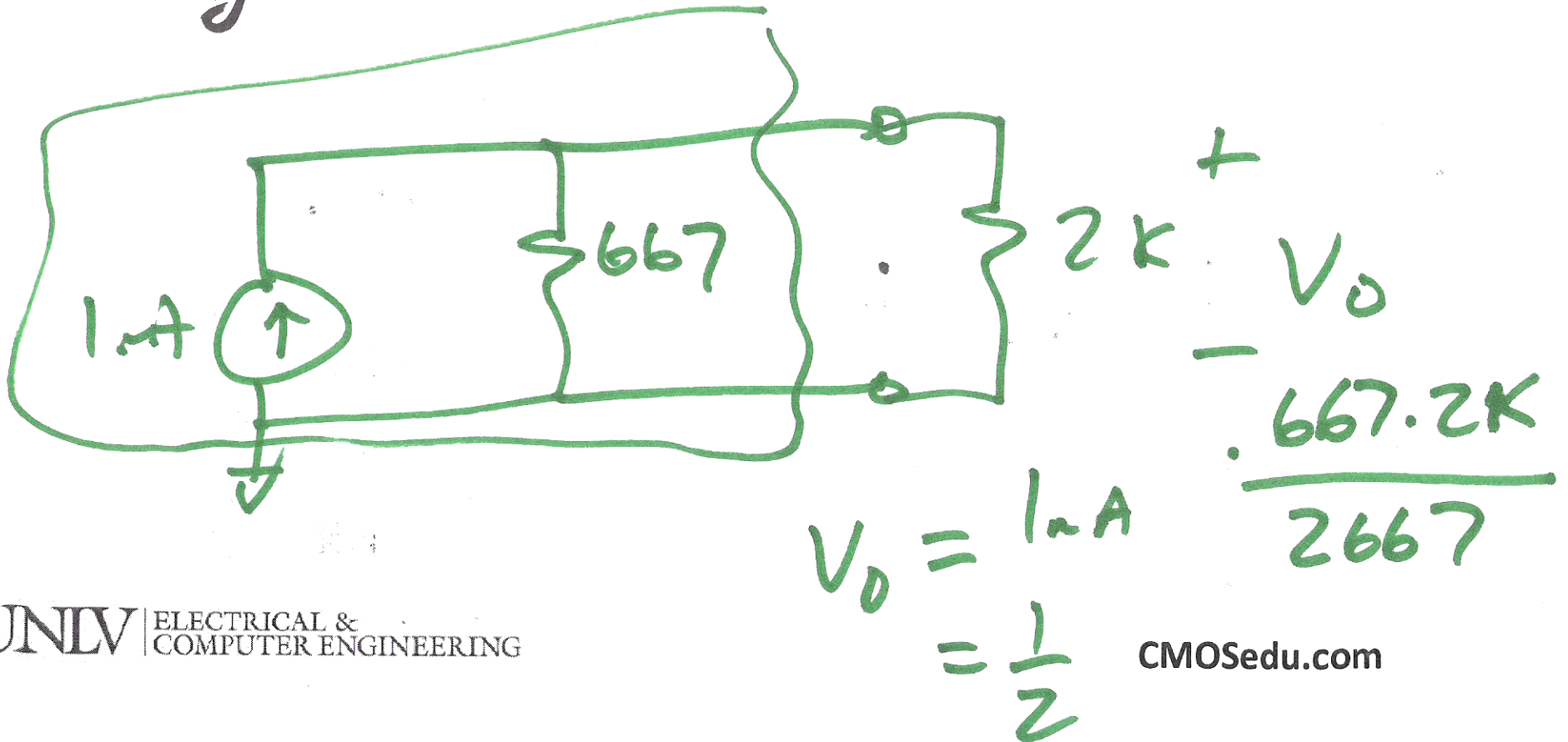
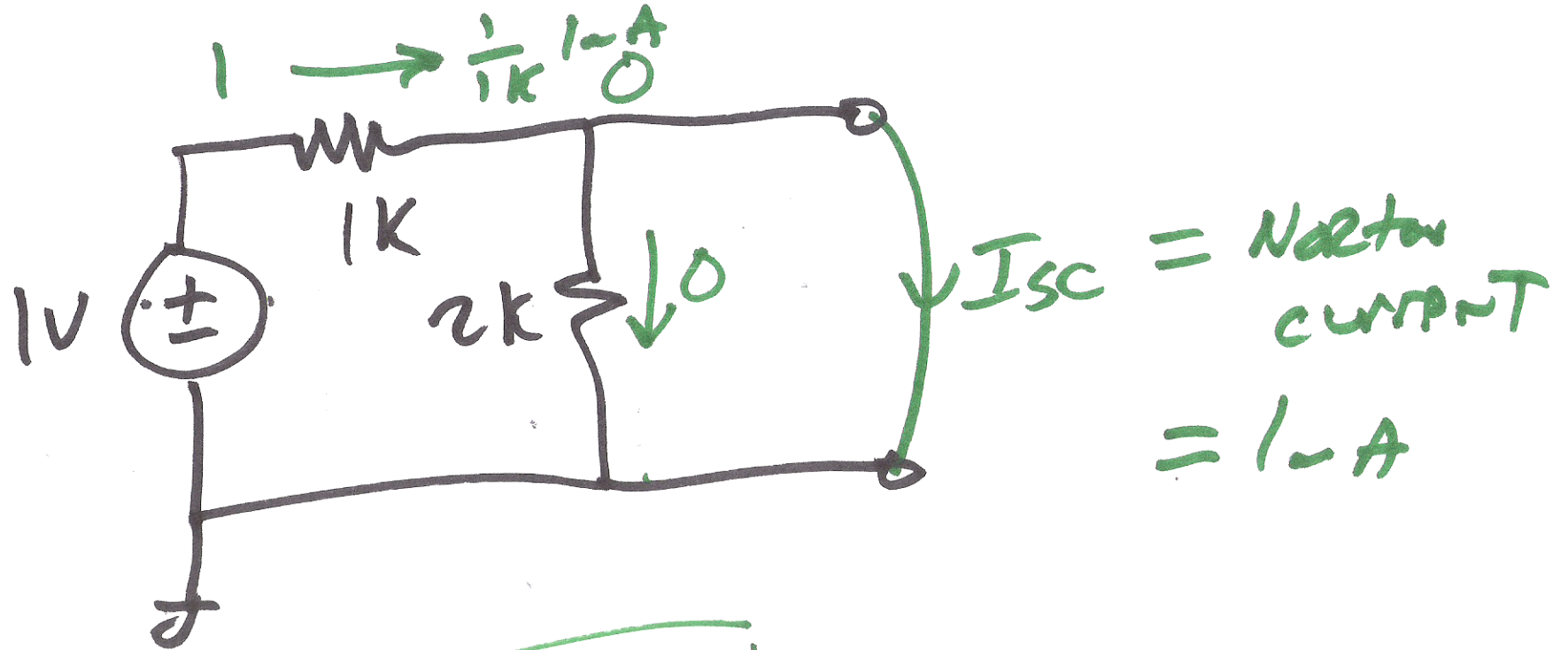
$$V_0 = .667 \cdot \frac{2k}{2k + 667} = \frac{1}{2} V$$

