Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (please print)

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

ECE 2201 – Final Exam

December 6, 2023

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

1. This exam is closed book, closed notes. You may use any calculator. You may **not** use a cell phone, tablet computer, nor laptop computer. You may have a crib sheet in the form of one 8 ½” x 11” piece of paper, with material written on both sides.
2. Print your name, and provide your signature above.
3. 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. You may separate the pages as you work.
4. Show all units in solutions, intermediate results, and figures. Units in the exam will be included between square brackets.
5. If the grader has difficulty following your work because it is messy or disorganized, you will lose credit.
6. Do not use red ink. Do not use red pencil.
7. You will have 160 minutes to work on this exam.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/25

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/40

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/30

4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/40

5. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/40

6. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/25

Total = 200

Room for extra work

1. (25 points) For the following circuit, what is the energy delivered by *RL* during the time period from t = 2[s] to t = 6[s]?

Assume that 



Room for extra work

2. (40 points) Use the node-voltage method to write a complete set of equations that could be used to solve this circuit. Do not simplify the circuit. Do not attempt to solve or simplify your equations. Define all variables appropriately.



Room for extra work

3. (30 points) A Device can be modeled as an independent current source in parallel with a resistance. The Device is shown in Figure 1. The relationship between the voltage and current for the Device is given in the plot in Figure 2. Two identical versions of this Device are inserted in the circuit shown in Figure 3. The polarities of the Devices are indicated with the terminal labels 1 and 2.

a) Find a circuit model for the Device. Draw the model, labeling the components with numerical values.

b) Find *iD* in Figure 3.



Room for extra work

4. (40 points) Use the circuit below to solve. Find the value of the Norton equivalent resistance as seen at terminals D and E.



Room for extra work

5. (40 points) Use the circuit below to solve.

a) Find the Thevenin equivalent circuit as seen by resistor *RL*. Draw the Thevenin equivalent circuit showing terminals A and B.

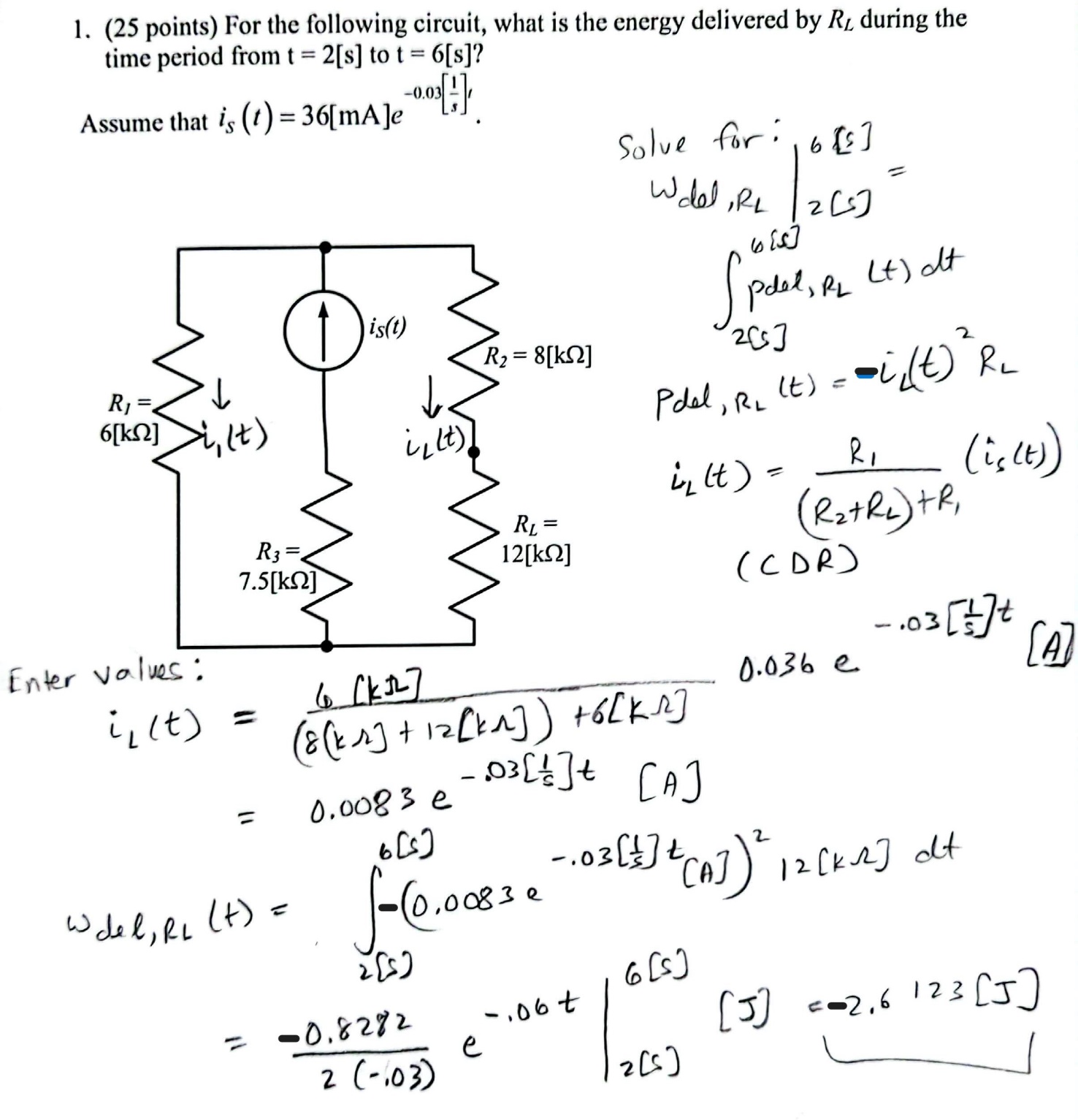
b) If the value of *RL* is selected such that the maximum power is transferred to it, what is the power absorbed by *RL*?

