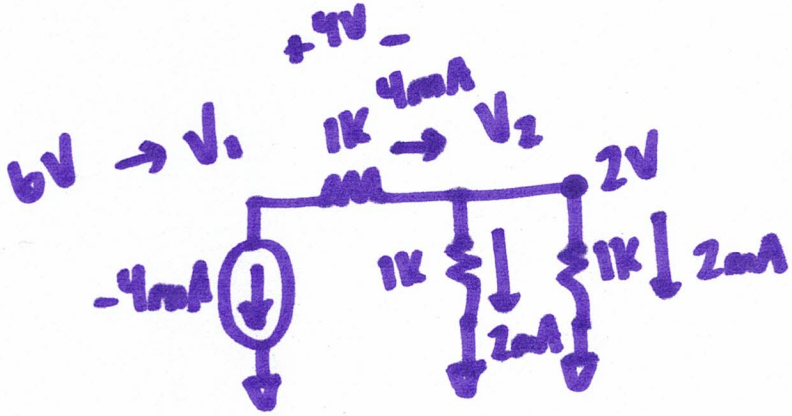
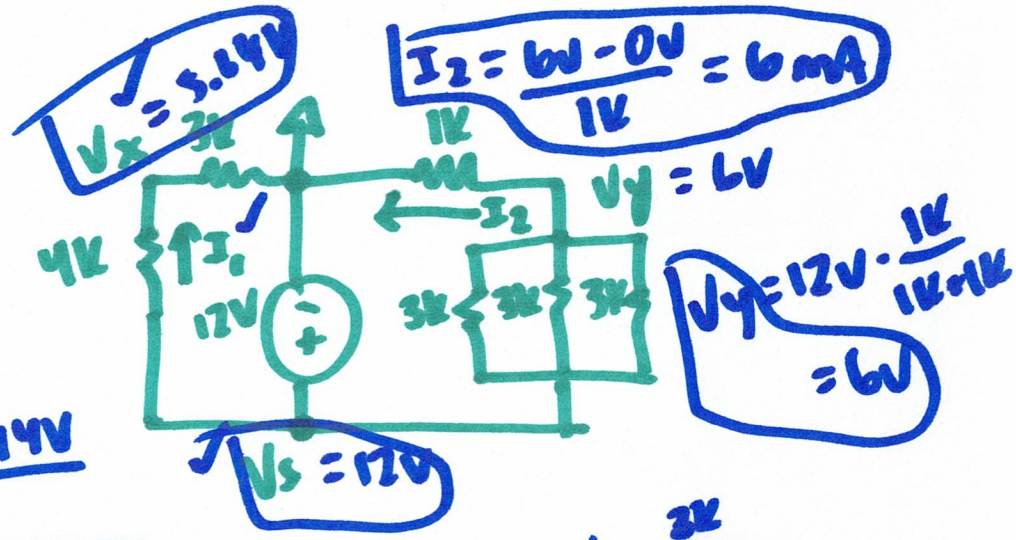
EE220: Circuits I

HW4: 2C



$$\frac{1}{3k}+\frac{1}{3k}+\frac{1}{3k}=\frac{1}{R_{eq}}$$

$$R_{eq}=1K$$



$$I_1=\frac{12V-5.14V}{4K}$$

$$\boxed{I_1=1.71mA}$$

$$V_x=V_s\cdot\frac{3K}{4K+3K}$$

$$V_x=12V\cdot 3/7=5.14V$$

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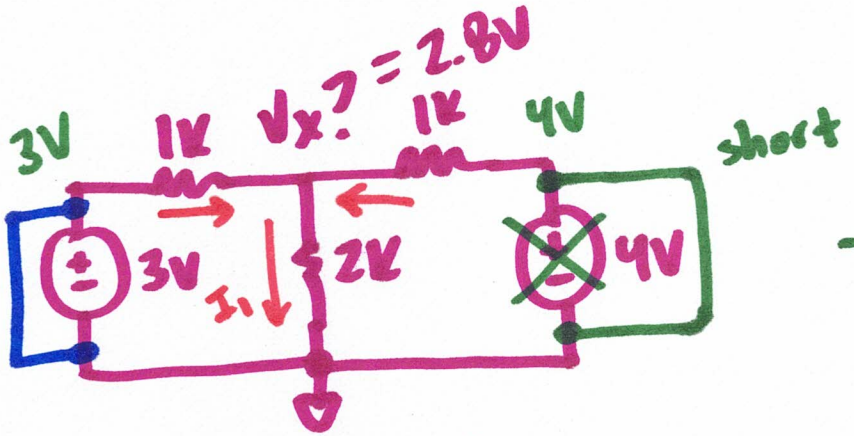
superposition

