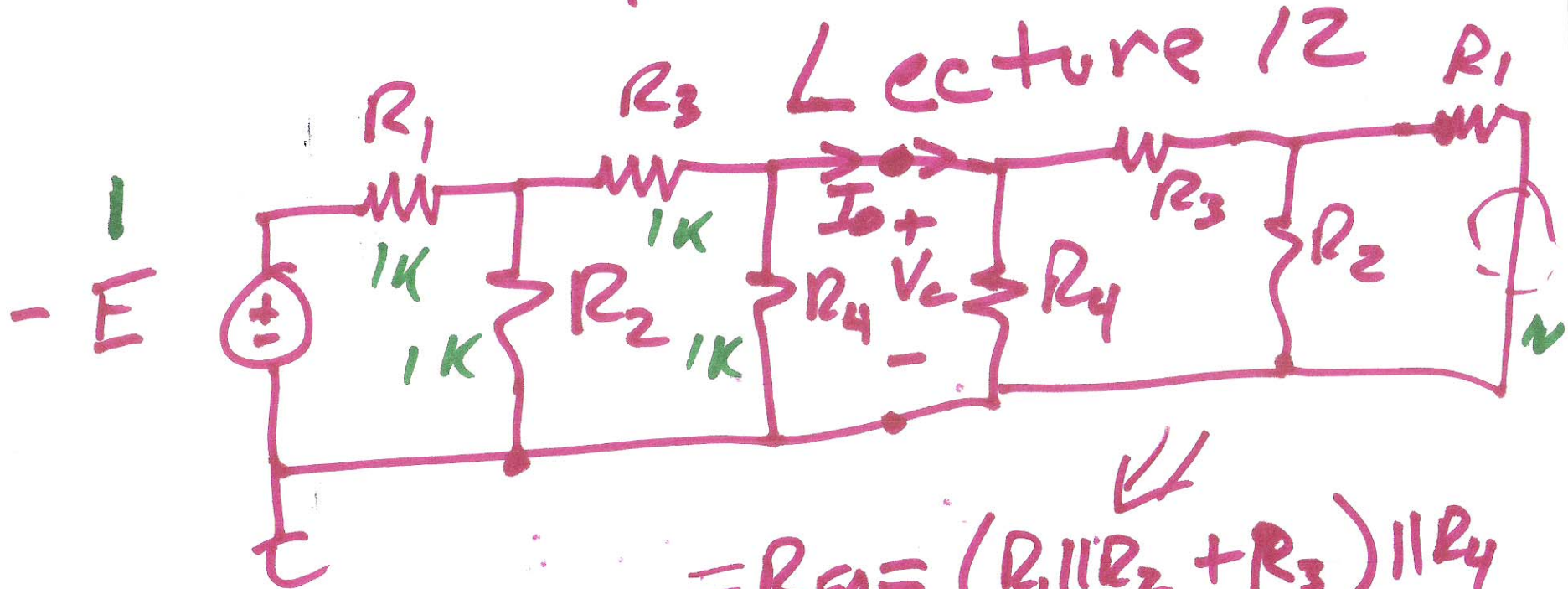
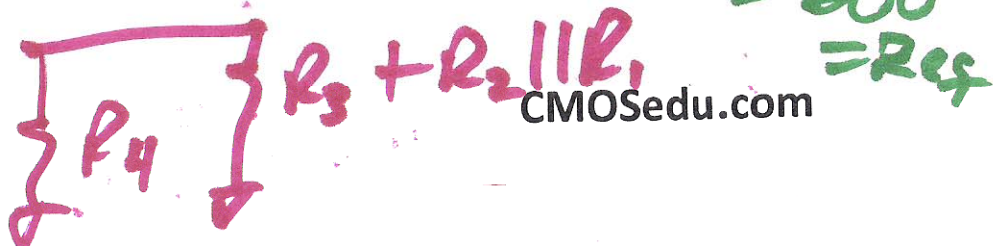


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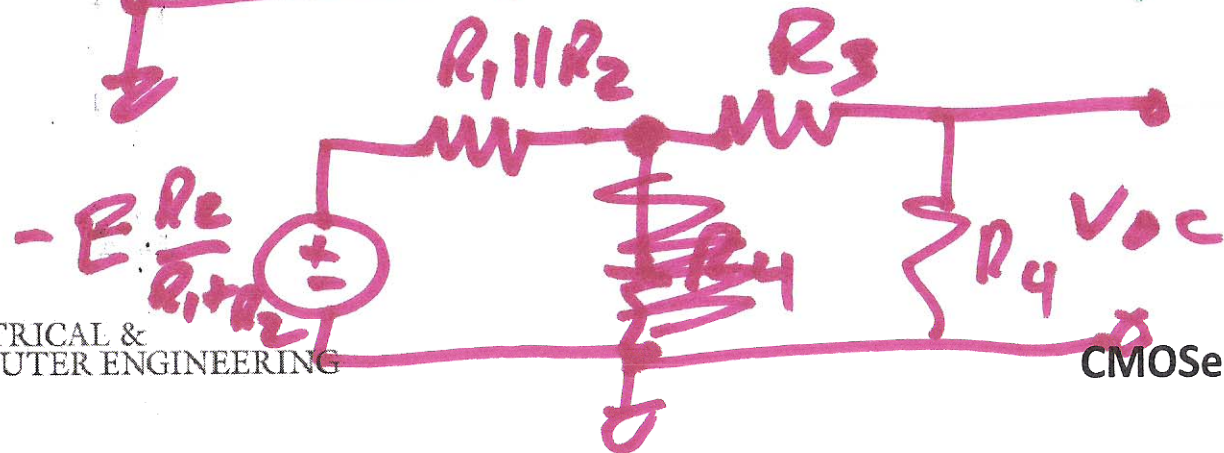
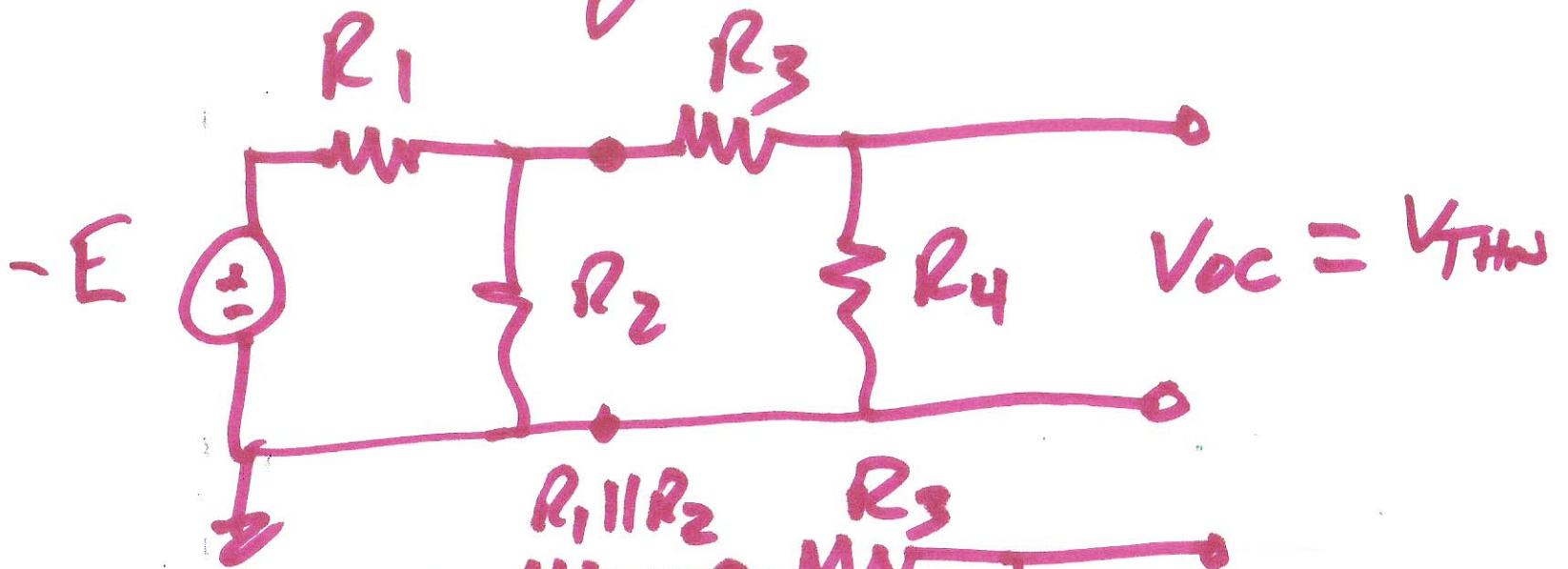
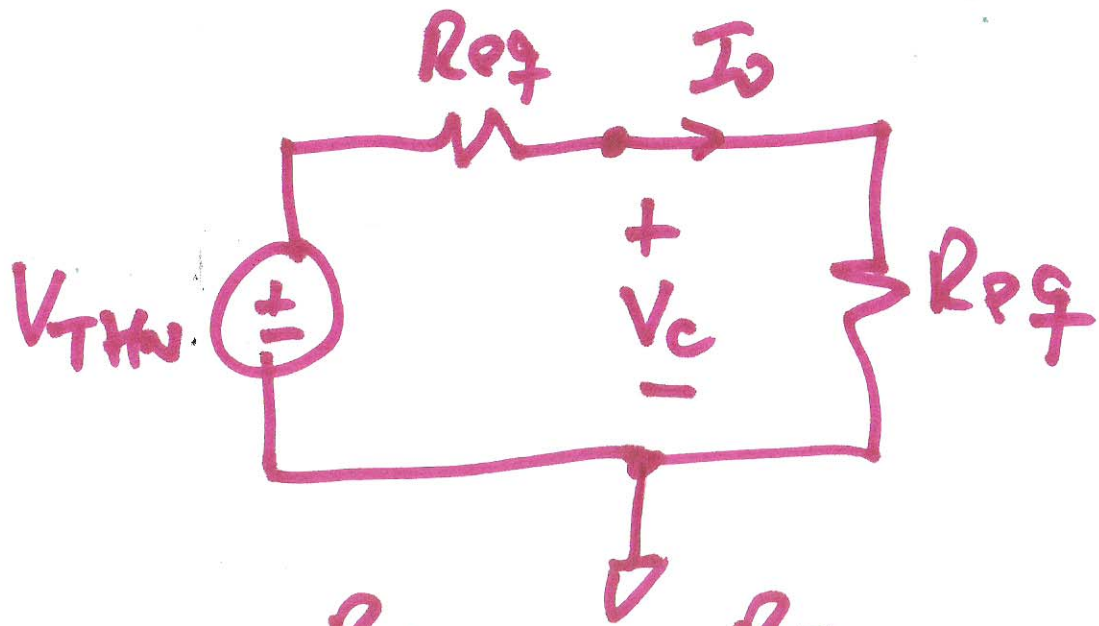
Lecture 12



