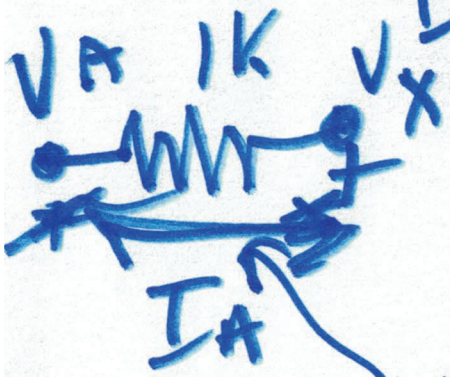
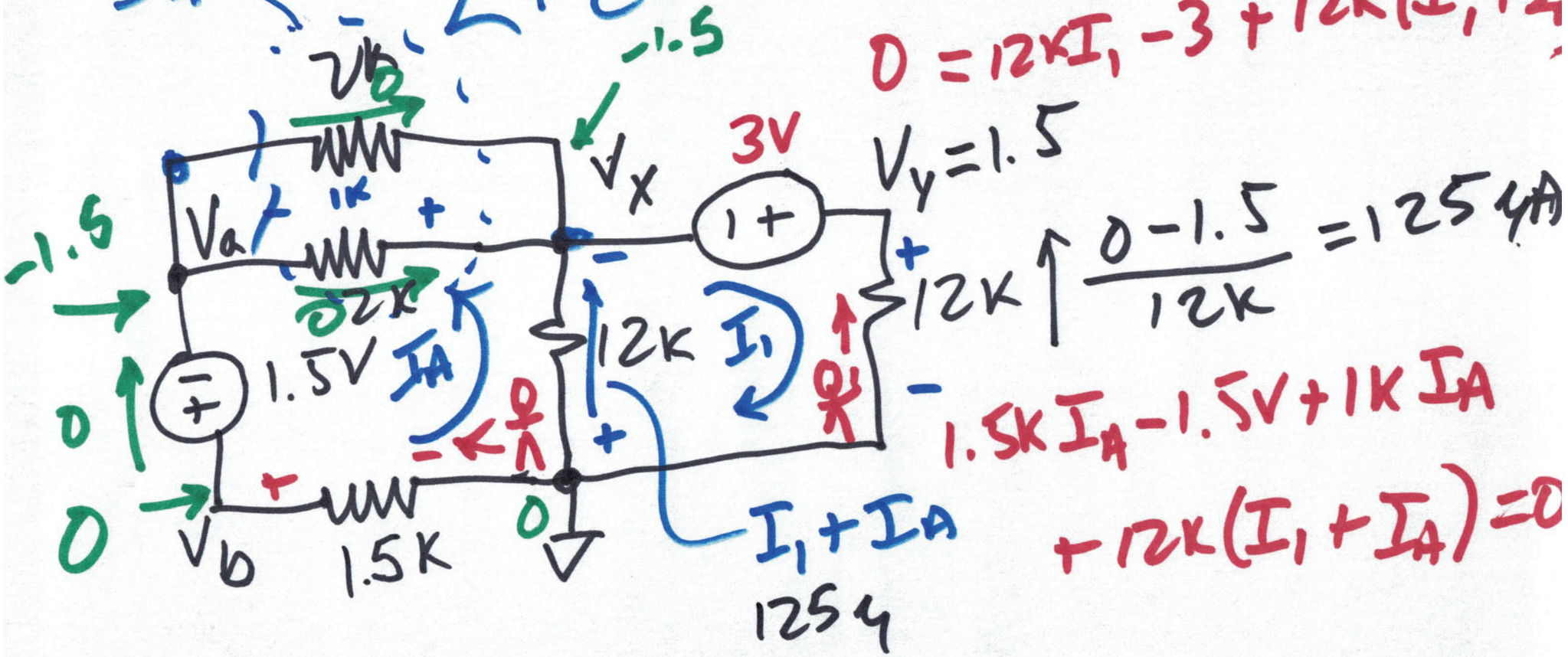
EE 220 Circuits I

