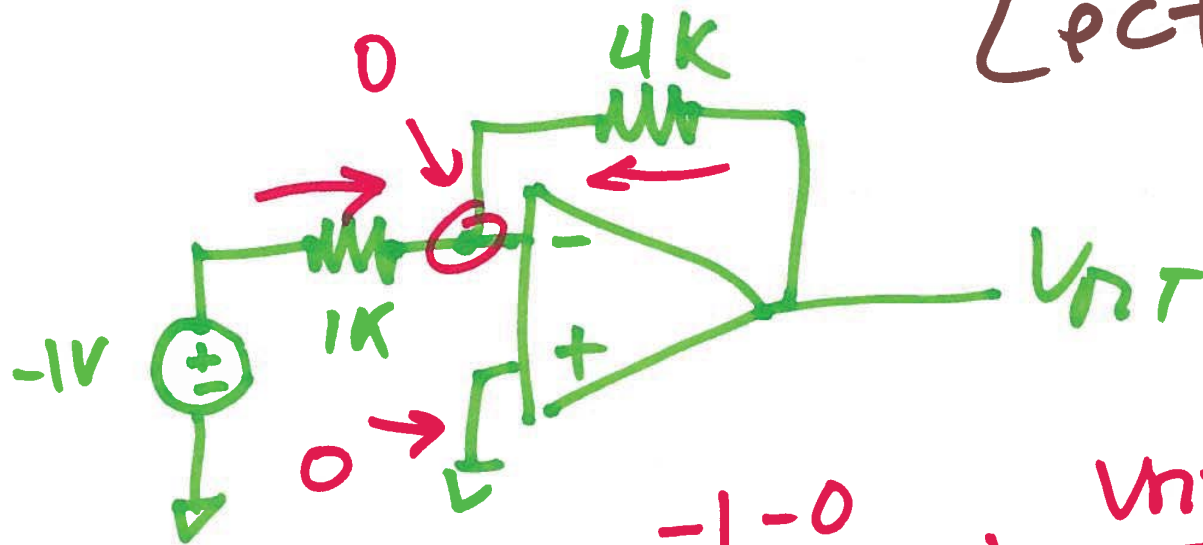


EE 220 CIRCUITS 1

OCT. 8, 2018

Lecture 13

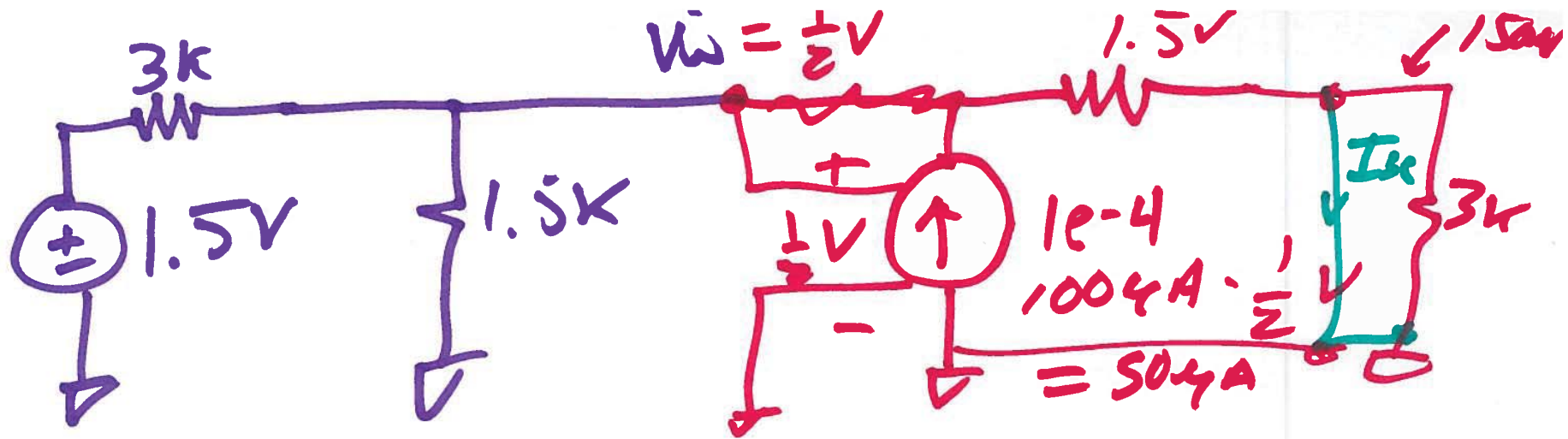


inverting

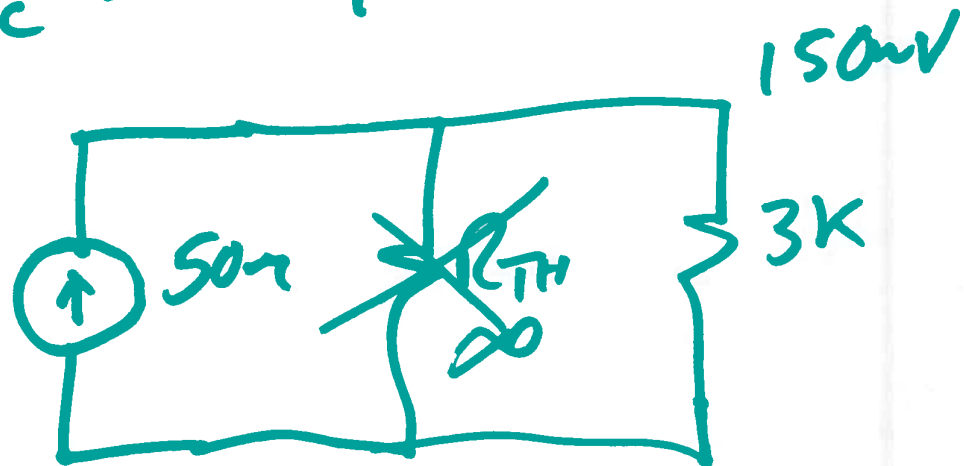
$$-R_F \cdot V_{in} = V_{out} \cdot \frac{R_I}{R_F}$$