$$= R_{eq} = (R_1 \parallel R_2 + R_3) \parallel R_4$$



1)



2)

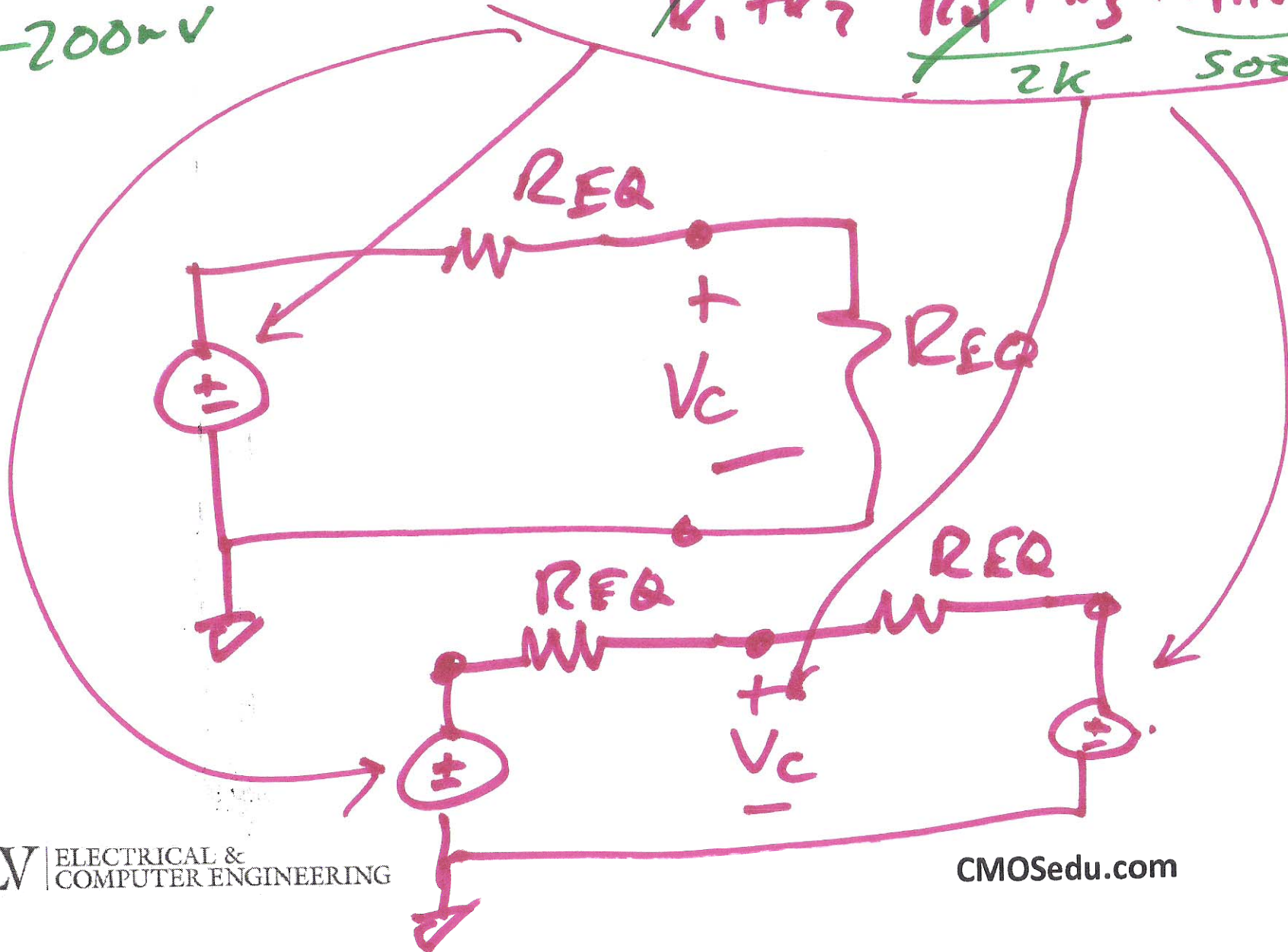
$$V_{oc} = V_{THN} = -E \cdot \frac{R_2}{R_1 + R_2} \cdot \frac{R_4}{R_4 + R_3 + R_1 \parallel R_2}$$

