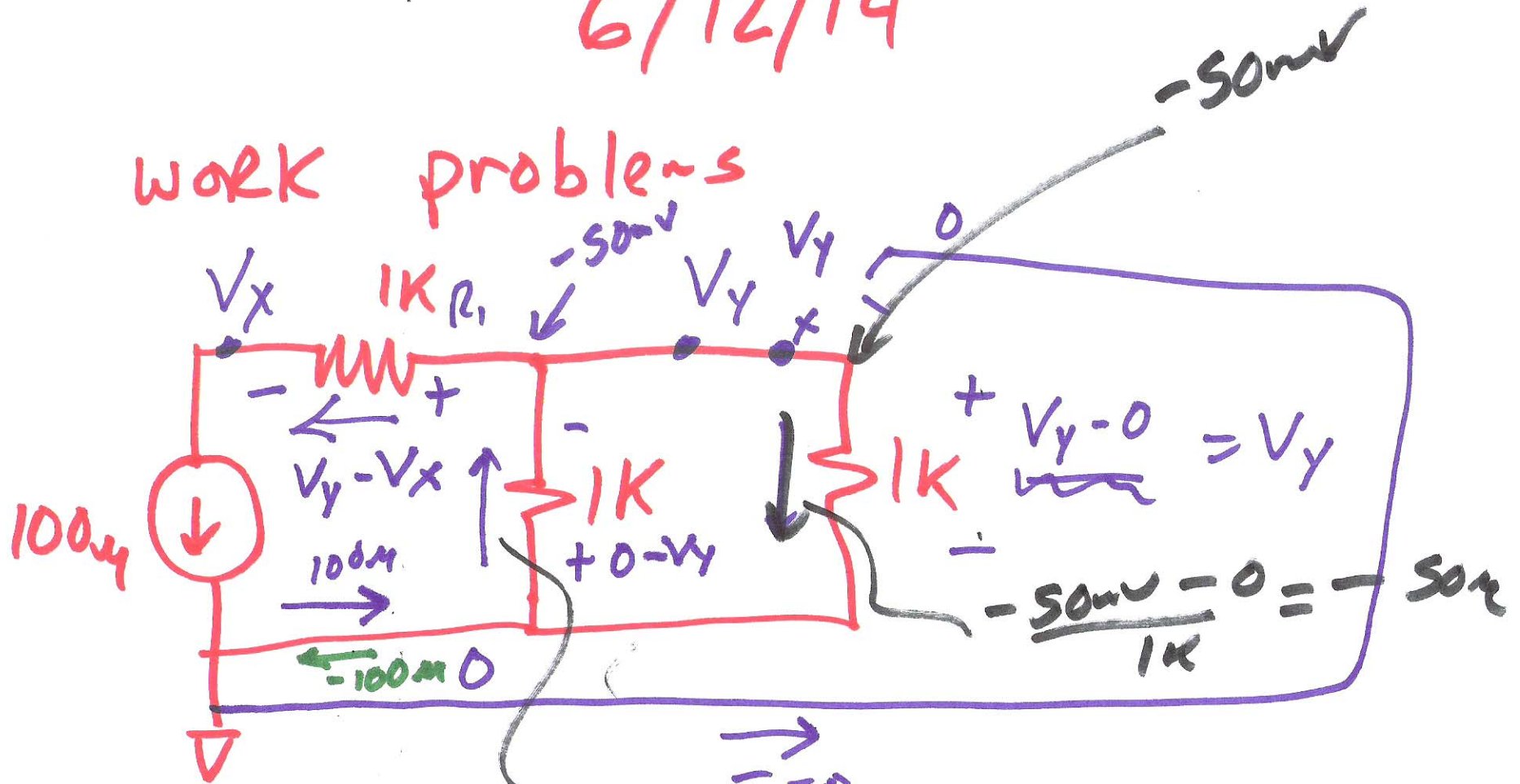


EE 220 Lecture 4

6/12/14

work problems



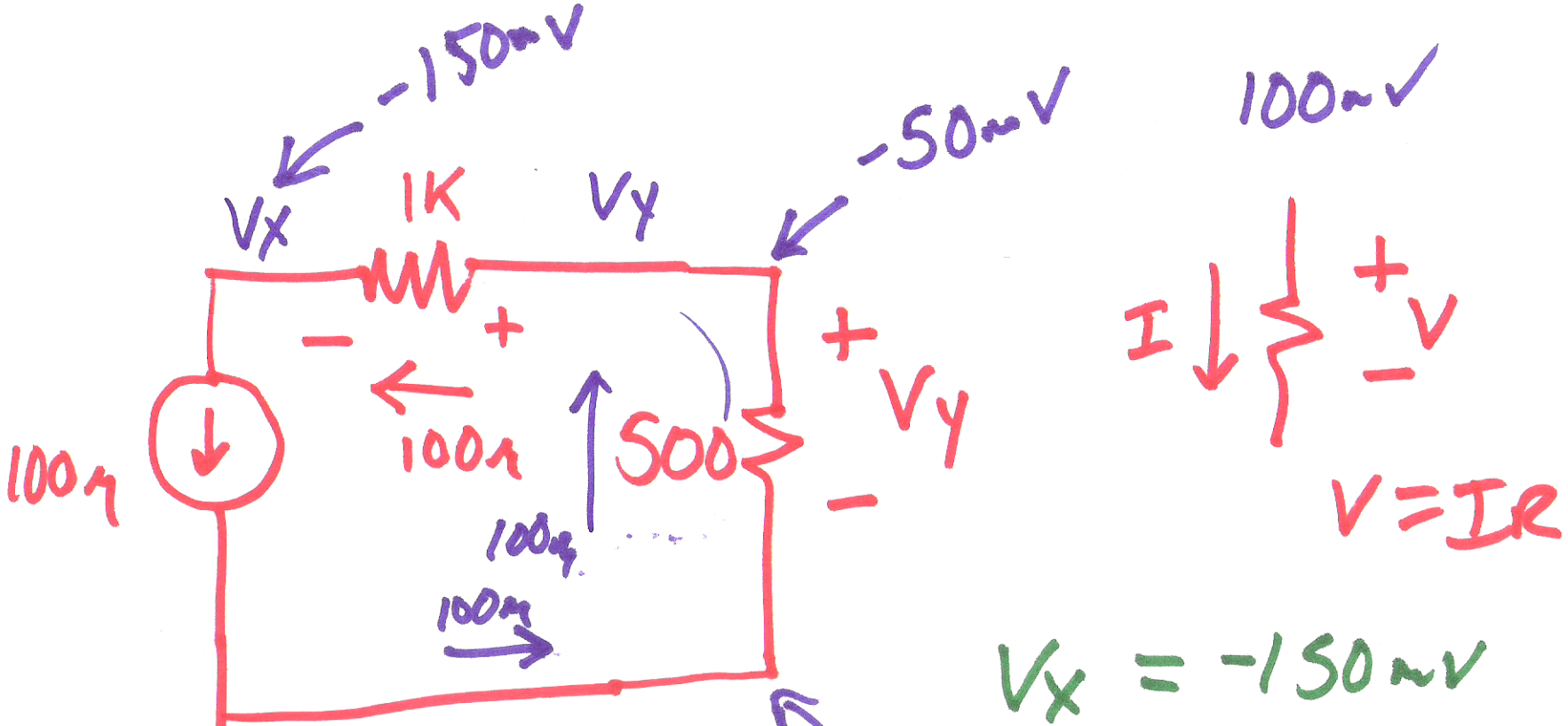
$$+ V_y - 0 = V_y$$

$$-\frac{50\mu\text{V} - 0}{1\text{k}} = -50\text{nA}$$

$$\rightarrow I = 0$$

