

Name: SOLUTIONS! (please print)

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

ECE 2201 – Quiz #3  
November 1, 2018

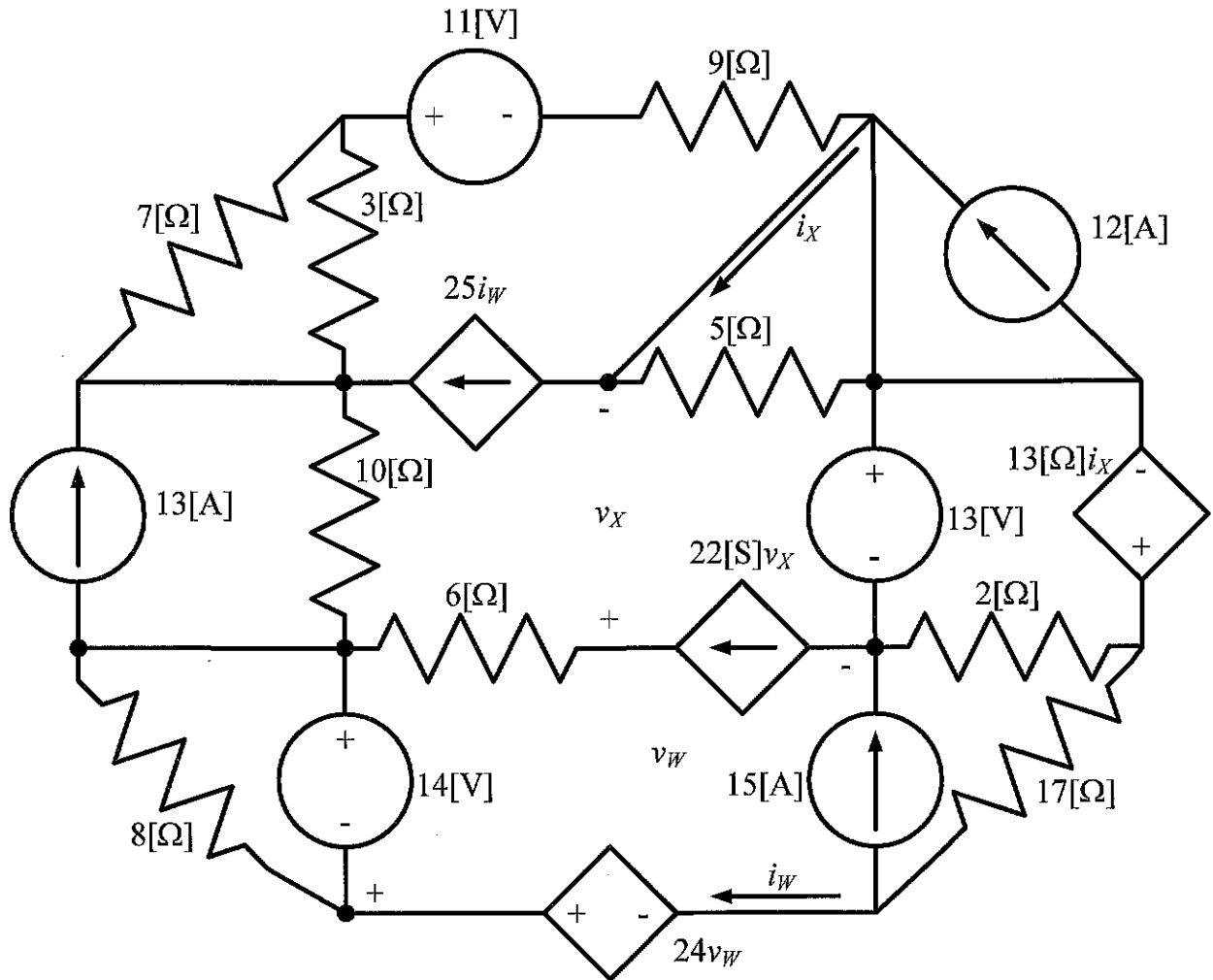
**Keep this quiz closed and face up  
until you are told to begin.**

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. Show all units in solutions, intermediate results, and figures. Units in the quiz will be included between square brackets.
4. If the grader has difficulty following your work because it is messy or disorganized, you will lose credit.
5. Do not use red ink. Do not use red pencil.
6. You will have 35 minutes to work on this quiz.