$\xrightarrow{-200mV}$

$\frac{1}{2}$

$1k \rightarrow \frac{200}{5}$

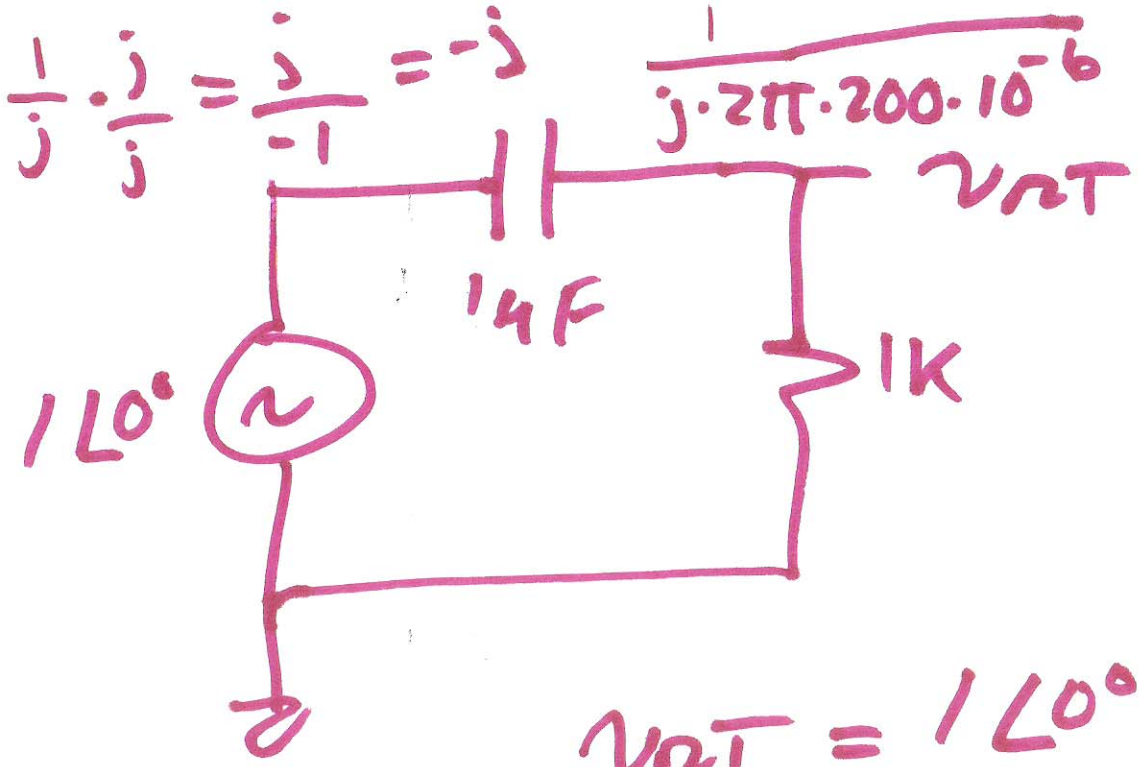
$\frac{2k}{500}$



3)

$$\frac{1}{j} = \frac{1}{j} \cdot \frac{j}{j} = \frac{j}{-1} = -j$$

$$\frac{1}{j \cdot 2\pi \cdot 200 \cdot 10^{-6}} = -j796$$



$$v_{RT} = 1\angle 0^\circ \cdot \frac{1K \angle 0^\circ}{1K + j \cdot 0 + 0 - j796}$$

$$\angle \tan^{-1} \left(\frac{-796}{1K} \right)$$

$$|1K + j0| = \sqrt{(1K)^2 + 0^2} = 1K$$

$$\angle \tan^{-1} -0.796 = \underline{\underline{-38.5^\circ}} \quad \angle \tan^{-1} \frac{0}{1K} = 0^\circ$$

$$\underline{\underline{1278.2}} = |1K + j(-796)| = \sqrt{(1K)^2 + (-796)^2} = 1278.2$$

4)

$$V_{RT} = 1 \angle 0^\circ \cdot \frac{1k \angle 0^\circ}{1278.2 \angle -38.5^\circ}$$

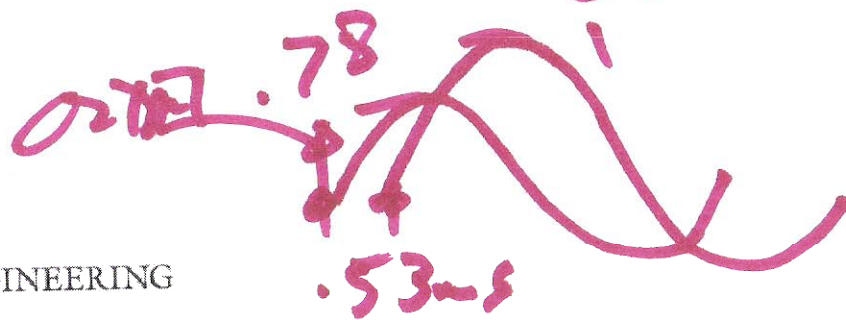
$$V_{in} = 1 \angle 0^\circ$$

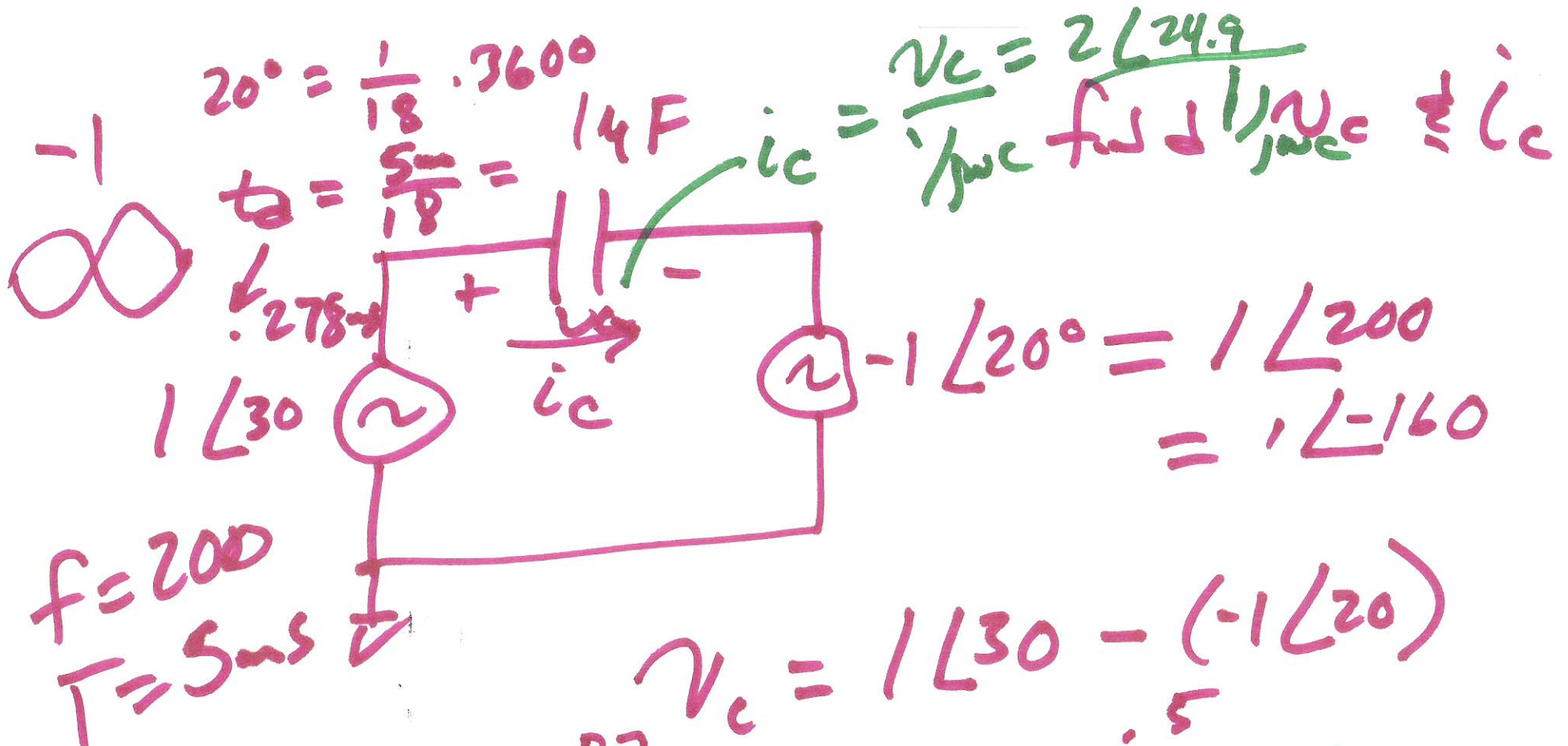
$$V_{RT} = .78 \angle +38.5^\circ = \frac{1 \cdot 1k}{1278.2} \angle (0 + 0 - (-38.5))$$

