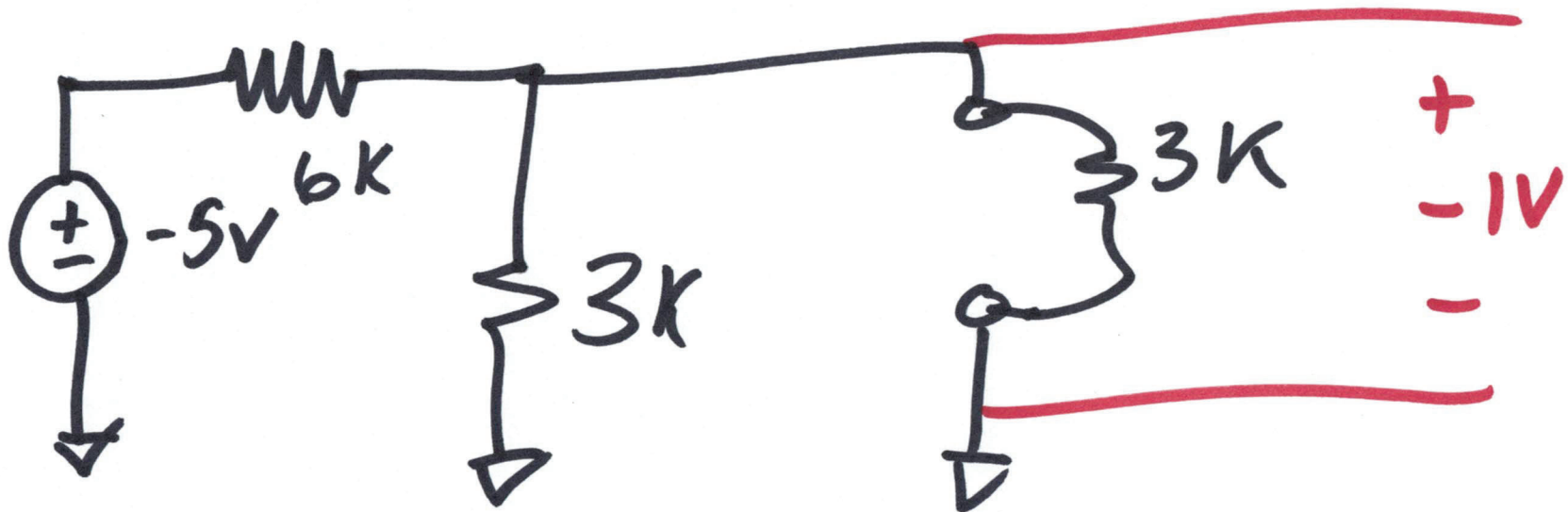


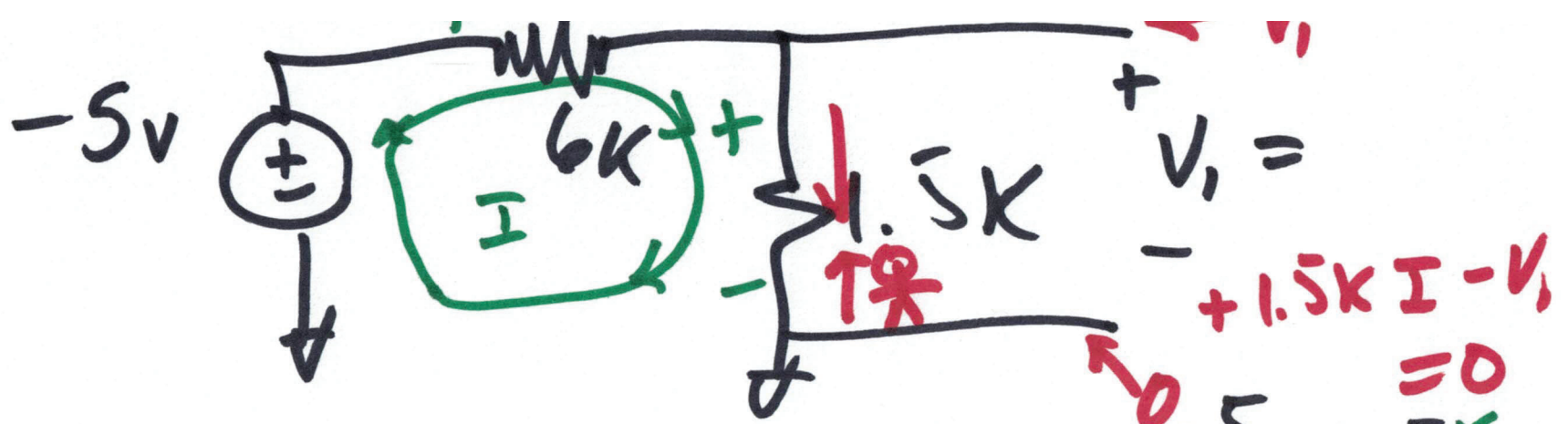
EE 220 Circuits 1

Sept. 15, 2021

Lecture 7,



1)



