Name: _____ (please print)

Signature: _____

ECE 2201 – Quiz #6
December 1, 2021

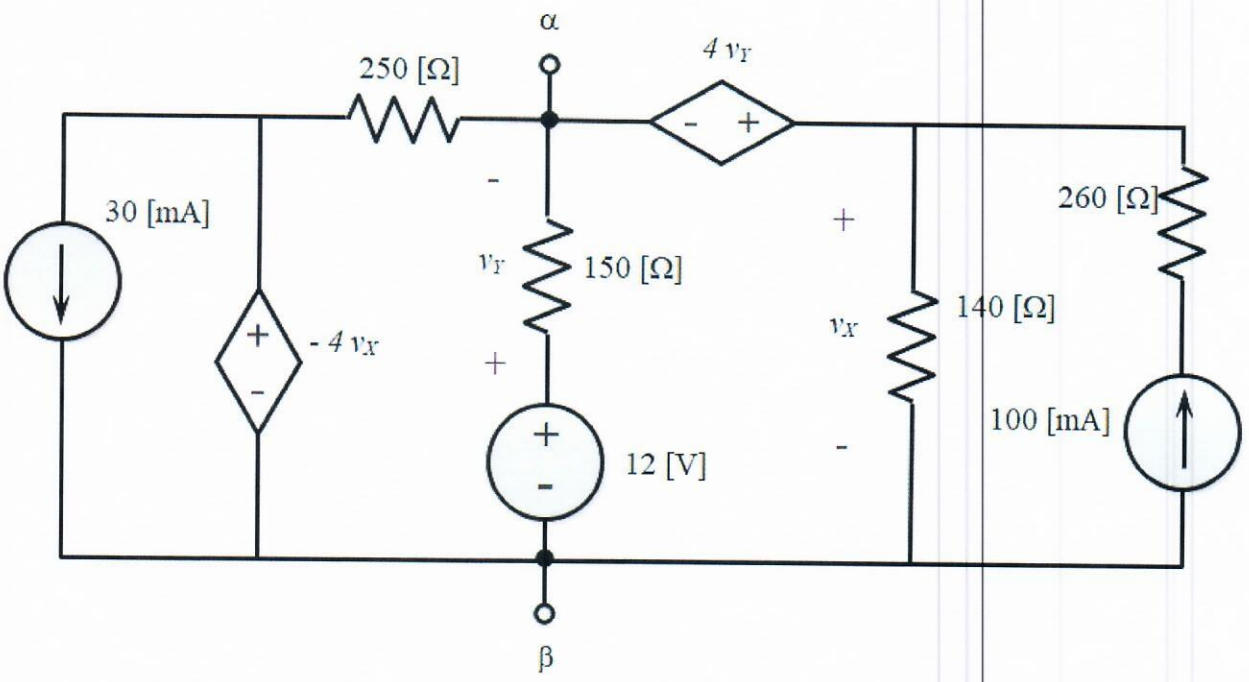
- This quiz is closed book, closed notes. You may have one 8 ½" x 11" piece of paper, written on both sides, as a crib sheet.
- Show all work on these pages. Show all work necessary to complete the problem. A solution without the appropriate work shown will receive no credit. A solution which is not given in a reasonable order will lose credit.
- Show all units in solutions, intermediate results, and figures. Units in the quiz will be included between square brackets.
- If the grader has difficulty following your work because it is messy or disorganized, you will lose credit.
- Do not use red ink. Do not use red pencil.
- You will have 30 minutes to work on this quiz.

_____/25

Room for extra work

When a resistor of value 10 [Ω] is connected to terminals α, β, of the circuit below, the current in the resistor is 0.570 [A]. The current is directed from α to β.

Find the Norton equivalent circuit at terminals α, β. (Do not include the 10 [Ω] resistor in the Norton equivalent.)



