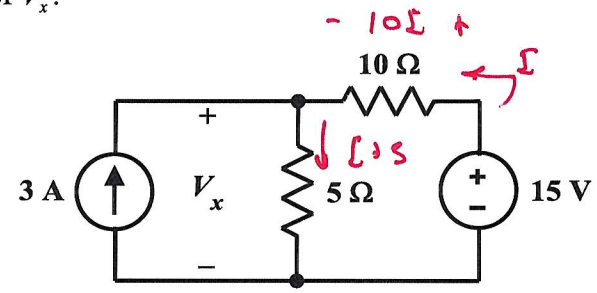
EE 2240

Problem #03

Determine the value of V_x.



$$10I + 5(I + 3) = 15$$

$$5I + 15$$

$$10I + 5I = 0$$

$$15I = 0 \Rightarrow I = 0$$

$$I + 3 = 3$$

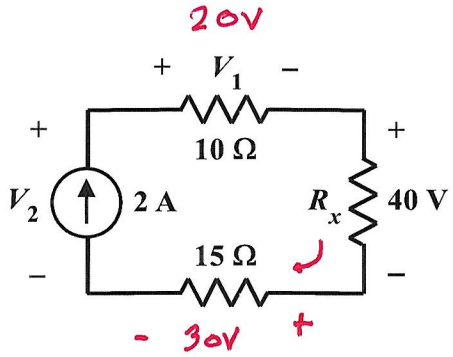
$$V_x = 5(3A) = 15V$$

Cut off last time.

EE 2240

Homework Problem #009

For the circuit shown below:



a. Determine the value of V_1.

20 V from Ohm's Law

b. Determine the value of R_x.

$$R_x = \frac{40V}{2A} = 20\,\Omega$$

c. Determine the value of V_2.

$$V_2 = 20V + 40V + 30V = 90\,V$$

d. How much power does R_x absorb?

$$P_x = (40V)(2A) = 80\,W$$

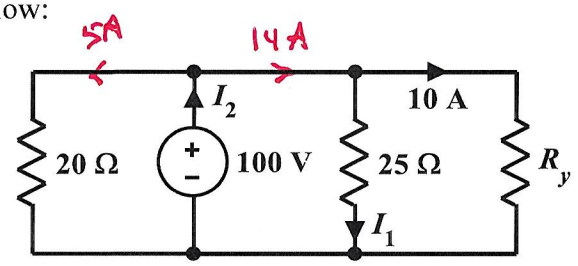
e. How much power does the independent current source deliver?

$$P_s = (2A)V_2 = (2A)(90V) = 180\,W$$

EE 2240

Homework Problem #010

For the circuit shown below:



a. Determine the value of I_1.

$$I_1 = \frac{100\text{V}}{25\Omega} = 4\text{ A}$$

b. Determine the value of R_y.

$$R_y = \frac{100\text{V}}{10\text{A}} = 10\Omega$$

c. Determine the value of I_2.

$$I_2 = 5\text{A} + 14\text{A} = 19\text{A}$$

d. How much power does R_y absorb?

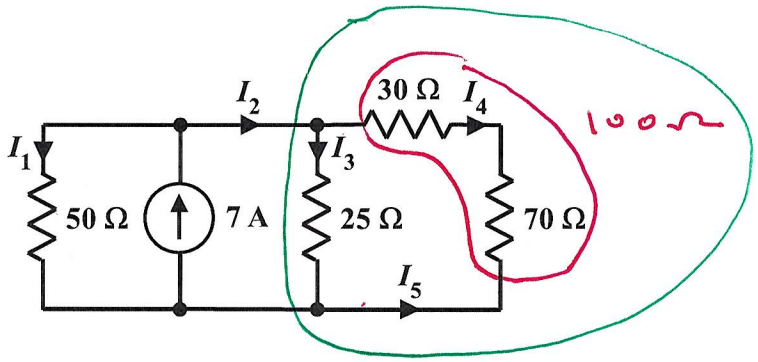
$$P_y = (100\text{V})(10\text{A}) = 1000\text{W} = 1\text{kW}$$
$$= (10\text{A})^2 R_y = 1000\text{W} = 1\text{kW}$$

e. How much power does the independent voltage source deliver?

