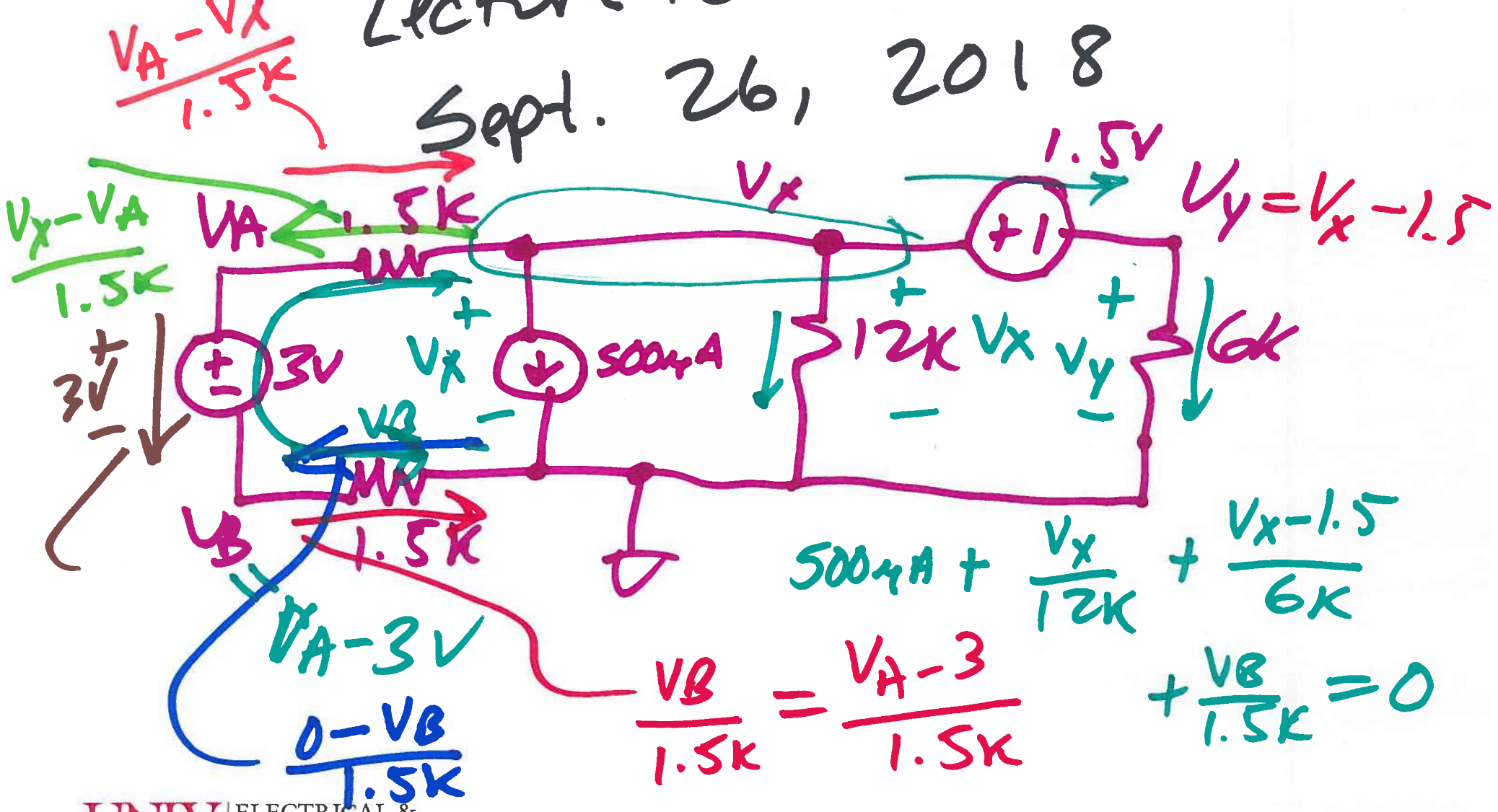
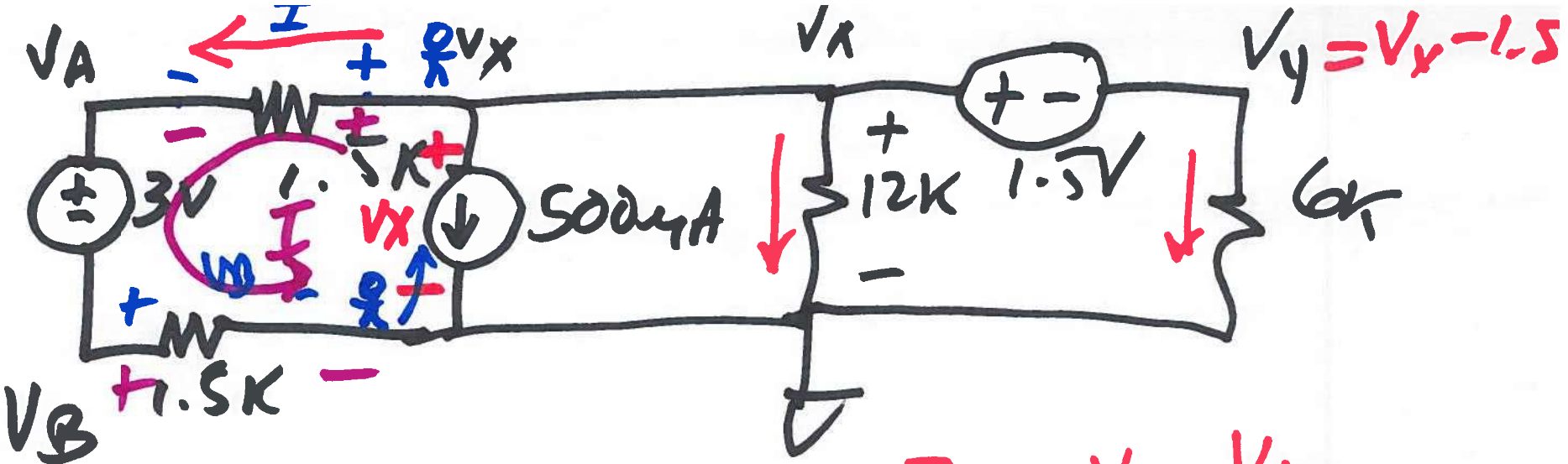
EE 220 circuits 1

