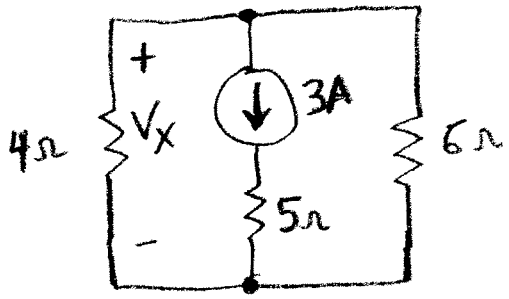
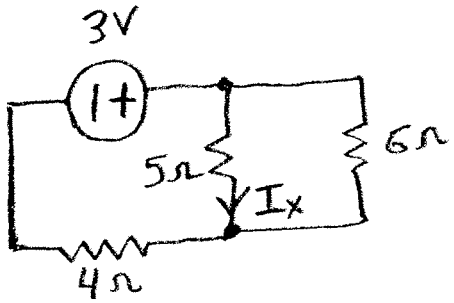
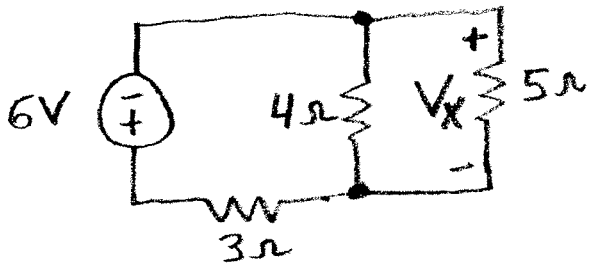
9. Determine the voltage V_x for the given circuit using series and parallel equivalents. Do not simplify the expression. If needed, the symbol for two resistive elements in parallel (e.g., $R_s \| R_L$) may be used.



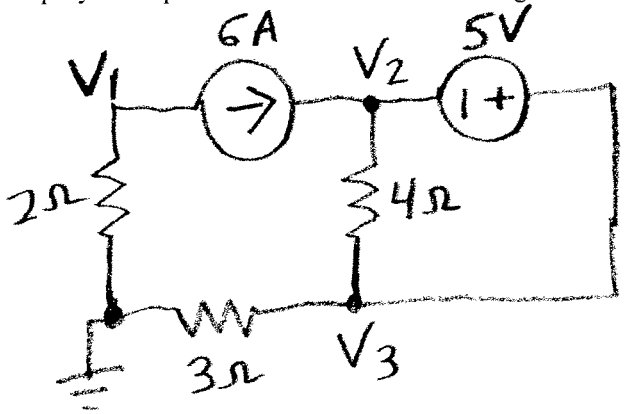
10. Using current division, determine the current I_x for the given circuit. Do not simplify the expression. If needed, the symbol for two resistive elements in parallel (e.g., $R_s \| R_L$) may be used.



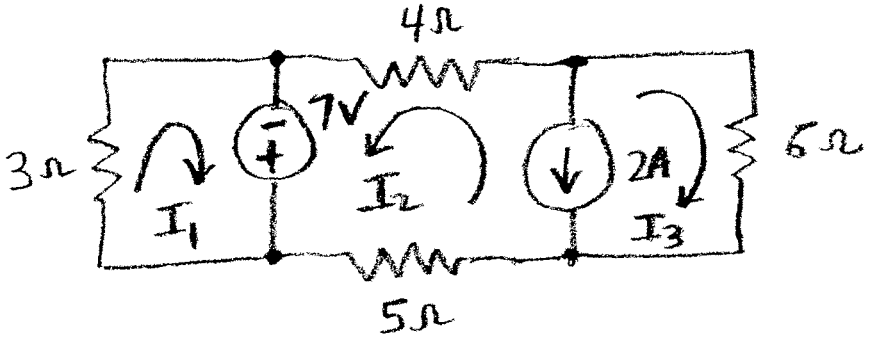
11. Using voltage division, determine the voltage V_x. Do not simplify the expression. If needed, the symbol for two resistive elements in parallel (e.g., $R_s \| R_L$) may be used.