Oct. 3, 2022

Lecture 10





$0 = 12K I_1 - 3 + 12K(I_1 + I_A$

$V_y = 1.5$

$\frac{0 - 1.5}{12K} = 125\,\mu A$

$1.5K I_A - 1.5V + 1K I_A$

$+ 12K(I_1 + I_A) = 0$

$$0 = I_1 - \frac{1}{4}mA + I_1 + I_A$$

$$-2I_1 = -250\mu A + I_A$$

$$I_1 = 125\mu A - \frac{I_A}{2}$$

$$0 = 1.5K I_A - 1.5 + \frac{1K}{10^3} I_A + 12K I_1 + 12K I_A$$

$$1.5 = 14.5K I_A + \frac{12K}{\Omega}\left(125\mu A - \frac{I_A}{2}\right)^{10^{-6}}$$

$$= 14.5K I_A + \frac{12}{8} m\cancel{\Omega} - 6K I_A$$

$$1.5 = \cancel{1.5K} 8.5K I_A + 1.5V$$

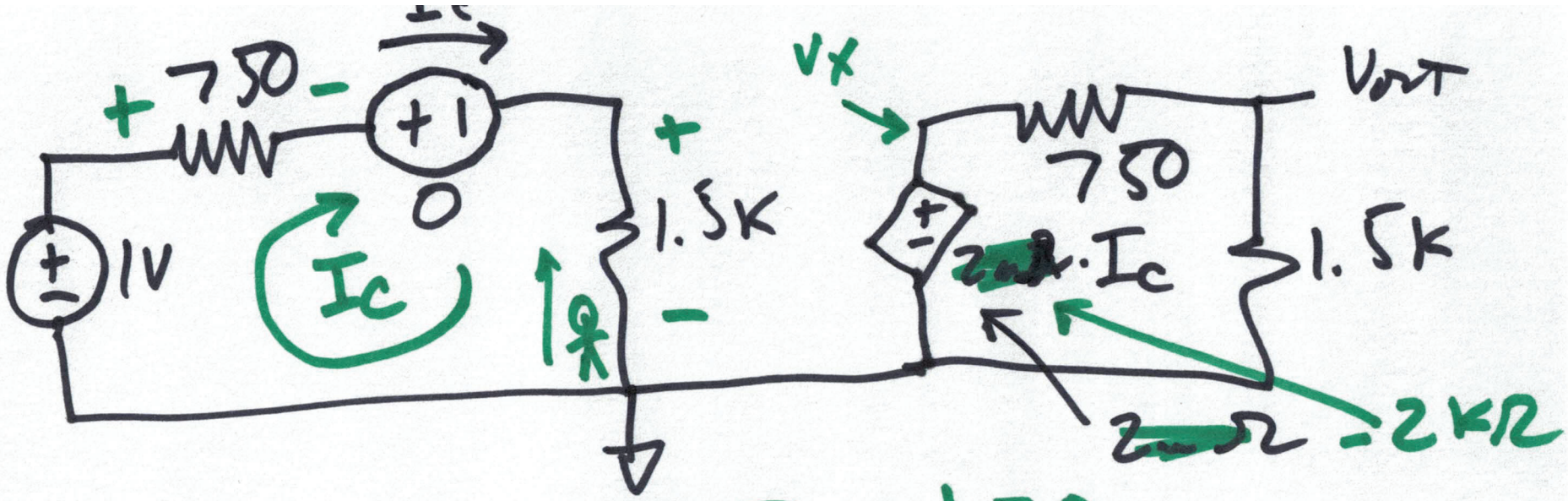
$$0 = I_A$$

$$\frac{3}{8.5} mA = 353\cancel{\mu A}$$

2)

