Name: _____ (please print)

Signature: _____

ECE 2300 – Quiz #2
February 11, 2013

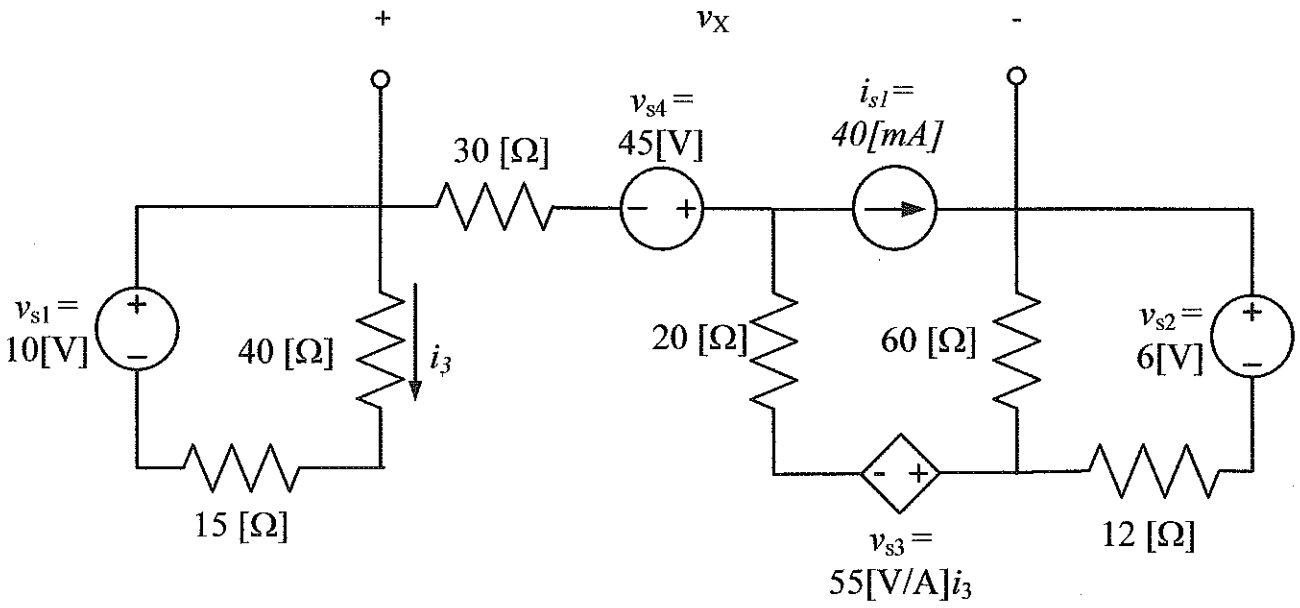
Keep this quiz closed and face up until you are told to begin.

1. This quiz is closed book, closed notes. You may use one 8.5" x 11" crib sheet, or its equivalent.
2. 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.
3. It is assumed that your work will begin on the same page as the problem statement. If you choose to begin your work on another page, you must indicate this on the page with the problem statement, with a clear indication of where the work can be found. **If your work continues on to another page, indicate clearly where your work can be found. Failure to indicate this clearly will result in a loss of credit.**
4. Show all units in solutions, intermediate results, and figures. Units in the quiz will be included between square brackets.
5. Do not use red ink. Do not use red pencil.
6. You will have 30 minutes to work on this quiz.

_____/20

For the circuit shown below, do the following.

a) Find v_x.
b) Find the power delivered to the independent voltage source v_{s2}.



Room for extra work

For the circuit shown below, do the following.