$$= 0.782 \angle +38.5^\circ$$

$$\theta = \frac{t_d}{T} \cdot 360, T = 5 \mu s$$

$$T = \frac{38.5}{360} \cdot 5 \mu s = .53 \mu s$$





$-1 \angle 20^\circ = 1 \angle 200^\circ$
 $= 1 \angle -160^\circ$

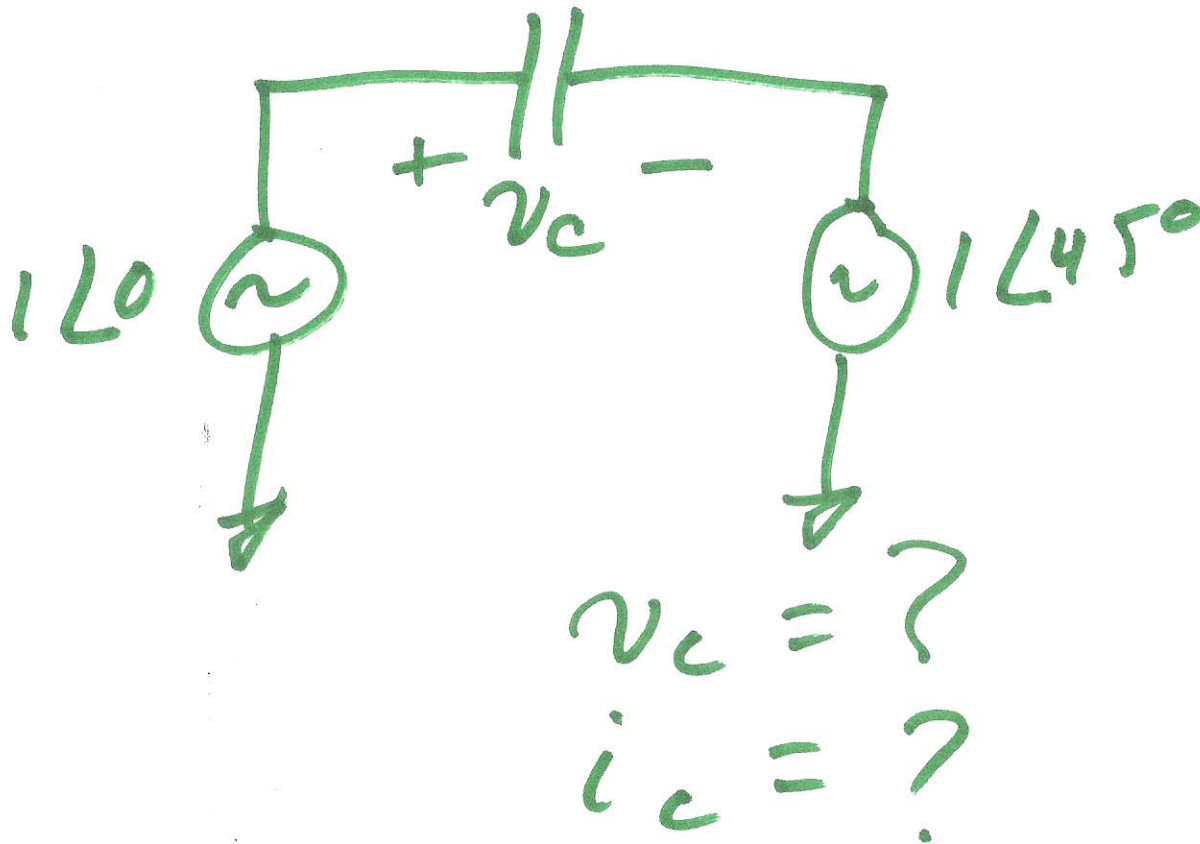
$V_c = 1 \angle 30^\circ - (-1 \angle 20^\circ)$

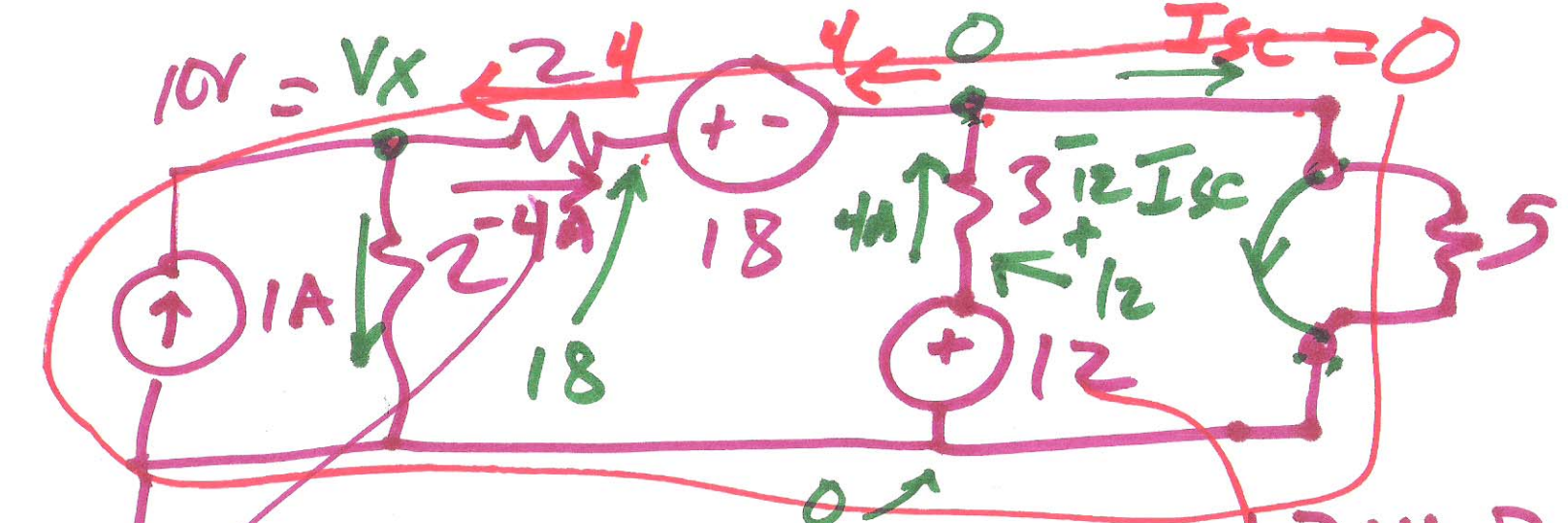
$V_c = 1 \cos 30^\circ + j 1 \sin 30^\circ + 1 \cos 20^\circ + j 1 \sin 20^\circ$