Lecture 10

Sept. 26, 2018





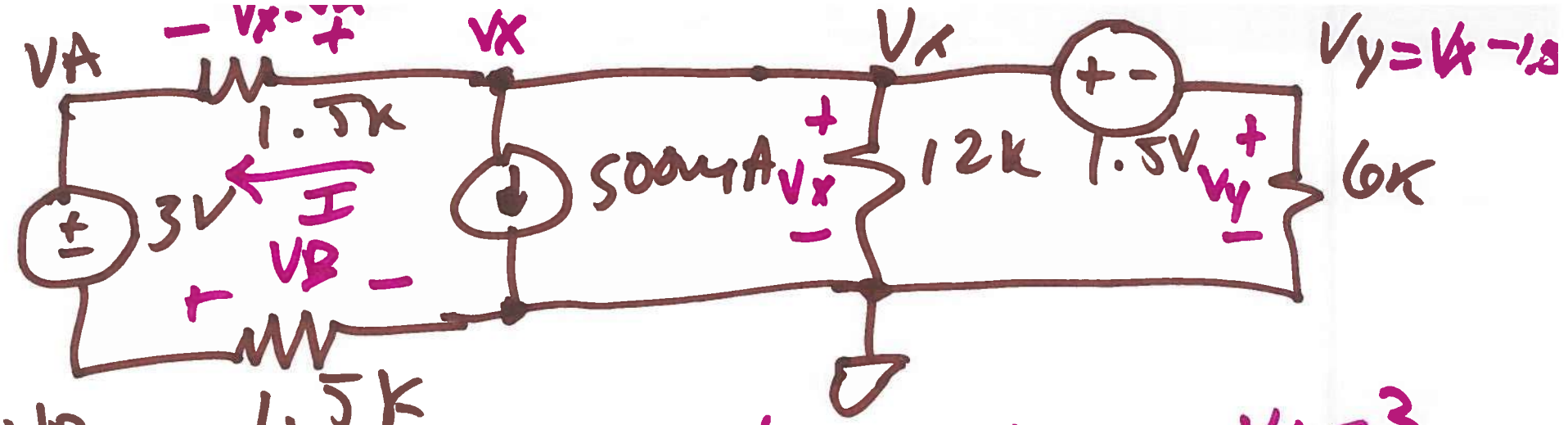
$$500\mu A + \frac{V_x}{12K} + \frac{V_x - 1.5}{6K} + \frac{V_x - V_A}{1.5K} = 0$$