a) Find v_x.
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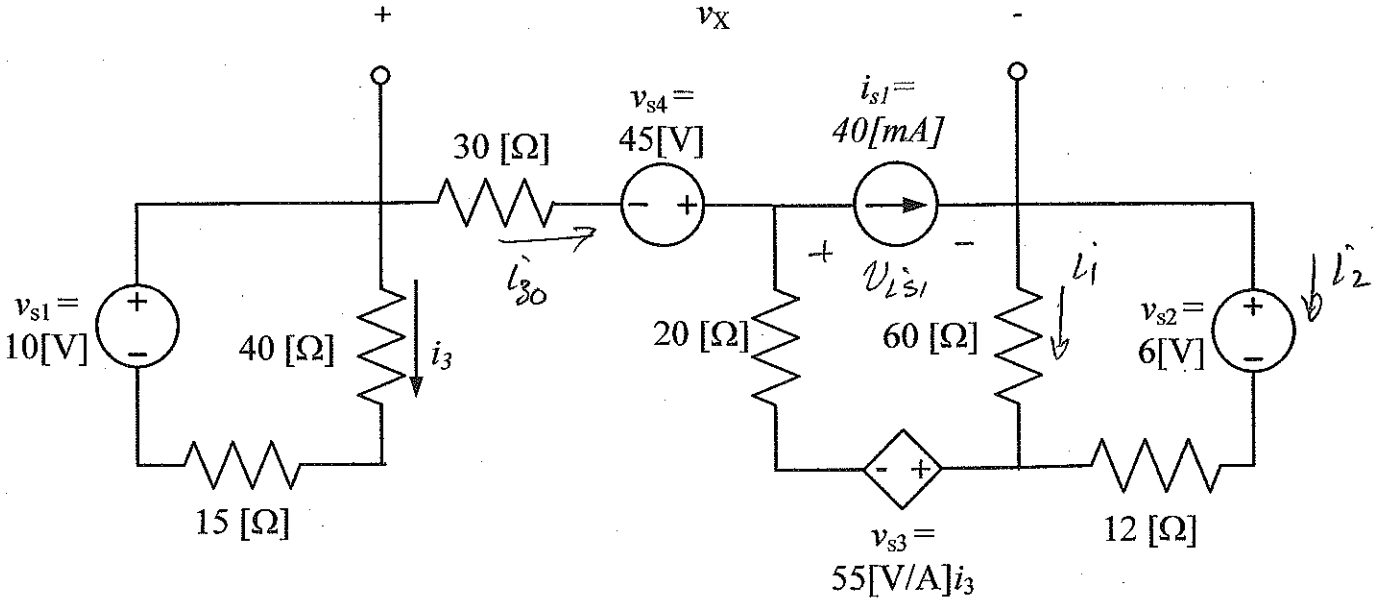

We have defined currents i'_1 and i'_2. We will need two equations to find these. We will need them later.

KCL: $i'_1 + i'_2 = i'_{s1} = 0.04$

KVL: $6 + 12i'_2 - 60i'_1 = 0$

$\Rightarrow i'_1 = 0.090$ [A], $i'_2 = -0.050$ [A]

We also need i'_3:

KVL: $40i'_3 + 15i'_3 - 10 = 0 \Rightarrow i'_3 = 0.18182$ [A]

Note that $i'_{30} = 0$.

a) $-v_x + 30\overbrace{i'_{30}}^{=0} - v_{s4} + v_{i'_{s1}} = 0$

So we need $v_{i'_{s1}}$ ...

Room for extra work

KVL $\quad v_{is_2} + 60 i_1' + 55 i_3' + 20 i_{s_1} = 0$

$$v_{is_1} = -60 i_1' - 55 i_3' - 20 i_{s_1} = -16.200 \text{ [V]}$$

$$v_x = -v_{s_4} + v_{is_1} = -45 - 16.20 = \underline{\underline{-61.2 \text{ [V]}}}$$

b) $\quad P_{\text{del to } v_{s_2}} = P_{\text{abs by } v_{s_2}} = v_{s_2} i_2'$

$$= 6(-0{,}05)$$

$$= \underline{\underline{-0{,}30 \text{ [W]}}}$$

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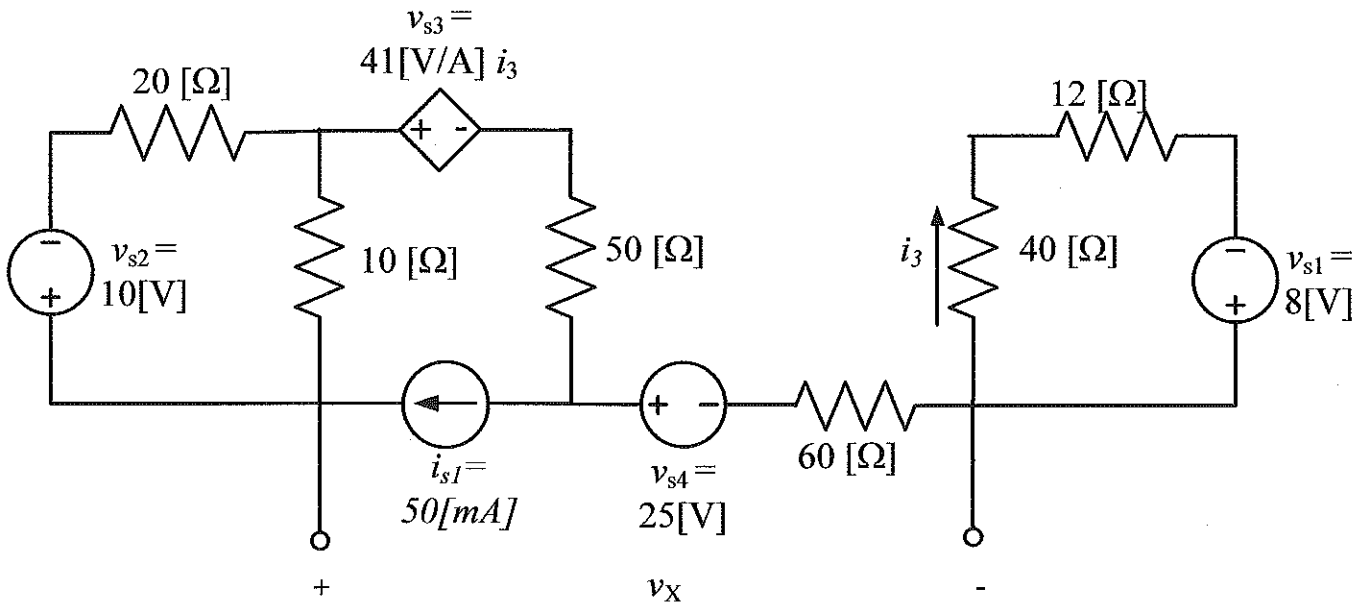