$30^\circ = \frac{1}{12} \cdot 360^\circ$
 $t_d = \frac{1}{12} \cdot 5\mu s = 0.416\mu s$

$= 1.81 + j \cdot 0.84$
 $= 2 \angle 24.9^\circ$

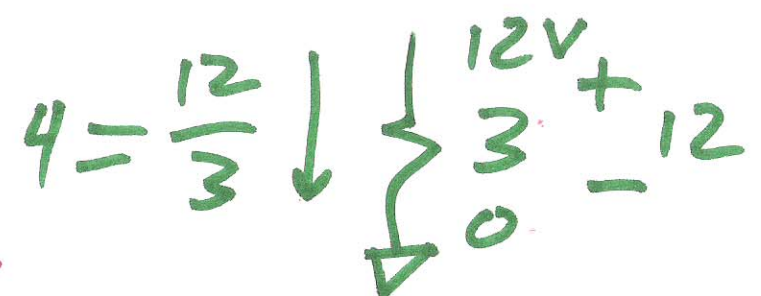
6)





$$R_{THN} = 3 \parallel 18 = 1.714 \Omega$$

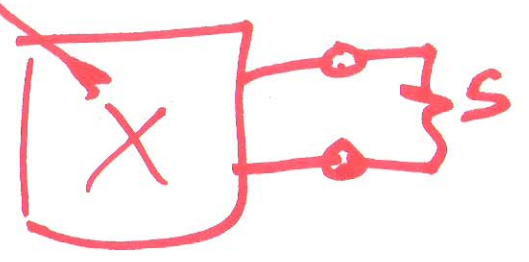
$$\frac{10 - 18}{2} = -4A$$



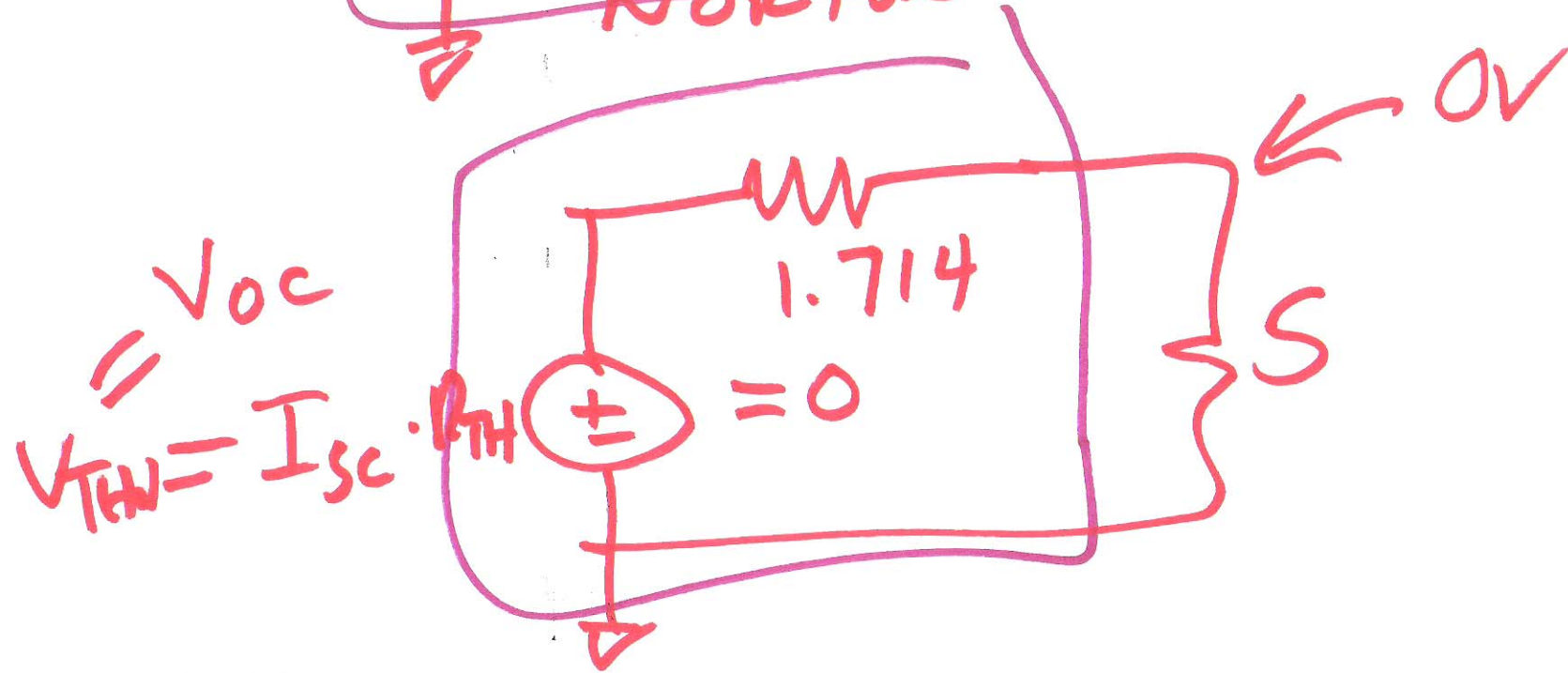
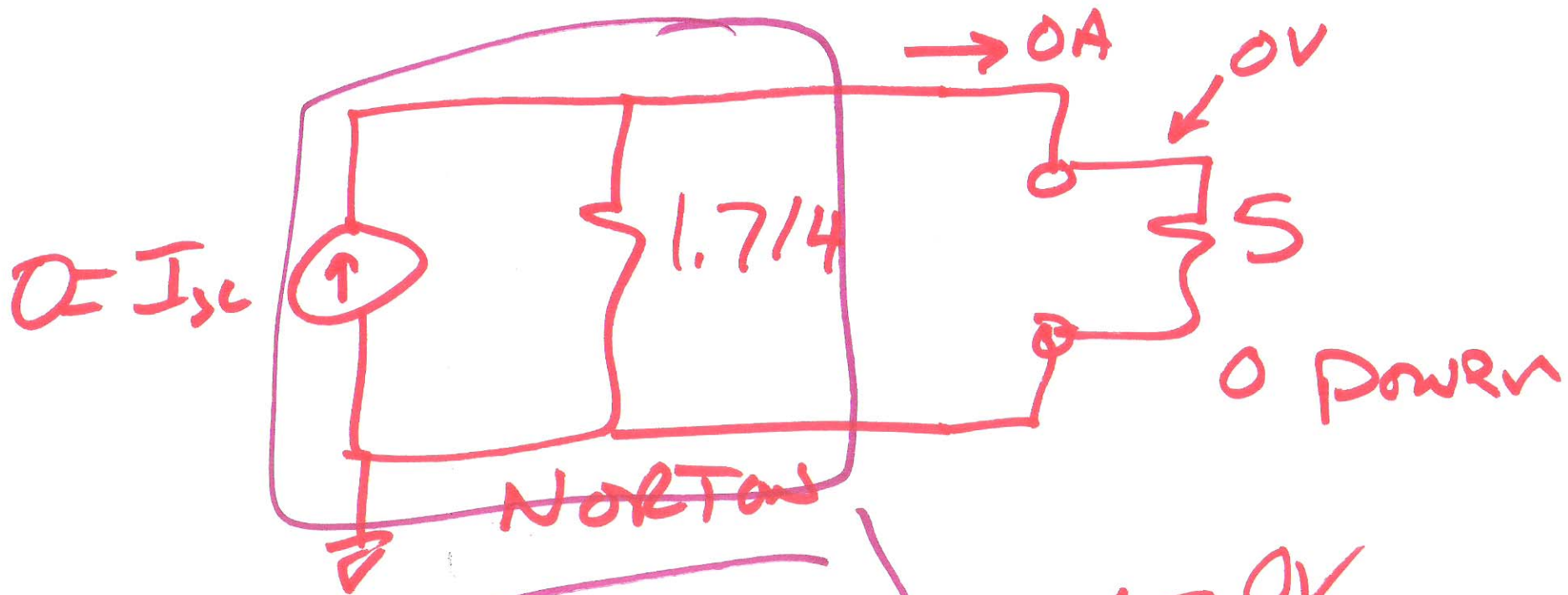
$$\frac{V_x}{2} + \frac{V_x - 18}{2} = 1A$$