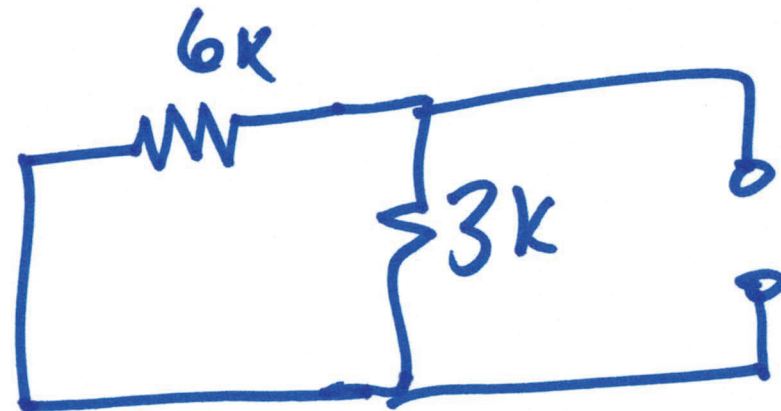
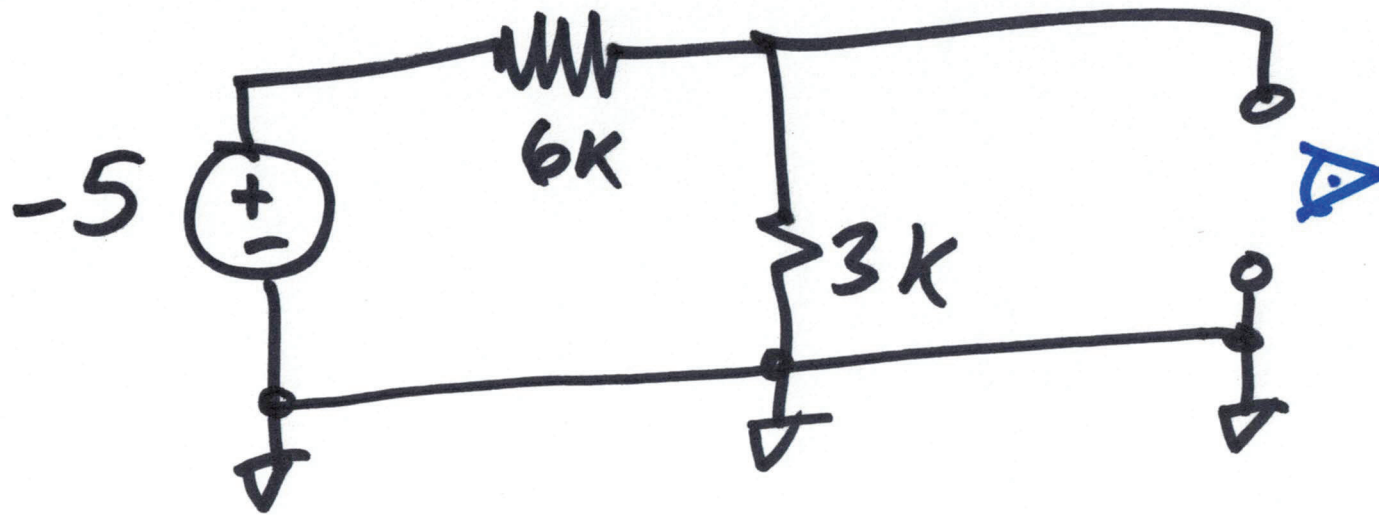
$$V_1 = -5 \cdot \frac{1.5k}{1.5k + 6k} = \frac{-5 \cdot 1.5k}{7.5k}$$

$$V_1 = -5 \cdot \frac{1}{5} = \underline{\underline{-1V}}$$

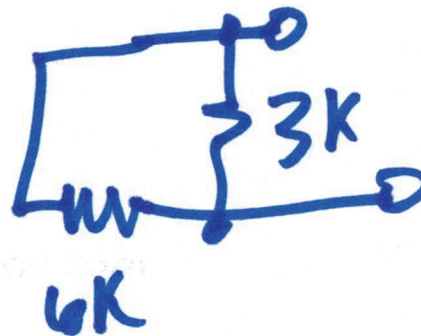
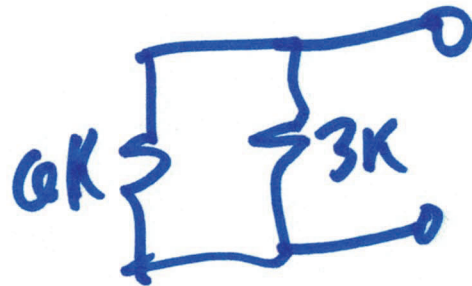
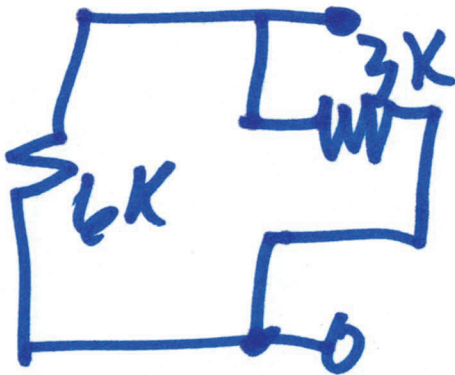
$$+(-5) - 6kI - 1.5kI = 0$$

$$I = \frac{-5}{7.5k}$$

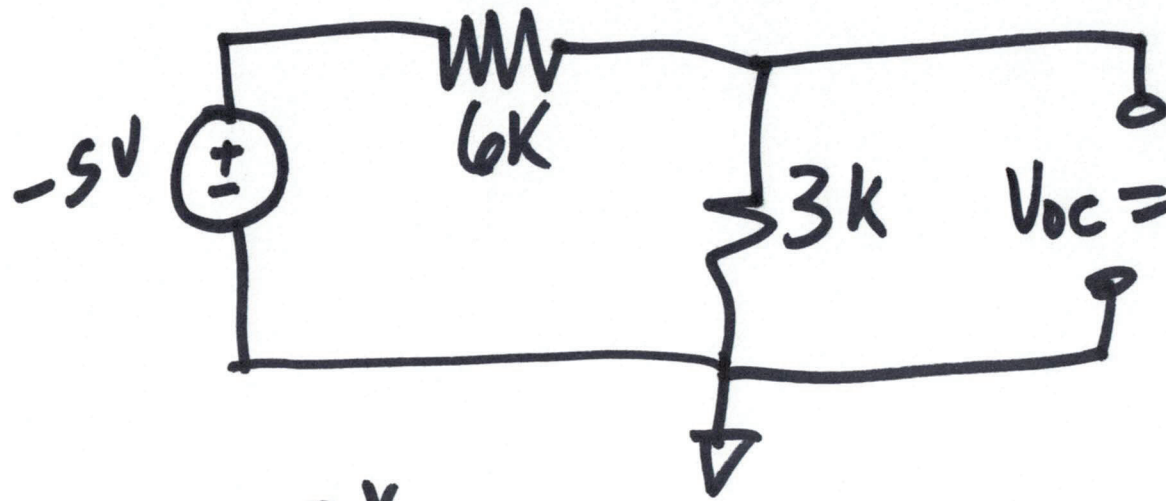
$$V_1 = 1.5k \cdot I = -5 \cdot \frac{1.5k}{7.5k}$$



$$\begin{aligned}
 R_{TH} &= 3k \parallel 6k \\
 &= \frac{3 \cdot 6}{3 + 6} k \\
 &= \underline{\underline{2k}}
 \end{aligned}$$

