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

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

ECE 2300 – Exam #2

April 11, 2015

Keep this exam closed until you are told to begin.

1. This exam 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 that is not given in a reasonable order will lose credit. Clearly indicate your answer (for example by enclosing it in a box).

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 exam will be included between square brackets.

5. Do not use red ink. Do not use red pencil.

6. You will have 90 minutes to work on this exam.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/30

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/35

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_/35

Total = 100

Room for extra work

1. {30 Points} Use the node-voltage method to write a complete set of equations that could be used to solve the circuit below. Do not attempt to simplify the circuit. Do not attempt to simplify or solve the equations.

**You must define all circuit variables.**



# Room for extra work

2. {35 Points} The circuit shown in Figure 1 can be modeled by a Thévenin equivalent circuit with respect to terminals A and B, as shown in Figure 2. When this circuit is connected to a current source as shown in Figure 3, the power delivered by the current source is 41.5[W].

1. Find , the Thévenin voltage of the circuit in Figure 1, with respect to terminals A and B.
2. Find in Figure 3.
3. Find .



Room for extra work

3. {35 Points} The circuit shown has a current source, with the value



The voltage *vX(t)* has the value *vX*(0-) = 10.8[V], the resistor *RX*  has the value   
*RX* = 2.2[k], and the capacitor *CX* has the value *CX* = 20[F].

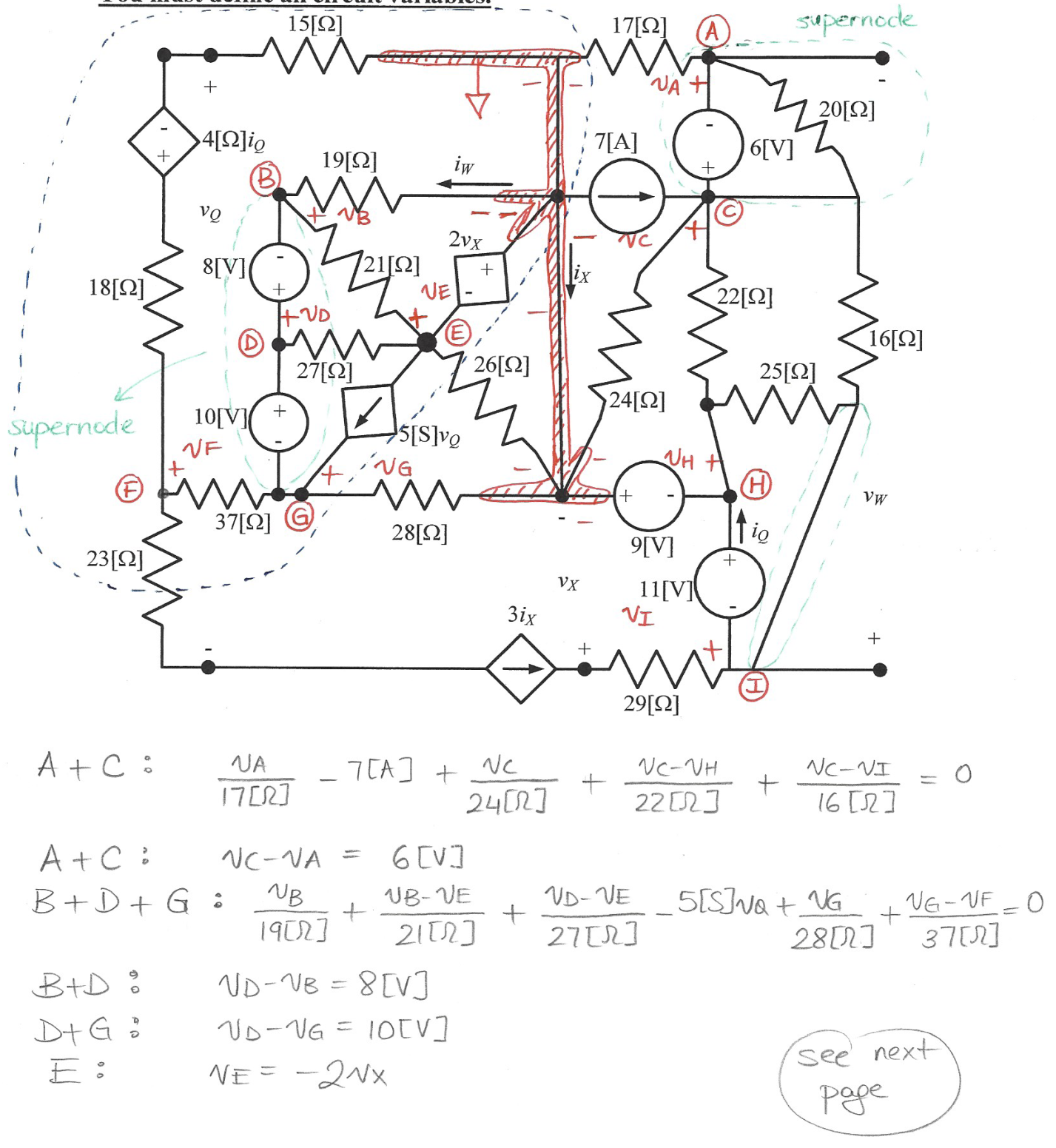
Find the value of *LX* so that at *t* = 30[ms] the energy stored in the inductor *LX* plus the energy stored in the capacitor *CX* adds up to 500[J].