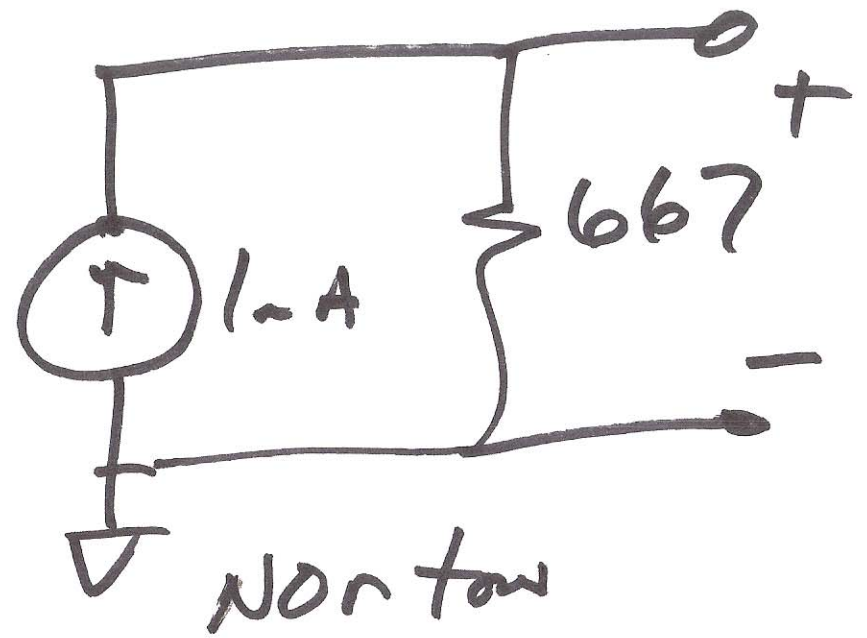
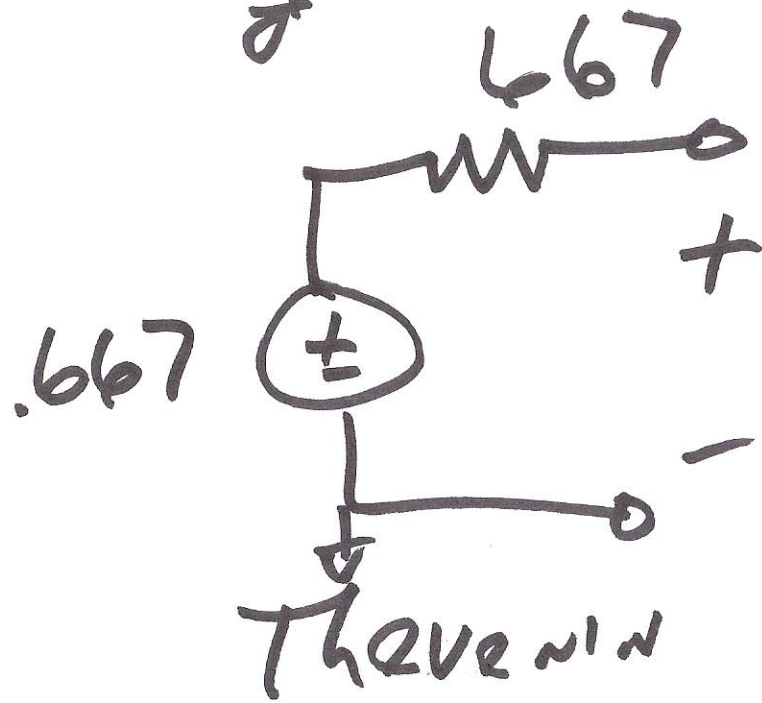
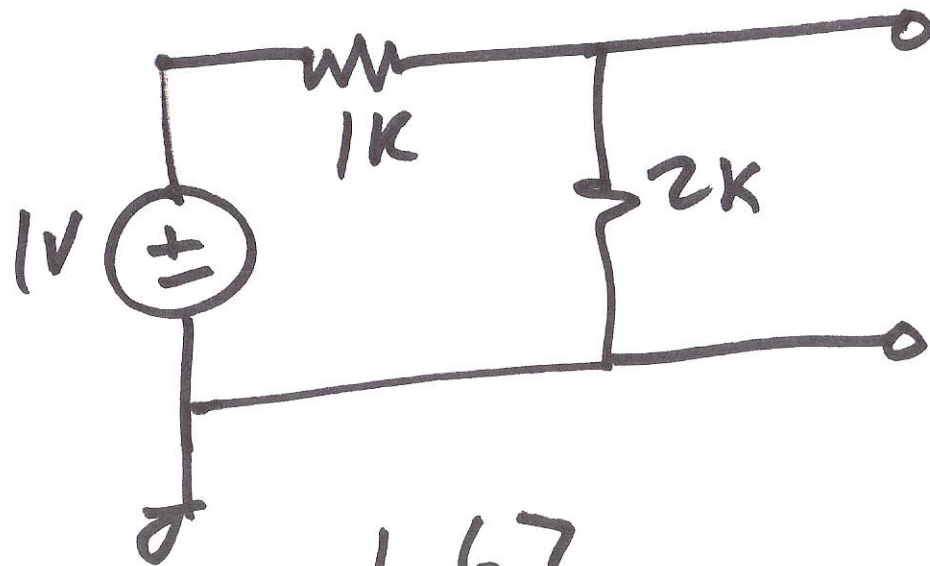
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## NORTON'S THEOREM