$$\frac{0 - (-50\mu\text{V})}{1\text{k}} = +50\text{nA}$$

17



$$V_x = -150 \text{ mV}$$

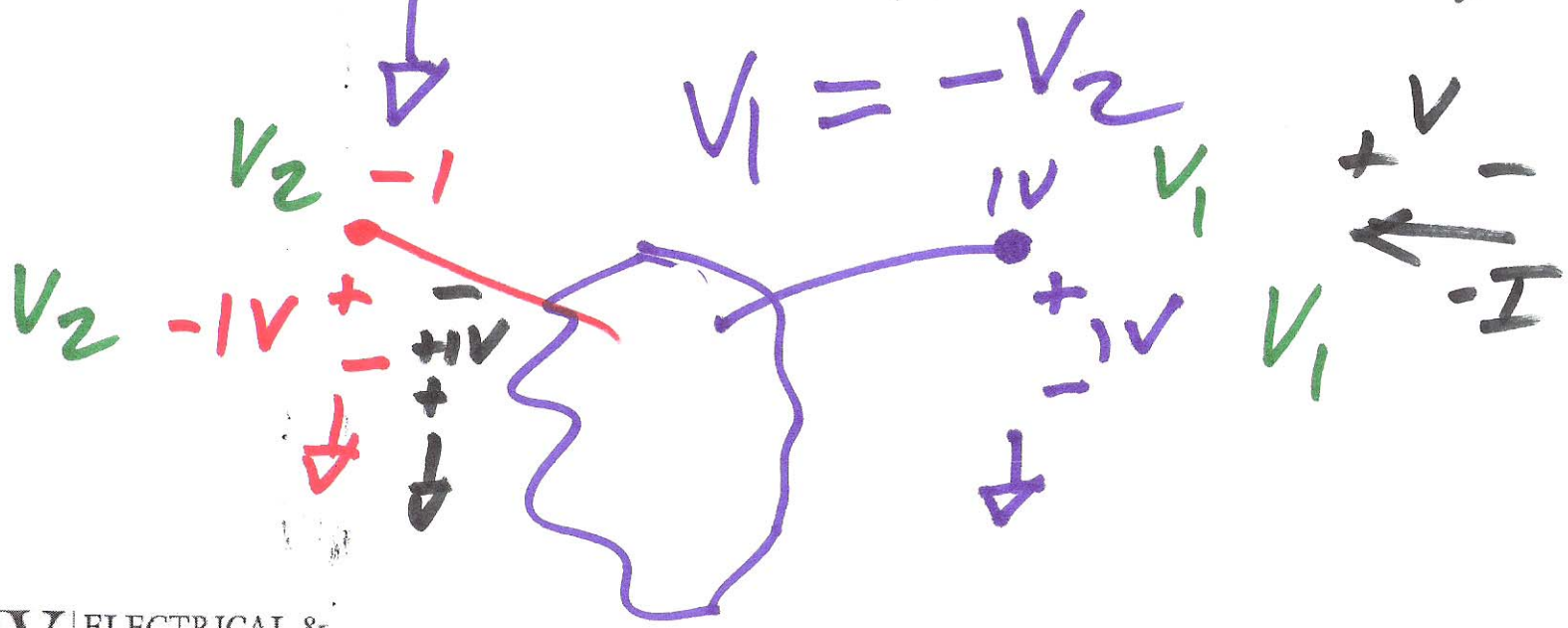
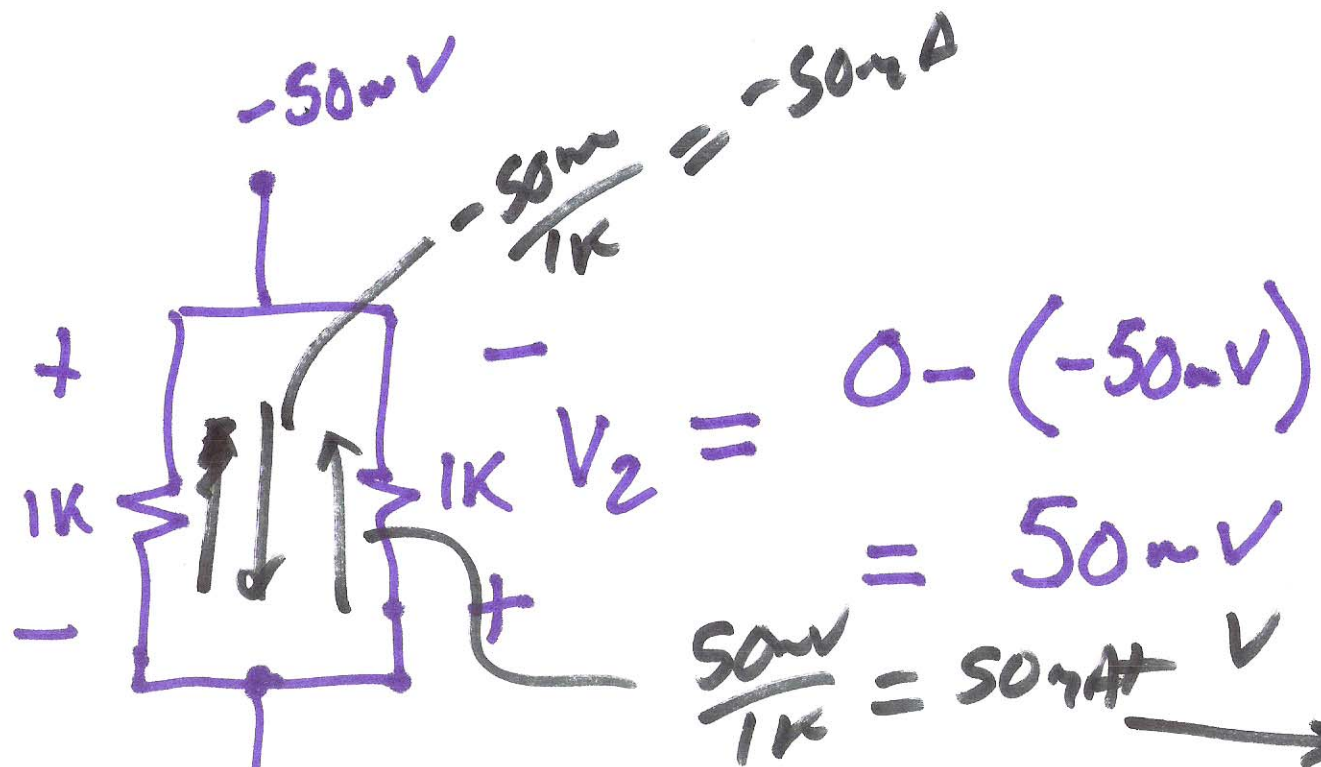
$$-50 \text{ mV} - V_x = 0, 100 \text{ nA}$$