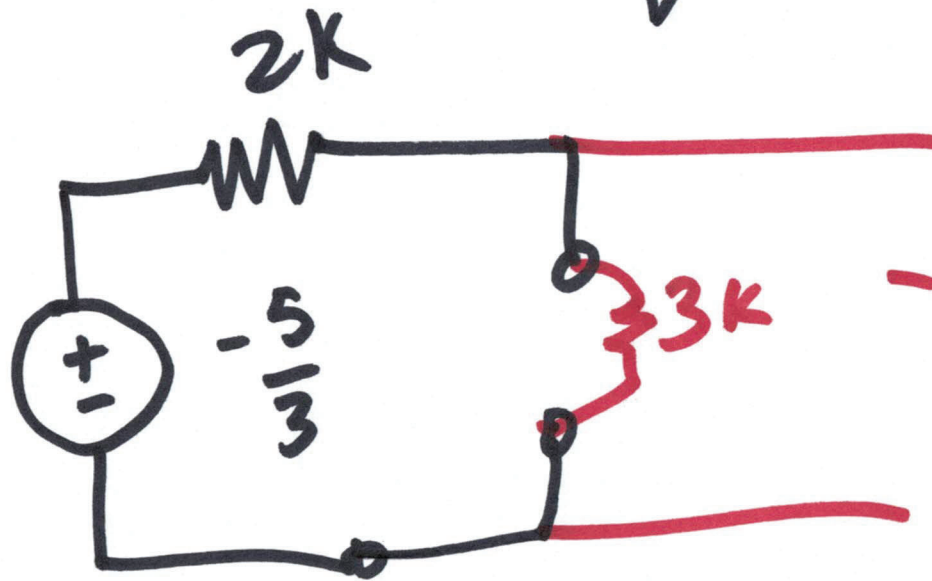


3)



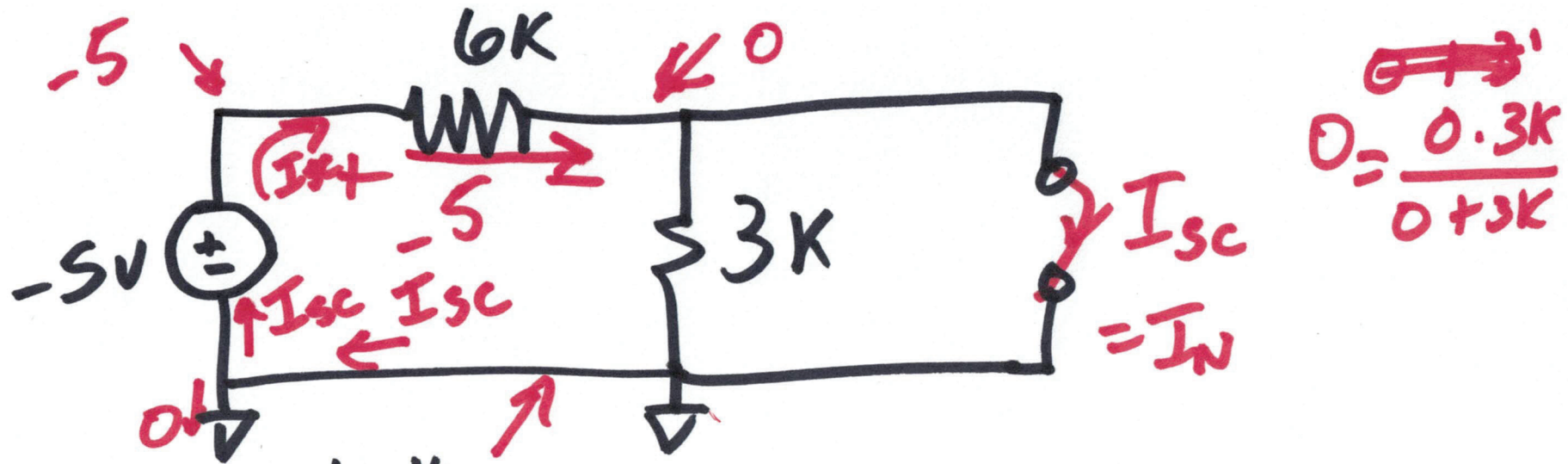
$$V_{OC} = V_{TH} = -5 \cdot \frac{3}{6+3}$$

$$= -\frac{15}{9} = -\frac{5}{3}$$



$$-\frac{5}{3} \cdot \frac{3k}{3k+2k} = \underline{\underline{-1V}}$$

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Ckt

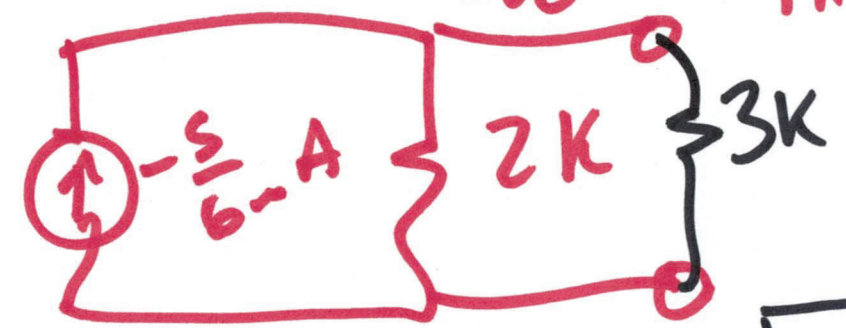


$$D = \frac{0.3k}{0 + 3k}$$

$$\frac{2 \cdot 3}{2 + 3} = \frac{6}{5} k\Omega = 1.2k\Omega$$

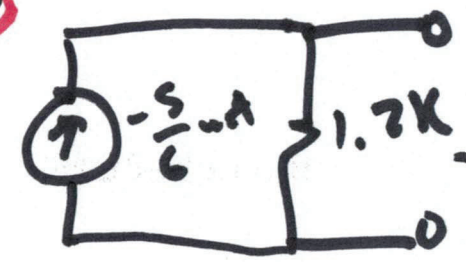
$$I_{sc} = \frac{-5 - 0}{6k} = -\frac{5}{6} mA$$