Room for extra work

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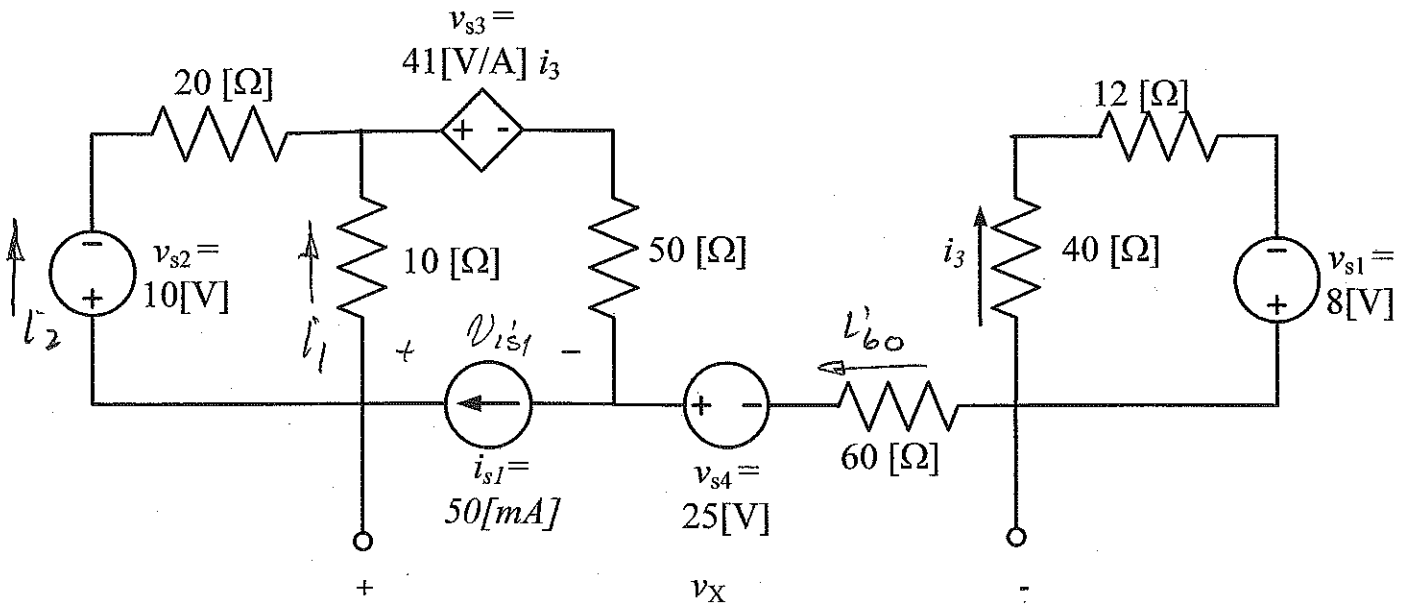

We have defined currents i_1 and i_2. We will need two equations to solve for these:

KCL $\quad i_1 + i_2 = i_{s1} = 0.05$

KVL $\quad 10 + 20 i_2 - 10 i_1 = 0$

$\Rightarrow \; i_1 = 0.36667$ [A], $\; i_2 = -0.31667$ [A]

We also need i_3:

KVL $\quad 40 i_3 + 12 i_3 - 8 = 0 \Rightarrow i_3 = 0.15385$ [A]

We note that $i_{60} = 0$. Now...

a) $\quad v_x = v_{is1} + v_{s4} - 60 i_{60}$ (=0) So we need v_{is1} ...

KVL: $\quad 10 i_1 + 41 i_3 + 50 i_{s1} - v_{is1} = 0$

$v_{is1} = 10 i_1 + 41 i_3 + 50 i_{s1} = 12.47$ [V]

Room for extra work

$$v_x = 12.47 + 25 = \underline{\underline{37.47}} \ [V]$$

b) $P_{del\ by\ v_{s2}} = -i_2 \cdot v_{s2}$

$= -(-0.31667)(10)$

$= 3.1667 \ [W]$