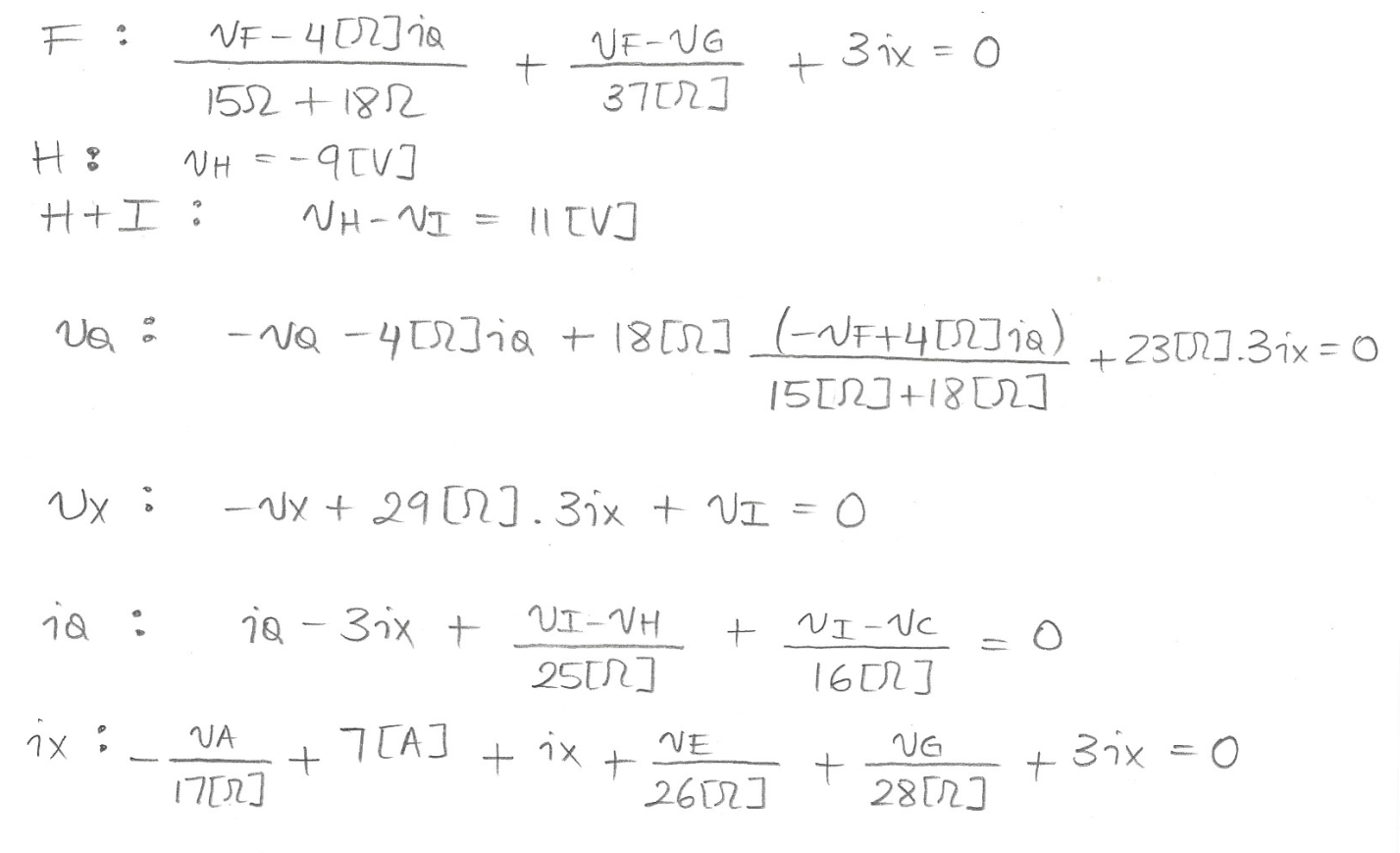


Solutions:

1. {30 Points} Use the node-voltage method to write a complete set of equations that could be used to solve the circuit below. Do not attempt to simplify the circuit. Do not attempt to simplify or solve the equations.