$I_A = 0$

$$I_1 = 125.4A \quad - \text{O}$$



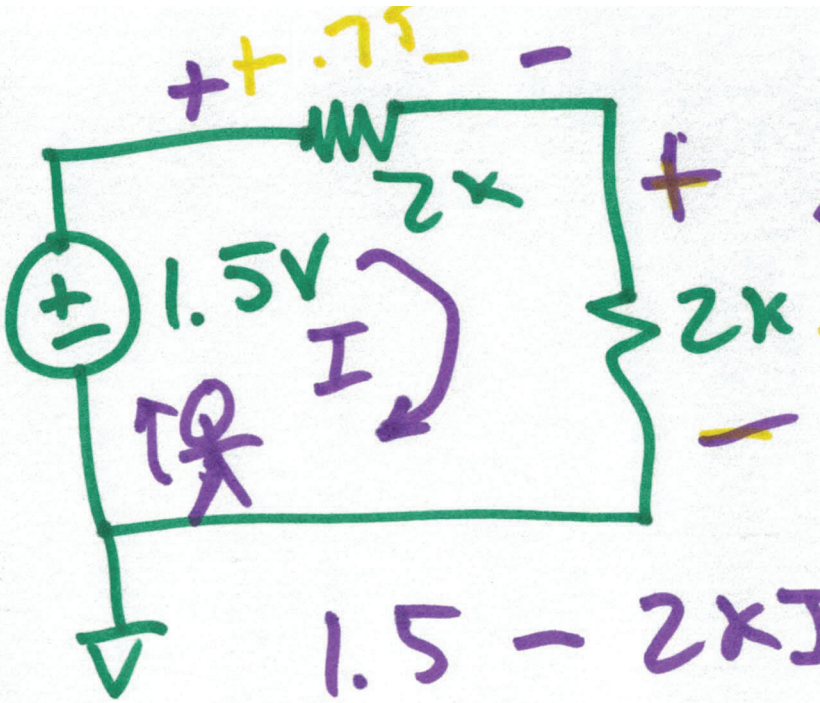
$$1.5k I_c + 0 + 750 I_c - 1 = 0$$

$$2.25k I_c = 1$$

$$I_c = \frac{1}{\frac{9}{4}}\,mA = \frac{4}{9}\,mA$$

$$V_x = -2k\Omega \cdot \frac{4}{9}\,mA = -\frac{8}{9}\,V$$

$$V_{oxT} = -\frac{8}{9} \cdot \frac{1.5k}{1.5k + 750}$$

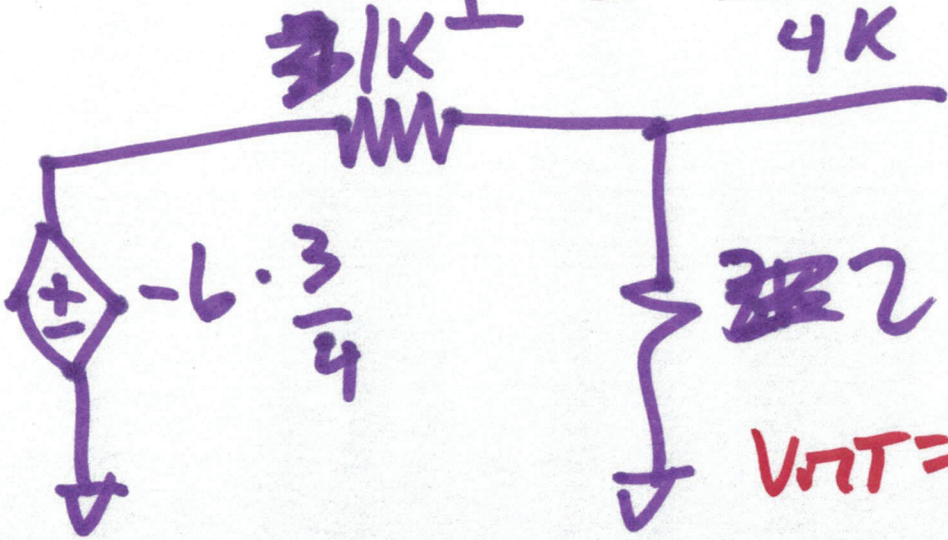


