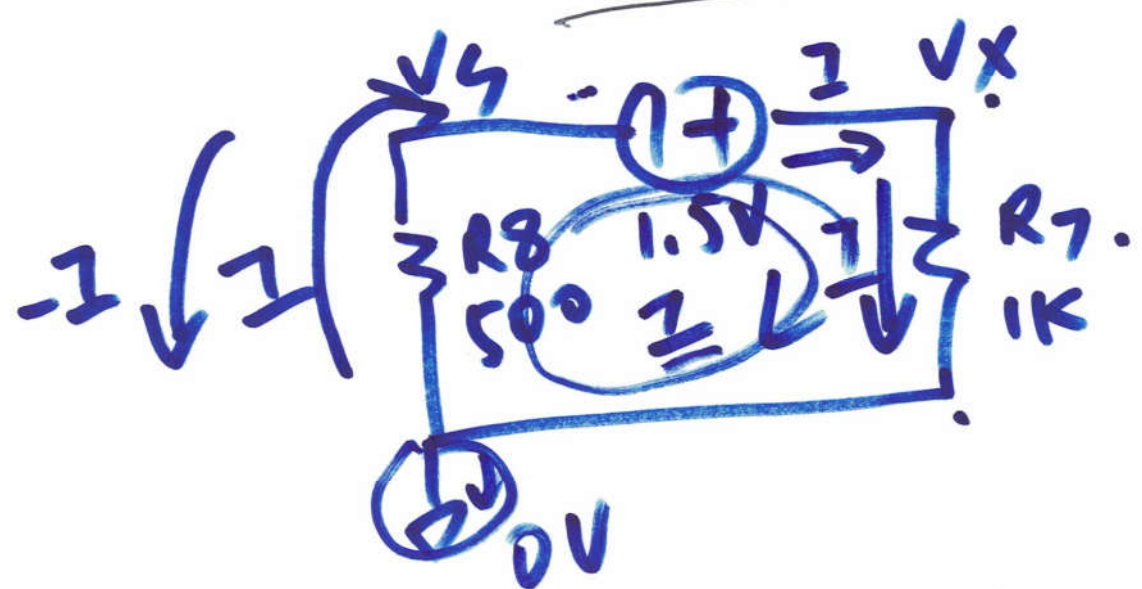


Lec 5



$$I = \frac{V_x - 0}{1K}$$

$$1.5 = V_x - V_s$$

$$I = \frac{0 - V_s}{500}$$

$$\frac{V_x}{1K} = \frac{-V_s}{500} \times 1K^2$$

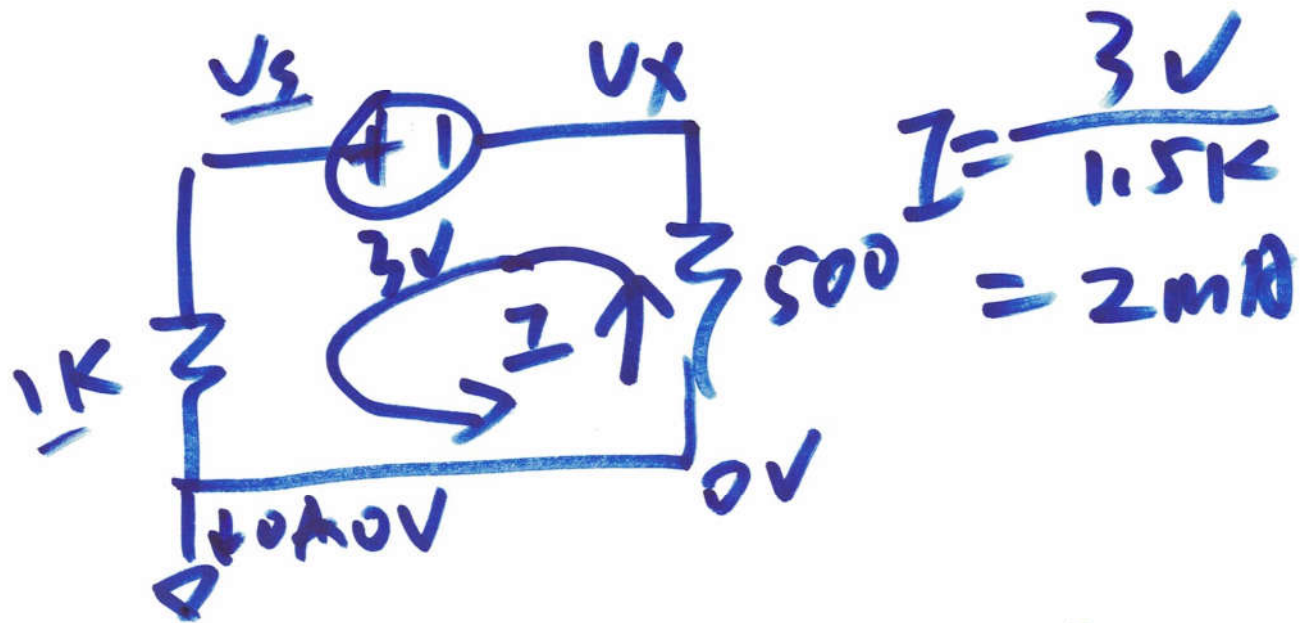
$$V_x = -2V_s$$

$$1.5 = -2V_s - V_s$$

$$= -3V_s$$

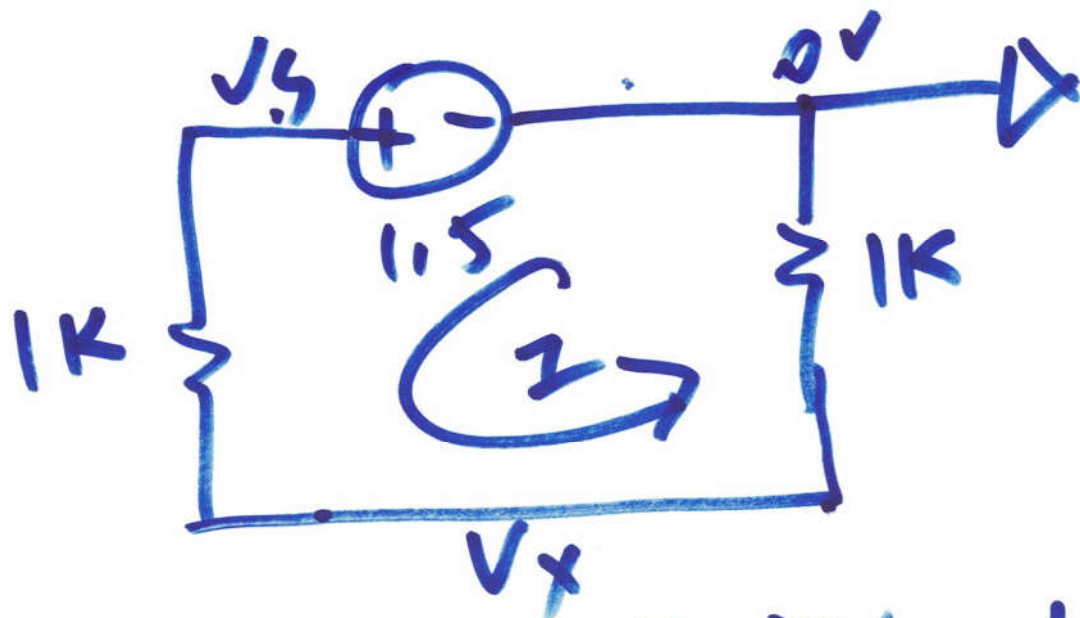
$$V_s = -0.5V$$

$$V_x = 1V$$



$$\begin{cases}
 V_S - V_X = 3 \\
 \frac{V_S - 0}{1k} = I \\
 \frac{0 - V_X}{500} = I
 \end{cases}
 \rightarrow
 \begin{cases}
 V_S - V_X = 3 \\
 \frac{V_S}{1k} = \frac{-V_X}{500} \\
 V_S = -2V_X \\
 -2V_X - V_X = 3 \\
 -3V_X = 3 \\
 V_X = -1V \\
 V_S = 2V
 \end{cases}$$