\_\_\_\_\_ /25

Room for extra work

Use either the node voltage method or the mesh current method to write equations that could be used to solve the circuit below. Do not simplify the circuit in any way. Do not attempt to solve the equations.



Room for extra work

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

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

ECE 2201 – Quiz #3  
November 1, 2018

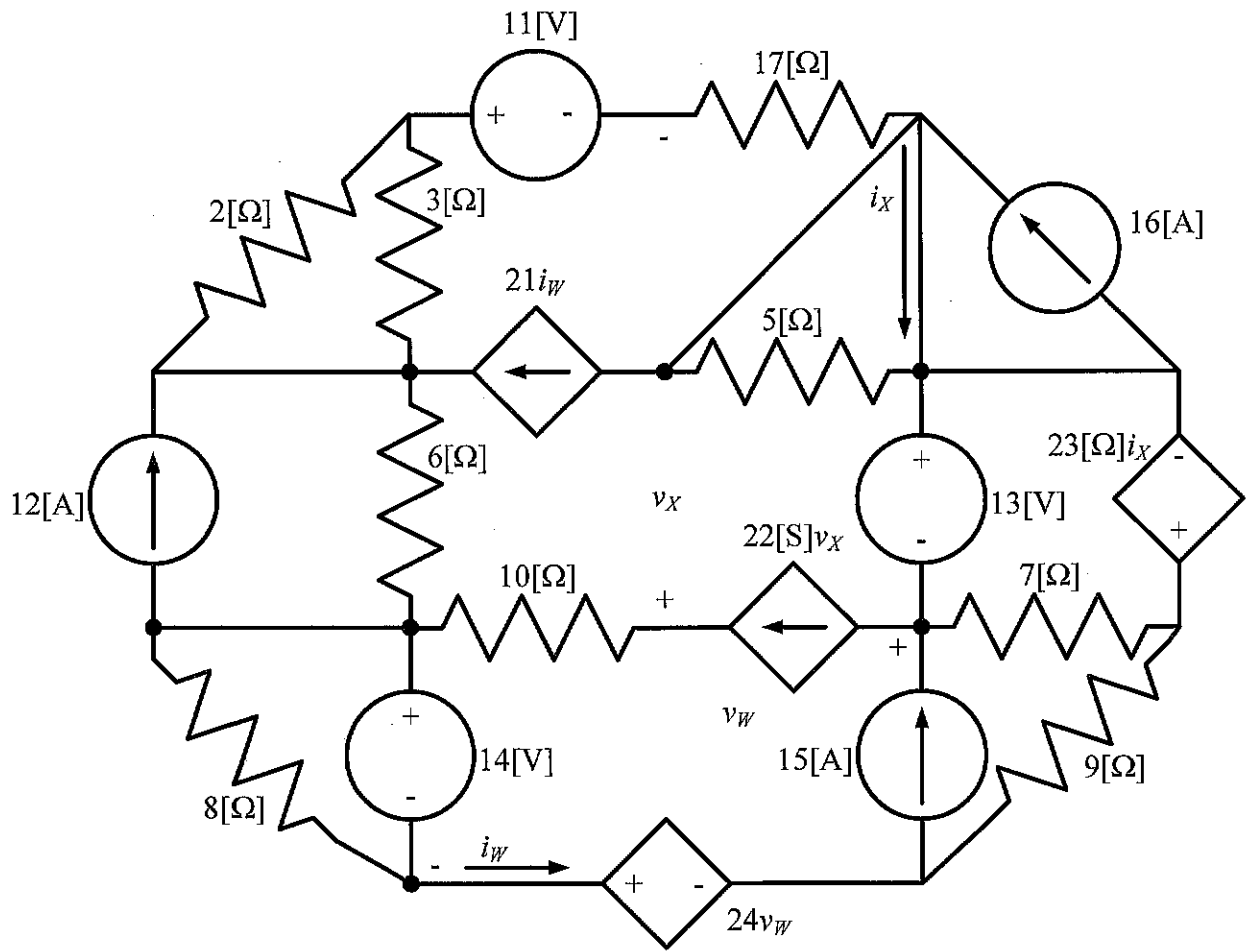
**Keep this quiz closed and face up  
until you are told to begin.**

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. Show all units in solutions, intermediate results, and figures. Units in the quiz will be included between square brackets.
4. If the grader has difficulty following your work because it is messy or disorganized, you will lose credit.
5. Do not use red ink. Do not use red pencil.
6. You will have 35 minutes to work on this quiz.