$$V_y - V_x = 1 \text{ k} \cdot 100 \text{ nA} = 100 \text{ mV} = 0.1 \text{ V}$$

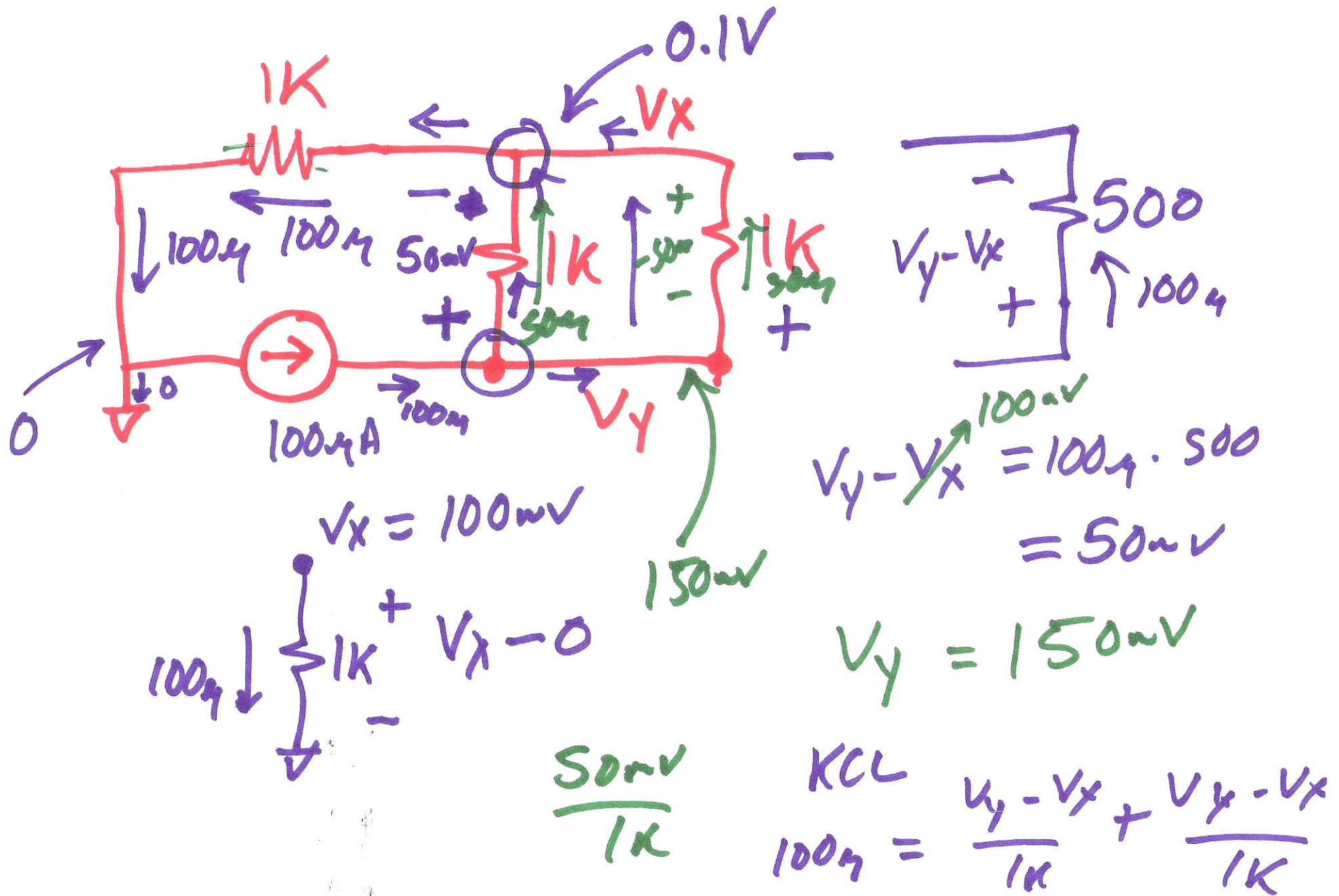
$$V_y = 500 \cdot (-100 \text{ nA}) = -0.05 \text{ V} = -50 \text{ mV}$$

2)