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



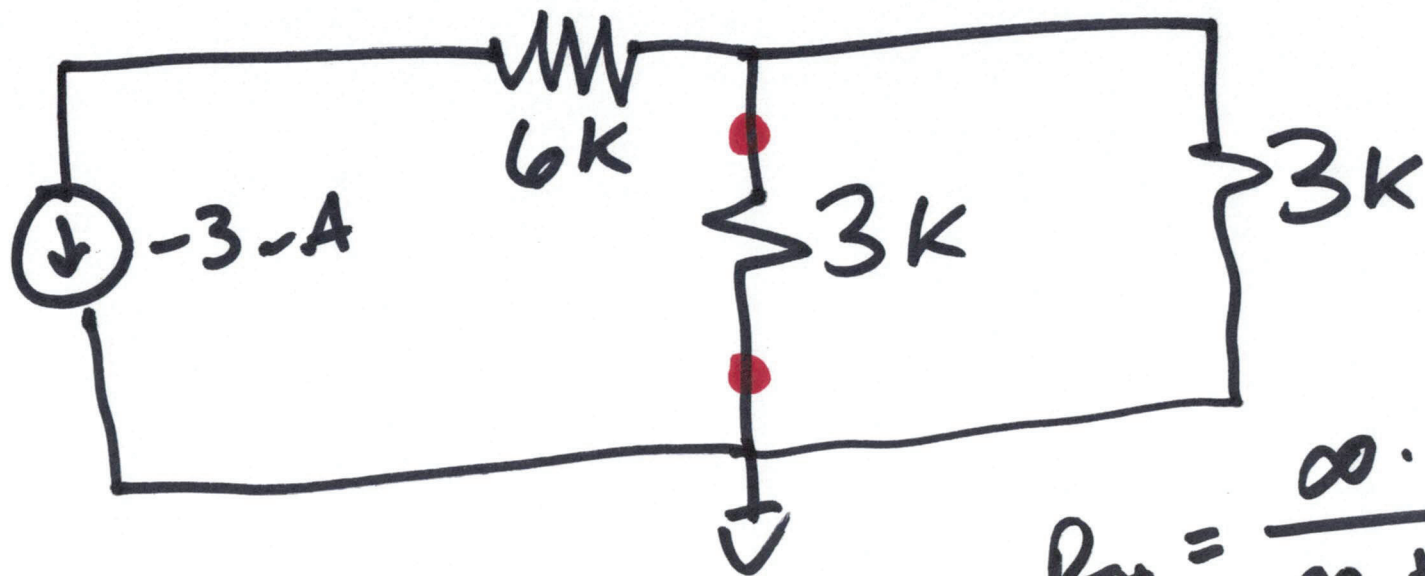
$$= 2k \cdot -\frac{5}{6} mA = -\frac{10}{6}$$

$$V_{TH} = -\frac{5}{3} V$$



$$1.2k \cdot -\frac{5}{6} mA = -1V$$

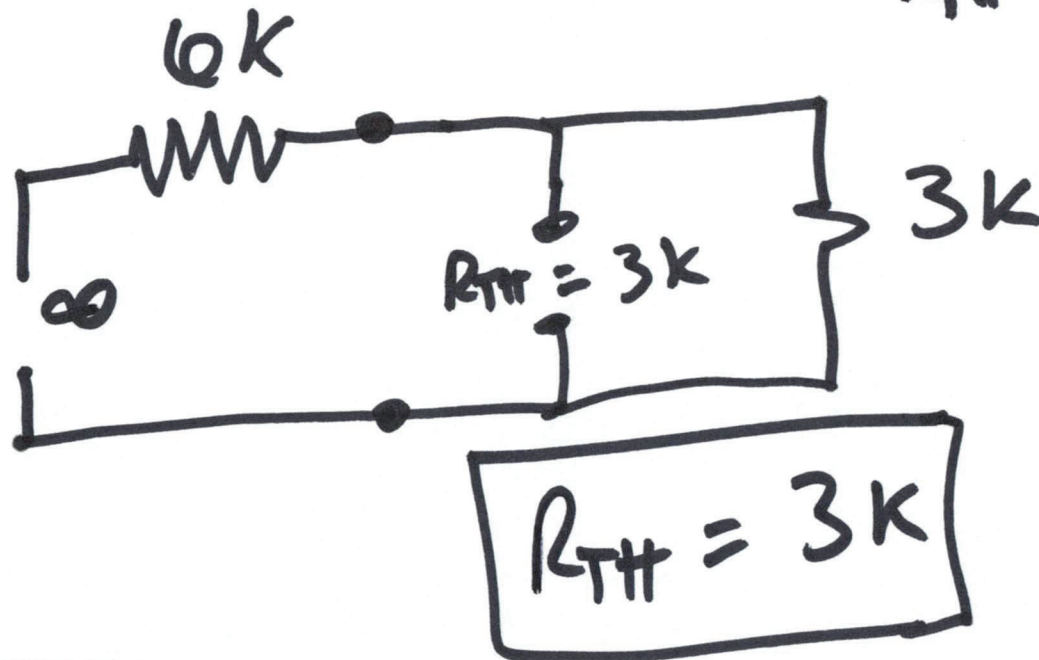
5)