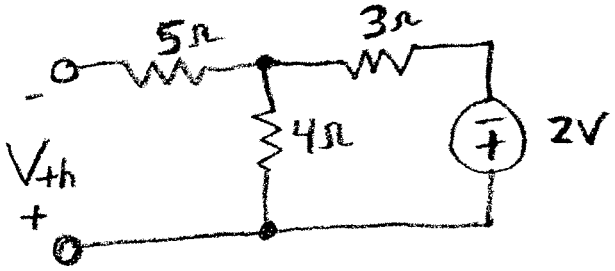
12. For the given circuit, using the labeled voltages, write all of the node voltage equations as done in class. Do not simplify the expressions or solve for these voltages.



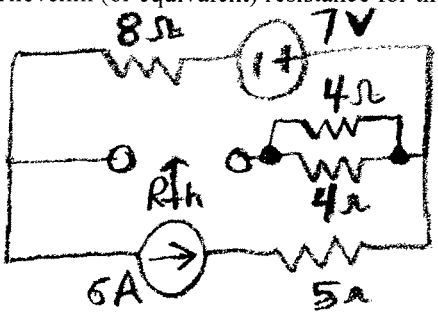
13. For the given circuit, using the labeled currents, write all of the mesh current equations as done in class. Do not simplify the expressions or solve for these currents.



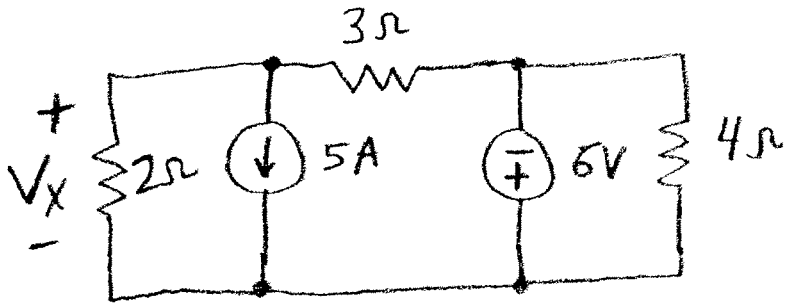
14. Determine the Thévenin voltage for the given circuit.



15. Determine the Thévenin (or equivalent) resistance for the given circuit.



16. Using superposition, determine the voltage V_x. Do not simplify the expression. If needed, the symbol for two resistive elements in parallel (e.g., $R_s \| R_L$) may be used.



51 pts total

Printed Name: SOLN

Signature: _____

Answer Sheet (Provide Units)

UNITS +2 pts

1 1. Pass EE Portion of FE

1 2. 21 W +½ pt. sign

1 3. E & D, C & D

1 4. −5 A +½ pt sign] if magnitude correct

1 5. 8 V +½ pt sign]

2 6. $(4+5)//2//3$ Ω

2 7. ≈ 10 Ω

4 8. $\frac{-3}{(6//5)+4}(5//6)/5$ A −1 if current/voltage division used

3 9. $-3\times(4//6)$ V (½ pt) −1 if current/voltage division used

4 10. $\frac{3}{(5//6)+4}\ \frac{6}{5+6}$ A

sign ½; $(5//6)+4$ → +2.5; $\frac{6}{5+6}$ → +1

3 11. $-6 \times \frac{4 \| 5}{(4 \| 5) + 3}$ V (½ pt + sign)

6 12. $\frac{V_1 - 0}{2} + 6 = 0$, $V_3 - V_2 = 5$

$\frac{V_3 - 0}{3} + \frac{V_3 - V_2}{4} + \frac{V_2 - V_3}{4} - 6 = 0$ (cancel)

(too many eqn −2)

$3I_1 - 7 = 0$

OR $-3I_1$

$-7 + 5I_2 - 6I_3 + 4I_2 = 0$

6 13. $2 = -I_2 - I_3$

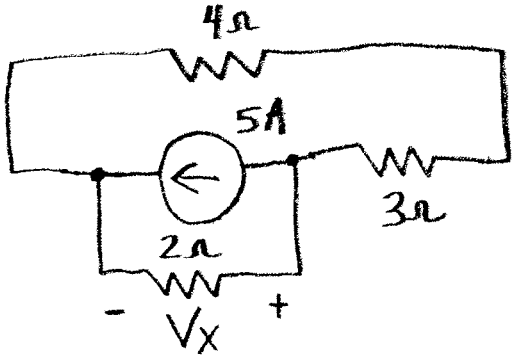
3 14. $2 \times \frac{4}{3+4} V = \frac{8}{7} V$ (½ pt sign)