\_\_\_\_\_ /25

Room for extra work

Use either the node voltage method or the mesh current method to write equations that could be used to solve the circuit below. Do not simplify the circuit in any way. Do not attempt to solve the equations.

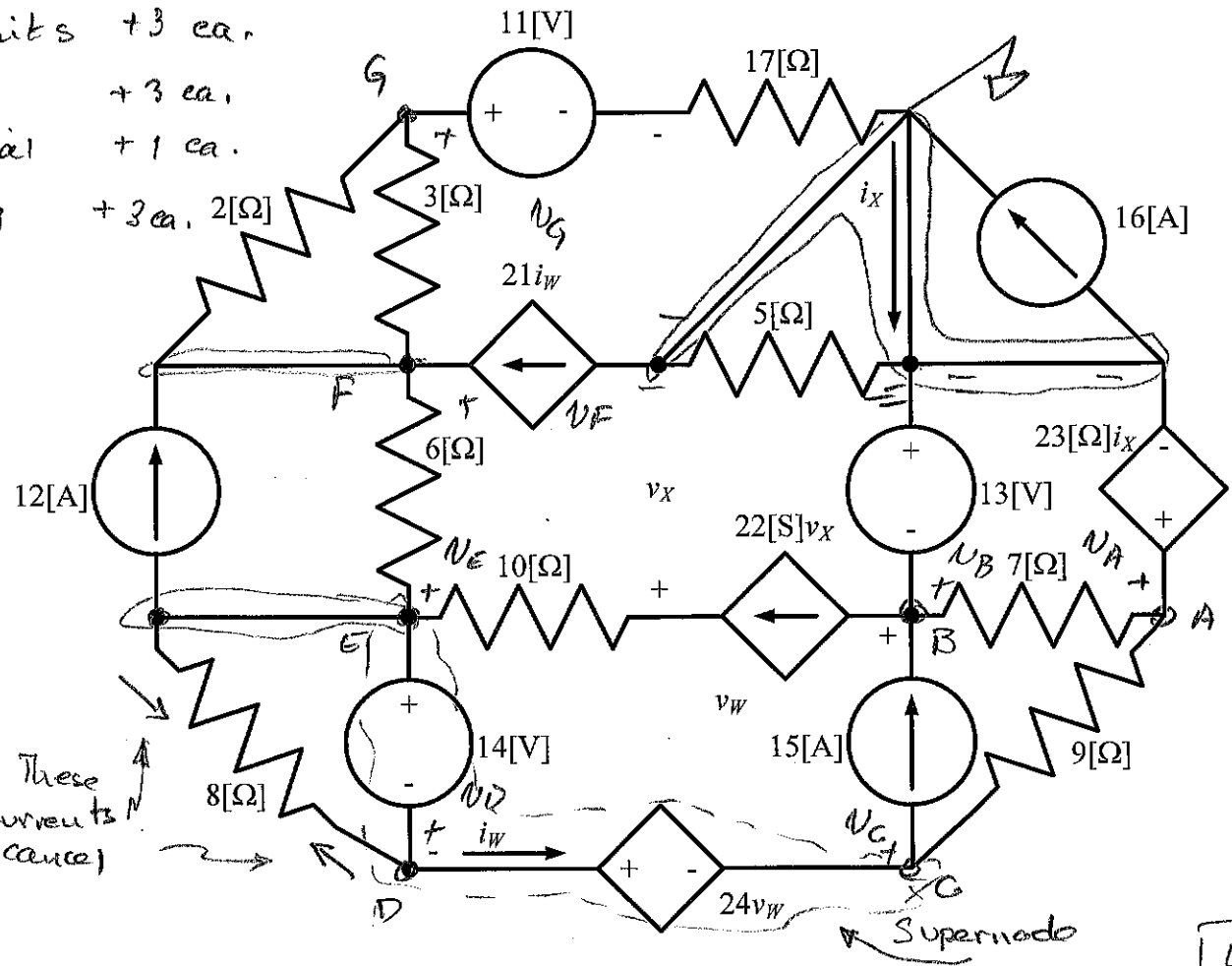


Room for extra work



Use either the node voltage method or the mesh current method to write equations that could be used to solve the circuit below. Do not simplify the circuit in any way. Do not attempt to solve the equations.