$$P_s = (100\text{V})(19\text{A}) = 1900\text{W} = 1.9\text{kW}$$

EE 2240

Homework Problem #012



Use equivalent resistance and the current divider equation to determine each of the following:

a. I_1

$$I_1 = \frac{\frac{1}{50}}{\frac{1}{50}+\frac{1}{25}+\frac{1}{100}} \cdot 7A = \frac{2}{7} \cdot 7 = 2\,A$$

b. I_2

$$I_2 = \frac{50}{50+20} \cdot 7A = 5\,A$$

c. I_3

$$I_3 = I_2 - I_4 \quad \text{(KCL)}$$
$$= 5A - 4A$$
$$= 1A$$

d. I_4

$$I_4 = I_2 - I_3 = 5 - 1 = 4A$$

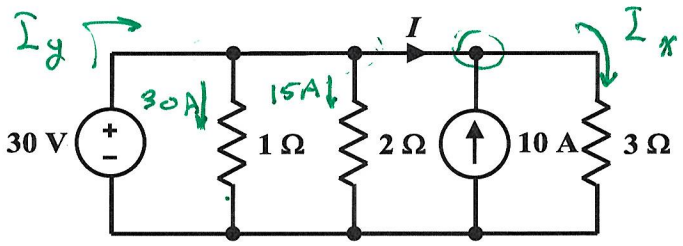
e. I_5

$$I_5 = -I_4 = -4A$$

$$I_3 = \frac{\frac{1}{25}}{\frac{1}{50}+\frac{1}{25}+\frac{1}{100}} \cdot 7 = 4A$$

EE 2240

Problem #04



a. Determine the power absorbed by the 1 Ω resistor.

$$P_{1\Omega} = \frac{(30V)^2}{1\Omega} = 900\ W$$

b. Determine the value of I.

$$I_x = \frac{30V}{3\Omega} = 10\ A$$

$$I = 10A - 10A = 0$$

c. Determine the power absorbed by the 3 Ω resistor.

$$P_{3\Omega} = (10A)^2(3\Omega) = 300\ W$$

d. How much power is delivered by the 30 V independent voltage source?

$$I_y = 30A + 15A + I = 45A$$

$$P_{VS} = (30V)(45A) = 1350\ W$$

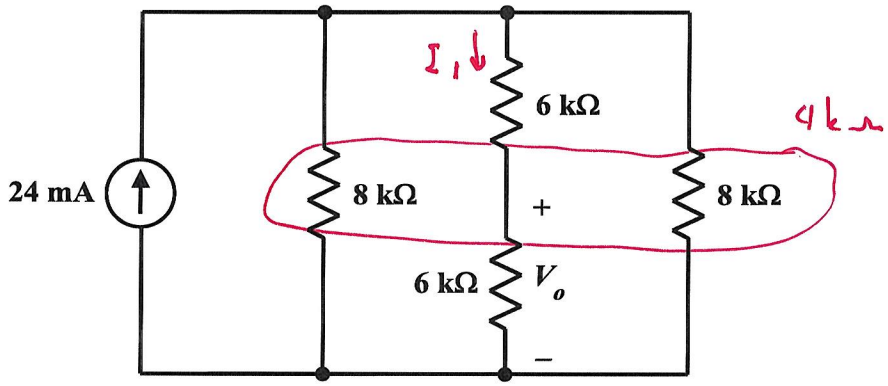
e. How much power is delivered by the 10 A independent current source?

$$P_{10A} = (10A)(30V) = 300W$$

EE 2240

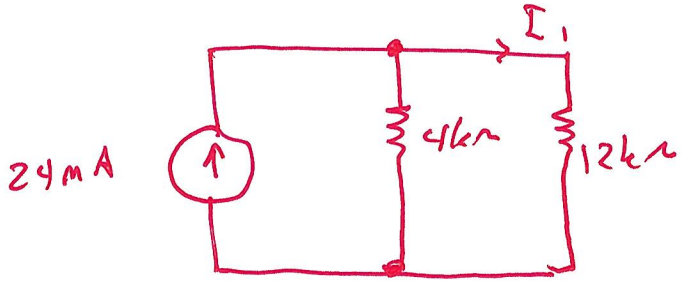
Problem #05

Find V_o.