**You must define all circuit variables.**



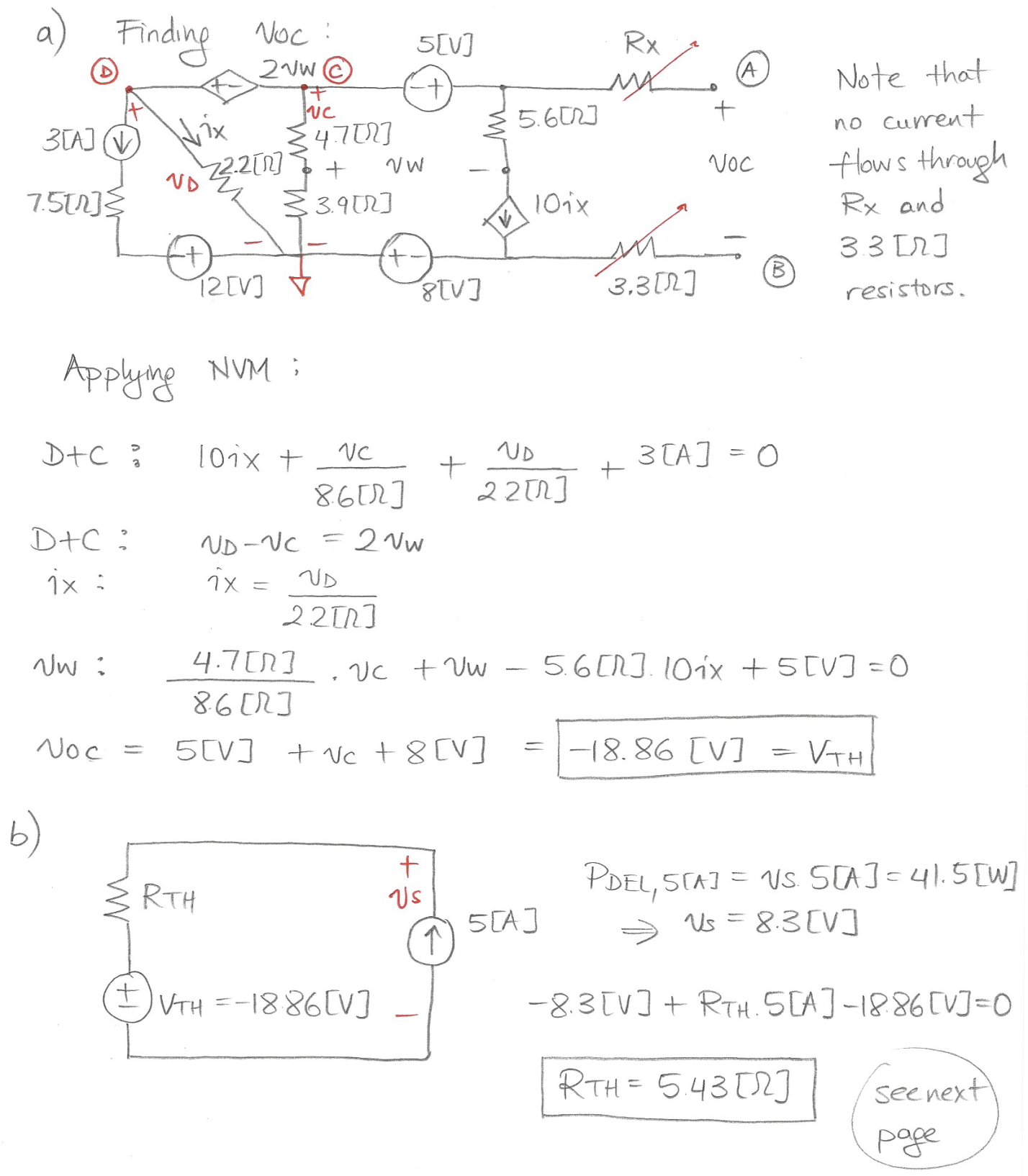


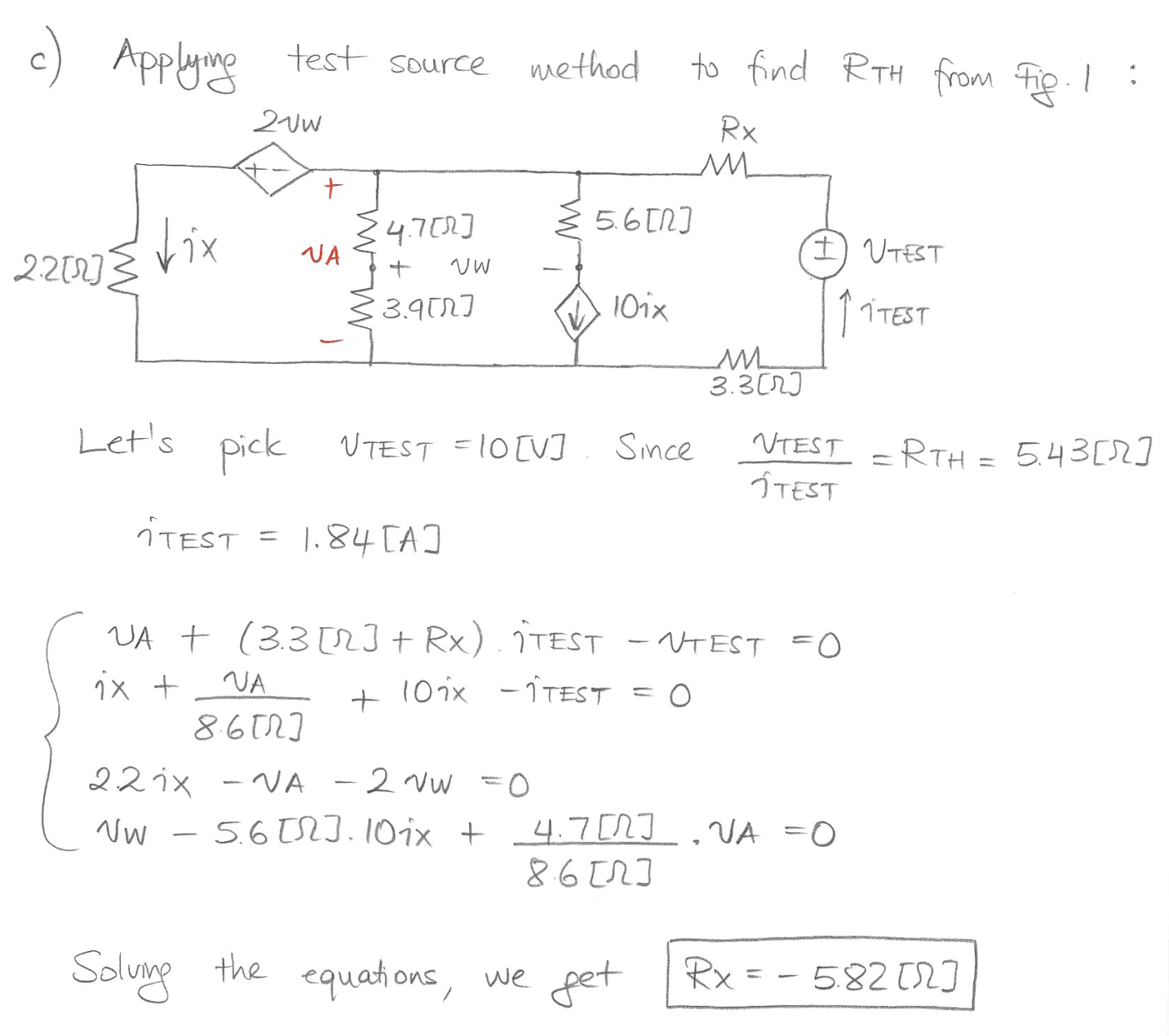
2. {35 Points} The circuit shown in Figure 1 can be modeled by a Thévenin equivalent circuit with respect to terminals A and B, as shown in Figure 2. When this circuit is connected to a current source as shown in Figure 3, the power delivered by the current source is 41.5[W].

1. Find , the Thévenin voltage of the circuit in Figure 1, with respect to terminals A and B.
2. Find in Figure 3.
3. Find .



See next page.





3. {35 Points} The circuit shown has a current source, with the value



The voltage *vX(t)* has the value *vX*(0-) = 10.8[V], the resistor *RX*  has the value   
*RX* = 2.2[k], and the capacitor *CX* has the value *CX* = 20[F].

Find the value of *LX* so that at *t* = 30[ms] the energy stored in the inductor *LX* plus the energy stored in the capacitor *CX* adds up to 500[J].