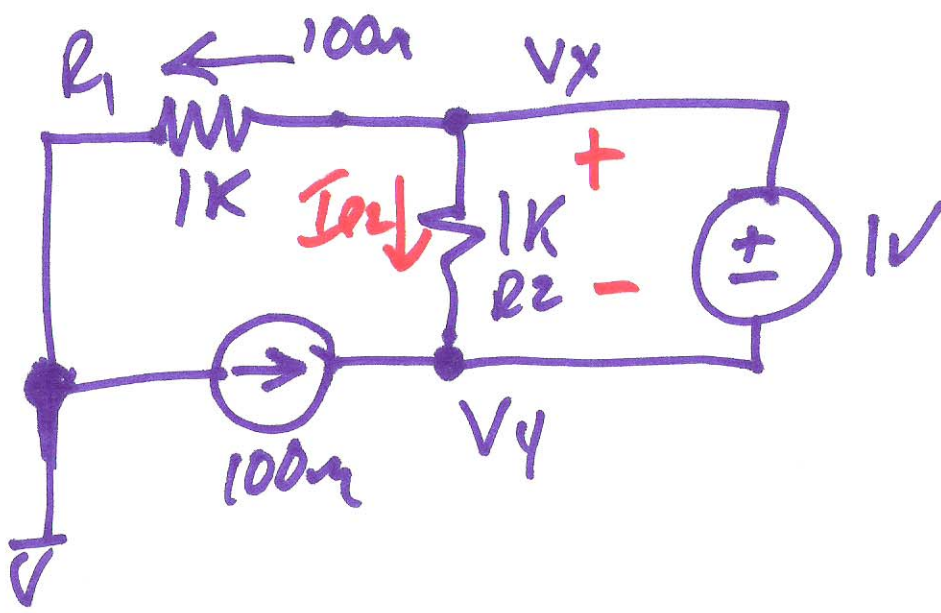
$-50\text{mV} - 0 = V_1$



3)



4)



$$V_x - V_y = 1, V_y = -0.9V$$

$$I_{02} = \frac{1}{1k} = 1\mu A$$

$$I_{R1} = 100\mu A$$

$$V_x = 100\mu V$$

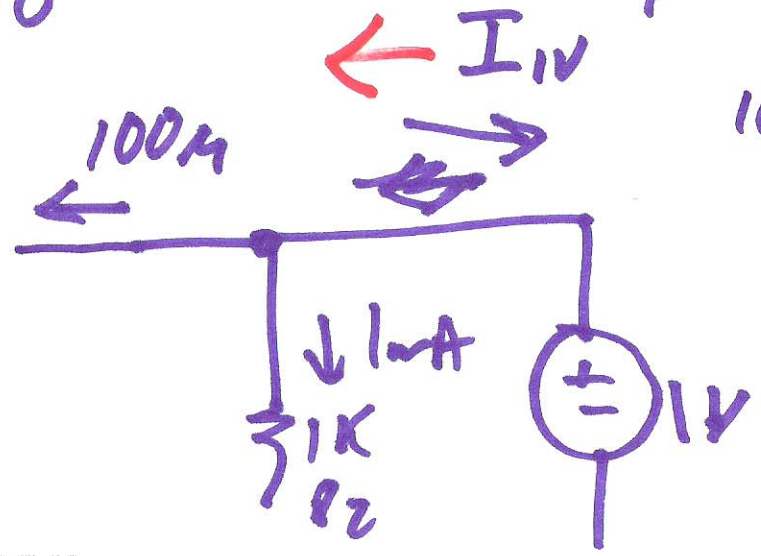
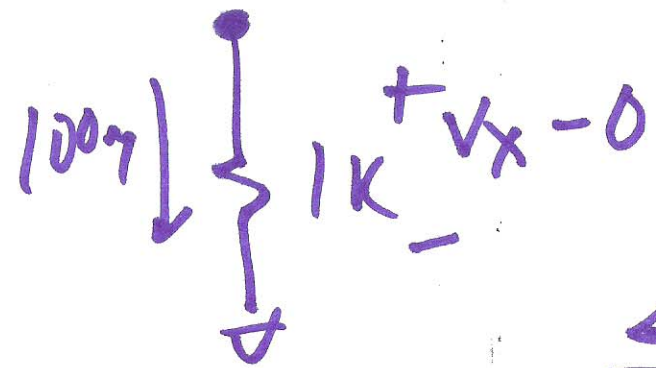
$$V_y = -0.9V$$