Constraints +3 eq.  
 NV Eqs +3 eq.  
 trivial +1 eq.  
 auxiliary +3 eq. 2[Ω]



+1 +1  
 $V_A = 23[\Omega] i_x$        $V_B = -13 [V]$

C, D, E  
 +3       $12 + \frac{V_E - V_F}{6} - 22[S]v_x + 15 + \frac{V_C - V_A}{9} = 0$

+1 +1       $V_E - V_F = 14[V]$        $V_D - V_C = 24V_w$

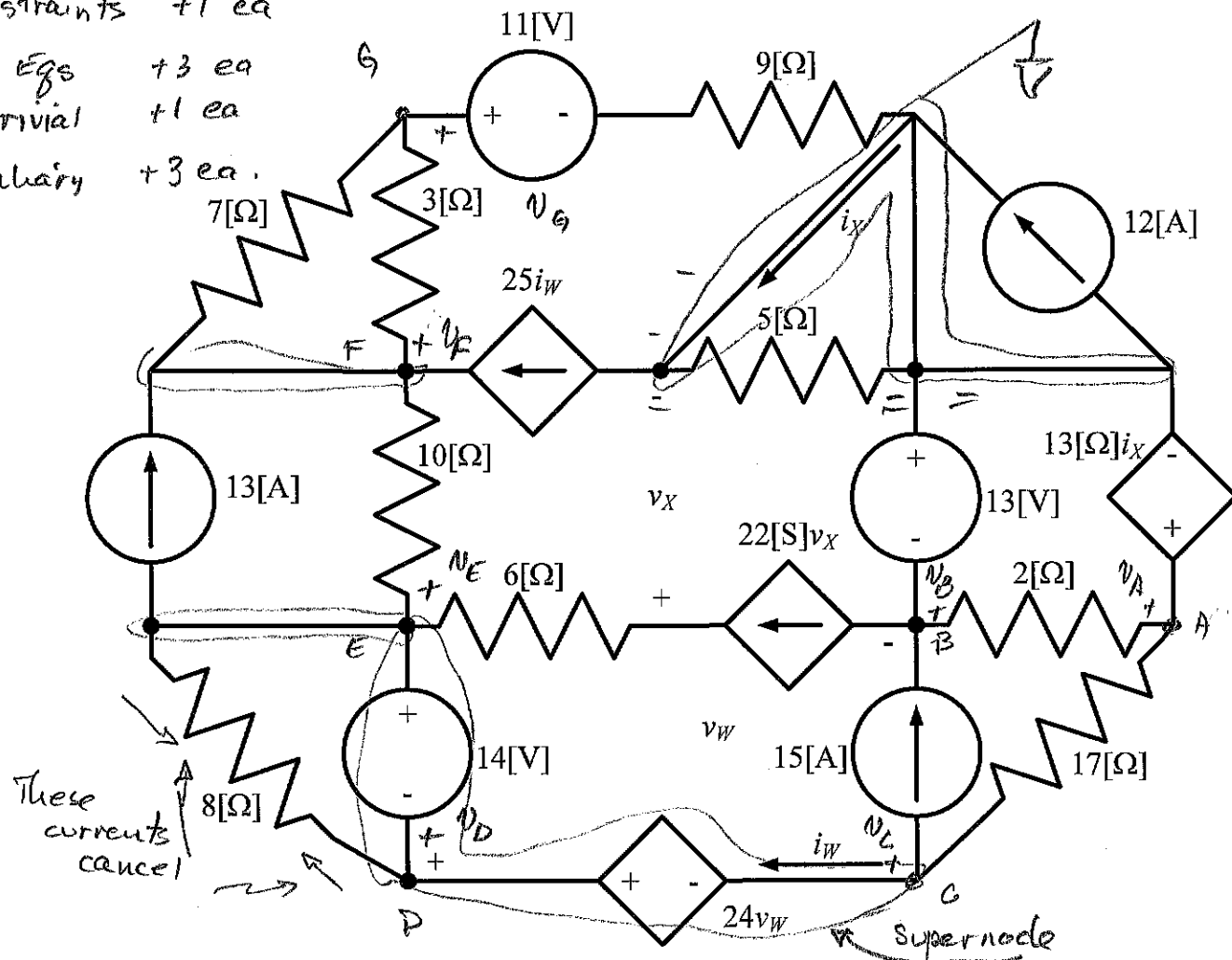
+3       $\frac{V_F - V_G}{2} + \frac{V_F - V_G}{3} - 12 - 21i_w + \frac{V_F - V_E}{6} = 0$