$$I_1 = \frac{4k\Omega}{4k\Omega + 12\Omega} \cdot 24mA = 6mA$$

$$V_o = (6k\Omega)(I_1)(6mA) = 36V$$



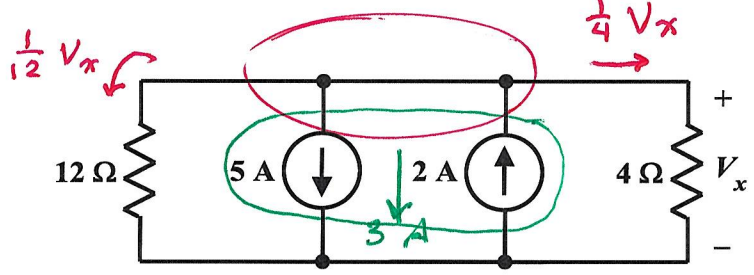
$$I_1 = \frac{4}{4+12} \cdot 24mA$$

$$= 6mA$$

EE 2240

Problem #06

Determine the value of V_x.

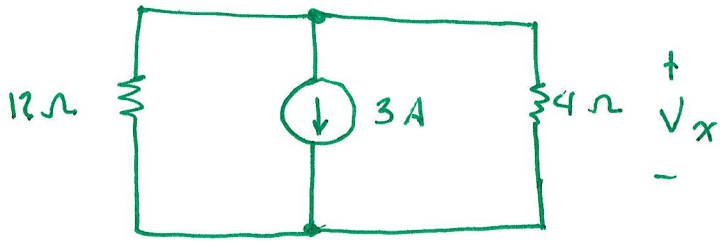


$\frac{1}{12}V_x + 5 - 2 + \frac{1}{4}V_x = 0$

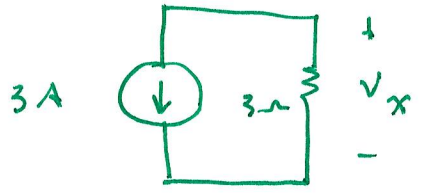
$\frac{1}{3}V_x = -3$

$V_x = -9\,V$

$\frac{1}{12}V_x + 3 + \frac{1}{4}V_x = 0$



$R_{eq} = \frac{4 \cdot 12}{4+12} = 3\,\Omega$

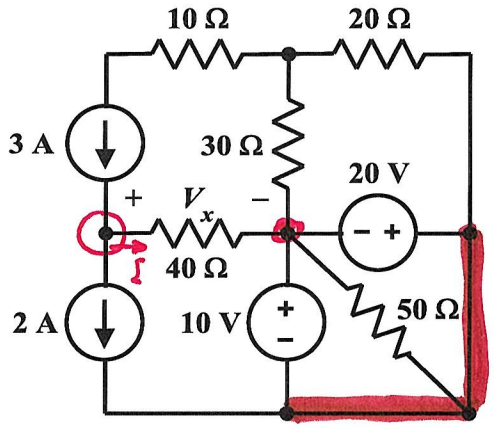


$V_x = -(3\,\Omega)(3\,A) = -9\,V$

EE 2240

Problem #07

Determine the value of V_x.