$$V_x - (V_x - V_A) - 3V - V_B = 0$$

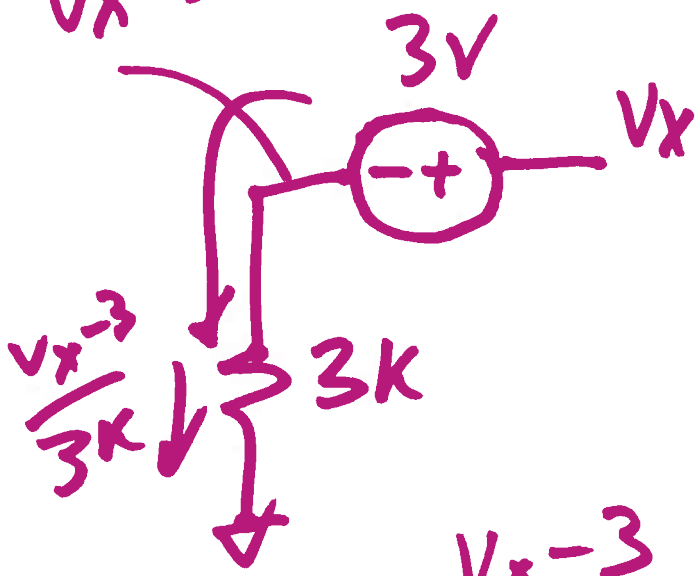
$$V_A - 3 = V_B$$

$$V_x - 1.5KI - 3V - 1.5KI = 0$$

$$I = \frac{V_x - 3}{3K}$$



$$\frac{V_x - V_A}{1.5k} = \frac{V_B}{1.5k} = \frac{V_A - 3}{1.5k}$$



$$V_x = 2V_A - 3$$

$$I = \frac{V_x - 3}{3k}$$

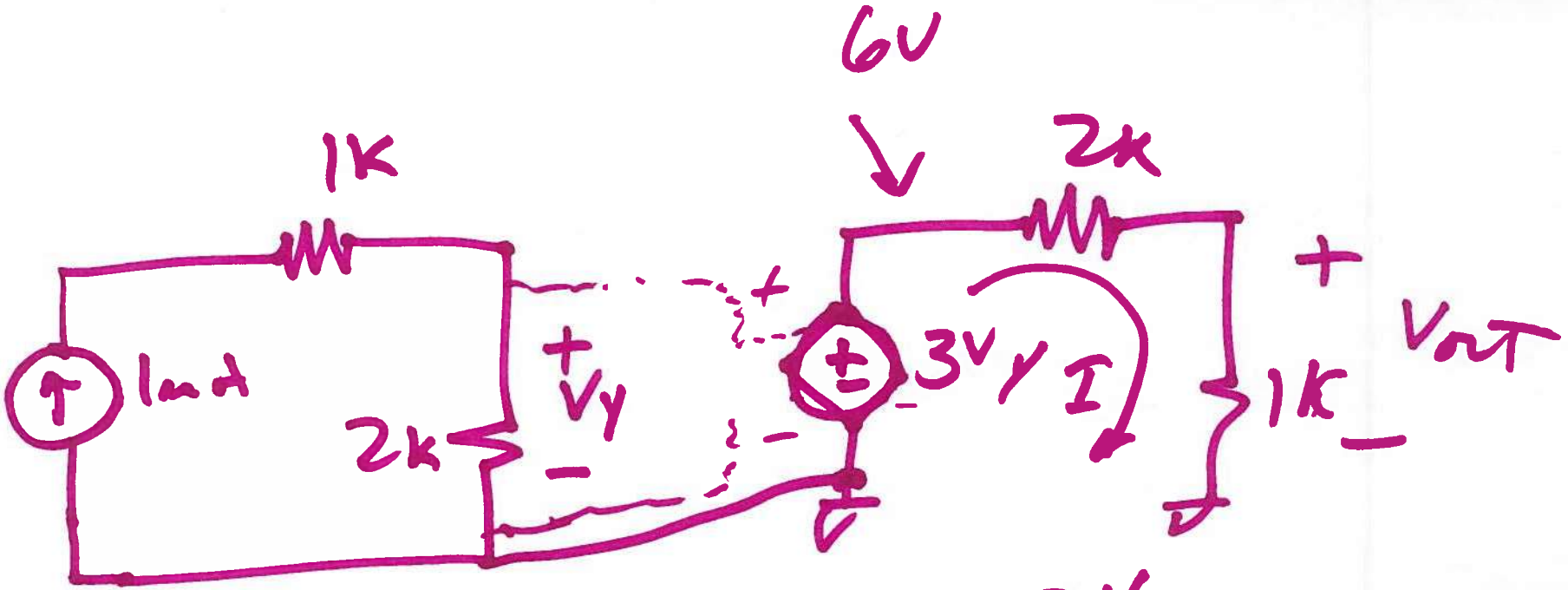
$$\frac{V_x - 3}{3k} + 500\mu A + \frac{V_x}{12k} + \frac{V_x - 1.5}{6k} = 0$$