+3       $\frac{V_G - 11}{17} + \frac{V_G - V_F}{2} + \frac{V_G - V_F}{3} = 0$

$i_w$   
 $i_x$   
 $v_x$   
 $v_w$   
 +3 eq.

Use either the node voltage method or the mesh current method to write equations that could be used to solve the circuit below. Do not simplify the circuit in any way. Do not attempt to solve the equations.

constraints +1 eq  
 KV Eqs +3 eq  
 trivial +1 eq  
 auxiliary +3 eq.



$$V_A = 13(\Omega) i_x \quad V_B = -13[V]$$

C, D, E:

$$13 + \frac{V_E - V_F}{10} - 22[S] V_x + 15 + \frac{V_C - V_A}{17} = 0$$

$$V_D - V_C = 24V_w$$

$$V_E - V_D = 14[V]$$

$$\frac{V_F - V_G}{3} + \frac{V_F - V_G}{2} - 25i_w - 13 + \frac{V_F - V_E}{10} = 0$$

vB - 3

$$\frac{V_G - 11}{9} + \frac{V_G - V_F}{3} + \frac{V_G - V_F}{2} = 0$$

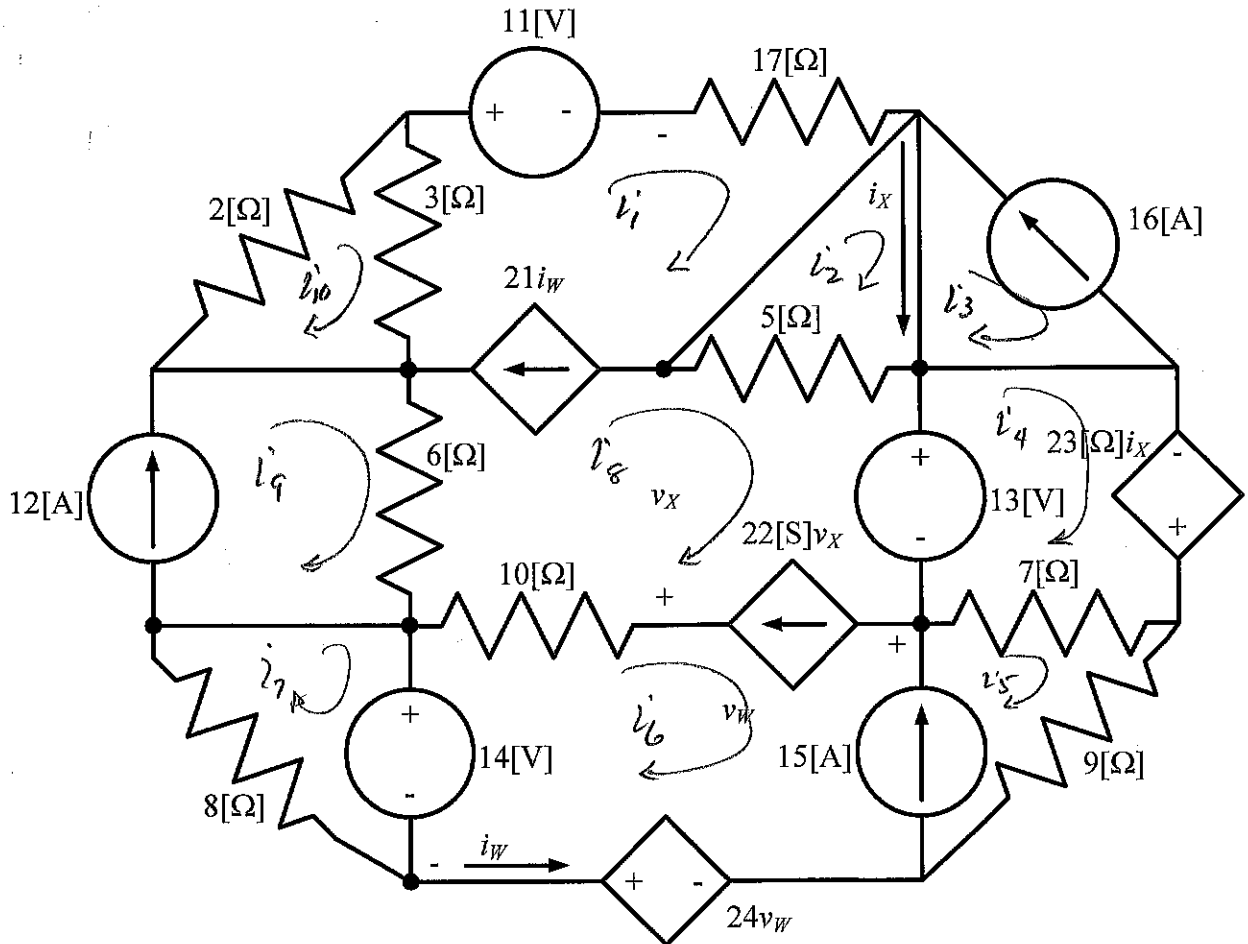
$$[I_w] \quad i_w + 15 + \frac{V_C - V_A}{17} = 0$$