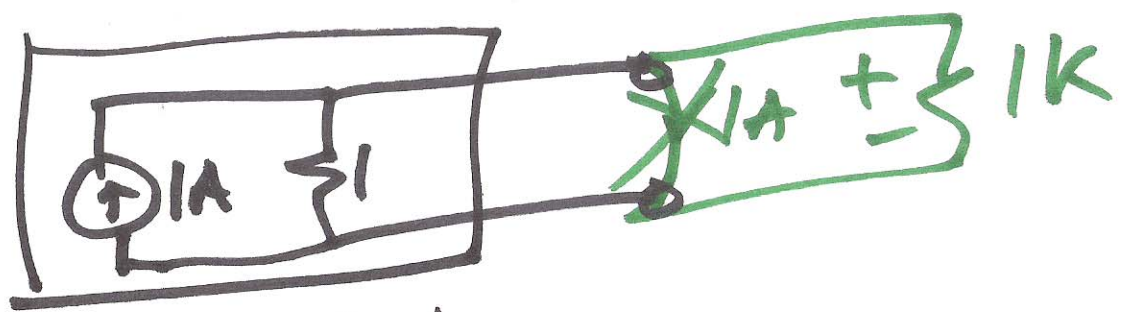
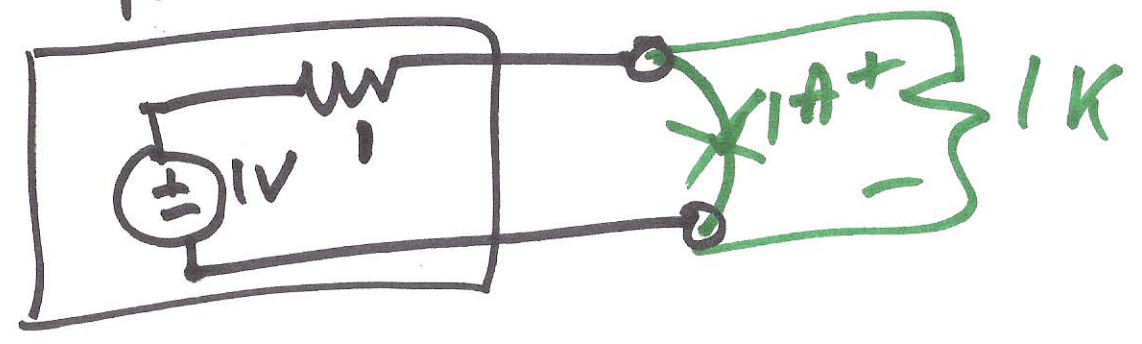
4)





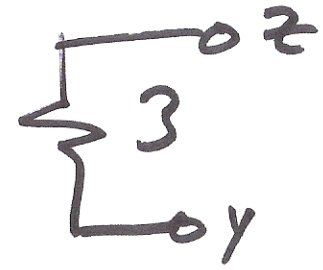
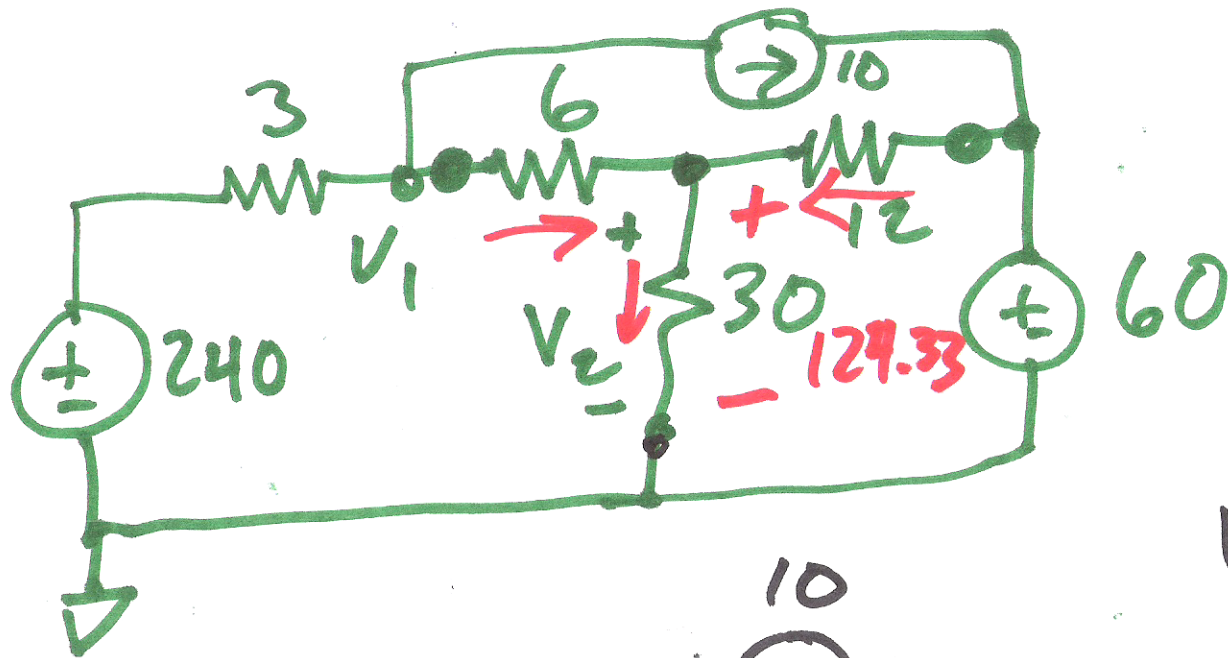
6)