$$R_{TH} = \frac{\infty \cdot 3k}{\infty + 3k}$$

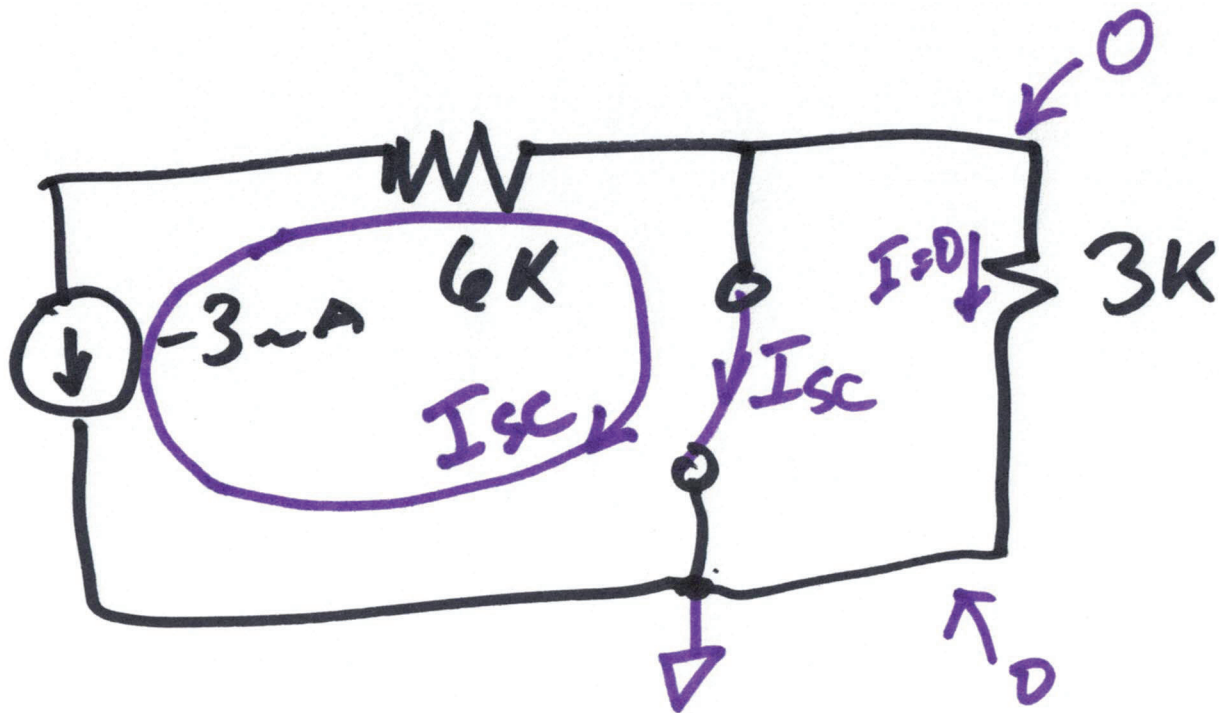
$$= \frac{3k}{1 + \frac{3k}{\infty}}$$

$$= 3k$$



$$R_{TH} = 3k$$

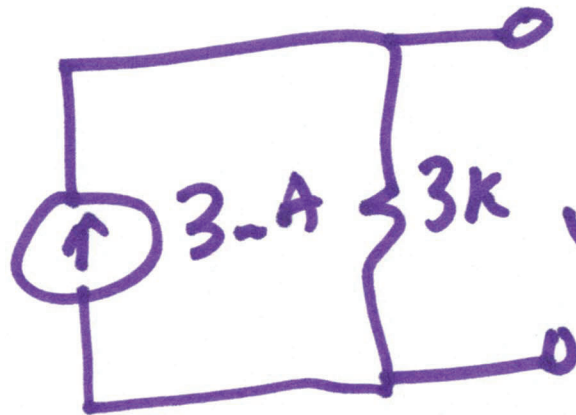
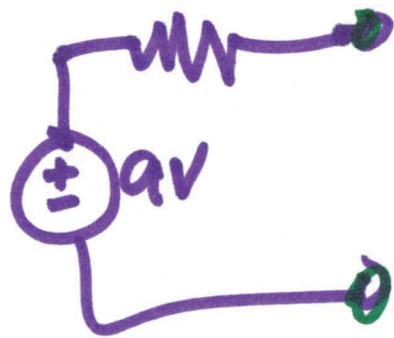
6)