$$2V_x - 18 = 2$$

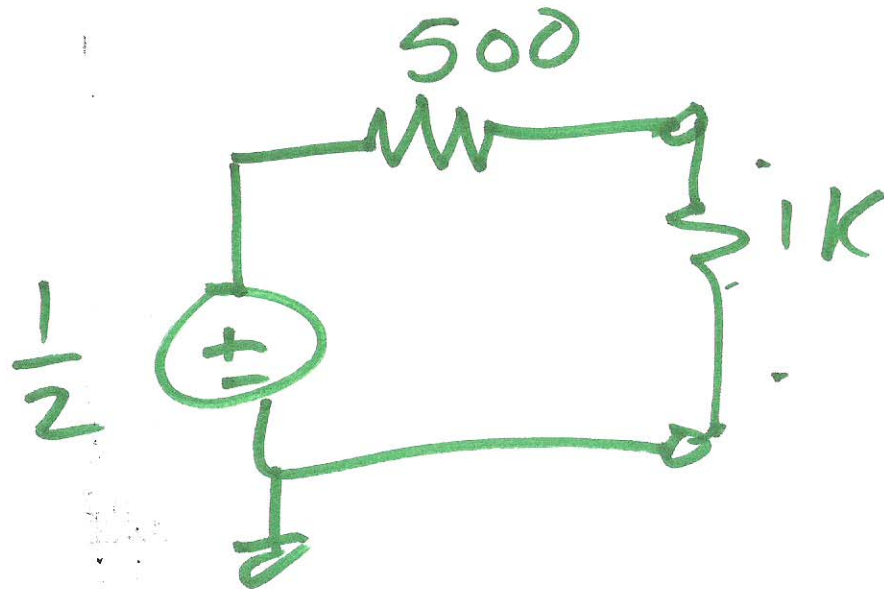
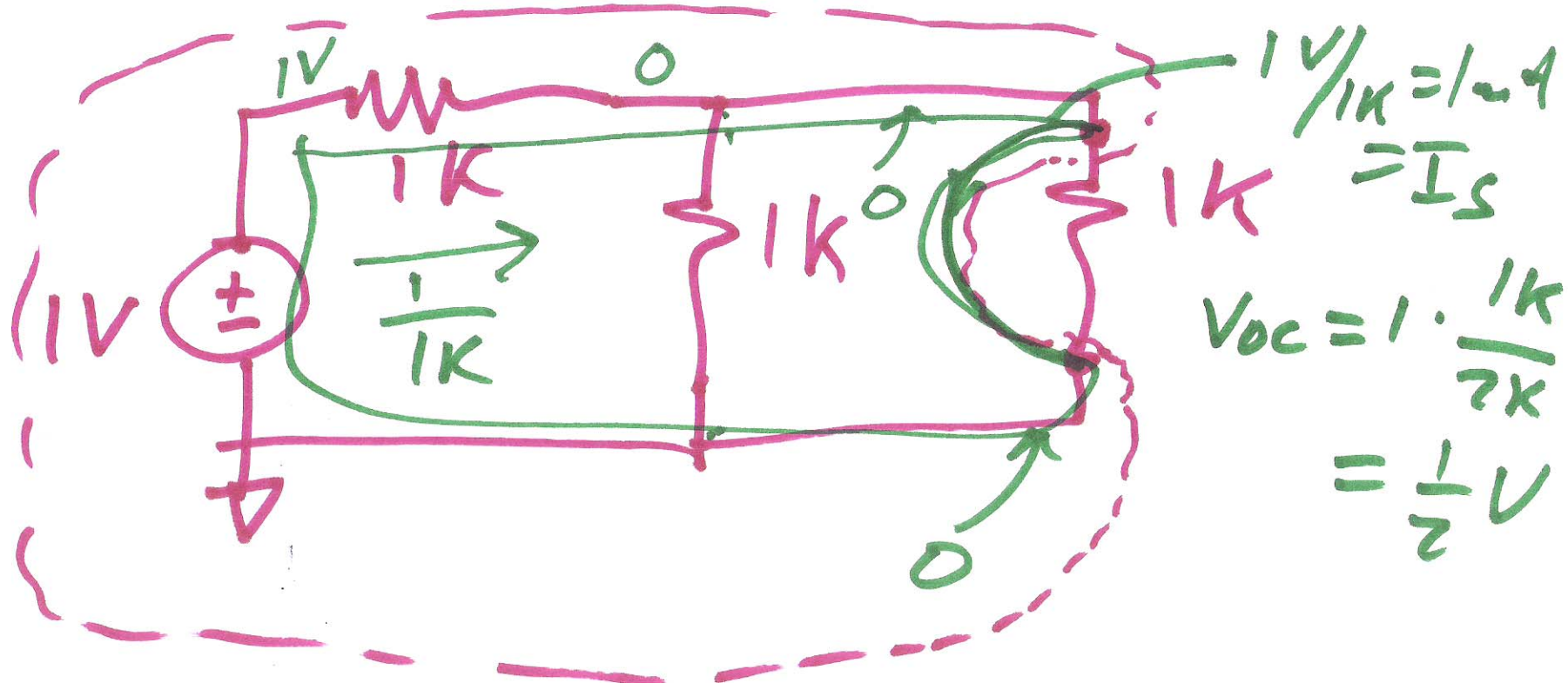
$$V_x = 10V$$