Thvenin

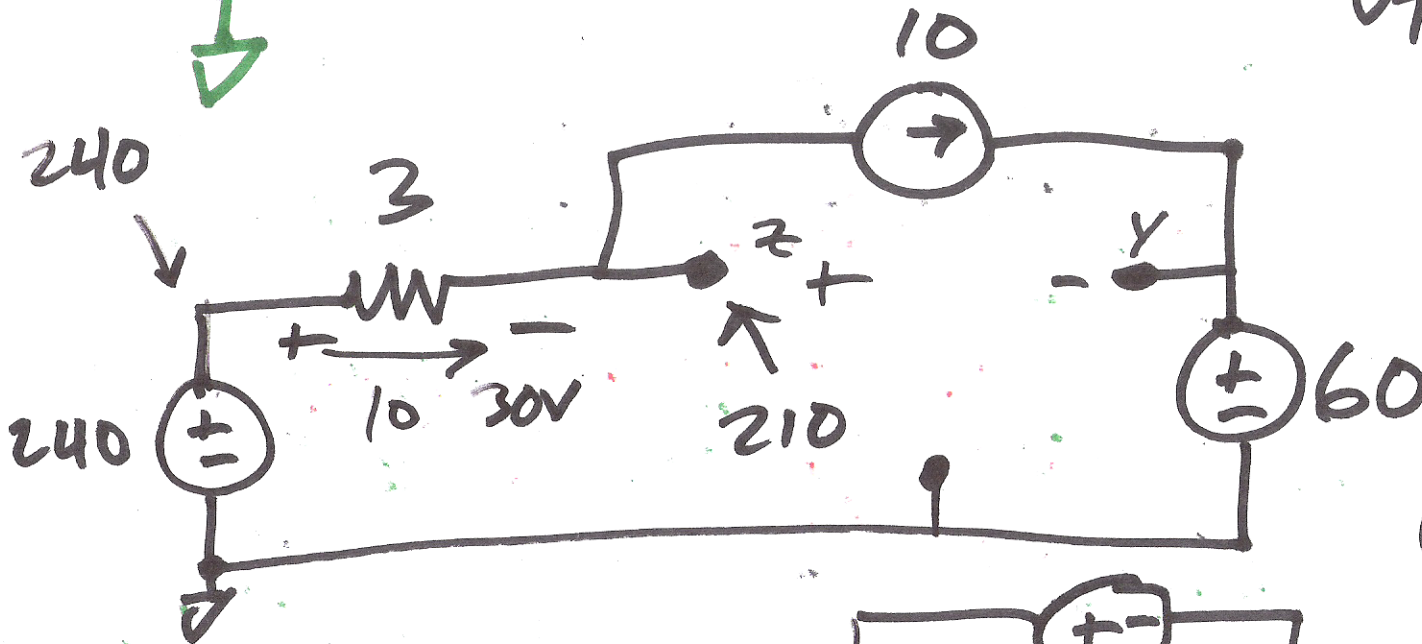


Norton

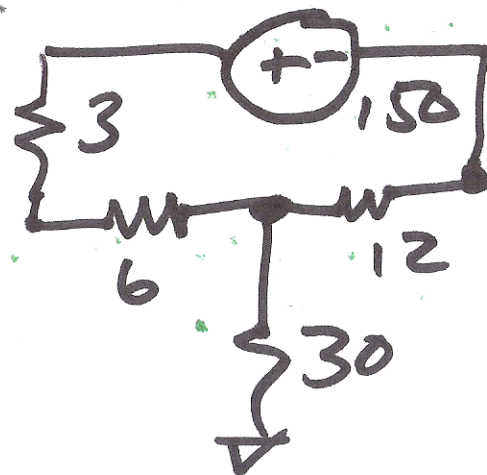
7)



$$V_{THW} = 210 - 60 = 150V$$

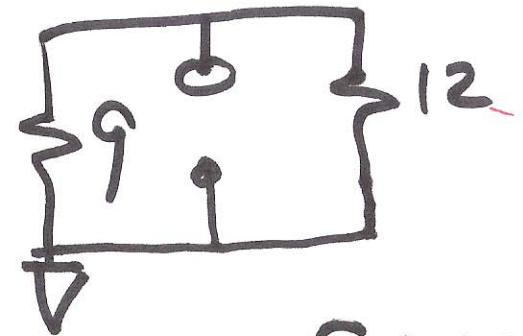
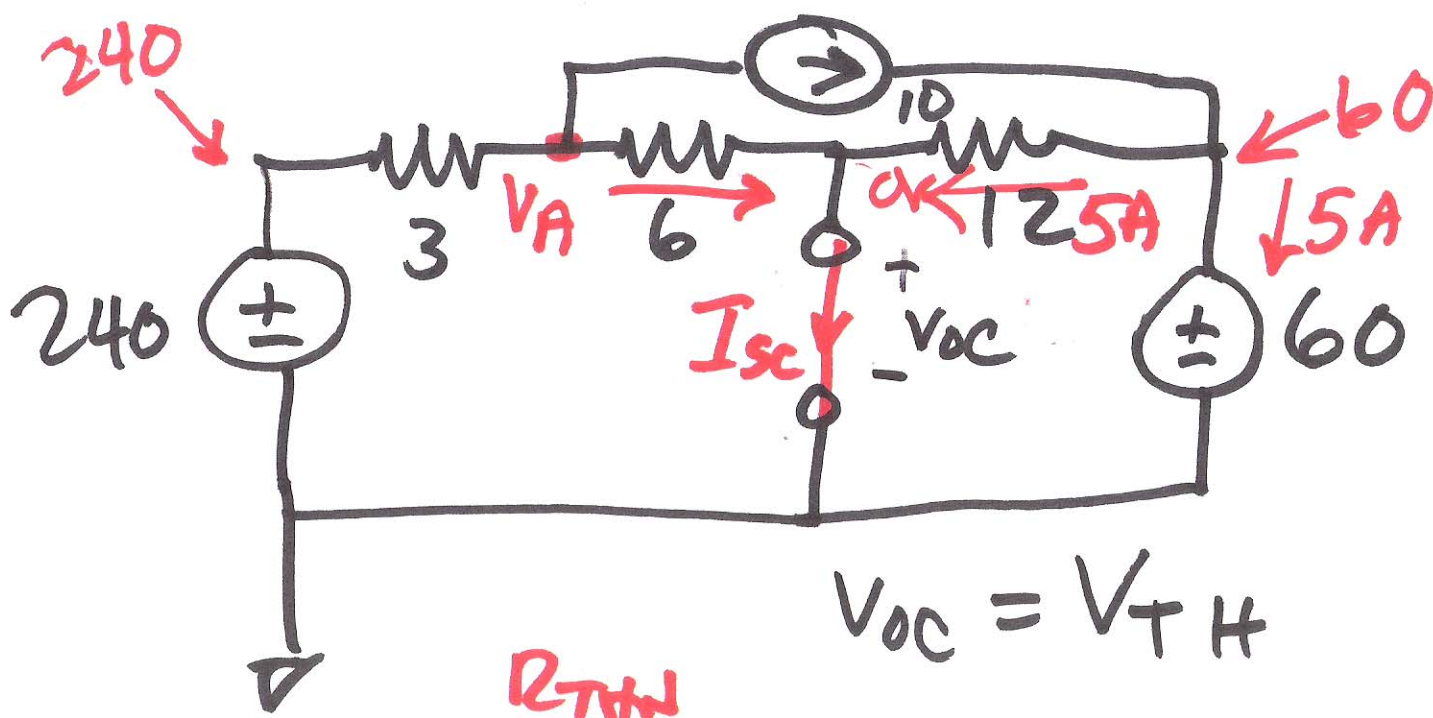