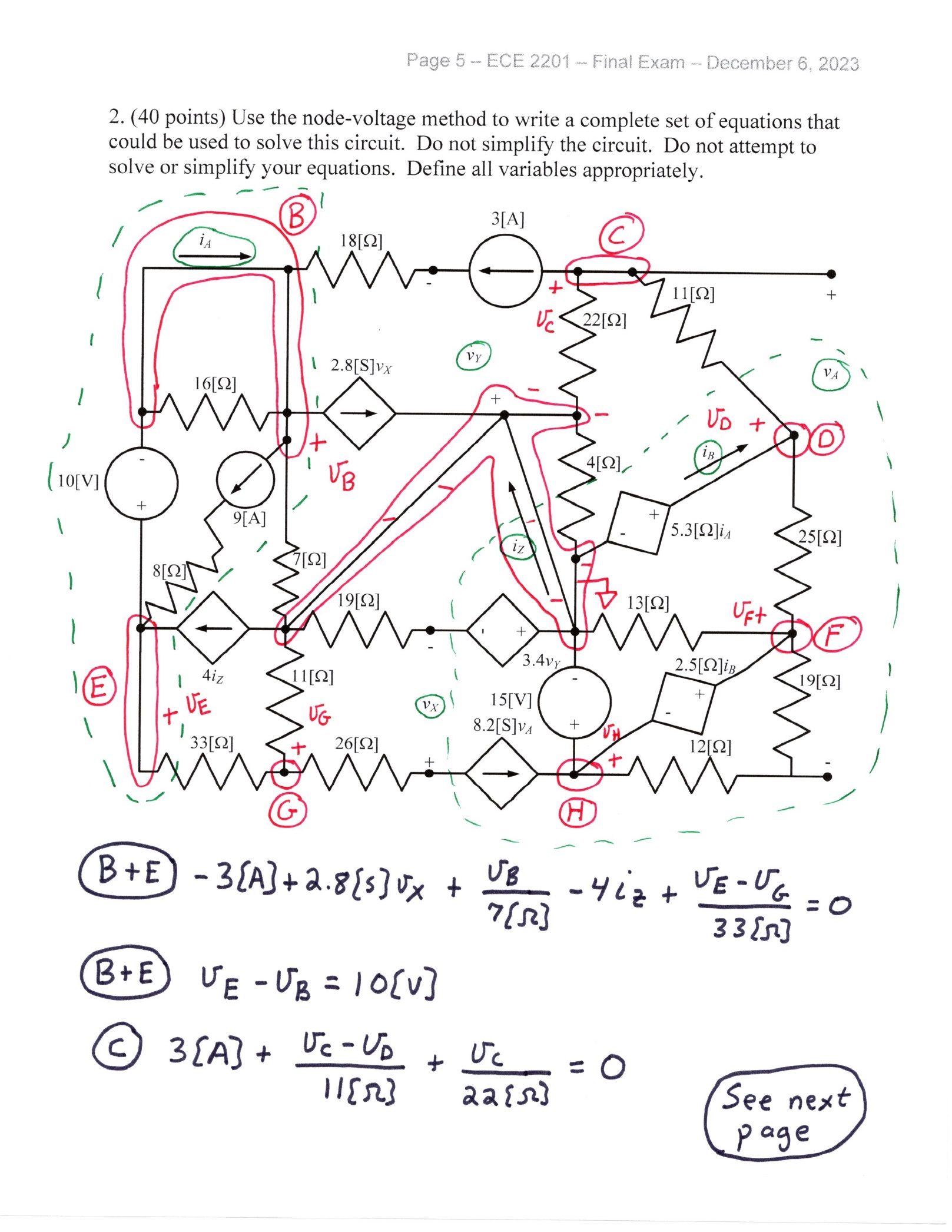


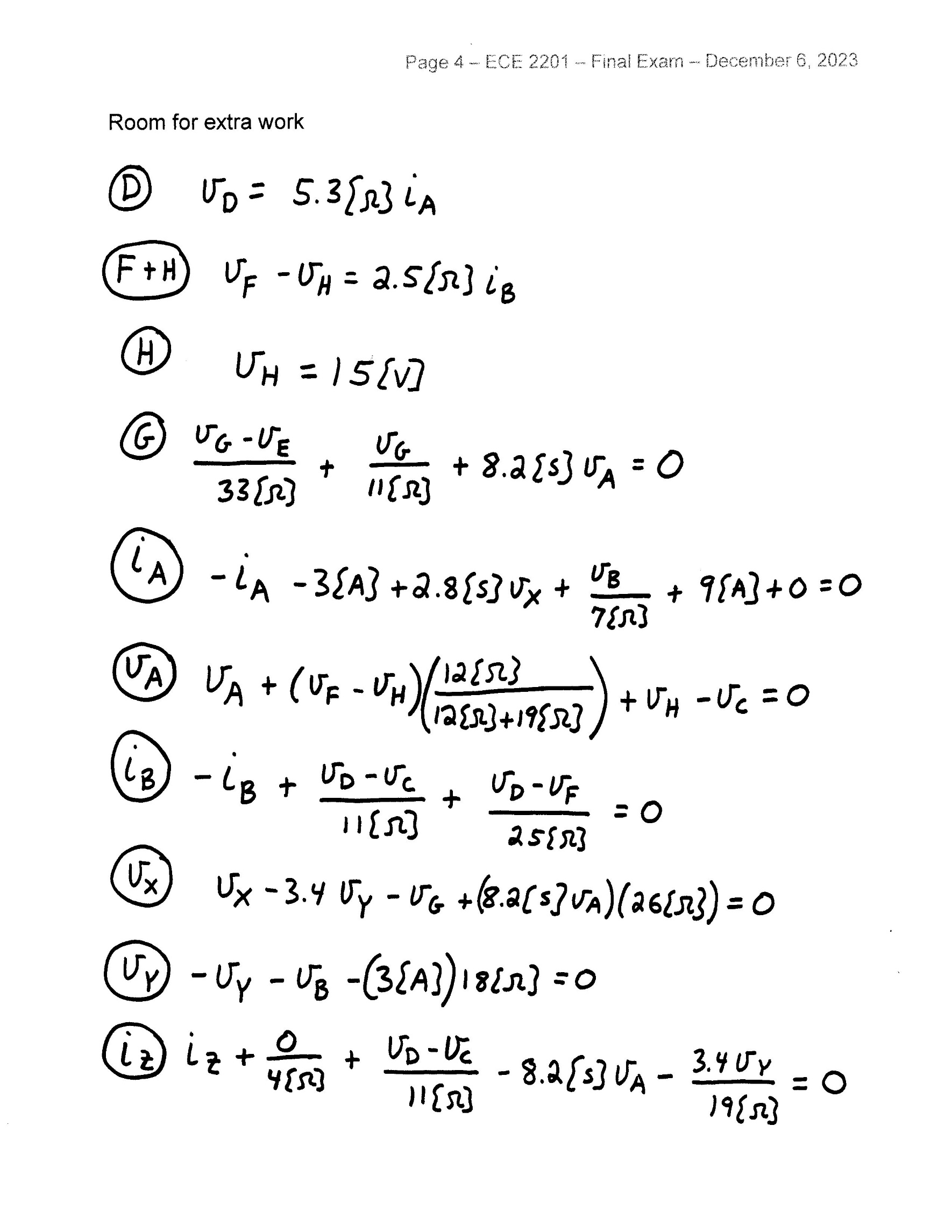