$$4V_x - 12 + 6V + V_x + 2V_x - 3 = 0$$

$$7V_x = 9$$

$$V_x = \frac{9}{7}V$$

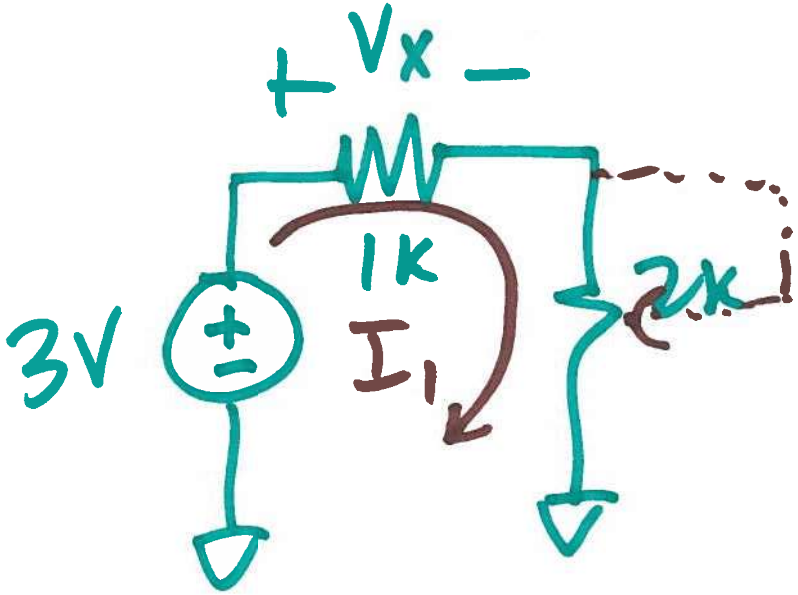
3)