$$[I_x] \quad i_x = 25i_w$$

$$[V_x] \quad V_x - V_E - 22V_x \cdot 6 = 0$$

$$[V_w] \quad V_w + V_B - V_E + 14 = 0$$

Use either the node voltage method or the mesh current method to write equations that could be used to solve the circuit below. Do not simplify the circuit in any way. Do not attempt to solve the equations.



Supermesh 1, 8, 6, 5

$$11 + 17i_1 + 5(i_8 - i_2) + 13 + 7(i_5 - i_4) + 9i_5 - 24v_w - 14 + 6(i_8 - i_9) + 3(i_1 - i_{10}) = 0$$

+6

Constraints:

$$i_1 - i_8 = 21i_w \quad i_8 - i_6 = 22v_x \quad i_5 - i_6 = 15 \text{ [A]}$$

+1 eq.

3, 2, 4

$$i_3 = -16 \text{ [A]} \quad 5(i_2 - i_8) = 0 \quad -23i_x + 7(i_4 - i_5) - 13 = 0$$

+1 +1 +2

7, 9, 10

$$14 + 8i_7 = 0 \quad i_9 = 12 \text{ [A]} \quad 2i_{10} + 3(i_{10} - i_1) = 0$$

+1 +1 +2

$i_x$

$$i_x = i_2 - i_3$$

$i_w$

$$i_w = -i_6$$

$v_x$

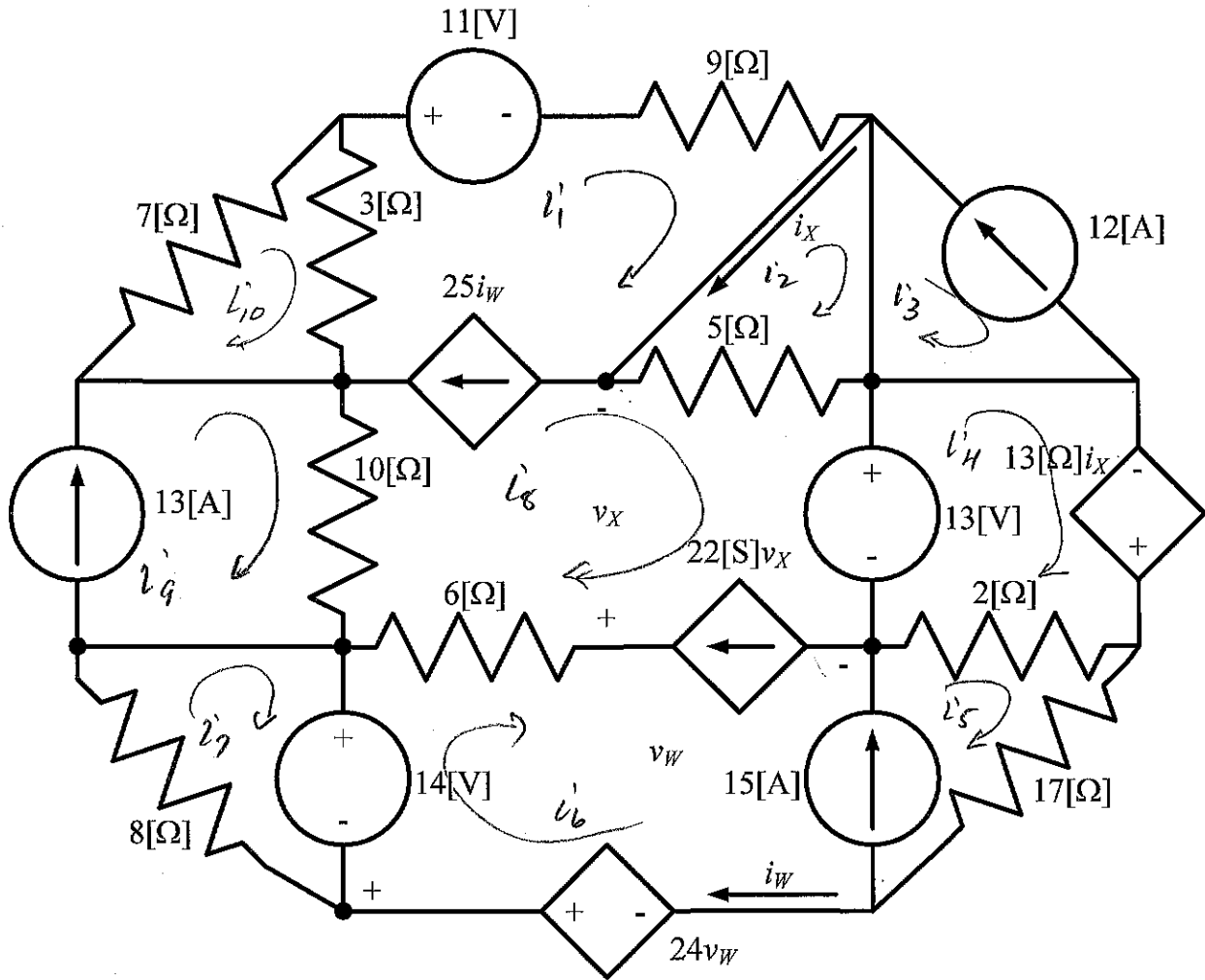
$$v_x - 11 + 3(i_{10} - i_1) + 6(i_9 - i_8) + 10(i_6 - i_8) = 0$$

$v_w$

$$v_w + 24v_w - 9i_5 + 7(i_4 - i_5) = 0$$

VA-3