three port  
wrong!



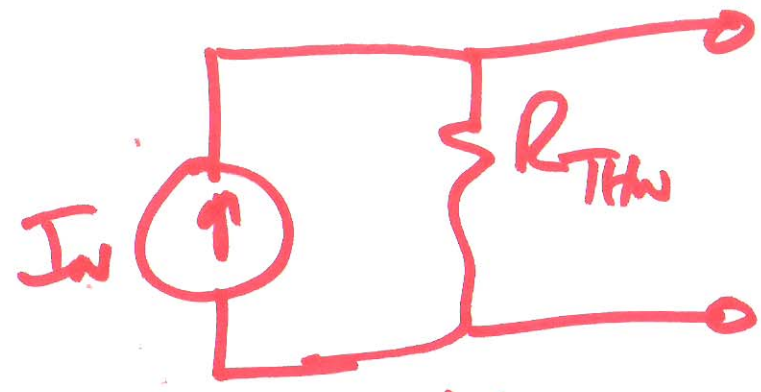
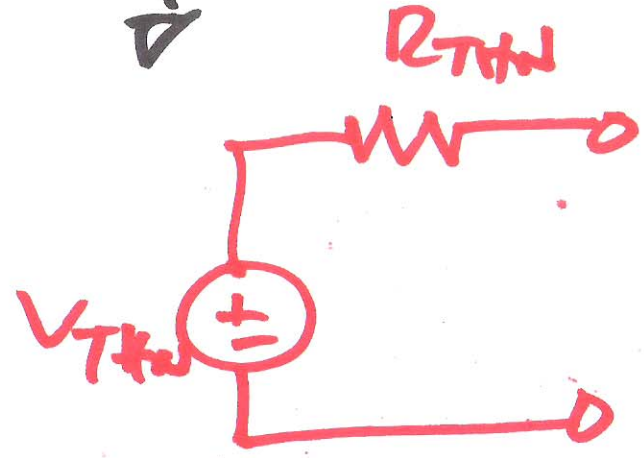
8)





$R_{TH} = 5.14 \Omega$

$V_{OC} = V_{TH}$

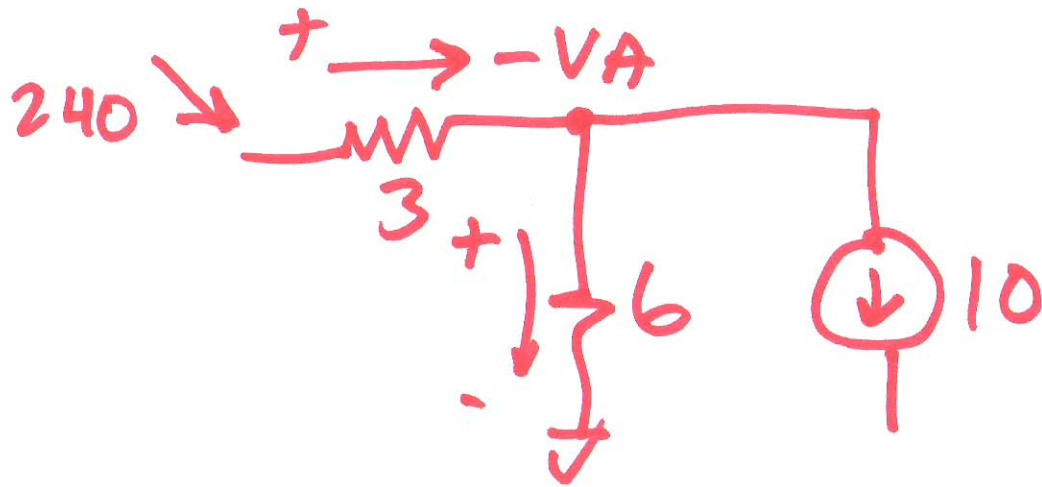


$I_{sc} = \frac{V_A}{6} + 5$

$I_N = \frac{V_{THN}}{R_{THN}} = I_{sc}$

$I_{sc} = \frac{140}{6} + 5 \approx 28.333$

9)