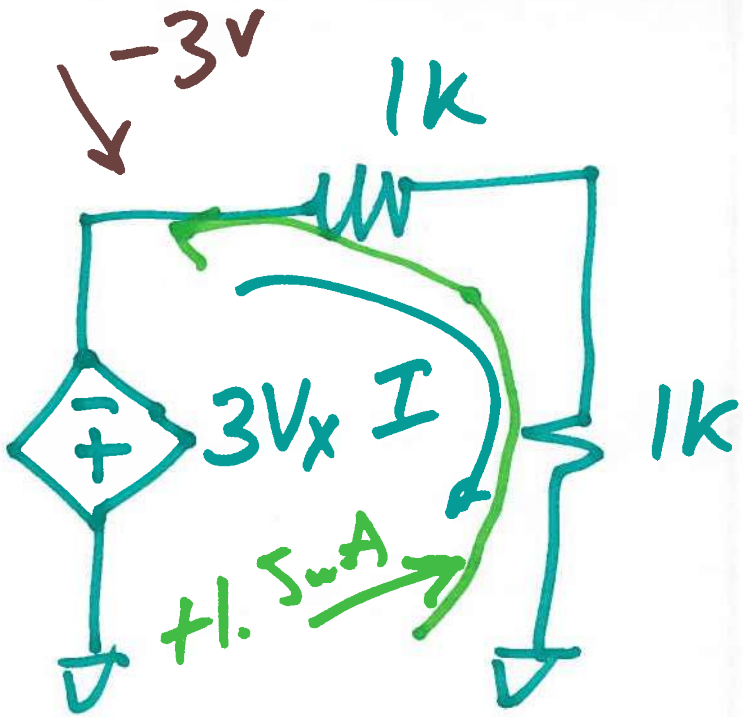


$$V_y = 1mA \cdot 2K = 2V$$

$$V_{out} = 6 \cdot \frac{1K}{1K+2K} = \boxed{2V}$$

$$I = \frac{2V}{1K} = \underline{\underline{2mA}}$$





$$V_x = 3 \cdot \frac{1k}{1k+2k} = 1V$$

$$I = \frac{-3V - 0}{2k} = -1.5mA$$

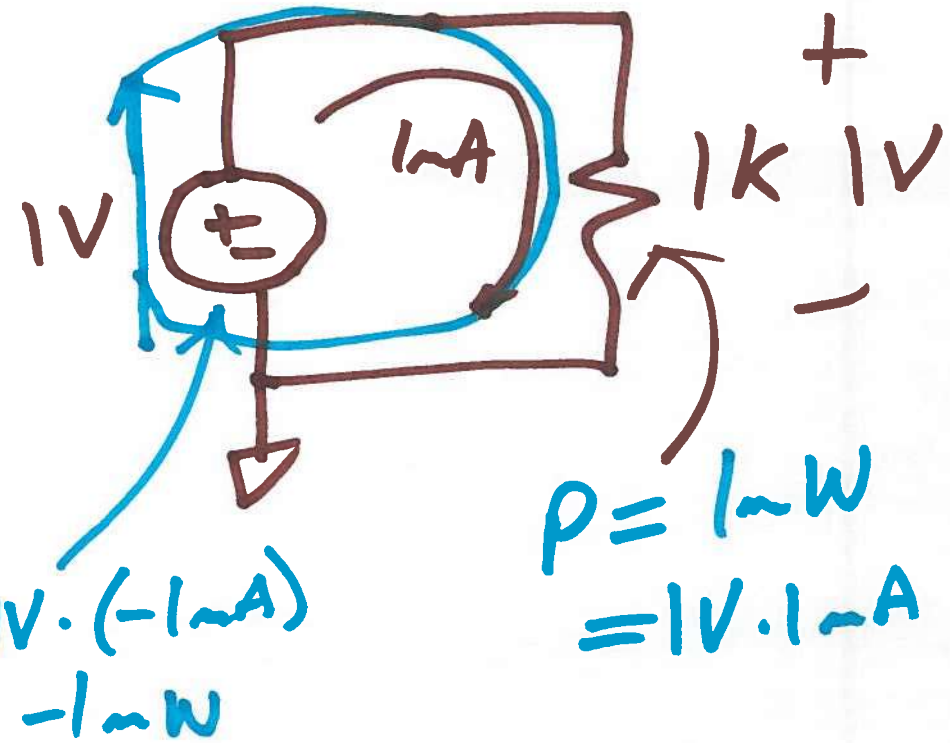
5)

$\frac{V^2}{R} = I^2R$ = Power = $V \cdot I$ (DC ckTs)