$$\frac{-1-0}{1K} + \frac{V_{out}-0}{4K} = 0$$

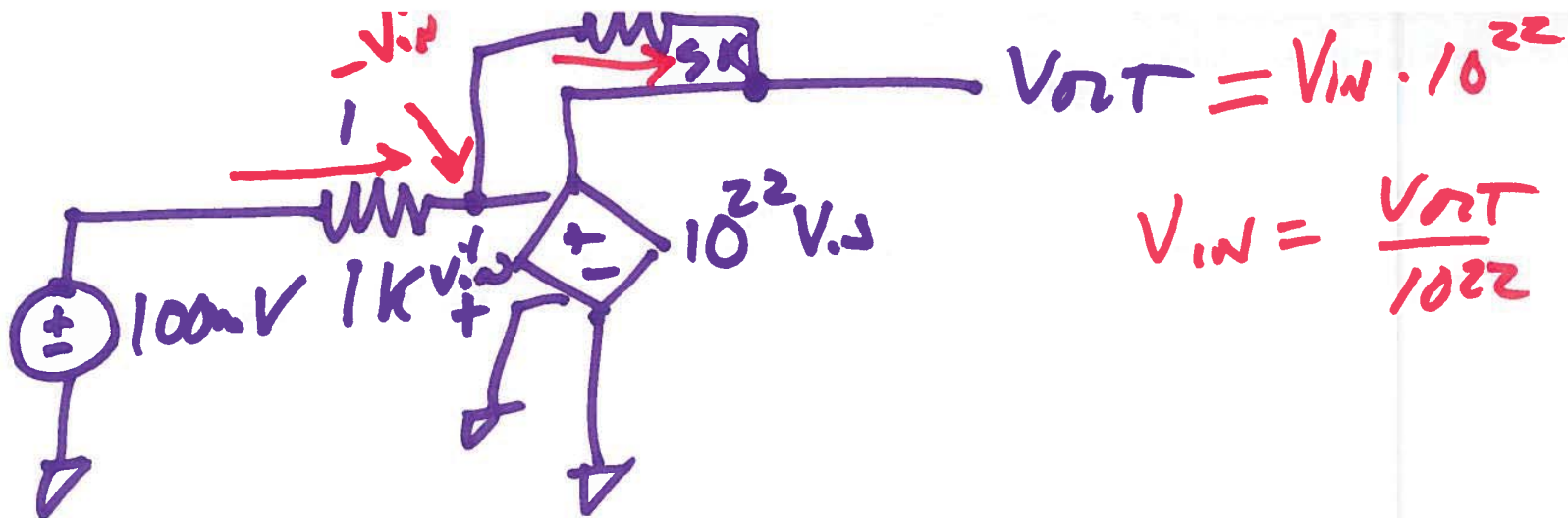
$$V_{out} = +4V$$



$$I_{sc} = 50\mu A$$



2)



$$\frac{100\text{mV} - (-V_{in})}{1\text{k}} = \frac{-V_{in} - V_{out}}{5\text{k}}$$