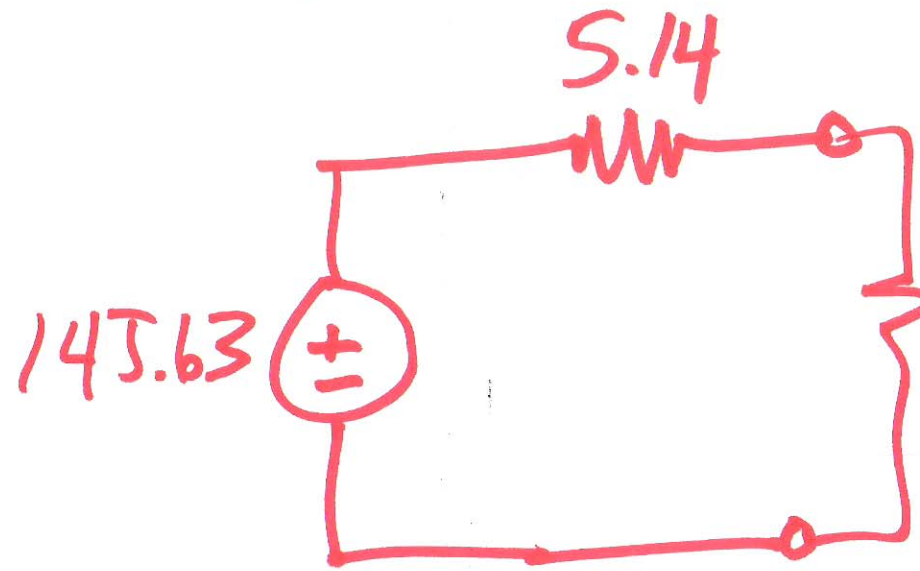
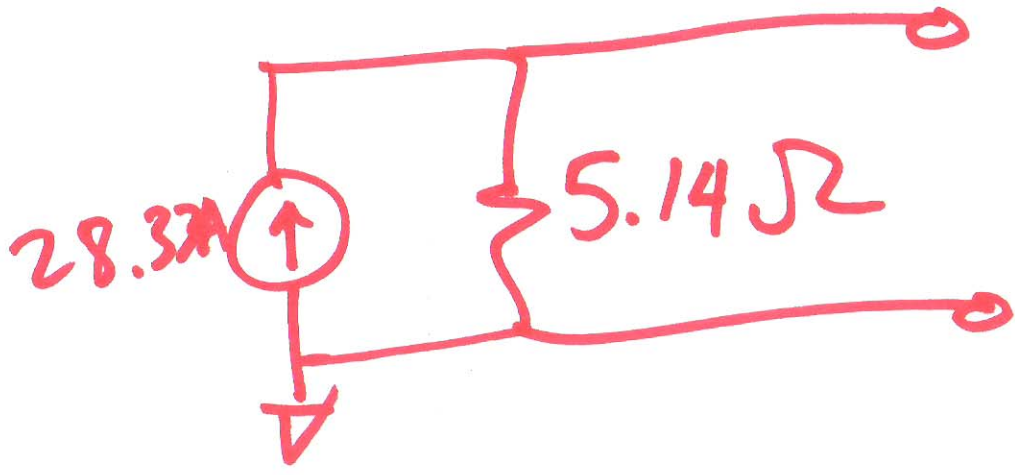
$$\frac{240 - VA}{3} - \frac{VA}{6} - 10 = 0$$

$$80 - 10 - \frac{2VA}{6} - \frac{VA}{6} = 0$$

$$70 - \frac{3VA}{6} = 0$$

$$VA = 140V$$

10)