Room for extra work

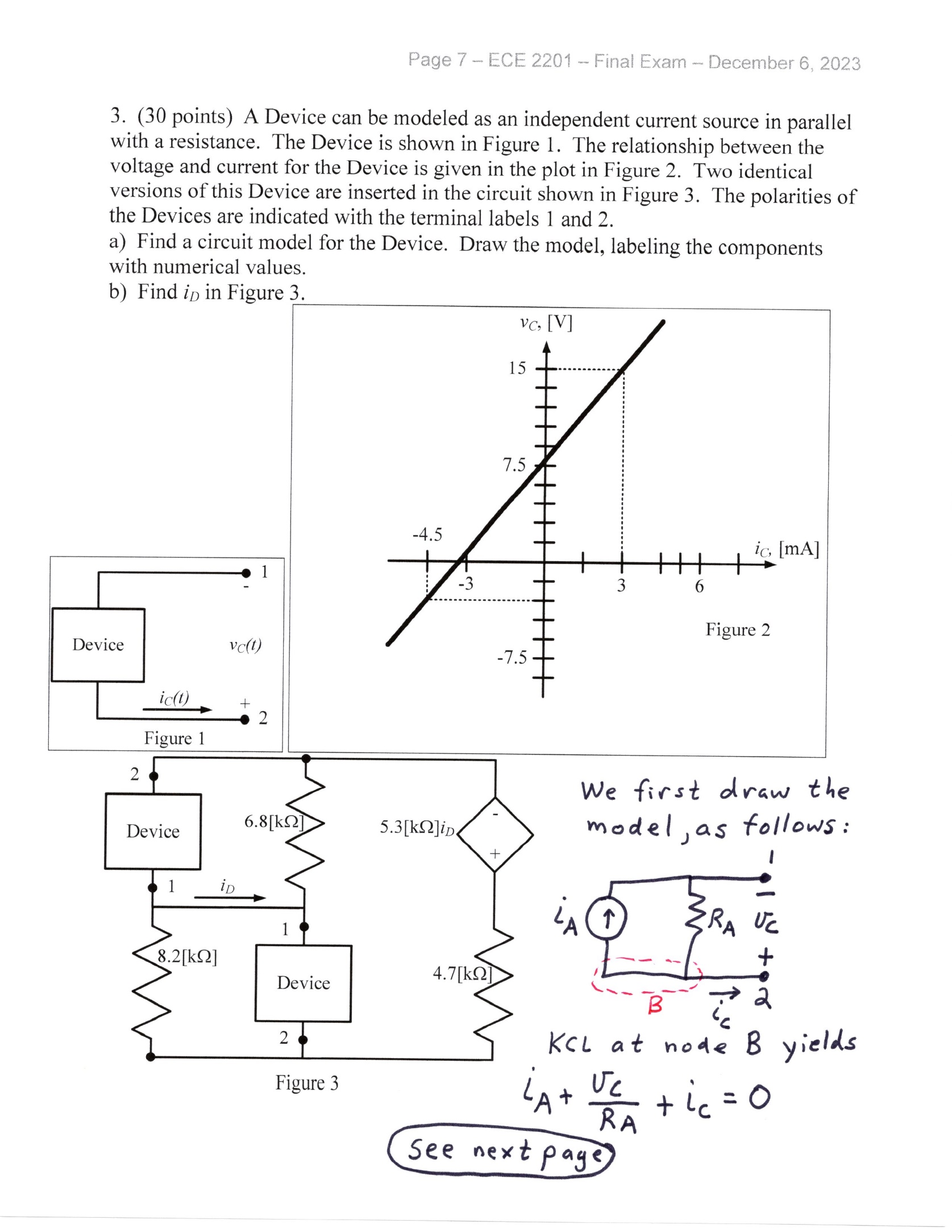
6. (25 points) Solve for *iY* using the superposition principle.

