

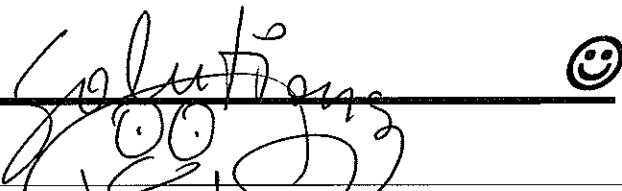
*University ☺ of Portland
Sch☺☺ of Engineering*

EE 261-Electrical Circuits-3 cr. hrs.
Fall 2011

Midterm Exam # 1

(Friday, September 30, 2011)
(Closed Book Exam, One Formula Sheet Allowed)
(Total Time: 55 minutes)

Name: SOLUTIONS ☺

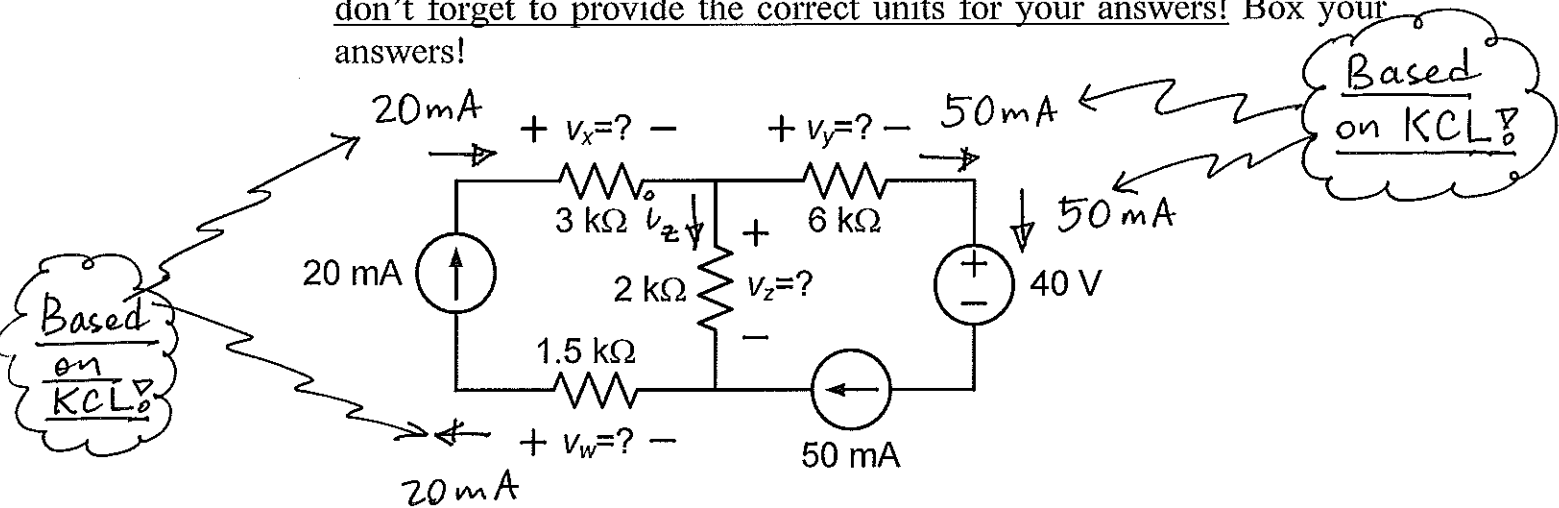
Signature: 

*"An honest mind possesses a kingdom."
Lucius Annaeus Seneca (4B.C.-65A.D.)*

*"Honest people are the true winners of the universe."
Anonymous*

NOTE: On all the problems, please show your work clearly, and provide the appropriate units for your answers. Also mark on the schematic to show any current or voltage that you define in your solution.

1. (20 points) In the electric circuit shown, find the values of the voltages of the four resistors as indicated. Please show your work clearly and provide brief justifications for the steps you take. Also, don't forget to provide the correct units for your answers! Box your answers!



