Name: Solution (please print)

Signature: _____

ECE 2201 – Quiz #2
September 29, 2016

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

1. {4pts} In Figure 1, if it is known that the 9[V] voltage source absorbs power, which of the following can be the value of i_S? Explain your reasoning briefly.

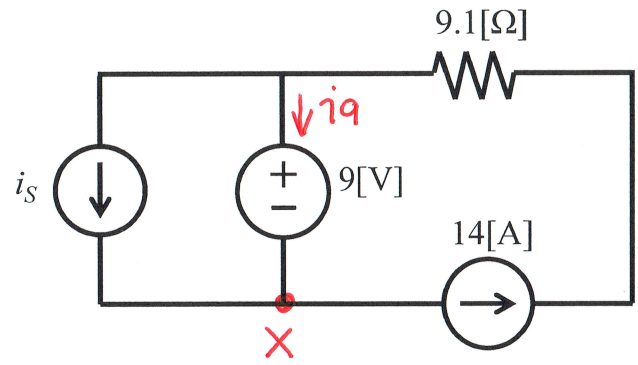

Figure 1

a) 12[A]
b) 15[A]
c) 20[A]
d) 17[A]

so $i_9 \times 9 > 0$

which means $i_9 > 0$

KCL @ X :

$i_9 + i_S = 14[A]$

Since $i_9 = 14[A] - i_S > 0$

$i_S < 14[A]$

2. {16pts} Use Figure 2 for this problem.

a) Find v_Y.

b) Find the power delivered by the dependent voltage source, v_{SI}. Are the electrons gaining or losing energy as they move through v_{SI}?

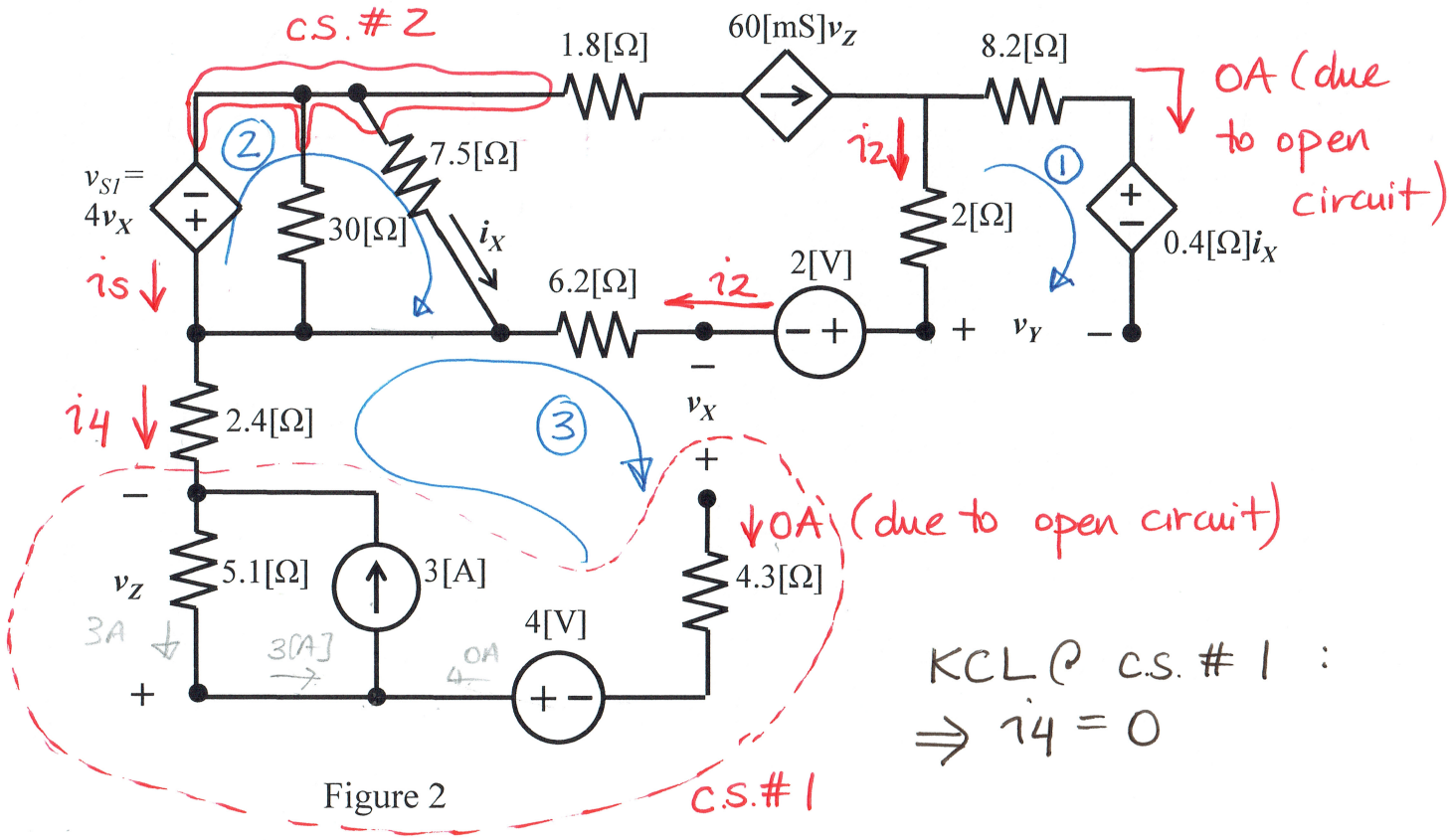

Figure 2

KCL @ c.s. # 1 :

$\Rightarrow i_4 = 0$

a) To start, I should better write an equation including v_y in it – since we are trying to find v_y.

KVL ①: $-v_y - i_z \cdot 2[\Omega] + 0.4[\Omega] i_x = 0$ (1)

(No voltage drop across 8.2[Ω] since current through 8.2[Ω] resistor is zero due to open circuit)

Since current through 8.2[Ω] is zero,

$i_z = 60[mS]\, v_z$ (2)

$v_z = -5.1[\Omega] \times 3[A] = -15.3[V]$ (3)

All we need is i_x.

KVL ②: $i_x \times 7.5[\Omega] + 4v_x = 0$ (4)

Now we need an eq. for v_x.

KVL ③: $-v_x - 4[V] + v_z - i_z \times 6.2[\Omega] = 0$ (5)

5 eq., 5 unknowns (v_x, v_y, v_z, i_x, i_z)

Solving we get, $\boxed{v_y = 4.739[V]}$

$i_x = 7.257[A]$

$v_x = -13.608[V]$ (needed for part b)

b) $p_{DEL,vs1} = i_s \cdot 4v_x$

KCL @ c.s#2: $i_s - \frac{4v_x}{30[\Omega]} + i_x + 60[mS]\, v_z = 0$

$i_s = -8.153[A]$

$\boxed{p_{DEL,vs1} = 443.805[W] > 0}$

Electrons gain energy since v_{s1} is delivering power!