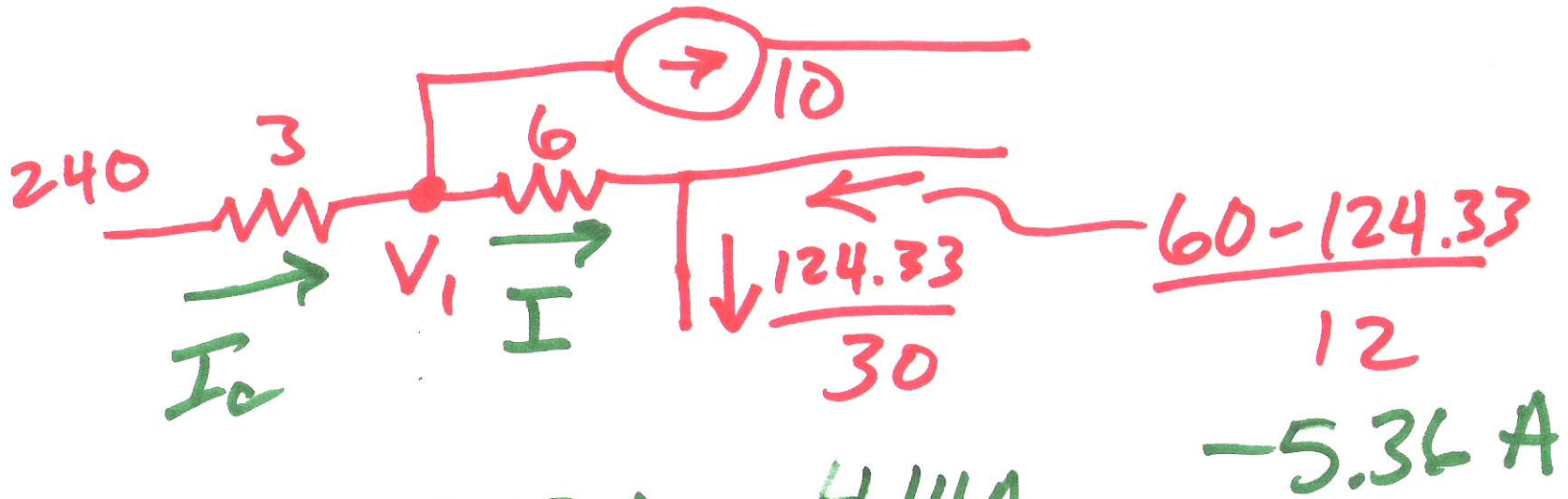


$$+ \quad V_2 = 145.63 \cdot \frac{30}{35.14}$$

$$-$$

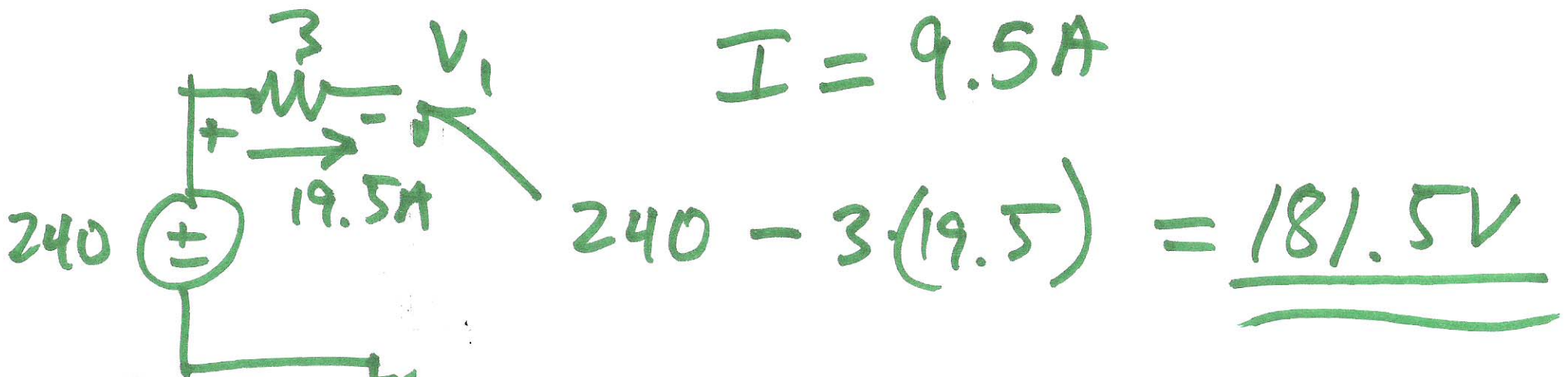
$$V_2 = \underline{\underline{124.33\text{V}}}$$

11)