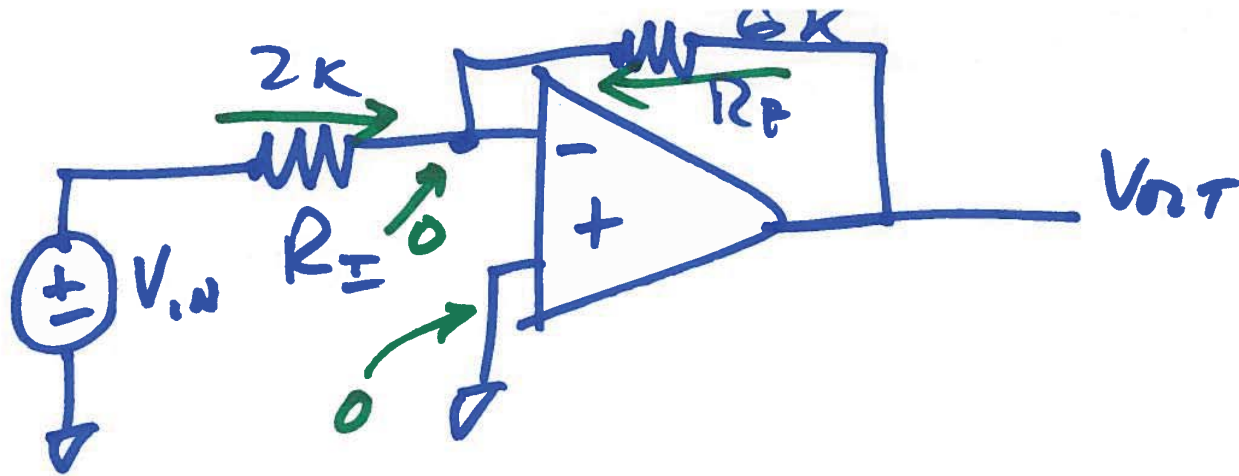
$$100\text{mV} + \frac{V_{out}}{10^{22}} = -\frac{1}{5} \left(\frac{V_{out}}{10^{22}} + V_{out} \right)$$

$$V_{out} = -500\text{mV}$$

~~$$-100\text{mV} = V_{out} \left(\frac{1}{10^{22} \cdot 5} + \frac{1}{5} + \frac{1}{10^{22}} \right)$$~~

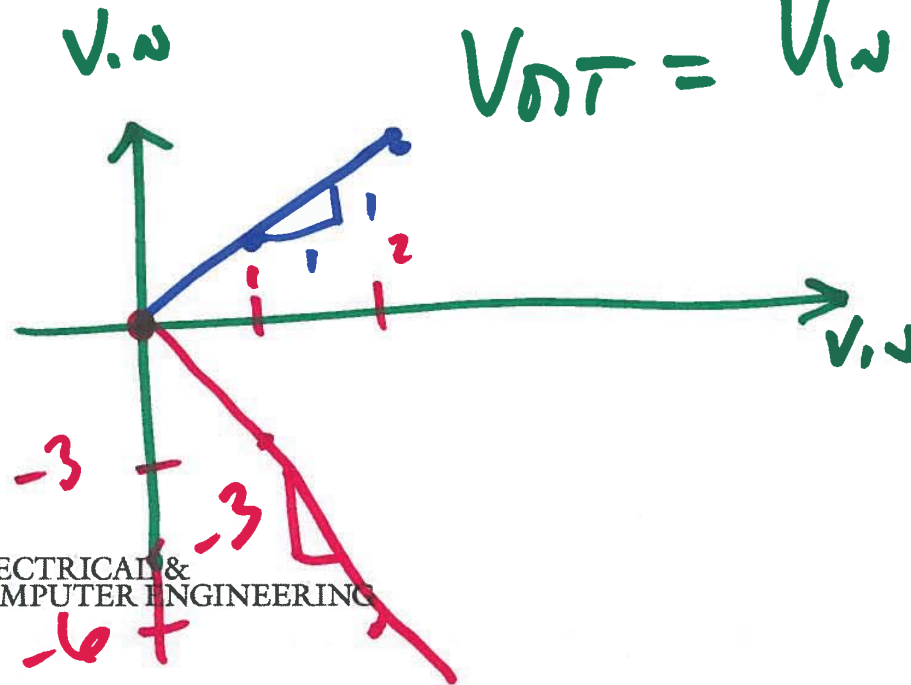
$$\frac{1}{5}$$

2)