$$2kI = 2k \cdot \frac{1.5}{4k}$$

$$= .75V$$

$$1.5 - 2kI - 2kI = 0$$

$$I = \frac{1.5}{4k}$$



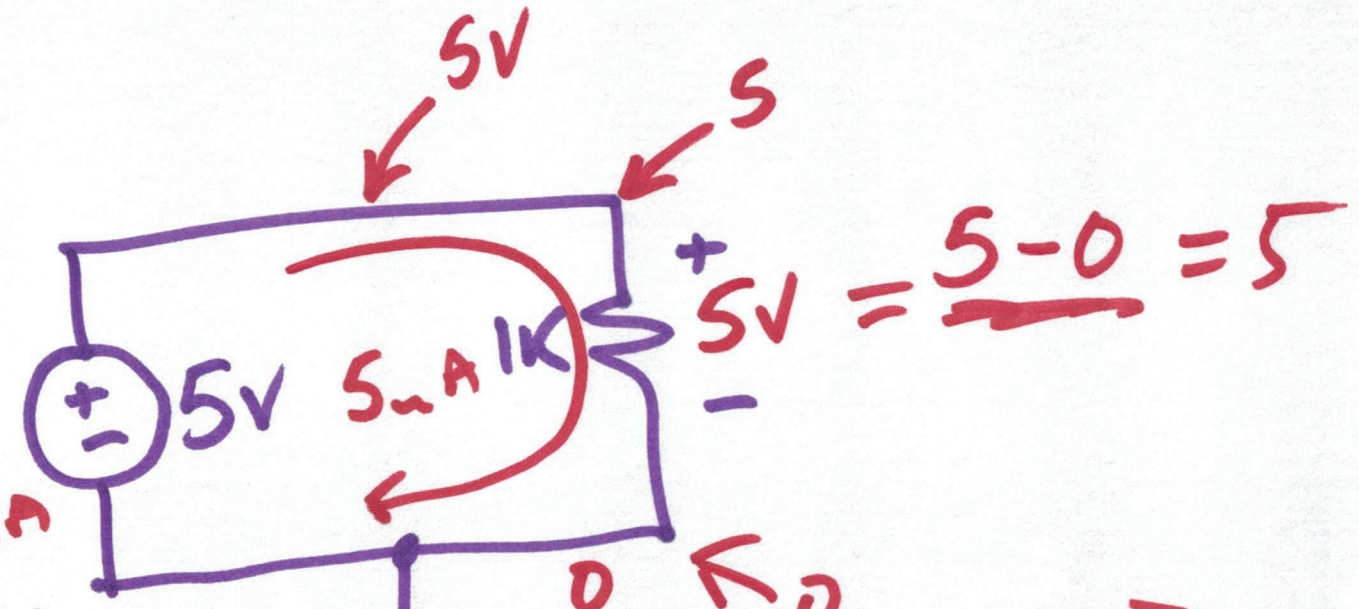
$$V_{OUT} = -\frac{36}{12} = -3V$$

Power is the use of energy over time

WATTS or Joules/s

Joules

CPU-Z



$5V = \frac{5-0}{} = 5$

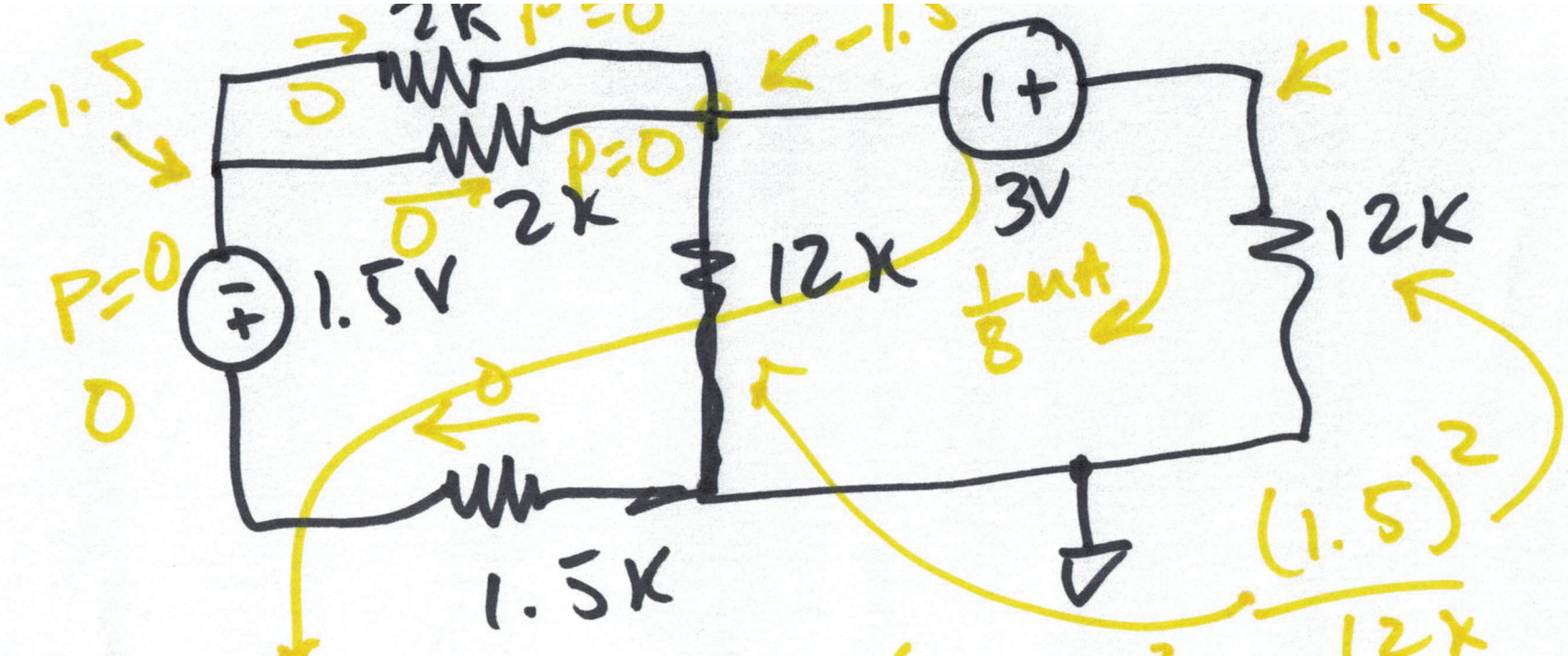
Power = V · I

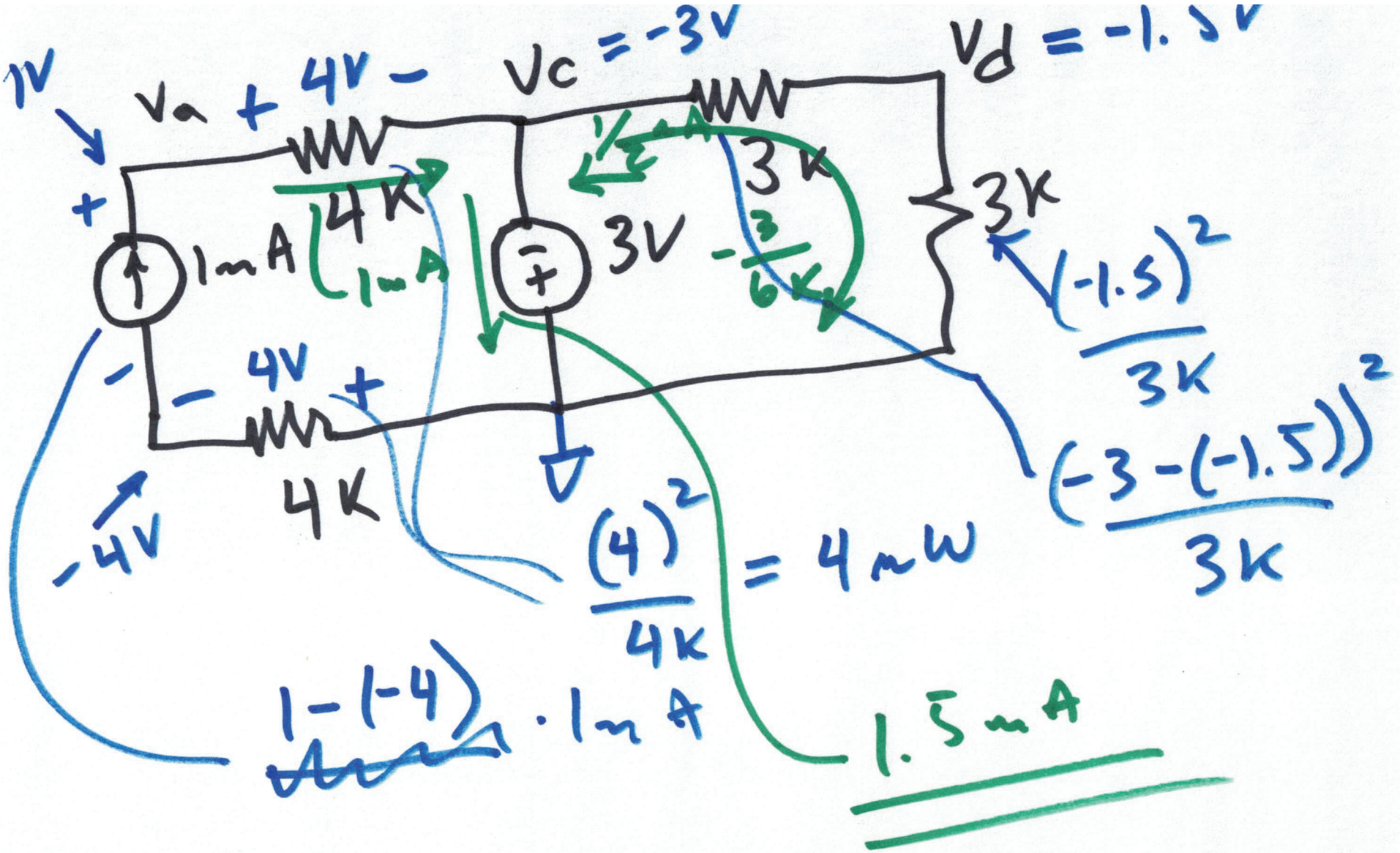
= 5.5mA

= 25mW

$I = \frac{V}{R} \Rightarrow V = IR$

$P = V \cdot I = \frac{V^2}{R} = I^2 R$


2K
P=0
-1.5
1.5
1+
3V
2K
P=0
P=0
1.5V
12K
12K
1/8 mA
0
1.5K
(1.5)^2
12K
P=-3 · 1/8 mA
(-1.5)^2
12K
= P
187.5 μW
= -3/8 mW
= -.375 mW


1V
Va
+
4V
−
Vc = -3V
Vd = -1.5V
4K
1mA
1mA
3V
1/2 mA
3K
-3/6K
3K
(-1.5)²/3K
(-3-(-1.5))²/3K
4V
4K
-4V
(4)²/4K = 4mW
1-(-4)·1mA
1.5mA