Use either the node voltage method or the mesh current method to write equations that could be used to solve the circuit below. Do not simplify the circuit in any way. Do not attempt to solve the equations.



Supermesh 1, 8, 6, 5

$$11 + 9i_1 + 5(l'_8 - l'_2) + 13 + 2(l'_5 - l'_4) + 17l'_5 - 24v_w - 14 + 10(l'_8 - l'_9) + 3(l'_1 - l'_{10}) = 0$$

constraints  $l'_1 - l'_8 = 25l'_w$      $l'_8 - l'_6 = 22v_x$      $l'_5 - l'_6 = 15 \text{ [A]}$     +1 ea.

2, 3, 4     $5(l'_2 - l'_8) = 0$      $l'_3 = -12 \text{ [A]}$      $-13i_x + 2(l'_4 - l'_5) - 13 = 0$

7, 9, 10     $14 + 8i_7 = 0$      $i_9 = 13 \text{ [A]}$      $7l'_{10} + 3(l'_{10} - l'_1) = 0$      $\begin{bmatrix} +1 & +1 & +2 \\ +1 & +1 & +2 \end{bmatrix}$

$\boxed{l'_x}$      $l'_x = l'_1 - l'_2$      $\boxed{l'_w}$      $l'_w = l'_6$      $\boxed{v_x}$      $v_x = -9l'_1 - 11 + 3(l'_{10} - l'_1) + 10(l'_9 - l'_8) + 6(l'_6 - l'_8) = 0$

$\boxed{v_w}$      $v_w + 2(l'_5 - l'_4) + 17l'_5 - 24v_w = 0$     vB-3     $\begin{matrix} +1 & +1 \\ +3 & +3 \end{matrix}$