$$R_{TH} = 3k$$

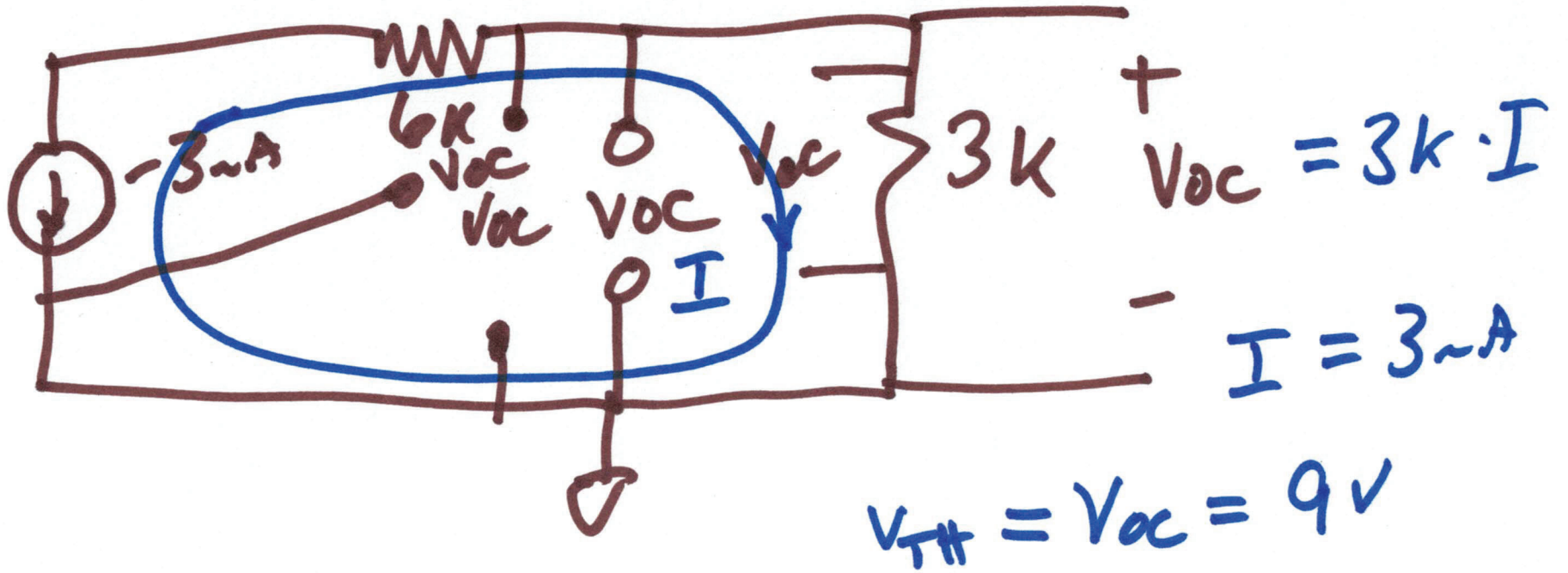
$$I_{sc} = 3A$$

$$V_{oc} = I_{sc} \cdot R_{TH} = 3A \cdot 3k$$

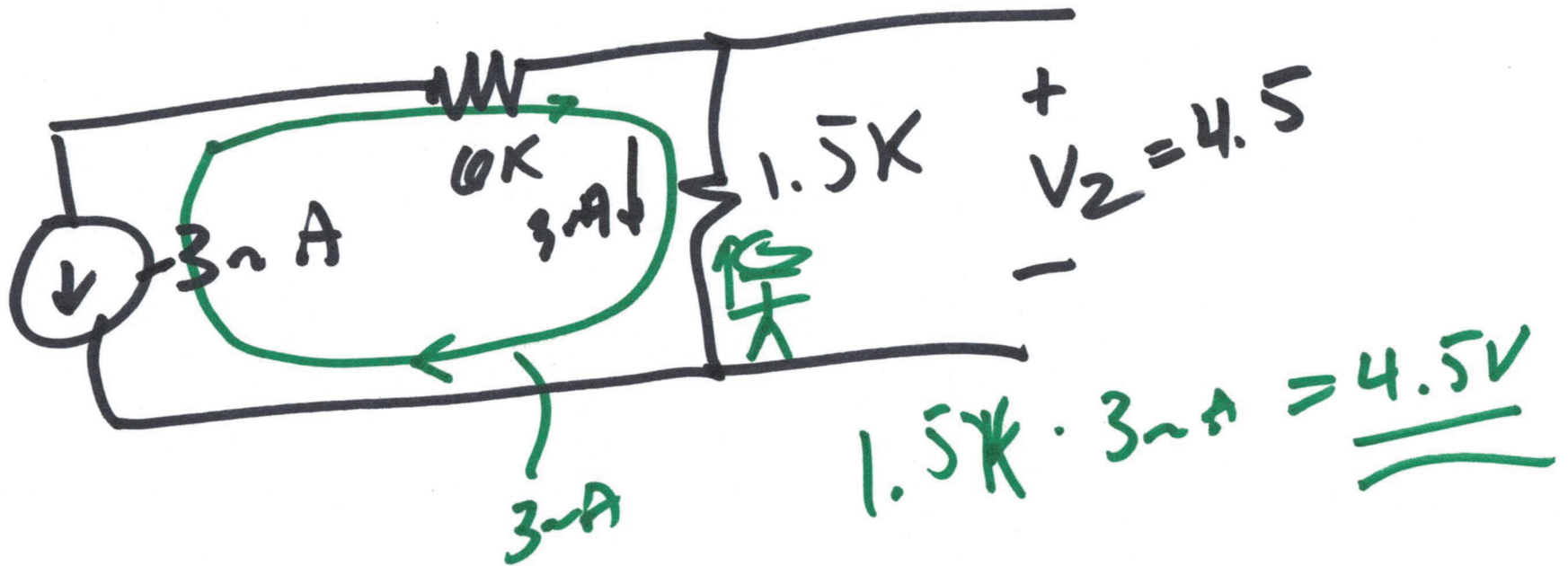
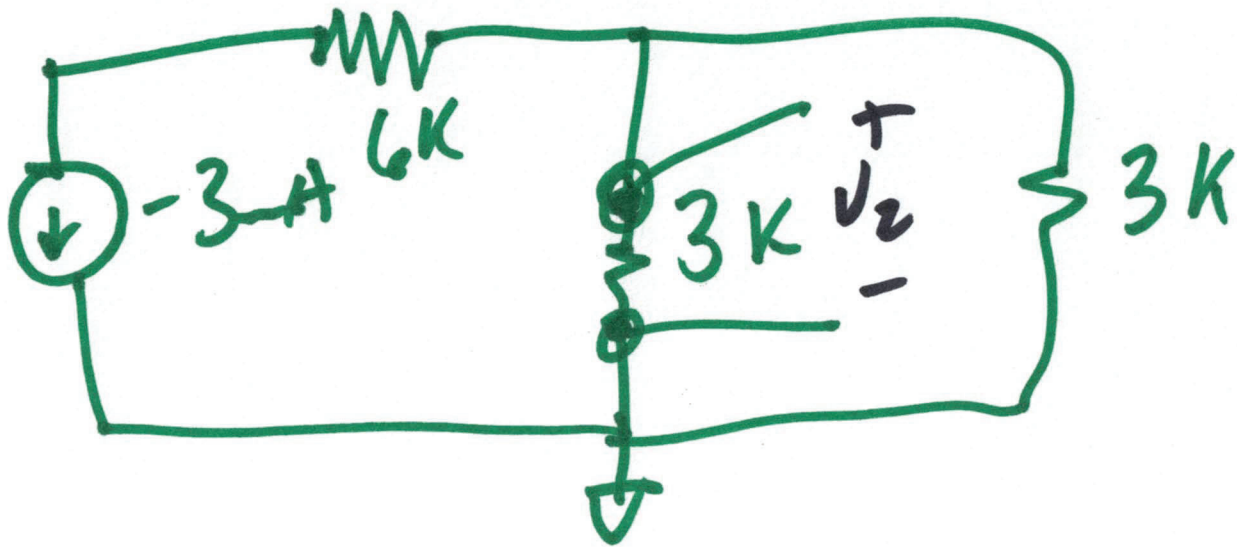