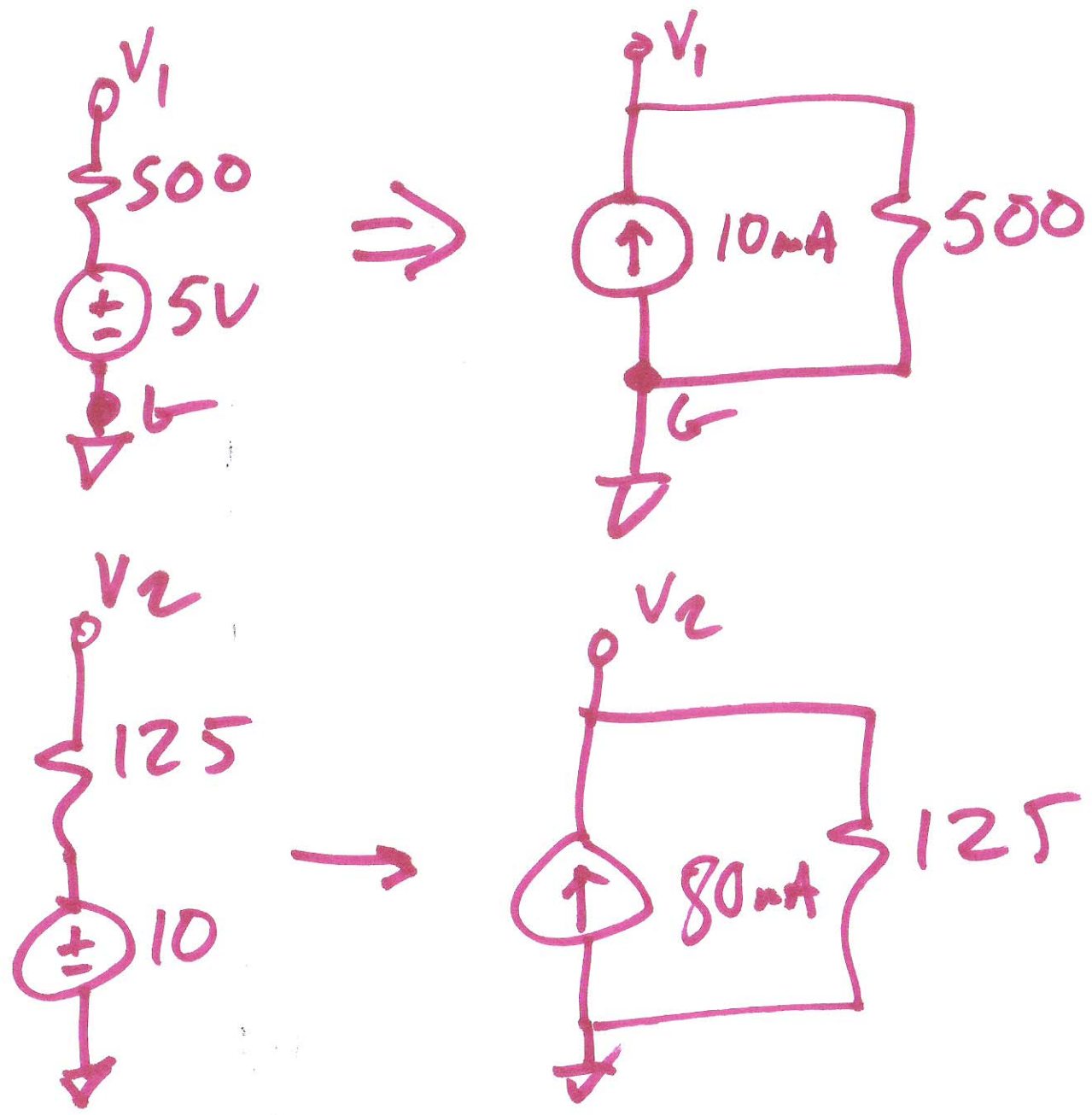
8)



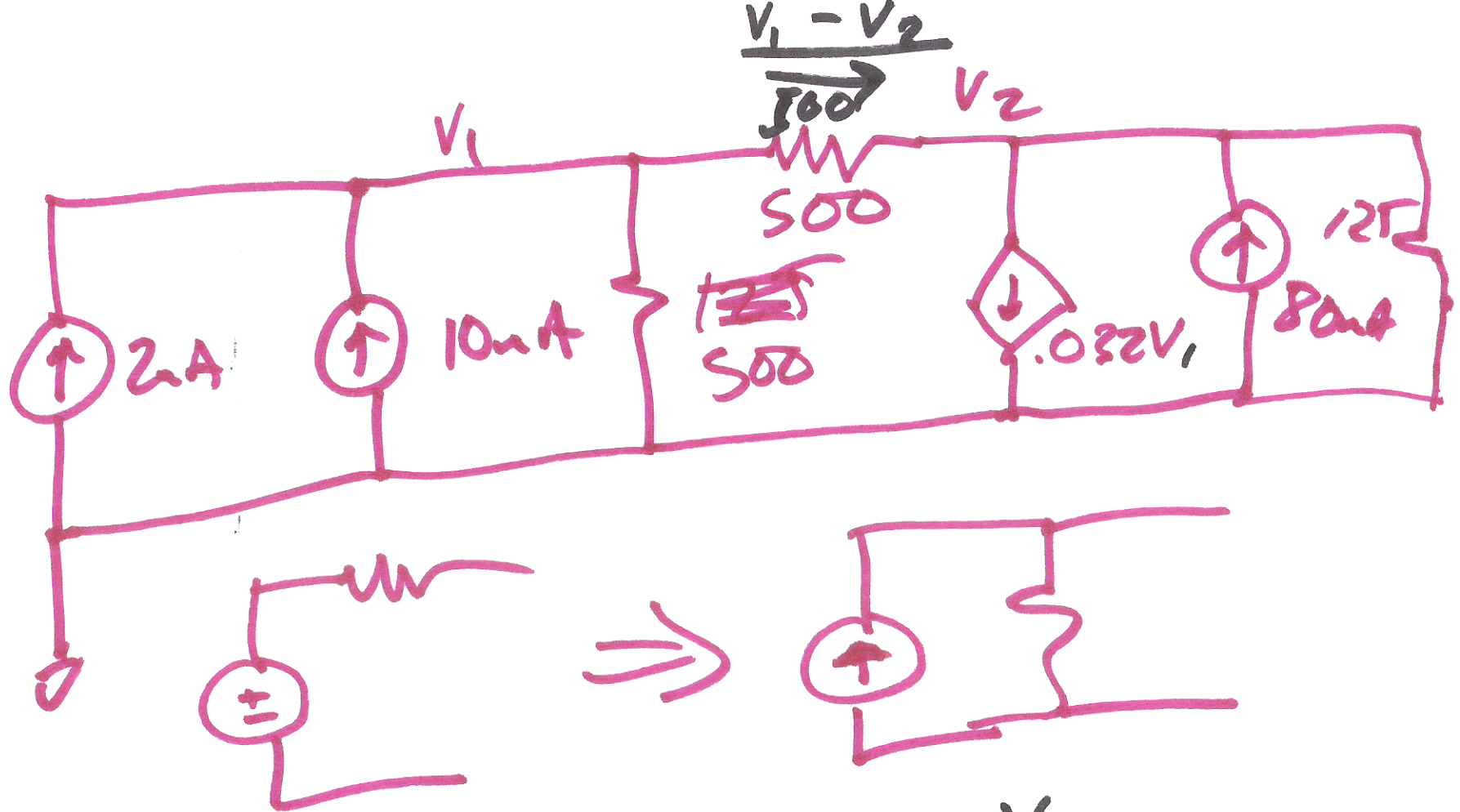
9)



25.