Room for extra work

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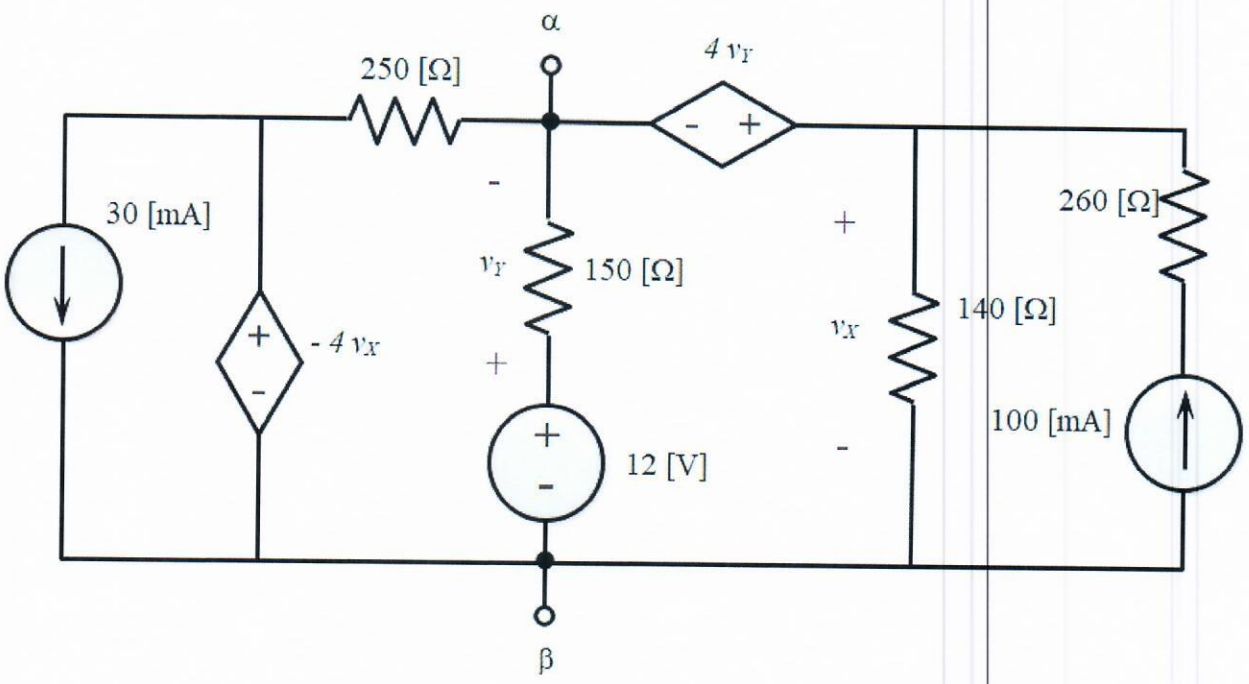
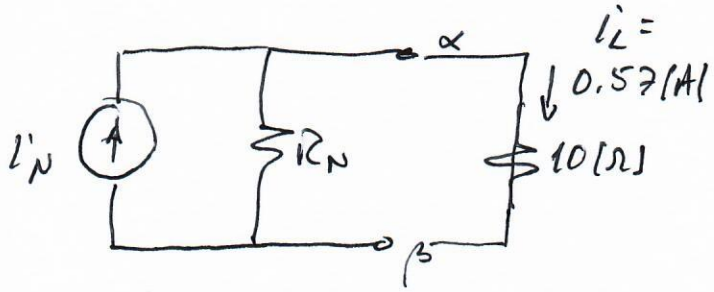


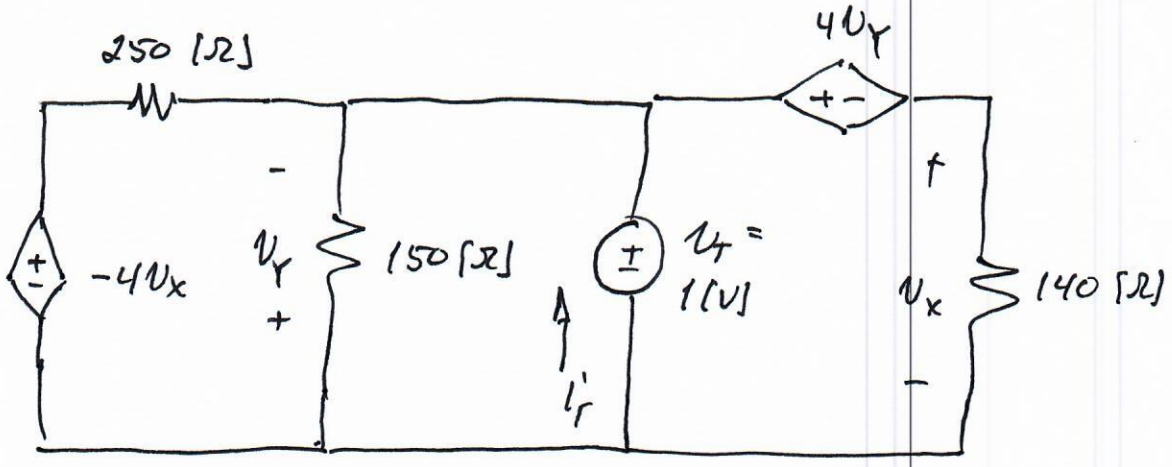
We could of course find the Norton equivalent at α, β without the information given about the 10 [Ω] resistor. Does that information tell us anything? Let's see:



$$i'_L = i'_N \cdot \frac{R_N}{R_N + 10} = 0.57\ [A]$$

So we have a constraint on i'_N and R_N. All we need is one of those and we can solve for the other using the equation above. Let's do a test source.

Room for extra work



$$i'_T = \frac{1}{150} + \frac{1 - 4V_y}{140} + \frac{1 + 4V_x}{250} \qquad V_y = -1$$

$$1 - V_x - 4V_y = 0 \qquad \Rightarrow \quad i'_T = 0,12638 \text{ [A]}$$

$$\therefore R_N = 1/i'_T = 7,9126 \text{ [Ω]}$$

Now $$i'_N = 0,57 \cdot \frac{R_N + 10}{R_N} = 1,290 \text{ [A]}$$