3 15. $2 + 8 = 10\ \Omega$

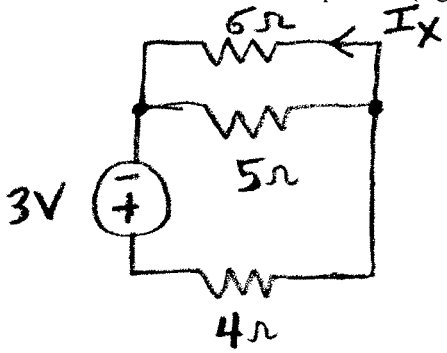
8 16. $-6 \times \frac{2}{2+3}$ (+4) $- 5 \times \frac{3}{2+3} \times 2$ V (+4)

(+½ pt sign each)

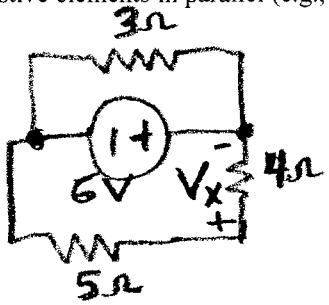
9. Determine the voltage V_x for the given circuit using series and parallel equivalents. Do not simplify the expression. If needed, the symbol for two resistive elements in parallel (e.g., $R_s \| R_L$) may be used.



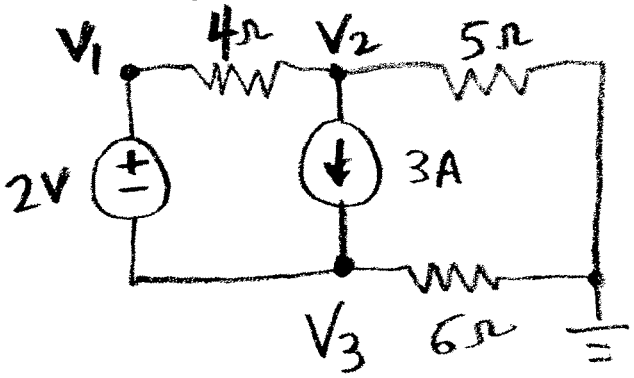
10. Using current division, determine the current I_x for the given circuit. Do not simplify the expression. If needed, the symbol for two resistive elements in parallel (e.g., $R_s \| R_L$) may be used.



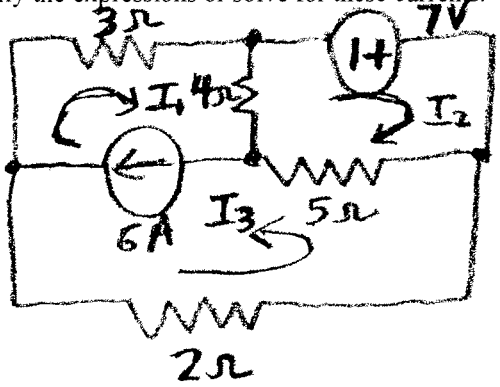
11. Using voltage division, determine the voltage V_x. Do not simplify the expression. If needed, the symbol for two resistive elements in parallel (e.g., $R_s \| R_L$) may be used.



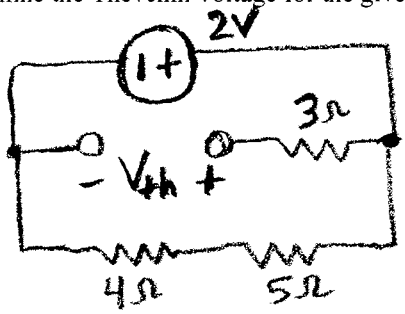
12. For the given circuit, using the labeled voltages, write all of the node voltage equations as done in class. Do not simplify the expressions or solve for these voltages.



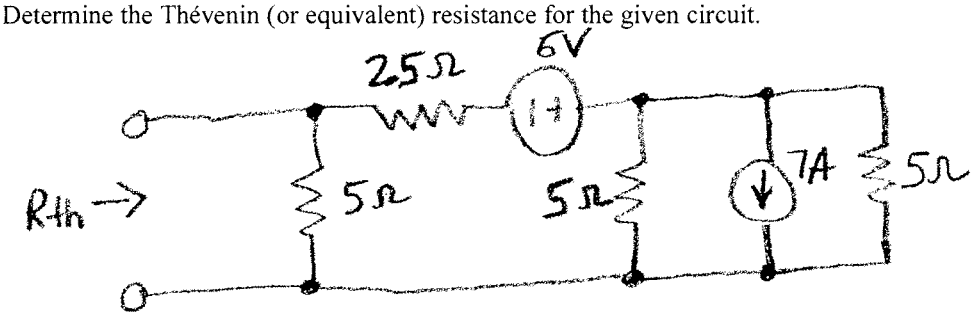
13. For the given circuit, using the labeled currents, write all of the mesh current equations as done in class. Do not simplify the expressions or solve for these currents.