Ohm's Law $\rightarrow V_x = (3 \text{ k}\Omega)(20 \text{ mA}) = \boxed{60 \text{ V}}$

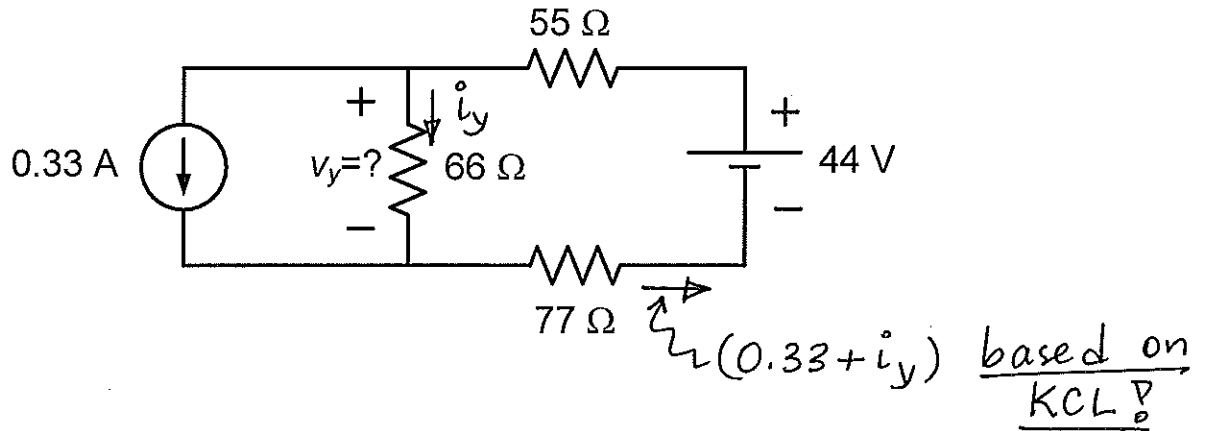
$V_w = -(1.5 \text{ k}\Omega)(20 \text{ mA}) = \boxed{-30 \text{ V}}$

$V_y = (6 \text{ k}\Omega)(50 \text{ mA}) = \boxed{300 \text{ V}}$

KCL $\rightarrow i_z = 20 - 50 = -30 \text{ mA}$

$\therefore V_z = -(2 \text{ k}\Omega)(30 \text{ mA}) = \boxed{-60 \text{ V}}$

2. (20 Points) Consider the electric circuit shown. Find the value of the voltage v_y across the 66Ω resistor. Show your work step by step including justifications.



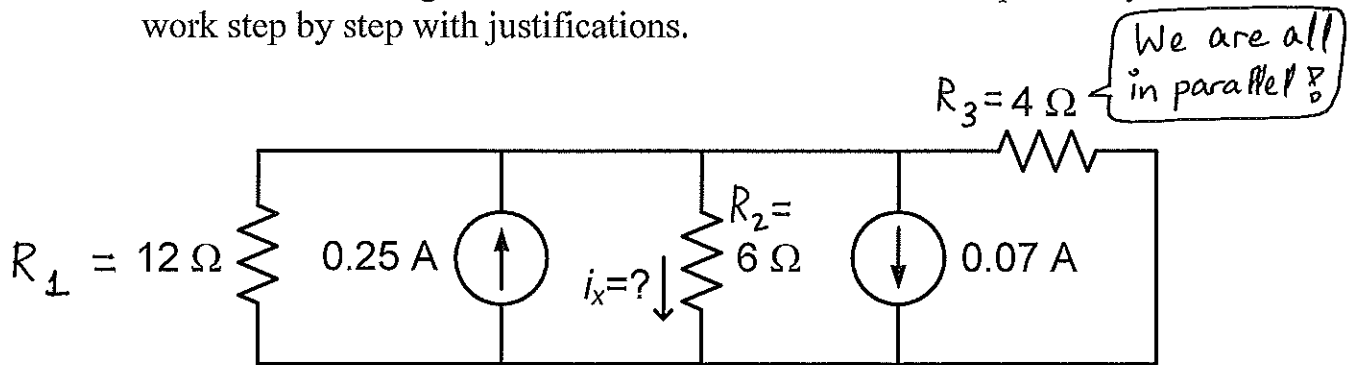
Applying KVL around the right-side loop :