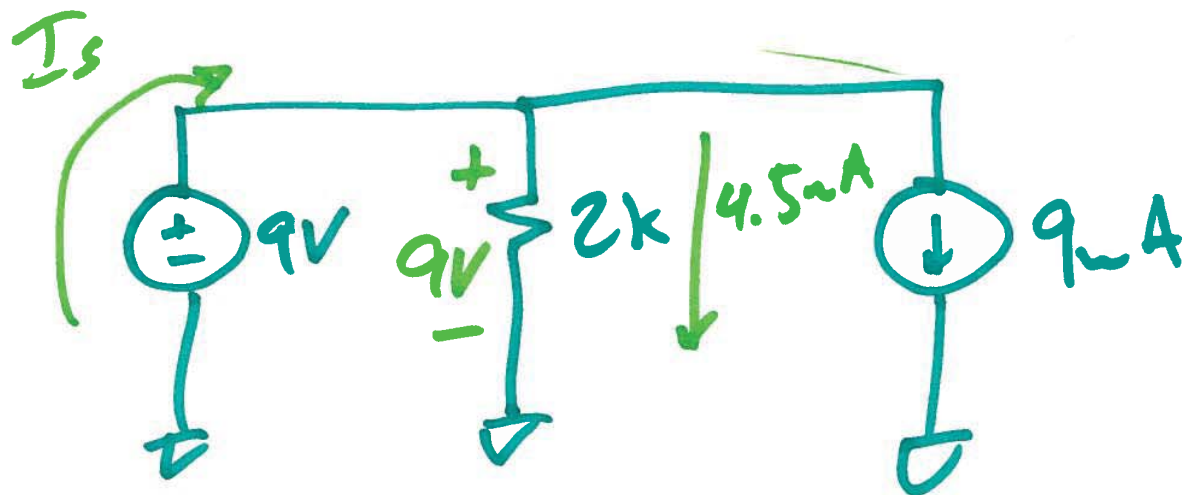


$$\frac{V_{in}}{R_I} + \frac{V_{out}}{R_F} = 0$$

$$V_{out} = V_{in} \cdot \left(-\frac{R_F}{R_I} \right)$$



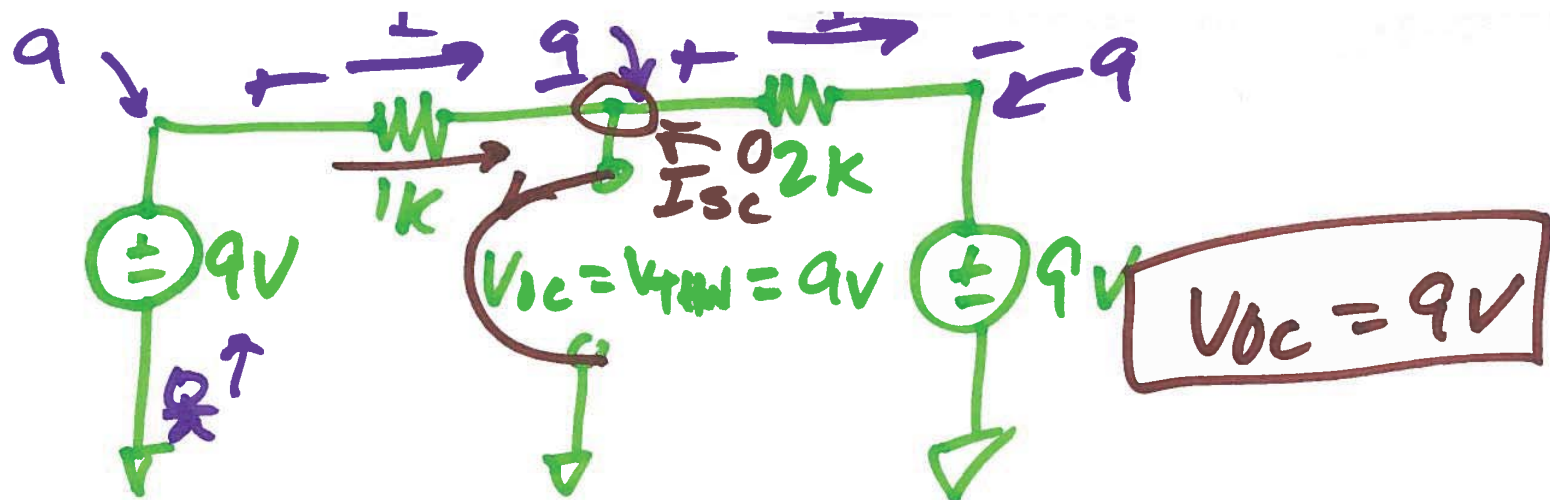
4)