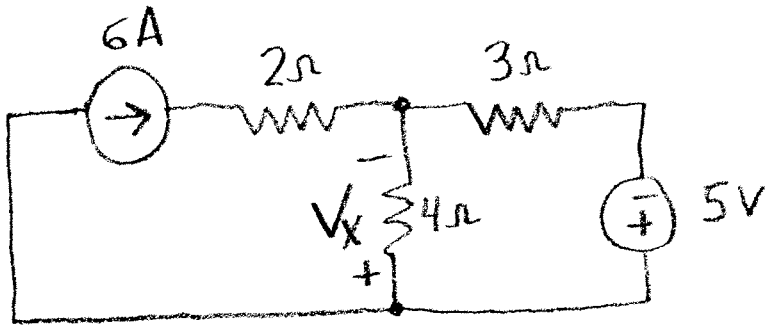
14. Determine the Thévenin voltage for the given circuit.



15. Determine the Thévenin (or equivalent) resistance for the given circuit.



16. Using superposition, determine the voltage V_x. Do not simplify the expression. If needed, the symbol for two resistive elements in parallel (e.g., $R_s \| R_L$) may be used.



51 pts total

Printed Name: SOLN

Signature:

+2 units

Answer Sheet (Provide Units)

1 1. communicate with EE's

1 2. 12 W ½ pt sign

1 3. C & D

1 4. 1A ½ pt sign] if magnitude correct

1 5. 3V ½ pt. sign]

2 6. $[(5+6)\|4]+(2\|3)\ \Omega$

2 7. $\approx 3\ \Omega$

4 8. $\frac{+6}{(4\|5)+3} \times (4\|5)/5$ A ½ pt. sign] -1 each if current/voltage division used

3 9. $-5 \times [(3+4)\|2]$ ✓ ½ pt sign]

4 10. $\frac{+3}{4+(5\|6)} \times \frac{5}{5+6}$ A ½ pt sign

3 11. $-6 \times \frac{4}{4+5}\ V$ $\frac{1}{2}$ pt sign

— 6 12. $V_1 - V_3 = 2$ $\qquad \frac{V_3-0}{6} - 3 + \frac{V_1-V_2}{4} = 0$

$$\frac{V_2-V_1}{4} + 3 + \frac{V_2-0}{5} = 0$$

$$2I_3 + 5(I_2+I_3) + 4(I_2-I_1) - 3I_1 = 0$$

$$6 = I_1 + I_3$$

6 13. $-7 + 5(I_2+I_3) + 4(I_2-I_1) = 0$

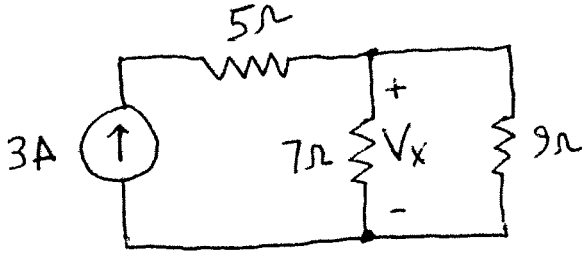
3 14. $+2\ V$ $\frac{1}{2}$ pt. sign

3 15. $25\ \Omega$

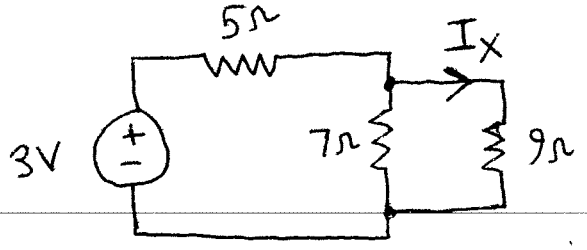
8 16. $5 \times \frac{4}{4+3}$ (+4) $\qquad -6 \times \frac{3}{3+4} \times 4\ V$ (+4)

$\frac{1}{2}$ pt. sign $\qquad$ $\frac{1}{2}$ pt sign

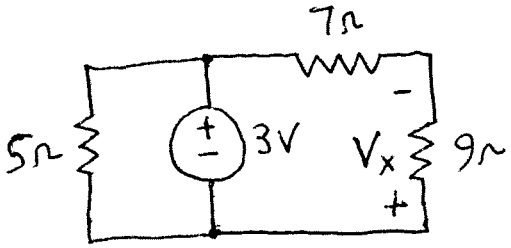
9. Determine the voltage V_x for the given circuit using series and parallel equivalents. Do not simplify the expression. If needed, the symbol for two resistive elements in parallel (e.g., $R_s \| R_L$) may be used.