$$V_x = 100\mu A \cdot 1k = 100\mu V$$

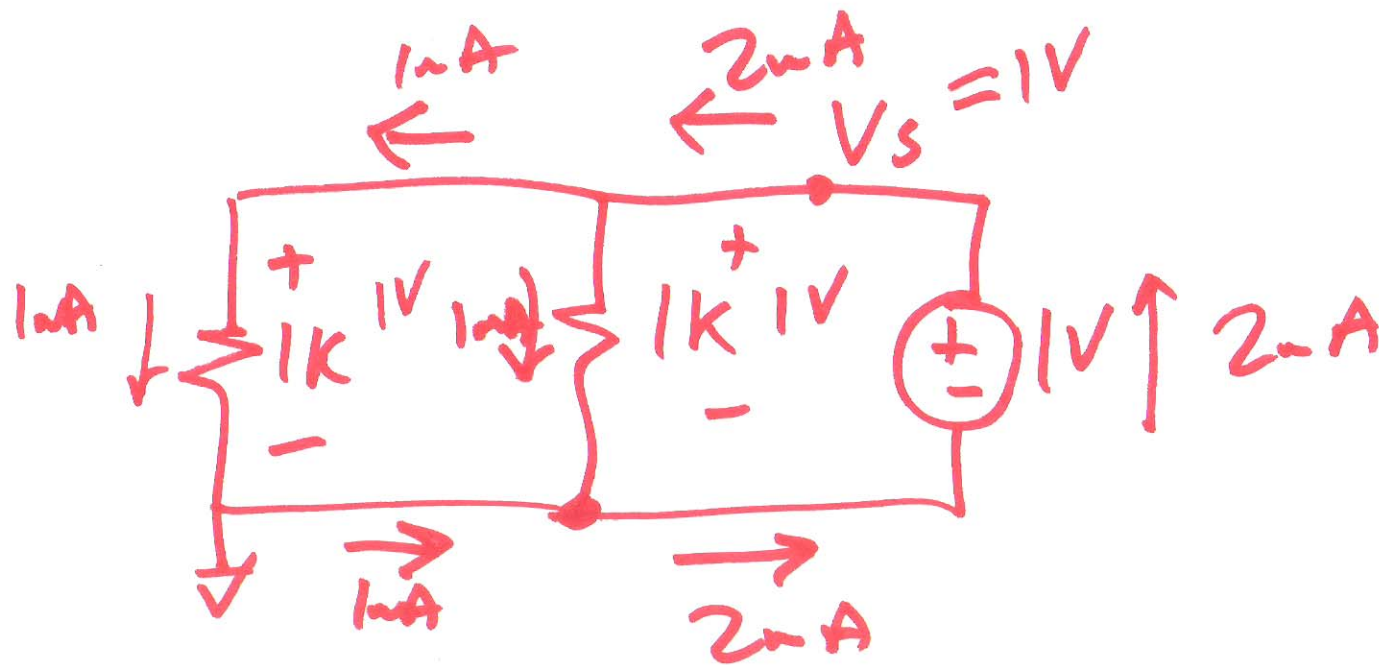
$$100\mu A + 1\mu A + I_{IV} = 0$$

$$I_{IV} = -1.1\mu A$$

$$100\mu A + 1\mu A = I_{IV}$$



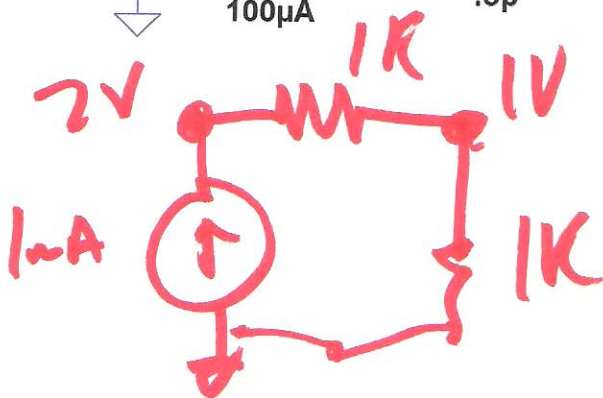
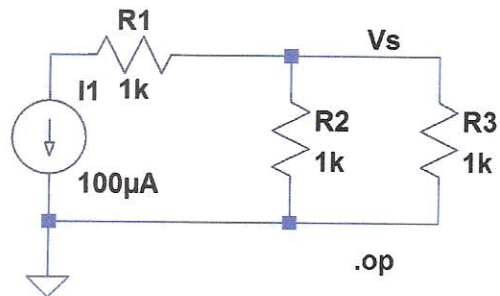
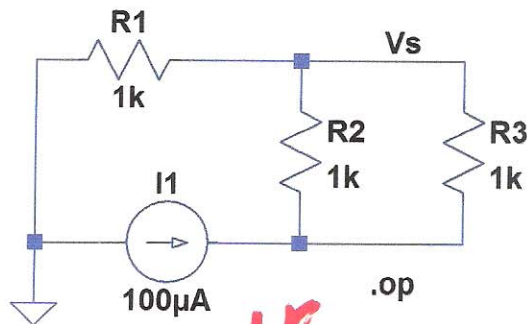
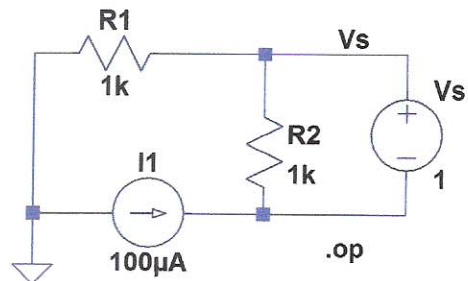
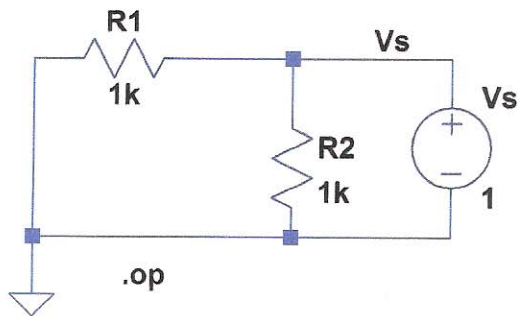
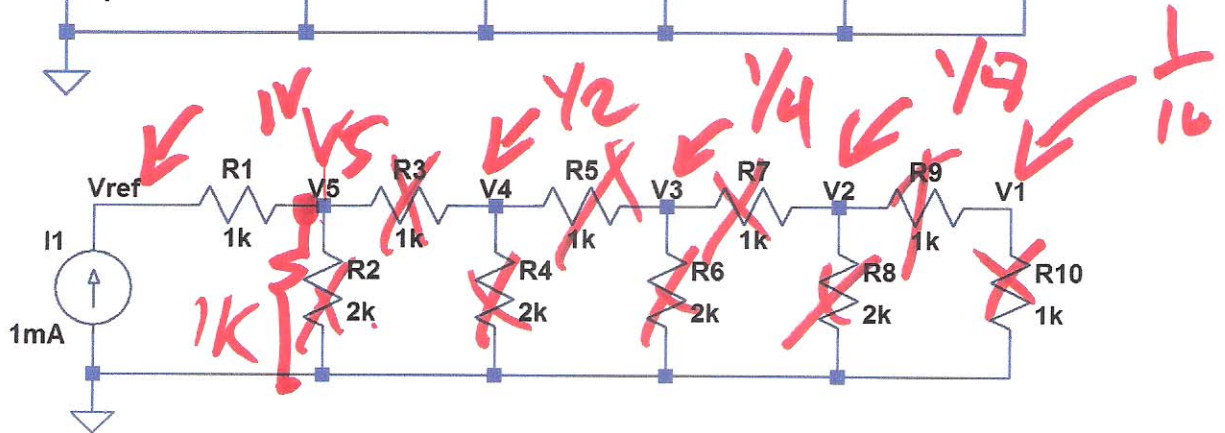
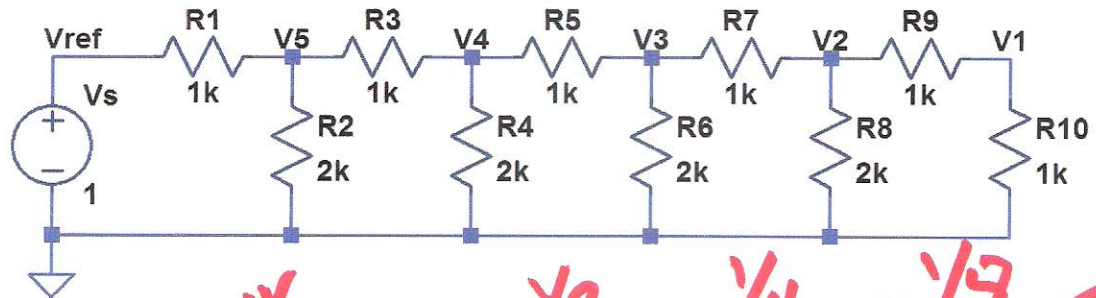
5)