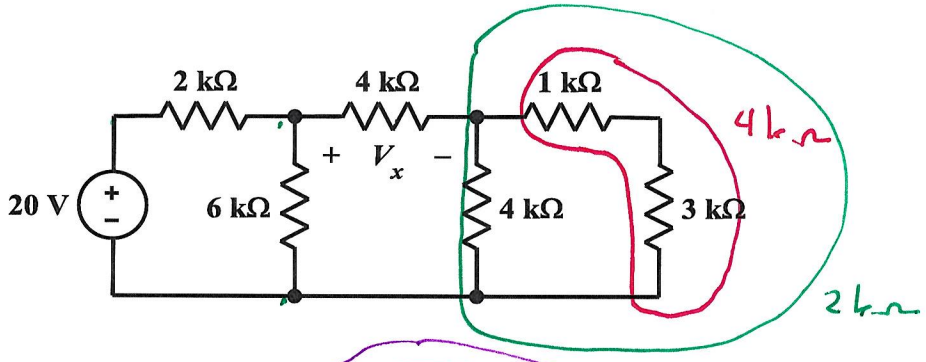
$-3A + I + 2A = 0 \Rightarrow I = 1A$

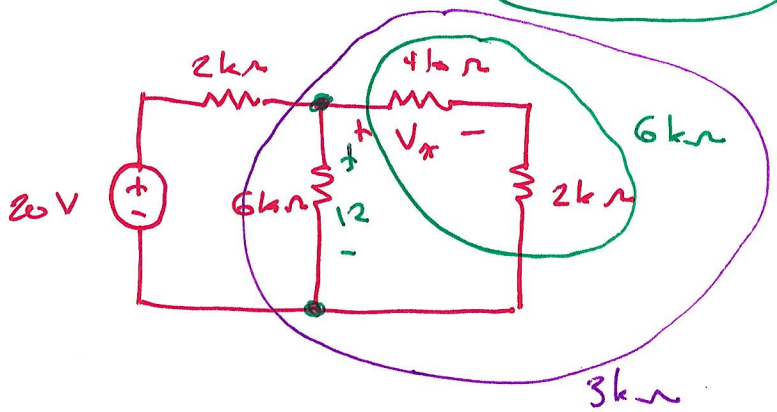
$V_x = (40\Omega)\, I = 40V$

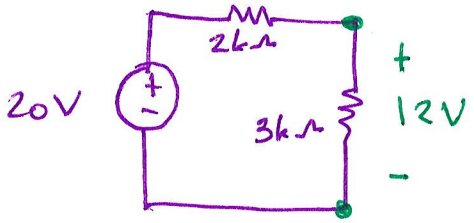
EE 2240

Problem #08

Find V_x.





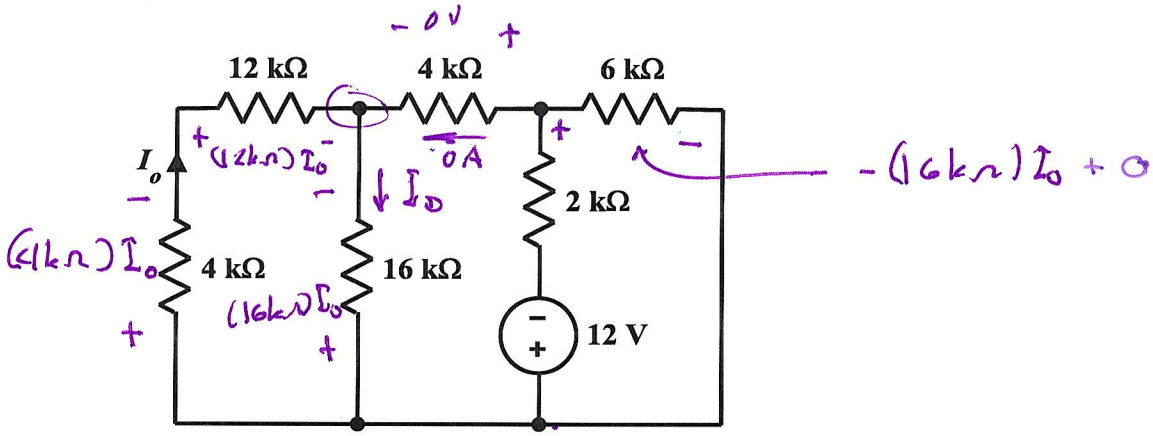


$$V_x = \frac{4k\Omega}{6k\Omega}\,12V = 8V$$

EE 2240

Problem #09

Determine the value of I_o.



$$-(16k\Omega)\,I_o = \frac{6k\Omega}{8k\Omega}(-12)$$

$$= -9$$

$$I_o = \frac{9}{16k\Omega}\,A$$

$$= \frac{9}{16}\,mA$$