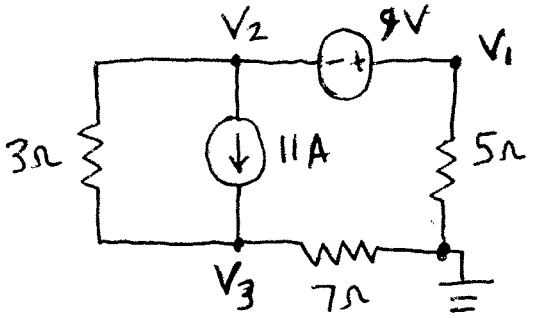
10. Using current division, determine the current I_x for the given circuit. Do not simplify the expression. If needed, the symbol for two resistive elements in parallel (e.g., $R_s \| R_L$) may be used.



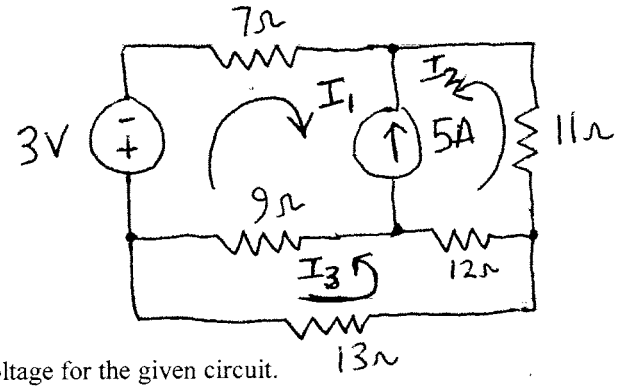
11. Using voltage division, determine the voltage V_x. Do not simplify the expression. If needed, the symbol for two resistive elements in parallel (e.g., $R_s \| R_L$) may be used.



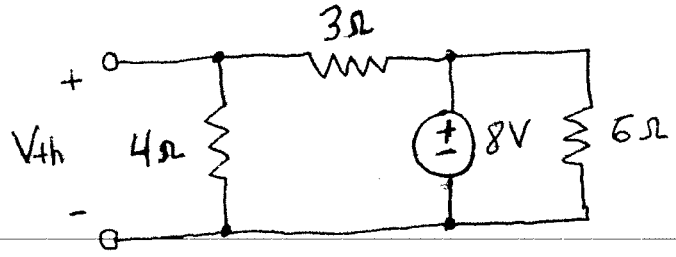
12. For the given circuit, using the labeled voltages, write all of the node voltage equations. Do not simplify the expressions or solve for these voltages.



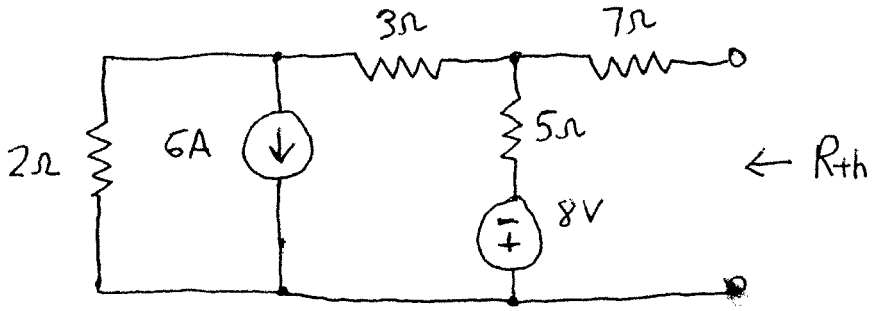
13. For the given circuit, using the labeled currents, write all of the mesh current equations as done in class. Do not simplify the expressions or solve for these currents.