$$I_s = 4.5\text{mA} + 9\text{mA}$$

$$I_s = 13.5\text{mA}$$

5)



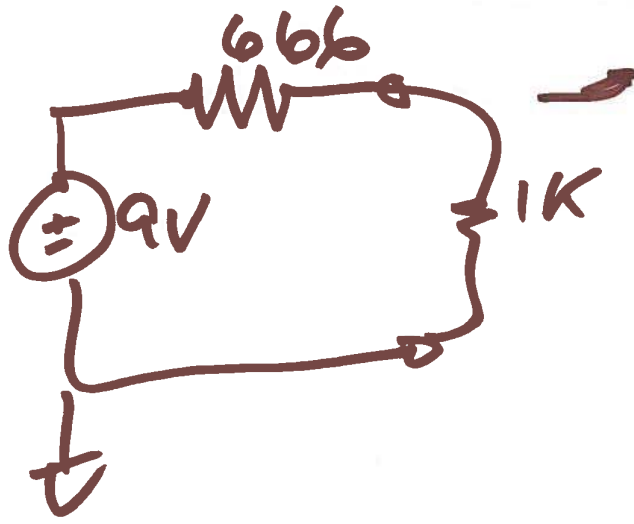
$$9 - I \cdot 1k - I \cdot 2k - 9 = 0$$

$$-I \cdot 3k = 0, \quad I = 0 \quad -4.5 \text{ mA}$$

$$\frac{9}{1k} = I_{sc} + \frac{0 - 9}{2k}$$

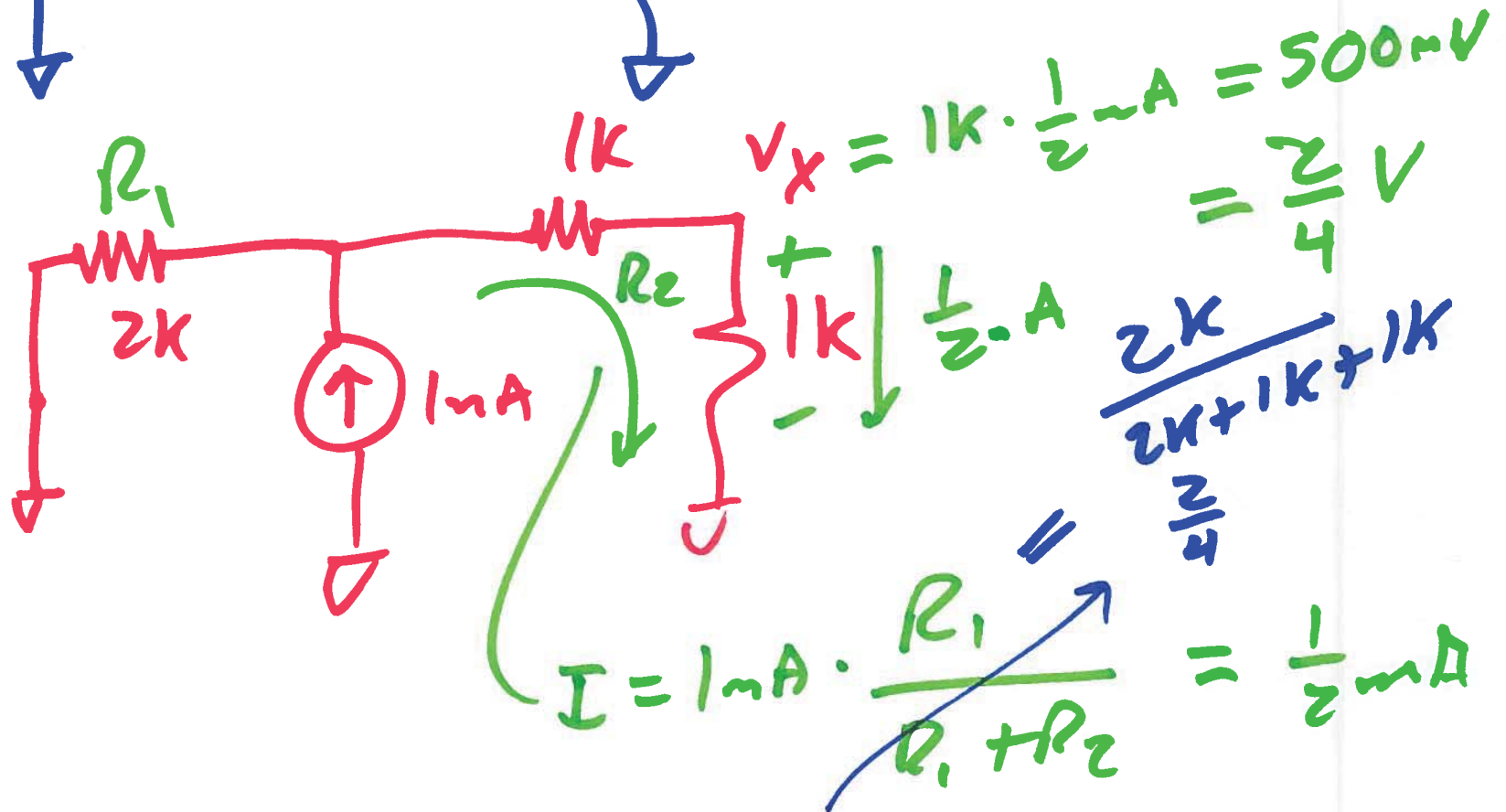