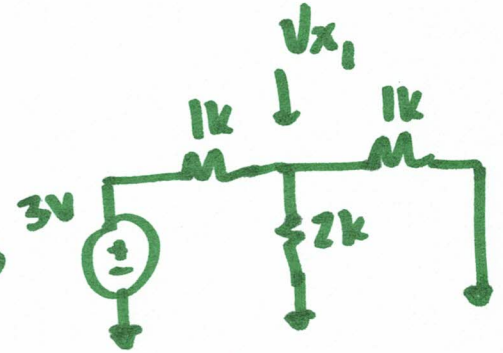


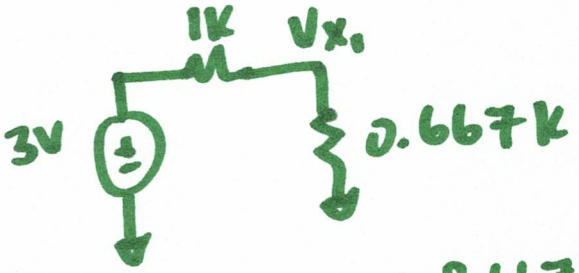
$$I_1 = \frac{2.8V - 0V}{2K}$$

$$I_1 = 1.4mA$$

$$Vx = Vx_1 + Vx_2$$

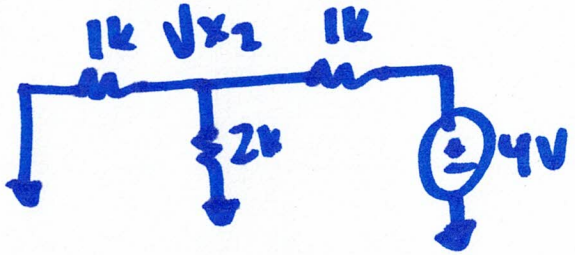
$$Vx = 1.2V + 1.6V = 2.8V$$





$$Vx_1 = 3V\left(\frac{0.667K}{1K + 0.667K}\right)$$

$$Vx_1 = 1.2V$$



$$Vx_2 = 4V - \left(\frac{0.667K}{1K + 0.667K}\right)$$

$$Vx_2 = 1.6V$$ ✓

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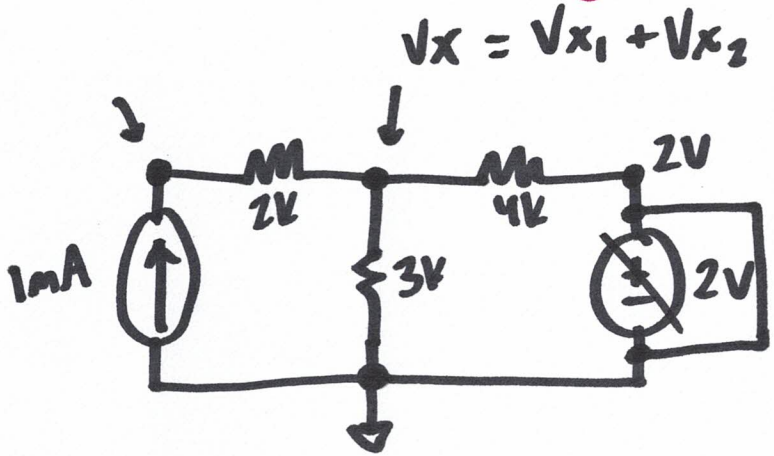
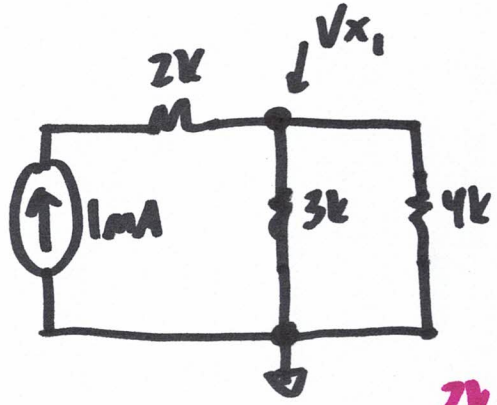
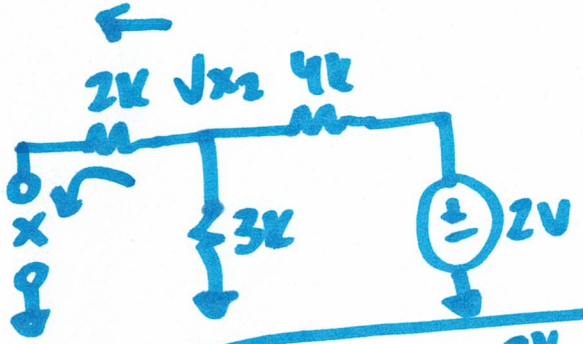
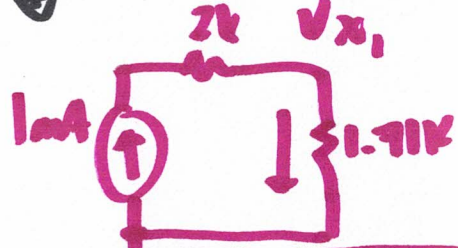
(Ex2)