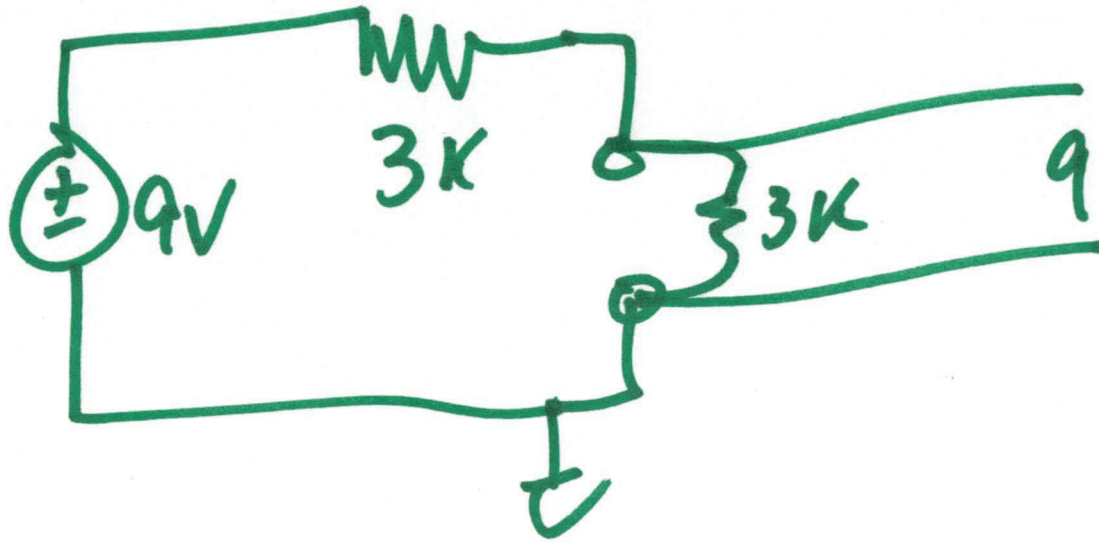
$$V_{TH} = V_{oc} = 9V$$

7)

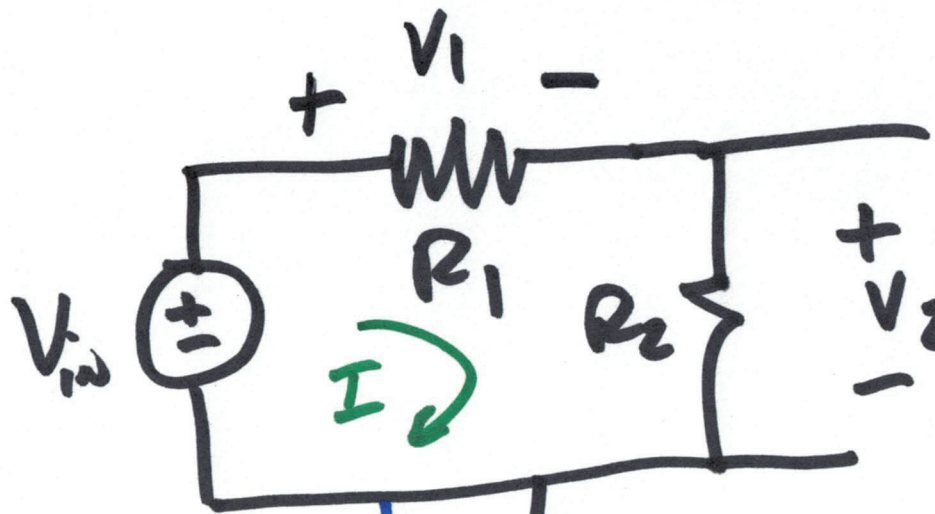


8)





$$9 \cdot \frac{3K}{3K+3K} = \underline{\underline{4.5V}}$$



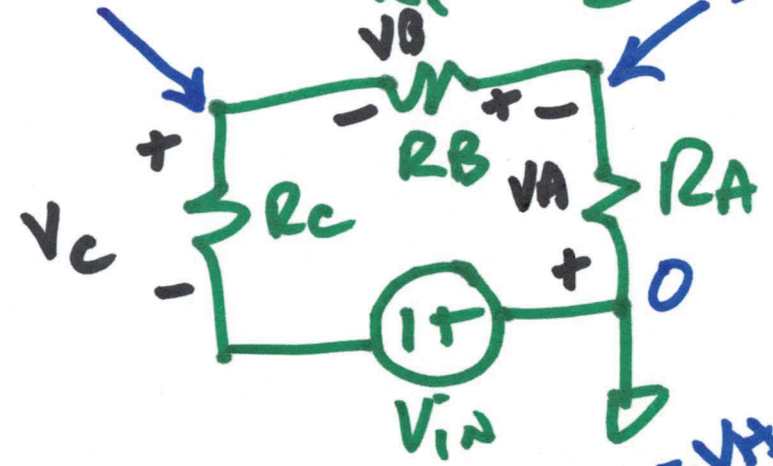
$$V_2 = V_{in} \cdot \frac{R_2}{R_1 + R_2}$$