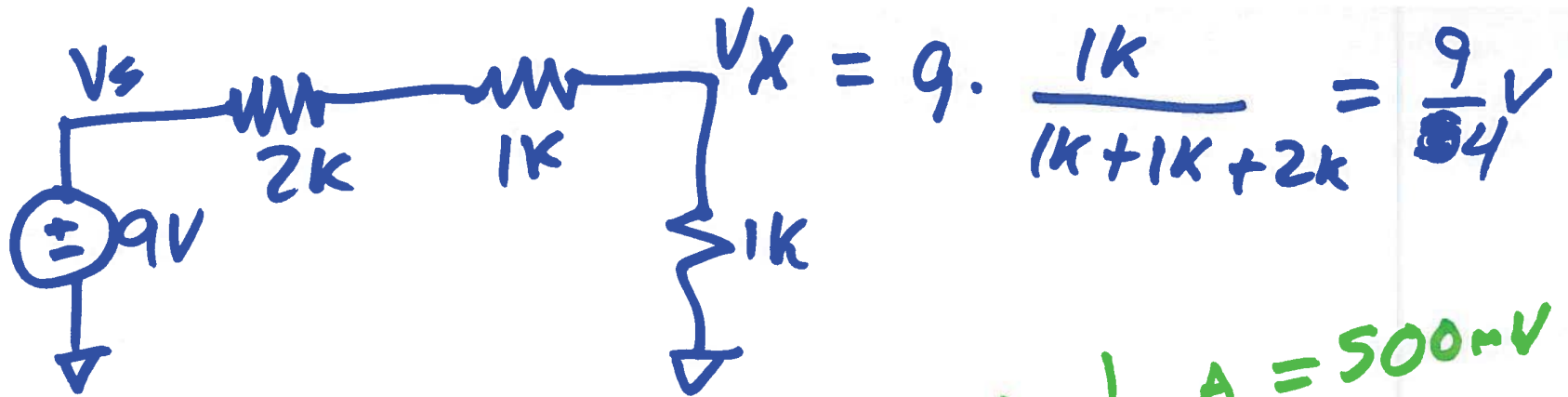
$$I_{sc} = 13.5 \text{ mA}$$

$$R_{TH} = \frac{9}{13.5 \text{ mA}} = 666 \Omega$$



$$1 \frac{2}{3} = \frac{5}{3} k$$

$$9 \cdot \frac{1K}{1.666k} = 9 \cdot \frac{3}{5} = \underline{\underline{\frac{27}{5} V}}$$



$$V_x = \frac{9}{4} + \frac{2}{4} = \frac{11}{4}V$$