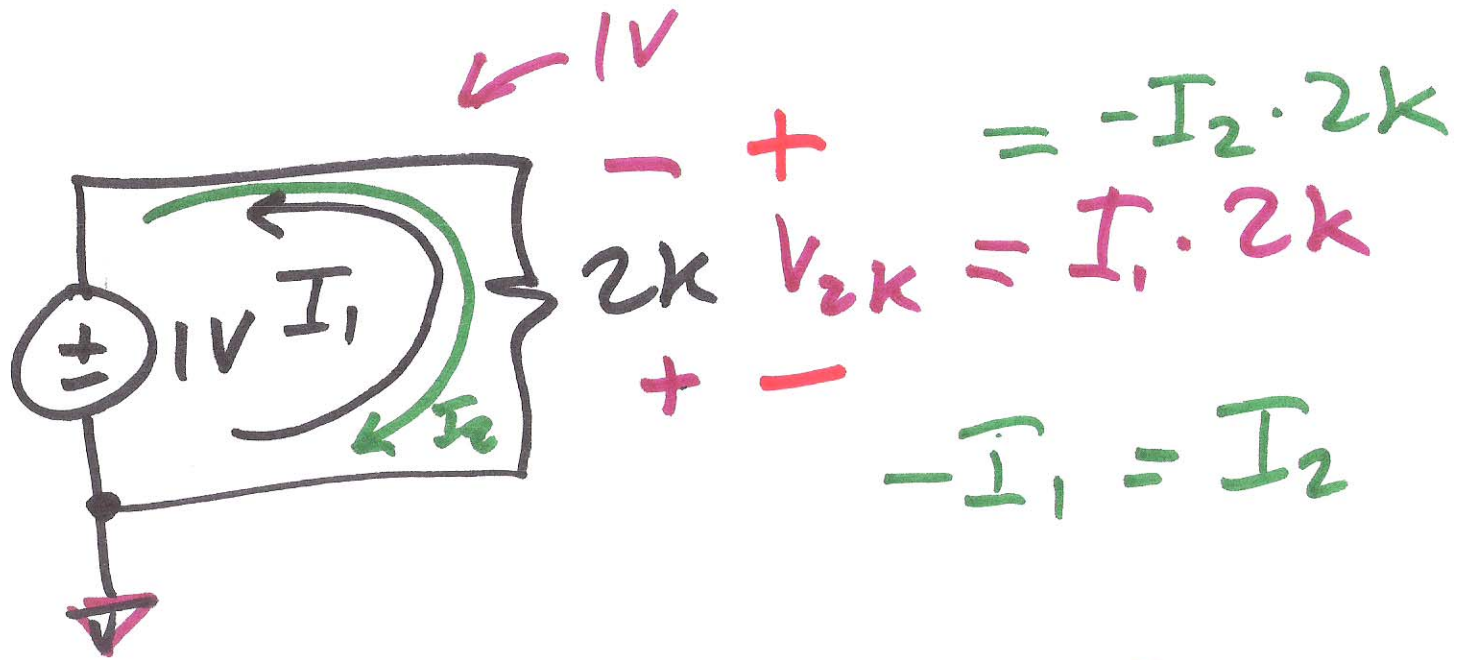


11)



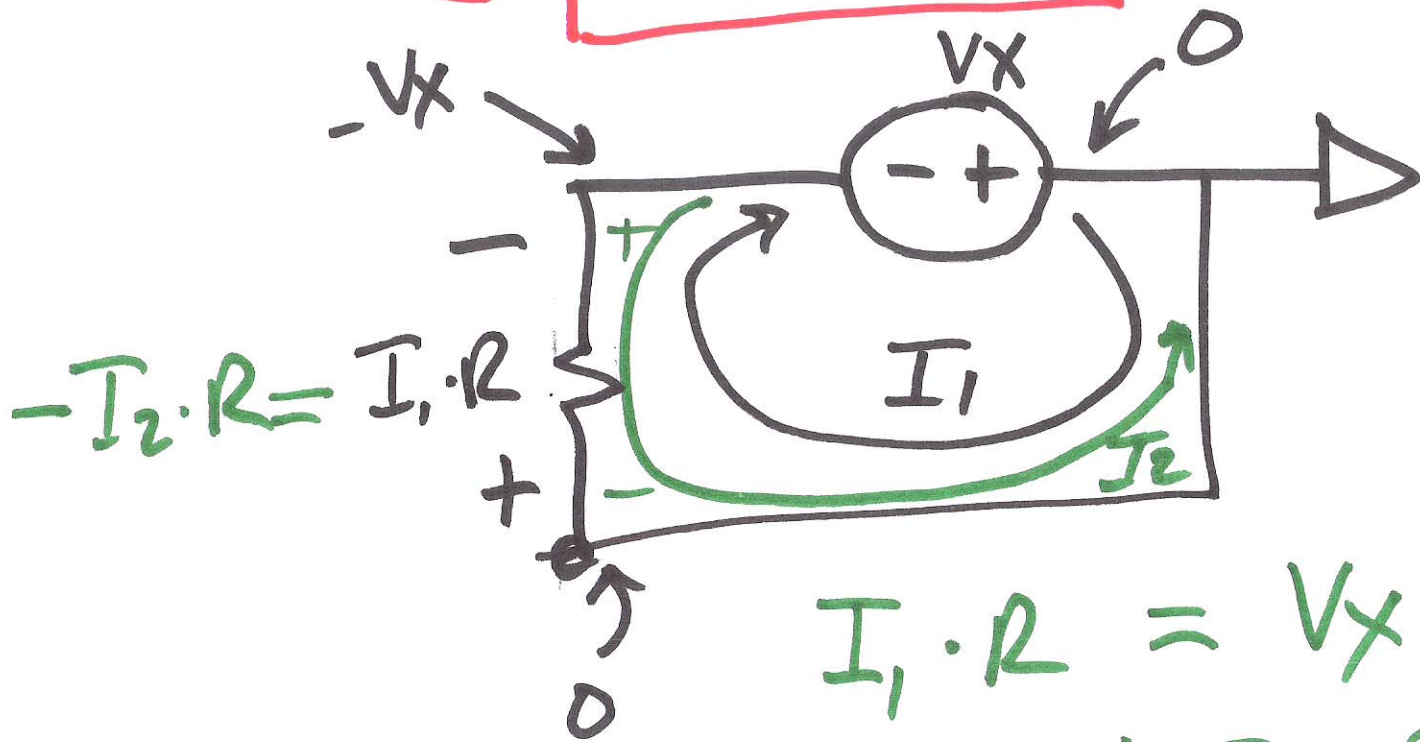
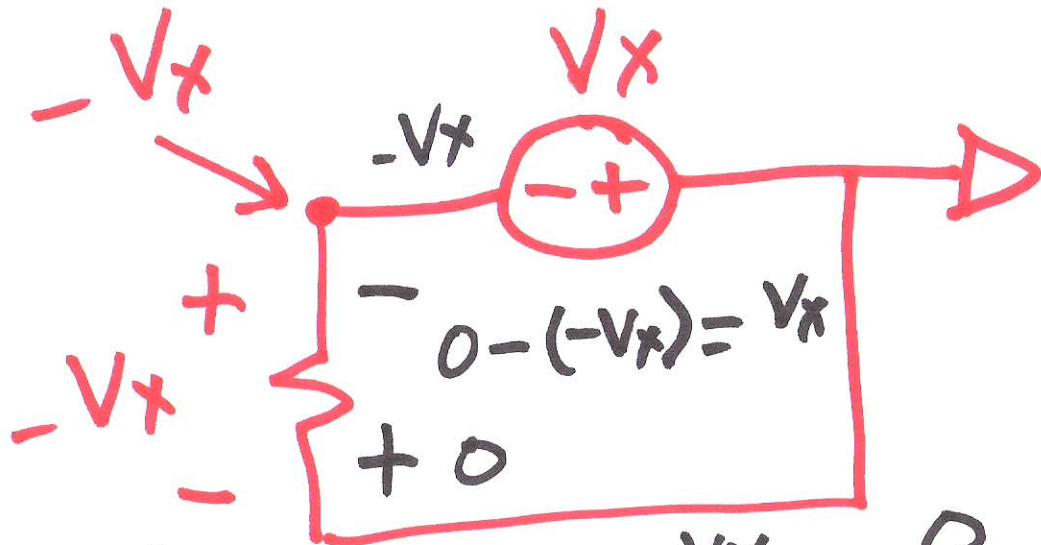
$$12\mu\text{A} = \frac{V_1}{500} + \frac{V_1 - V_2}{500}$$

$$\frac{V_1 - V_2}{500} + 80\mu\text{A} = .032V_1 + \frac{V_2}{125}$$



$$\begin{aligned}
 & - + = -I_2 \cdot 2k \\
 & 2k \quad V_{2k} = I_1 \cdot 2k \\
 & + - \\
 & -I_1 = I_2
 \end{aligned}$$

$$\begin{aligned}
 V_{2k} &= I_2 \cdot 2k \\
 &= -I_1 \cdot 2k
 \end{aligned}$$



$$I_1 \cdot R = V_x$$

$$V_x + I_2 \cdot R = 0$$

14)