$$-V_A - V_B = V_{in} + V_C$$

$$V_1 = V_{in} \cdot \frac{R_1}{R_1 + R_2}$$

$$I = \frac{V_{in}}{R_1 + R_2}$$

$$0 - (-V_A) = V_A$$



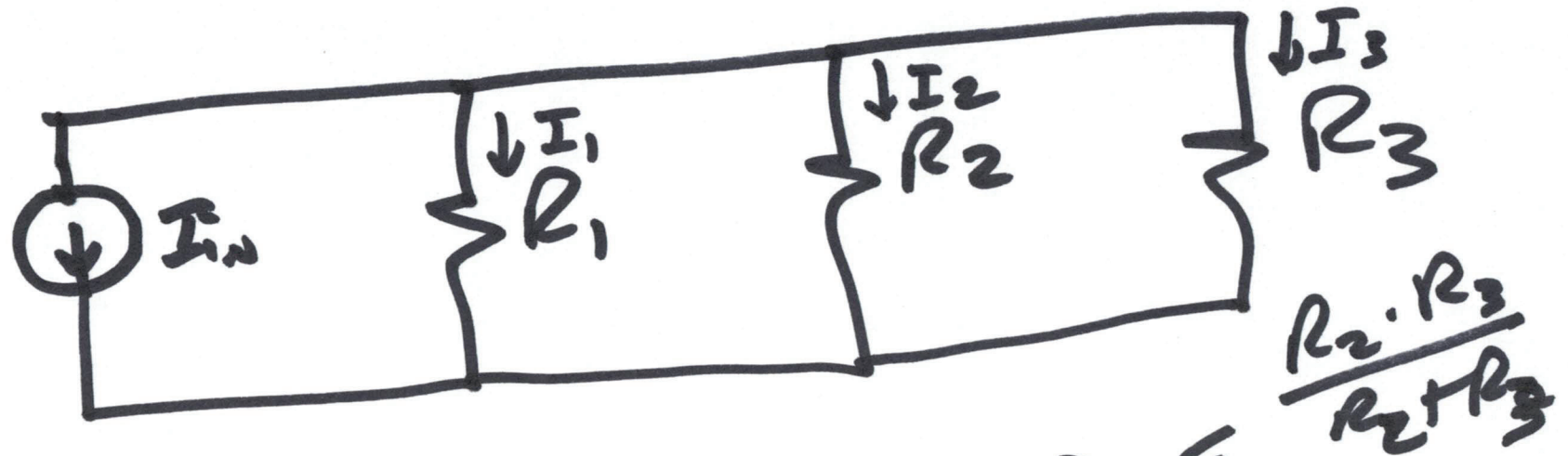
$$V_A = V_{in} \cdot \frac{R_A}{R_A + R_B + R_C}$$

$$V_{in} = V_A + V_B + V_C$$

$$V_B = V_{in} \cdot \frac{R_B}{R_A + R_B + R_C}$$

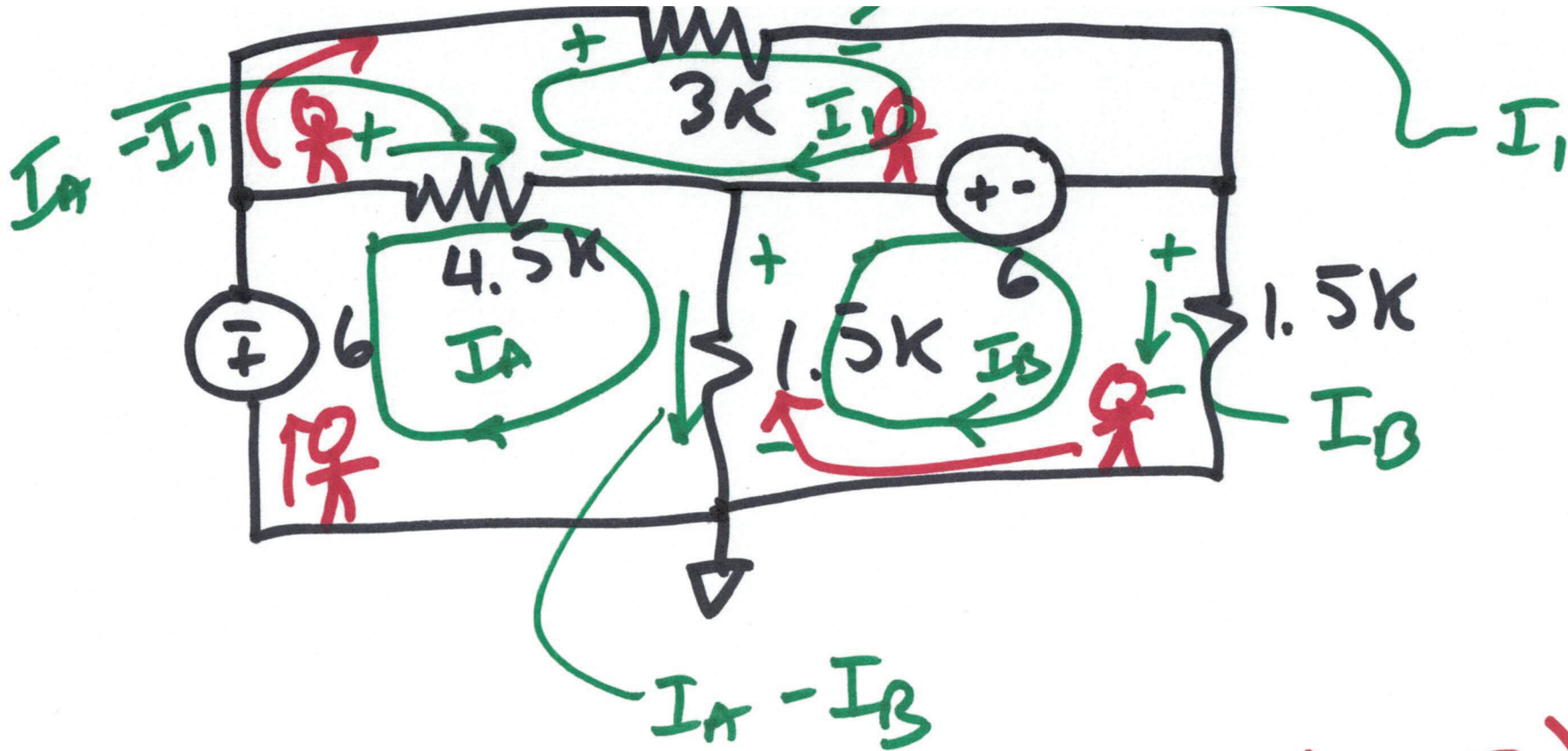
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CURRENT divider



$$I_1 = -I_{in} \cdot \frac{R_2 \parallel R_3}{R_1 + R_2 + R_3}$$

$$I_3 = -I_{in} \cdot \frac{R_1 \parallel R_2}{R_1 + R_2 + R_3}$$



$$\begin{aligned}
 -6 - 4.5k(I_A - I_1) - 1.5k(I_A - I_B) &= 0 \\
 -3kI_1 + 6 + 4.5k(I_A - I_1) &= 0 \\
 +1.5k(I_A - I_B) - 6 - 1.5k \cdot I_B &= 0
 \end{aligned}$$

(3)