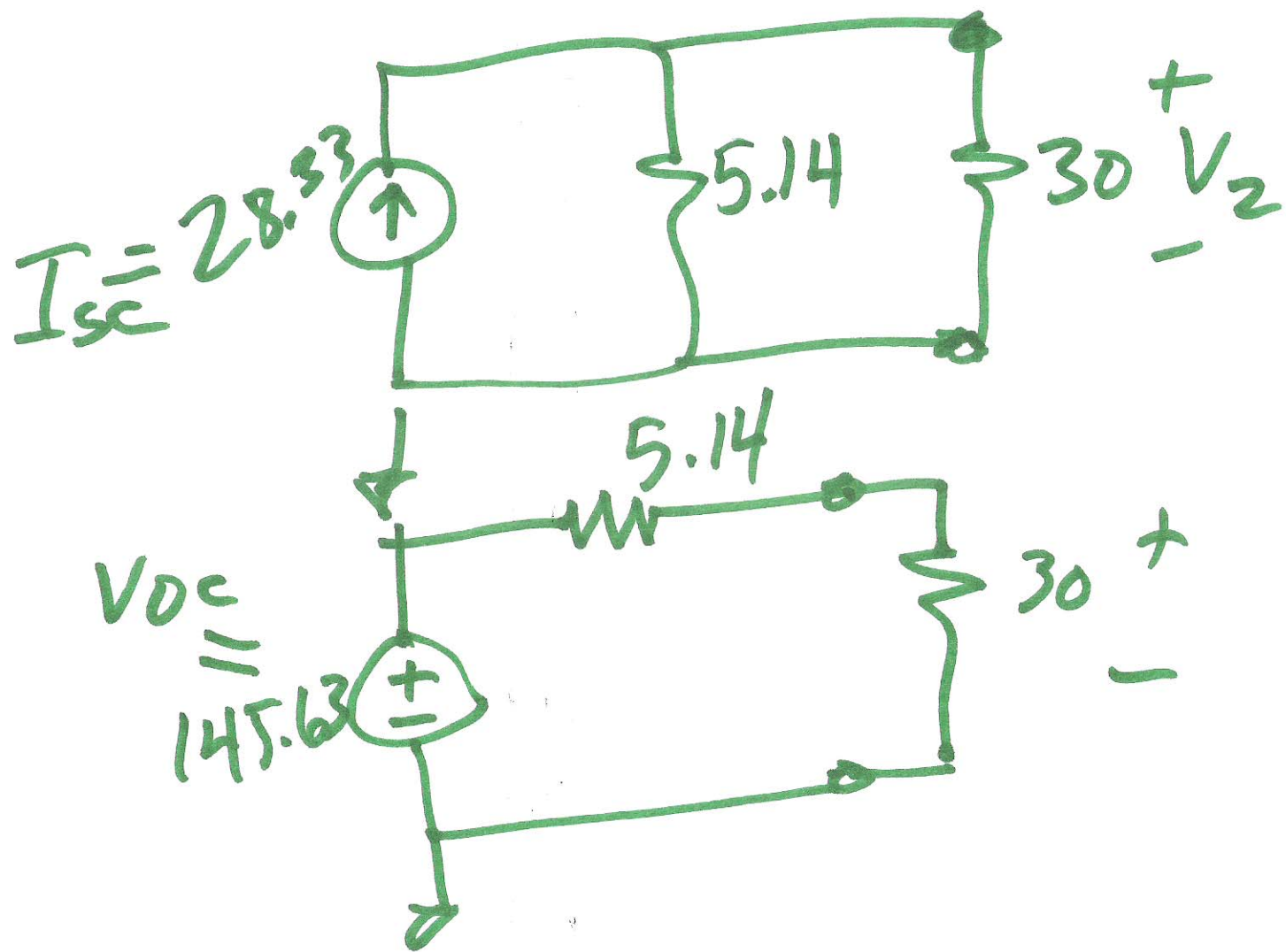


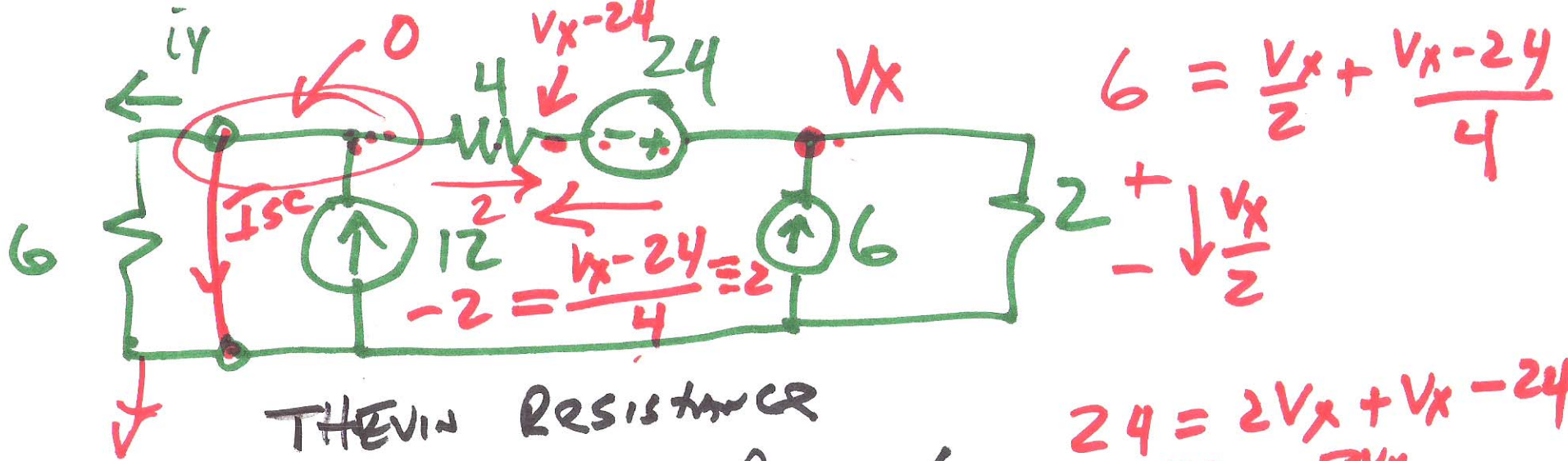
$I_C = 10 + 9.5A$   
 $= 19.5A$   
 $I + (-5.36A) = 4.14A$

$I = 9.5A$



(2)





THEVENIN RESISTANCE

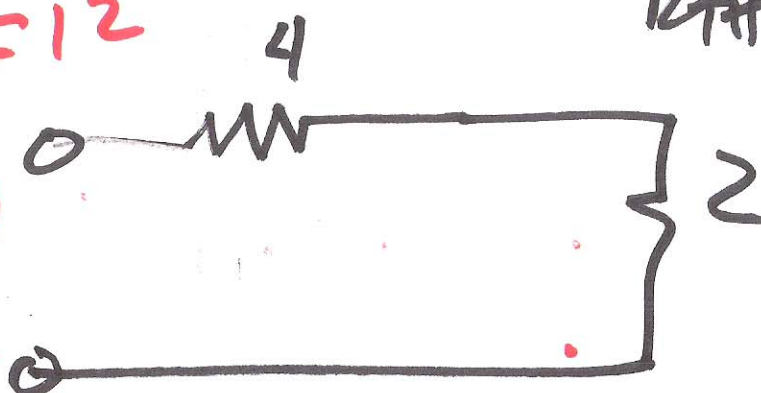
$R_{TH} = 6$

$24 = 2V_x + V_x - 24$   
 $48 = 3V_x, V_x = 16V$

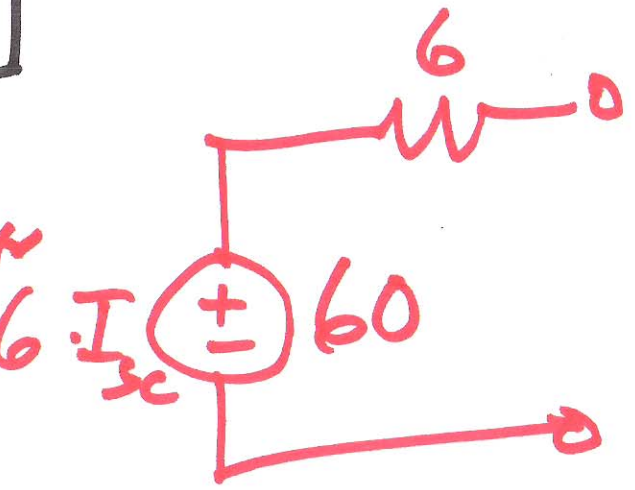
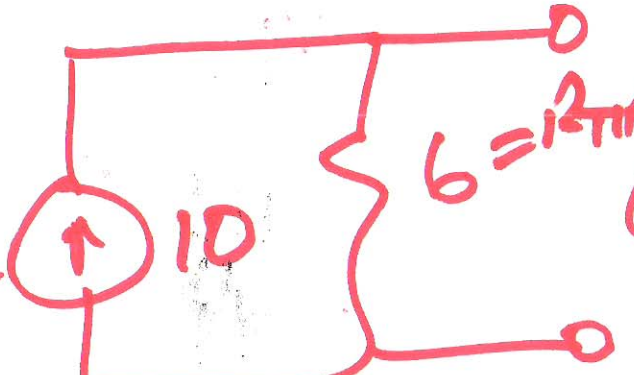
$I_{sc} \cdot R_{TH} = V_{oc}$

$I_{sc} + 2 = 12$

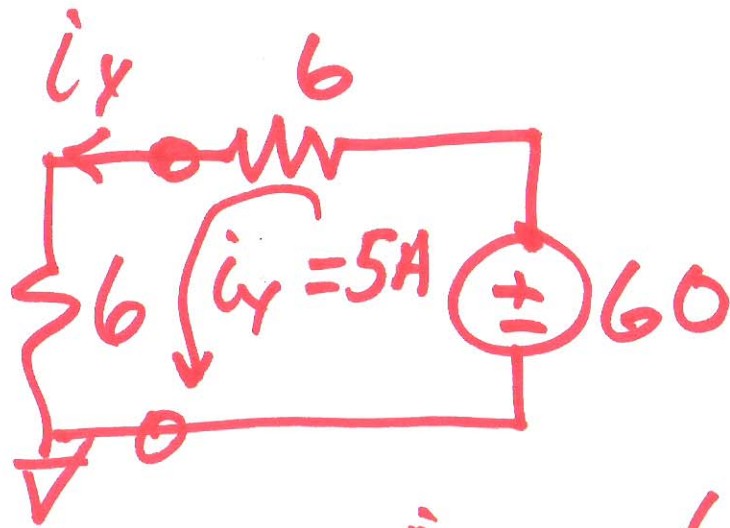
$I_{sc} = 10$



$\frac{V_{oc}}{R_{TH}} = I_{sc}$



14)



$$i_y = \frac{60}{12} = \underline{\underline{5A}}$$