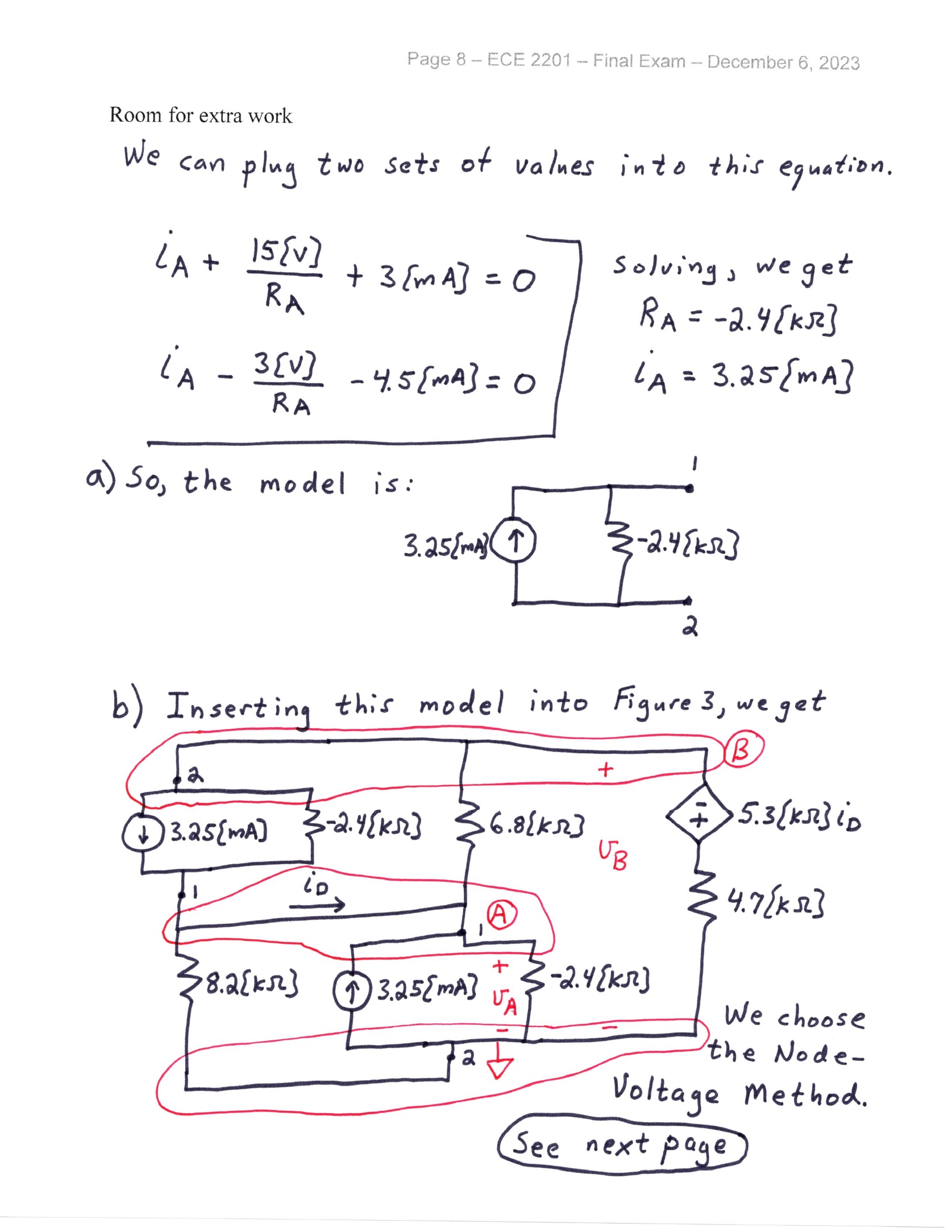


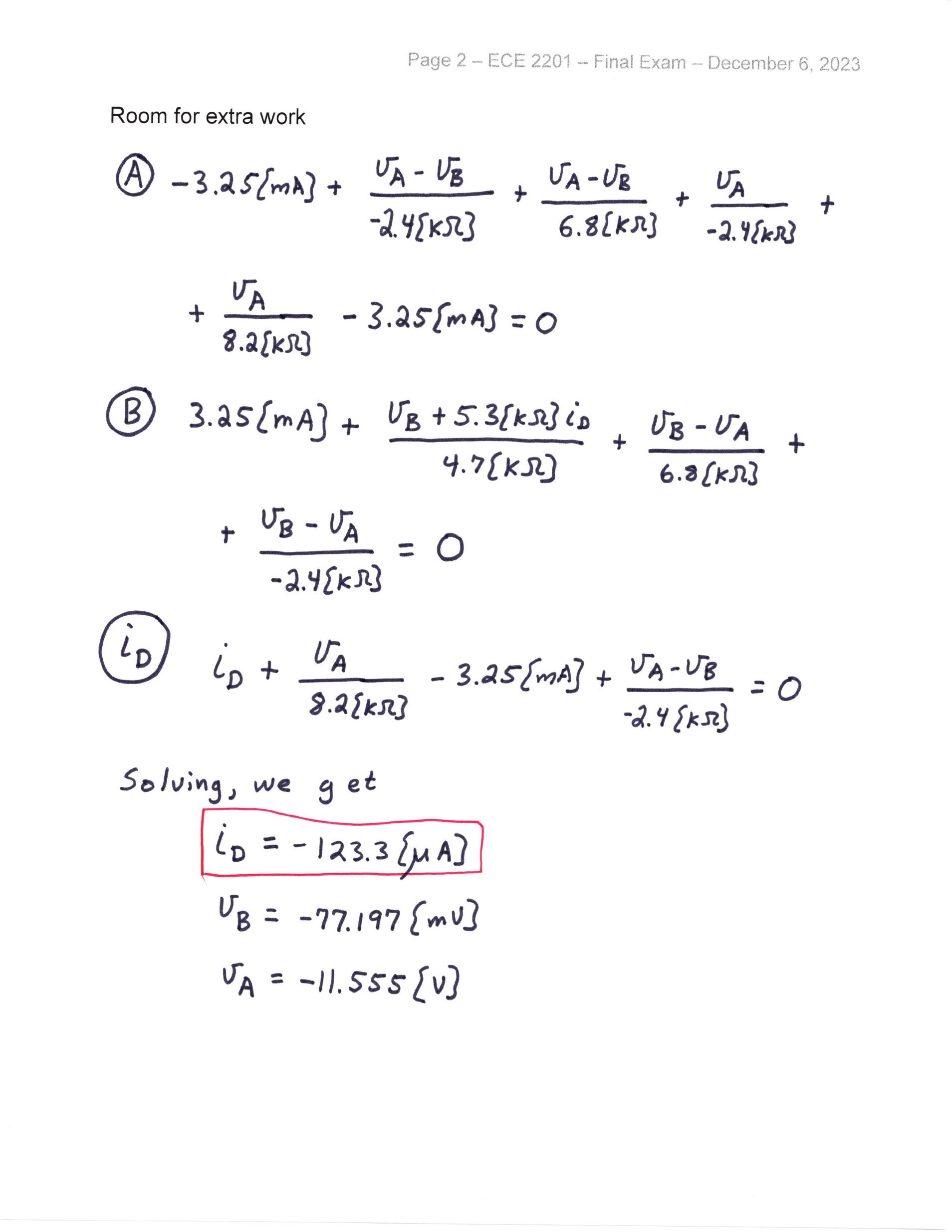


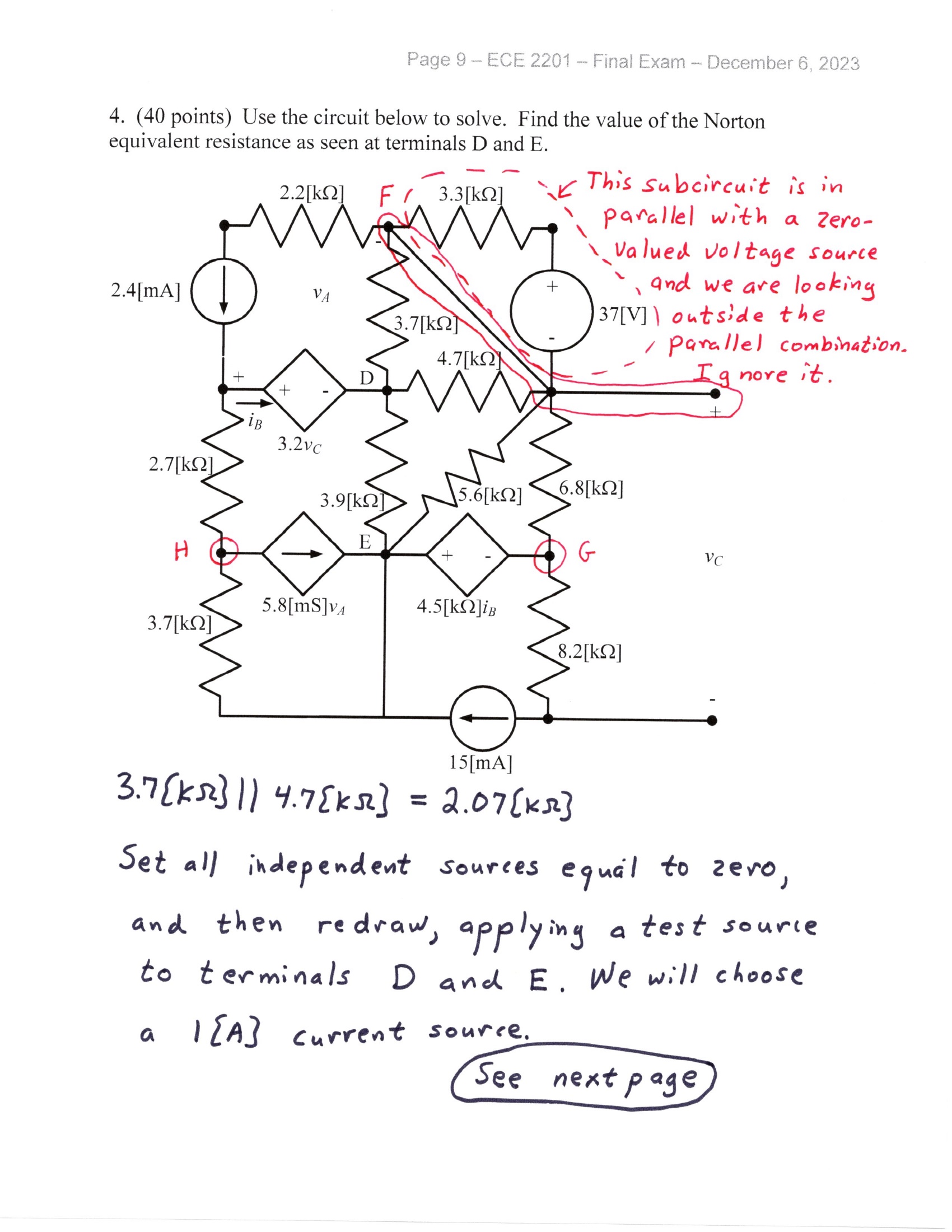


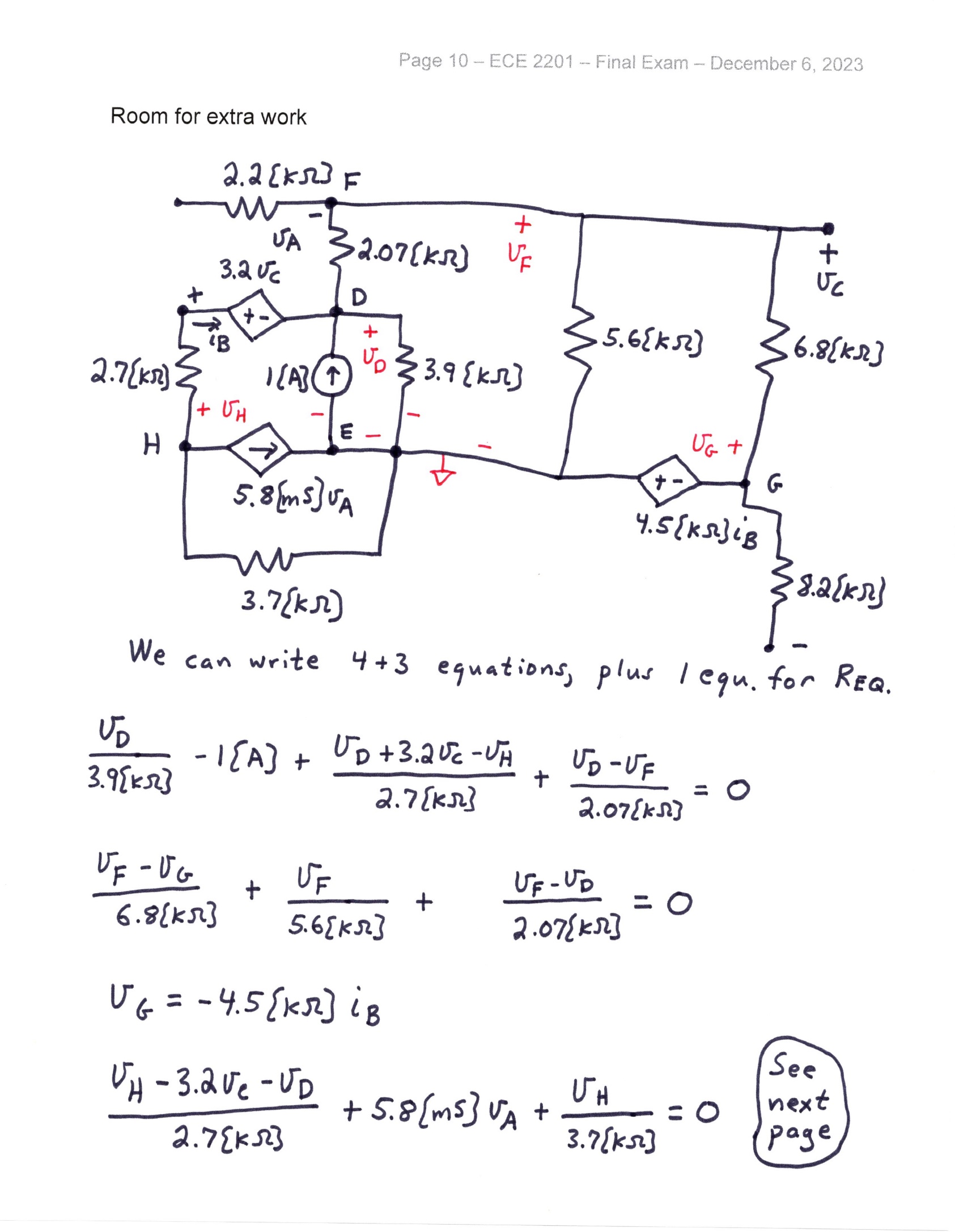