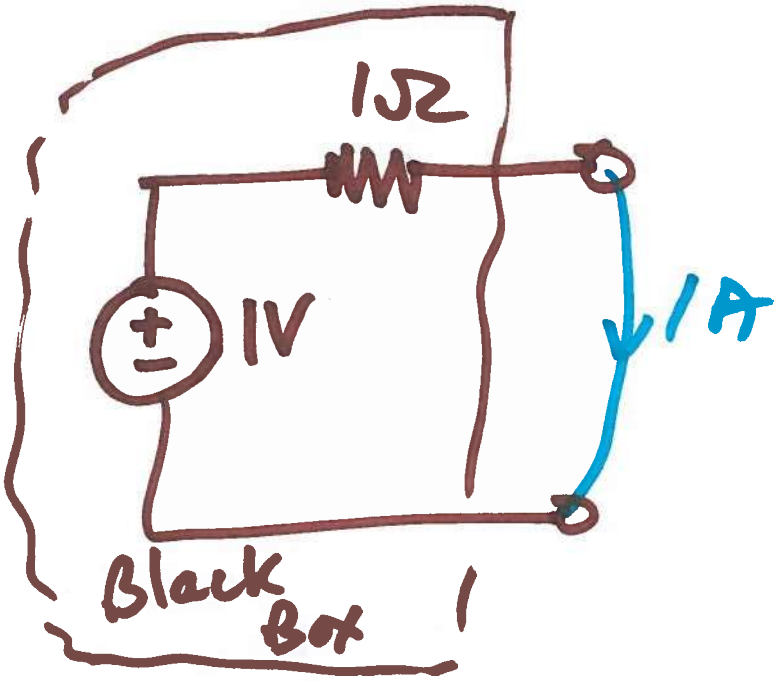
WATts = $\frac{\text{JOULES}}{s}$

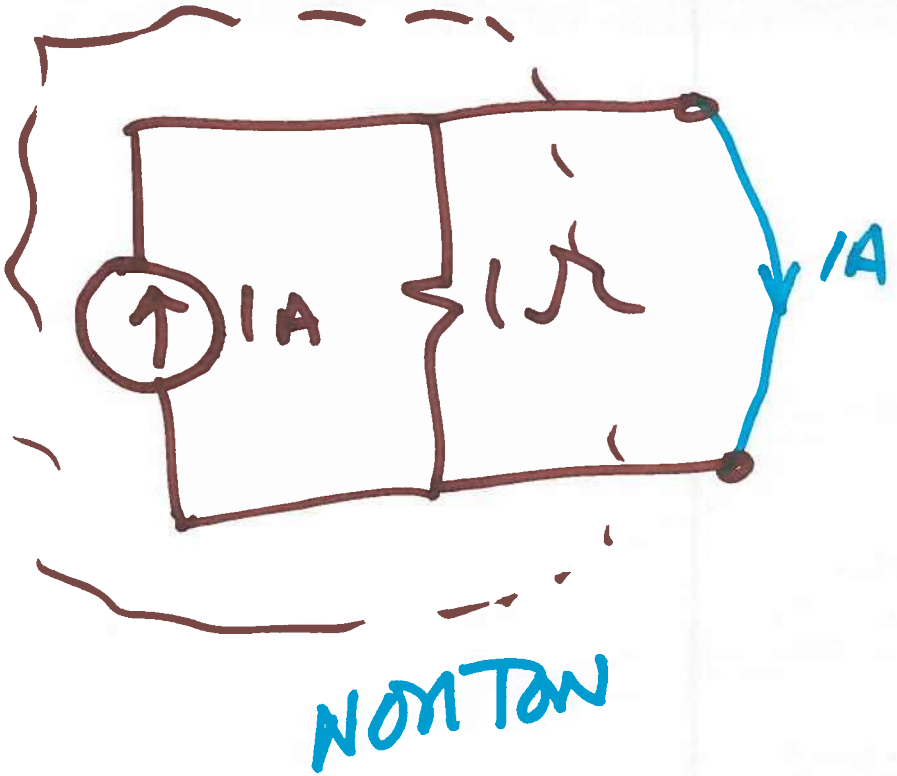
Energy = Joules

Power = $I \cdot V$



b)


1Ω
1V
1A
Black Box
Thevenin


1A
1Ω
1A
NORTON