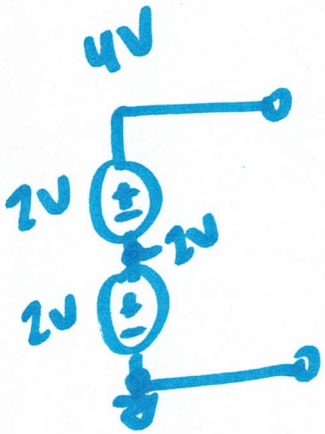




$$V_{x_2} = 2V \cdot \frac{3k}{7k} = 0.857V$$



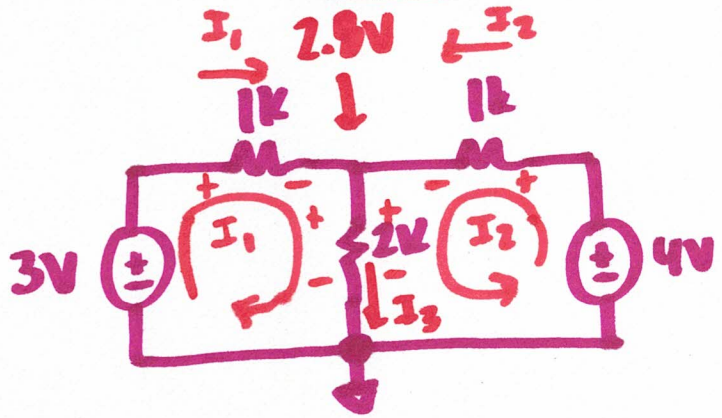
$$V_{x_1} = 1.71V$$



$$V_x = V_{x_1} + V_{x_2} = 1.71V + 0.857V$$

$$V_x = 2.567V$$

Mesh analysis → uses KVL



① $+3V - I_1 \cdot 1k - (I_1 + I_2) \cdot 2k = 0 \rightarrow 3V - I_1 \cdot 1k - I_1 \cdot 2k - I_2 \cdot 2k = 0$

② $+4V - I_2 \cdot 1k - (I_1 + I_2) \cdot 2k = 0 \rightarrow 4V - I_2 \cdot 1k - I_1 \cdot 2k - I_2 \cdot 2k = 0$

$3V - I_1 \cdot 3k - I_2 \cdot 2k = 0$

$\frac{3V - I_1 \cdot 3k}{2k} = \frac{I_2 \cdot 2k}{2k}$

$I_2 = 1.5mA - 1.5 \cdot I_1$

$I_2 = 1.5mA - 1.5(0.2mA)$

$I_2 = 1.2mA$

$4V - I_2 \cdot 3k - I_1 \cdot 2k = 0$

$4V - [1.5mA - 1.5I_1] \cdot 3k - I_1 \cdot 2k = 0$

$4V - 4.5V + 4.5k \cdot I_1 - I_1 \cdot 2k = 0$

$-0.5V + 2.5kI_1 = 0$

$\frac{2.5kI_1}{2.5k} = \frac{0.5V}{2.5k}$

$I_1 = 0.2mA$

$I_3 = 1.4mA$

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