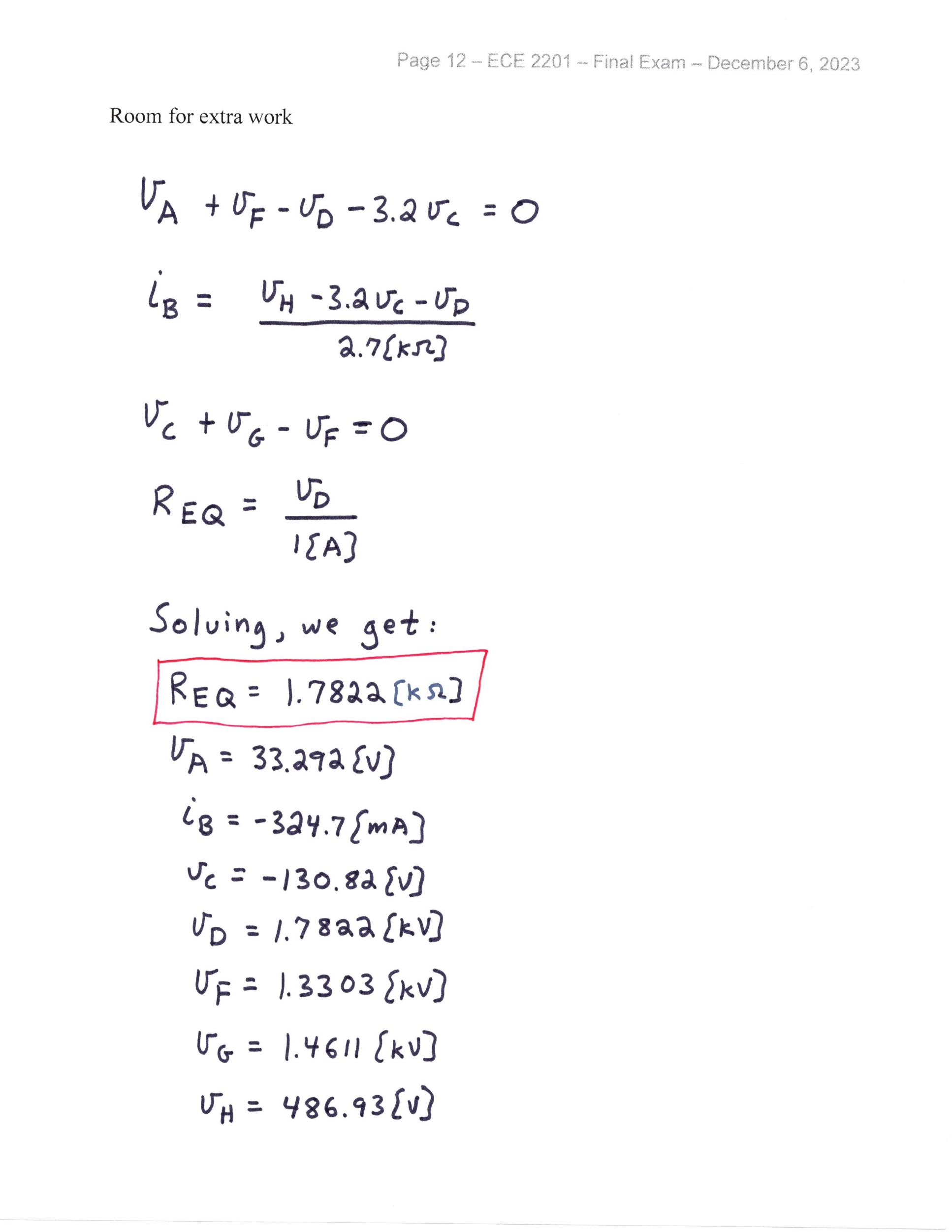












A paper with a diagram and equations

Description automatically generated with medium confidence

A close-up of a math problem

Description automatically generated

A whiteboard with text and diagrams

Description automatically generated

A diagram of a mathematical equation

Description automatically generated with medium confidence

A white paper with black text

Description automatically generated