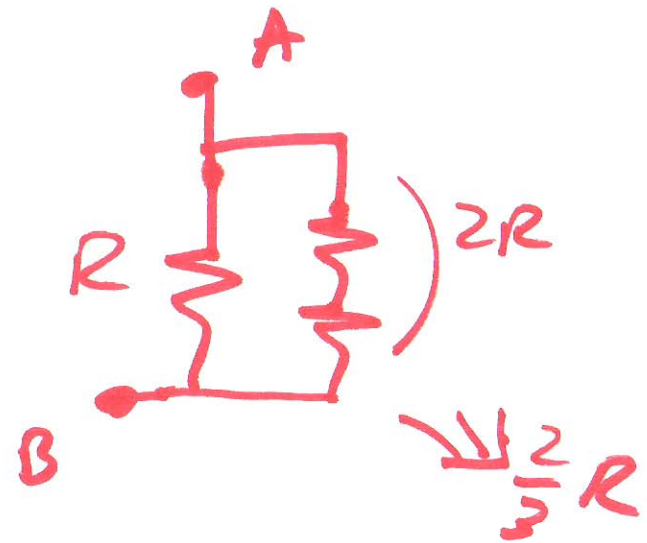
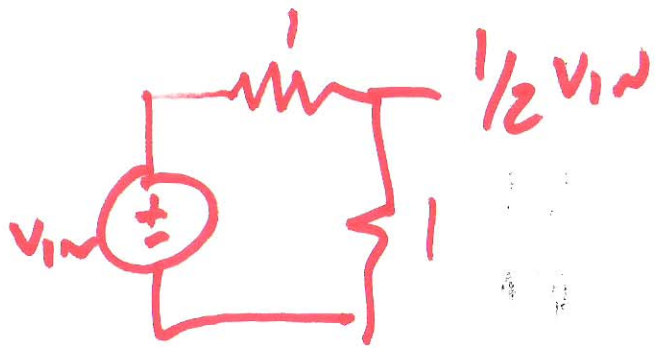
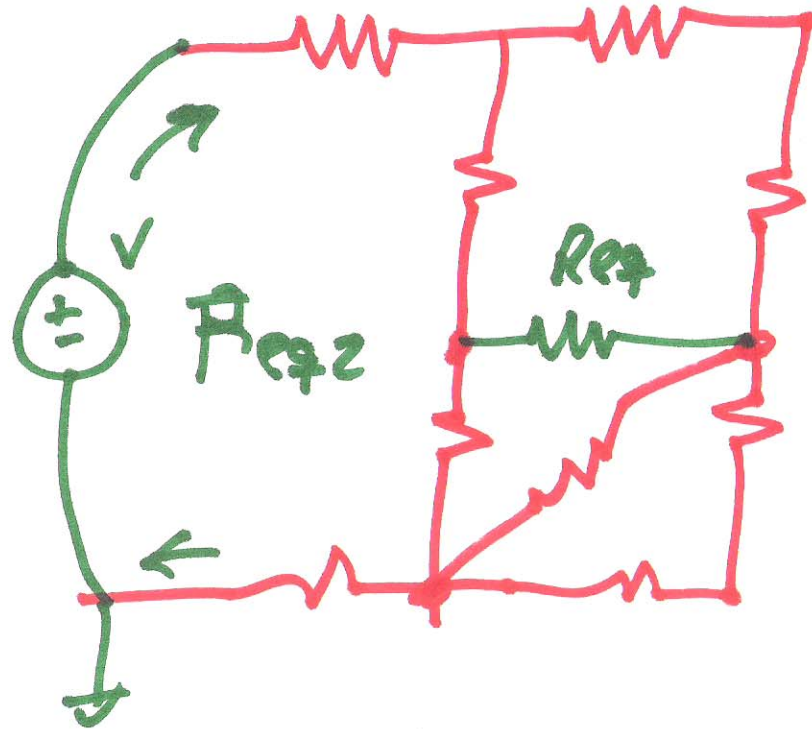
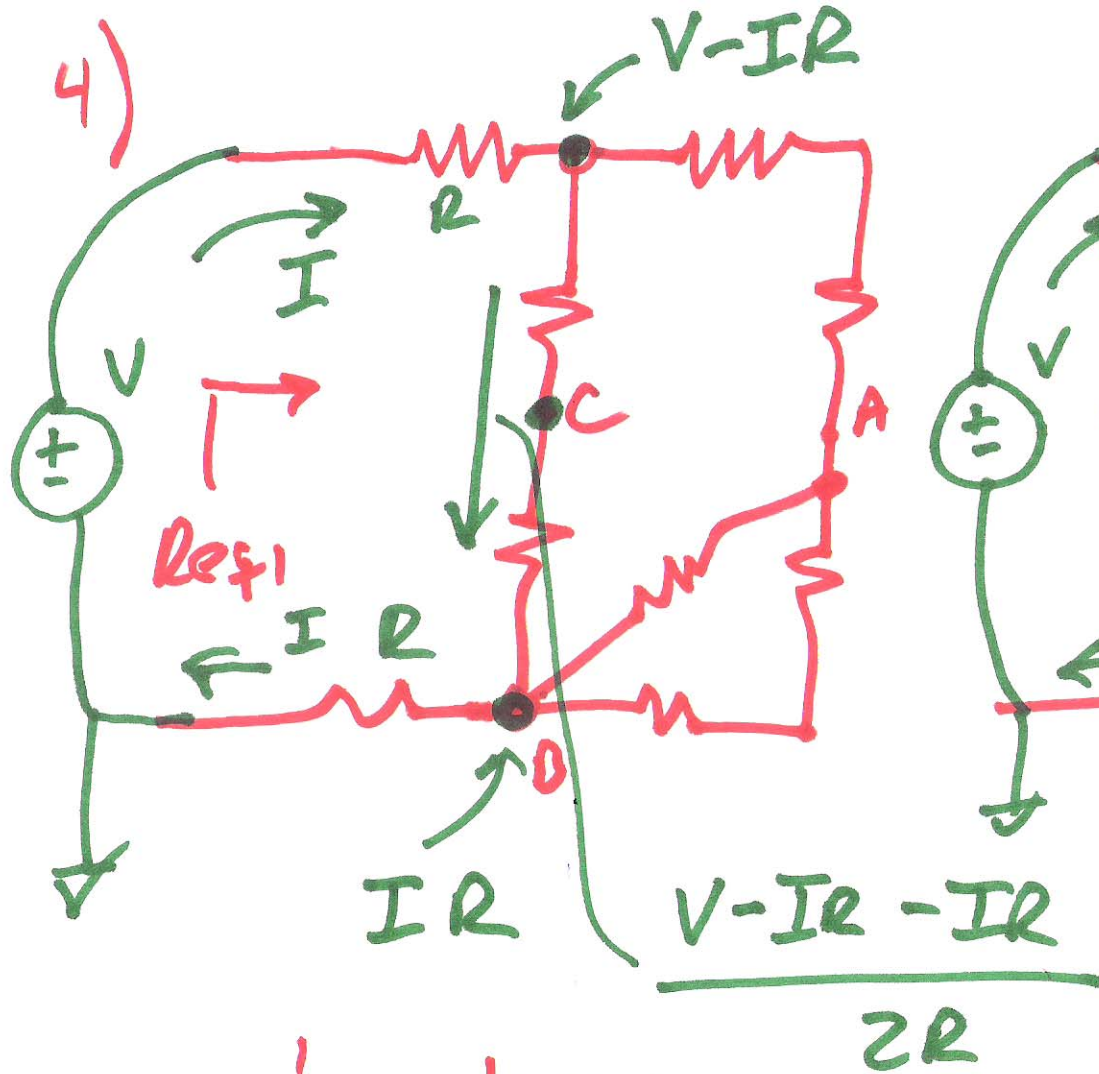
b)