②



$$\frac{V_S - 0}{1k} = 1.5 \Rightarrow V_S = 1.5$$

$$\frac{V_S - V_X}{1k} = I$$

$$\frac{V_X - 0}{1k} = I$$

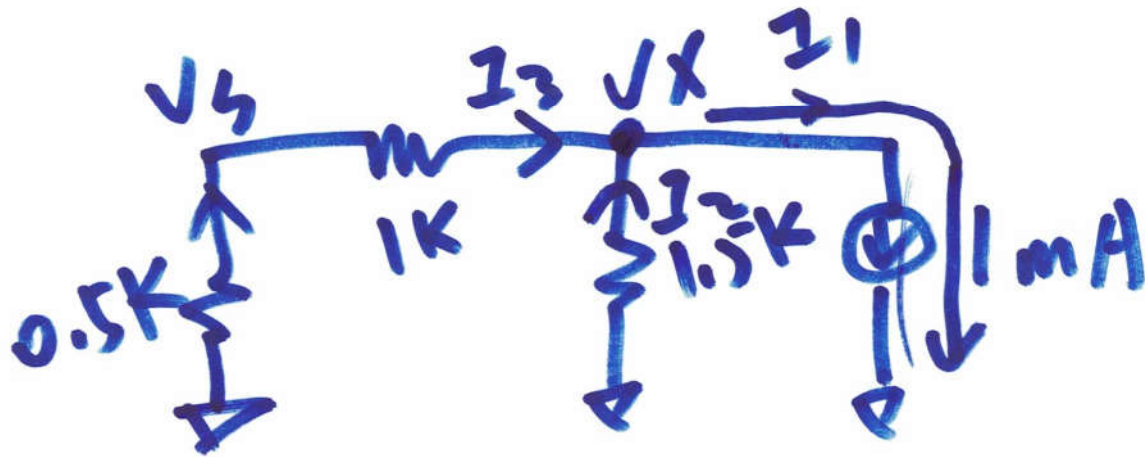
$$\frac{V_S - V_X}{1k} = \frac{V_X - 0}{1k}$$

$$V_S - V_X = V_X$$

$$V_S = 2V_X$$

$$V_X = 0.75V$$

3



KCL:

$$I_1 = I_2 + I_3$$

$$I_1 = 1\text{mA}$$

$$I_2 = \frac{0 - V_x}{1.5\text{k}}$$

$$I_3 = \frac{0 - V_s}{0.5\text{k}}$$

$$I_3 = \frac{V_s - V_x}{1\text{k}}$$

$$1\text{mA} = \frac{-V_x}{1.5\text{k}} + \frac{-V_s}{0.5\text{k}}$$

$$\frac{-V_s}{0.5\text{k}} = \frac{V_s - V_x}{1\text{k}}$$

$$\rightarrow 1.5 = -V_x - 3V_s$$

$$\rightarrow -2V_s = V_s - V_x$$

$$-3V_s = -V_x$$

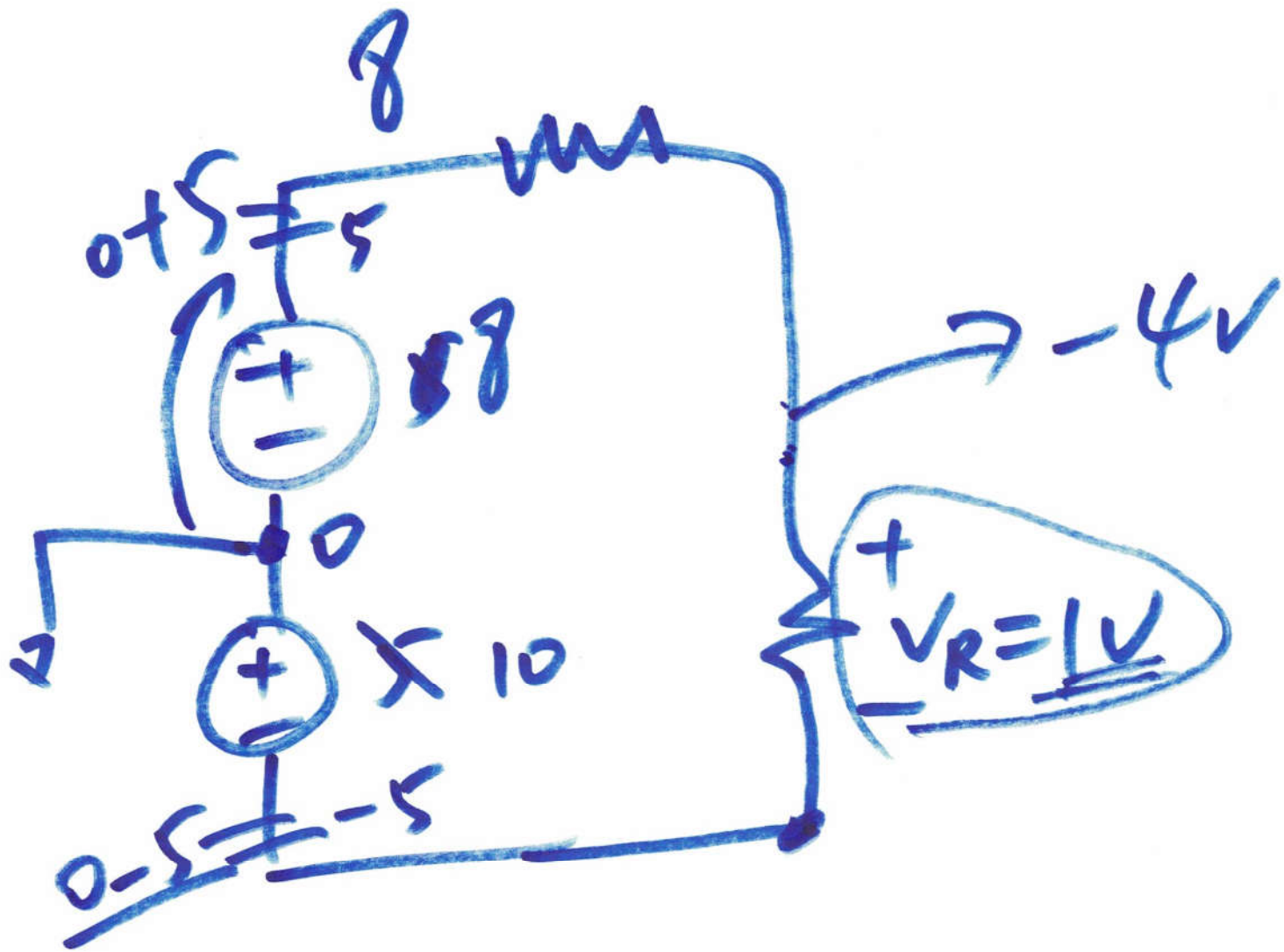
$$3V_s = V_x$$

$$1.5 = -3V_s - 3V_s = -6V_s$$

$$\begin{cases} V_s = -\frac{1.5}{6} = -0.25 \text{ V} \\ V_x = 3V_s = (3 \times -0.25) = -0.75 \text{ V} \end{cases}$$

$$I_2 = \frac{0 - V_x}{1.5 \text{ k}} = \frac{0 + 0.75}{1.5 \text{ k}} = 0.5 \text{ mA}$$

$$I_3 = \frac{-V_s}{0.5 \text{ k}} = \frac{0.25 \text{ V}}{0.5 \text{ k}} = 0.5 \text{ mA}$$



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