$$66 i_y + 77(0.33 + i_y) - 44 + 55(0.33 + i_y) = 0$$

$$\rightarrow i_y = \frac{44 - 132(0.33)}{\underbrace{66 + 77 + 55}_{198}} \approx 0.0022 \text{ A}$$

$$\therefore v_y = 66 i_y \approx \boxed{0.1467 \text{ V}}$$

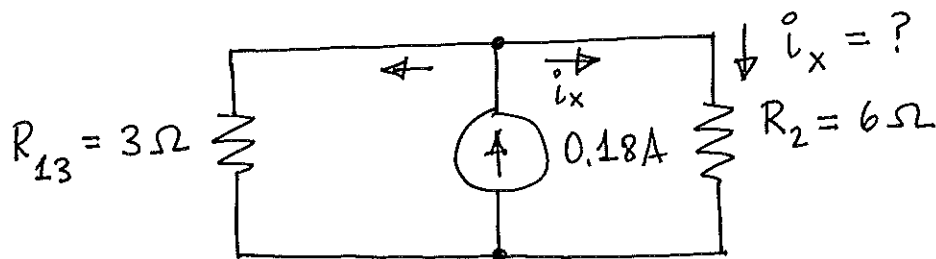
3. (20 Points) Consider the electric circuit shown. Determine the current i_x that flows through the $6\ \Omega$ resistor as shown. Please provide your work step by step with justifications.



Combining the two current sources and combining resistors R_1 and R_3 yield:

$$I_{eq} = 0.25 - 0.07 = 0.18\text{ A } \uparrow$$

$$\underbrace{R_1 // R_3}_{R_{13}} = \frac{(12)(4)}{12+4} = 3\ \Omega$$

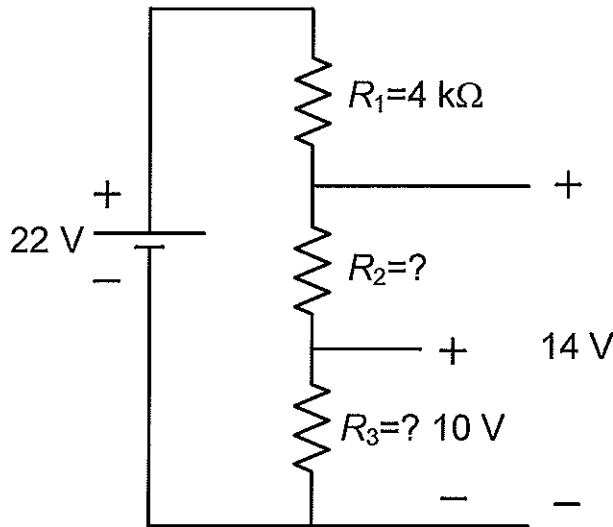


Using CDP:

I'm the other resistor

$$i_x = \frac{3}{3+6} (0.18) = \boxed{0.06\text{ A}}$$

4. (20 Points) For the electric circuit shown, find the values of resistors R_2 and R_3 . Show your work step by step and provide justifications.



$$V_{DP} \rightarrow \frac{(R_2 + R_3)}{4\text{ k}\Omega + (R_2 + R_3)} (22) = 14\text{ V} \rightarrow R_2 + R_3 = 7\text{ k}\Omega$$

$$V_{DP} \rightarrow \frac{R_3}{4\text{ k}\Omega + \underbrace{R_2 + R_3}_{7\text{ k}\Omega}} (22) = 10\text{ V} \rightarrow R_3 = \boxed{5\text{ k}\Omega}$$

$$\therefore R_2 = 7\text{ k}\Omega - R_3 = \boxed{2\text{ k}\Omega}$$