H.W. #3 EE 220 Summer 2014

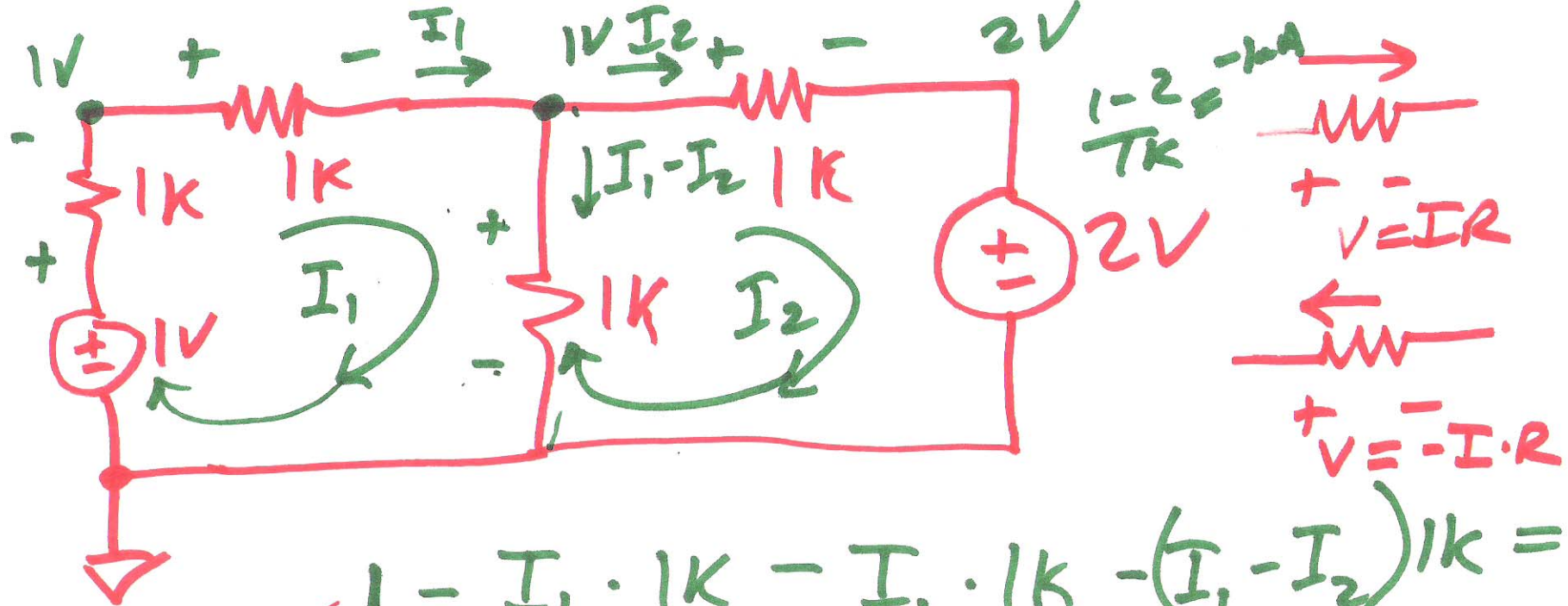
- Find all voltages and currents in the following circuits. Verify your answers with LTSpice. Make sure your hand calculations are concise, complete, and easy to follow.



7)



8)



$$1 - I_1 \cdot 1k - I_1 \cdot 1k - (I_1 - I_2)1k = 0$$

$$+ (I_1 - I_2)1k - I_2 \cdot 1k - 2 = 0$$

$$I_1 - 2I_2 - 2mA = 0$$

$$I_1 = 2I_2 + 2mA$$

$$1mA \rightarrow 3I_1 + I_2 = 0$$

a)

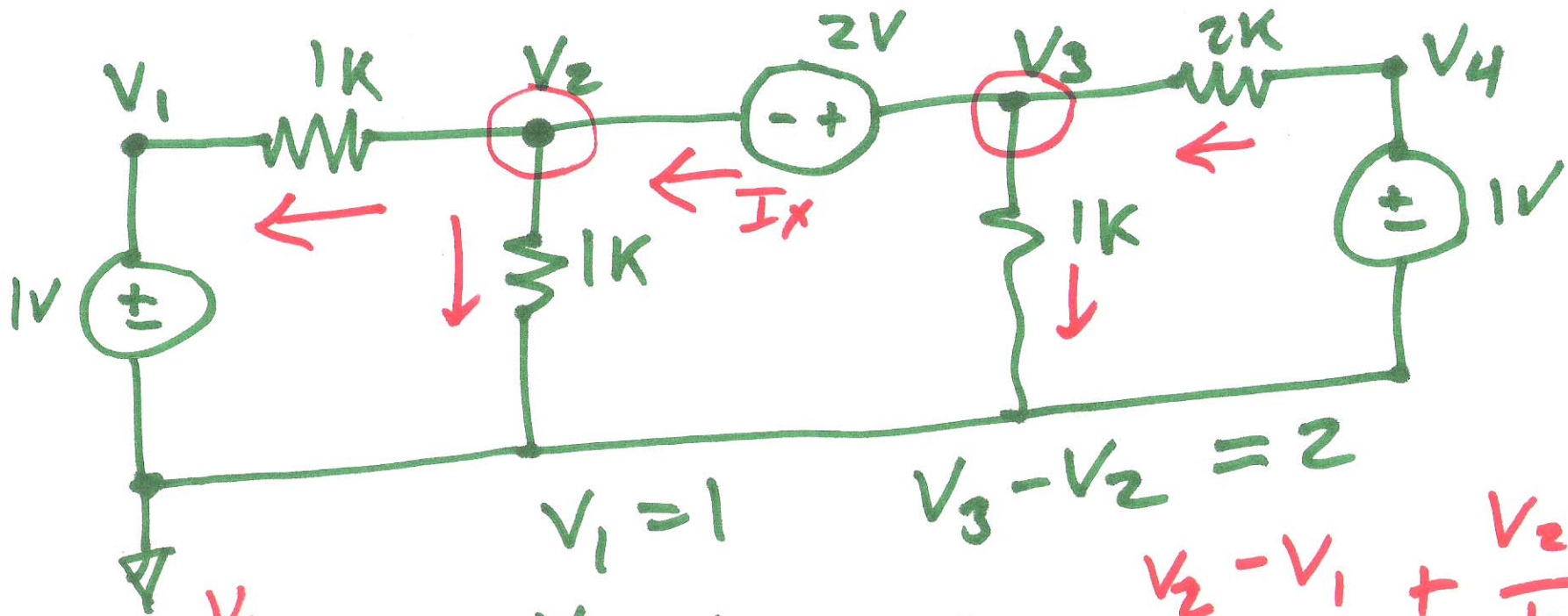
$$1\text{mA} - 6I_2 - 6\text{mA} + I_2 = 0$$

$$-5I_2 = 5\text{mA}$$

$$I_2 = -1\text{mA}$$

$$I_1 = 2I_2 + 2\text{mA}$$

$$I_1 = 0$$

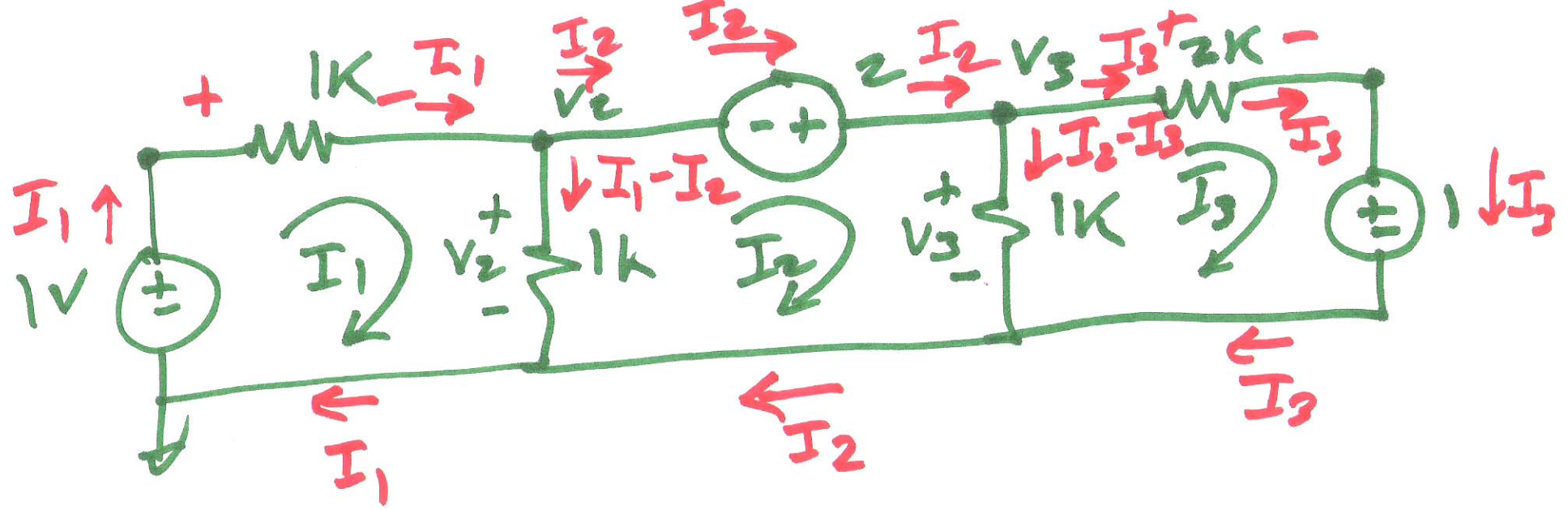


V_1
 V_2
 V_3
 V_4
 I_x

$V_1 = 1$
 $V_4 = 1$

$V_3 - V_2 = 2$
 $I_x = \frac{V_2 - V_1}{1k} + \frac{V_2}{1k}$
 $\frac{V_4 - V_3}{2k} = I_x + \frac{V_3}{1k}$

11)



$$\cdot V_2 = (I_1 - I_2) 1k$$

$$\cdot V_3 = (I_2 - I_3) 1k$$

$$\text{Loop 1: } \cdot 1V = 1k \cdot I_1 + V_2$$

$$\text{Loop 2: } \cdot V_2 + 2 = V_3$$

$$\text{Loop 3: } \cdot V_3 = 2k \cdot I_3 + 1$$

V_2
 V_3
 I_1
 I_2
 I_3

12)