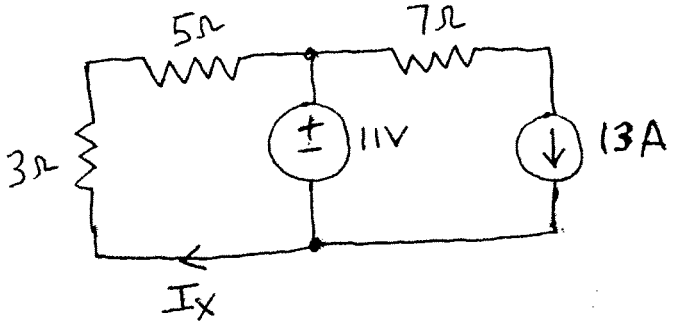
14. Determine the Thévenin voltage for the given circuit.



15. Determine the Thévenin (or equivalent) resistance for the given circuit.



16. Using superposition, determine the current I_x. Do not simplify the expression. If needed, the symbol for two resistive elements in parallel (e.g., $R_s \| R_L$) may be used.



Printed Name: SOLUTION

Signature: _____

Answer Sheet (Provide Units)

1. PE, EIT Tests, Licenses, Communications etc.
2. 12 W
3. E & F
4. 1 A
5. -12V
6. $[(3\|5)+7+9]\|11\ \Omega$
7. $8\ \Omega$
8. $\frac{-3}{(7\|9)+5} \times \frac{7}{7+9}$ OR $-3\,\frac{7\|9}{(7\|9)+5} \times \frac{1}{9}$ A
9. $3 \times (7\|9)$ OR $3 \times \frac{9}{7+9} \times 7$ V
10. $\frac{3}{(7\|9)+5} \times \frac{7}{7+9}$ A

11. $-3 \times \frac{9}{7+9}$ V

12. $V_1 - V_2 = 9$, $\frac{V_3 - 0}{7} - 11 + \frac{V_3 - V_2}{3} = 0$

$\frac{V_2 - V_3}{3} + 11 + \frac{V_1 - 0}{5} = 0$,

13. $I_1 + I_2 = -5$,

$3 + 7I_1 - 11I_2 + 12(I_3 - I_2) + 9(I_1 + I_3) = 0$

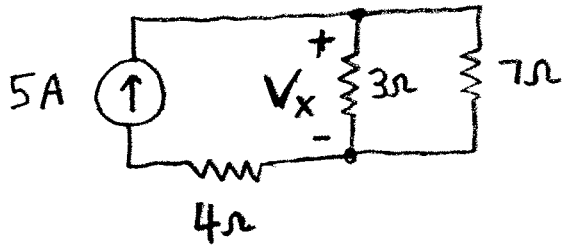
$13I_3 + 12(I_3 - I_2) + 9(I_1 + I_3) = 0$

14. $8 \times \frac{4}{4+3}$ V

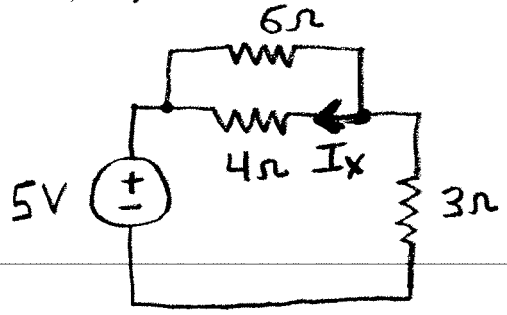
15. $[(2+3)\,//\,5] + 7 = 2.5 + 7 = 9.5\ \Omega$

16. $\frac{-11}{3+5} + 0$ A

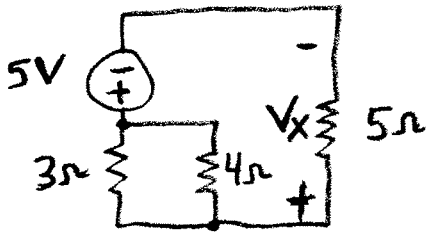
9. Determine the voltage V_x for the given circuit using series and parallel equivalents. Do not simplify the expression. If needed, the symbol for two resistive elements in parallel (e.g., $R_s \| R_L$) may be used.



10. Using current division, determine the current I_x for the given circuit. Do not simplify the expression. If needed, the symbol for two resistive elements in parallel (e.g., $R_s \| R_L$) may be used.



11. Using voltage division, determine the voltage V_x. Do not simplify the expression. If needed, the symbol for two resistive elements in parallel (e.g., $R_s \| R_L$) may be used.



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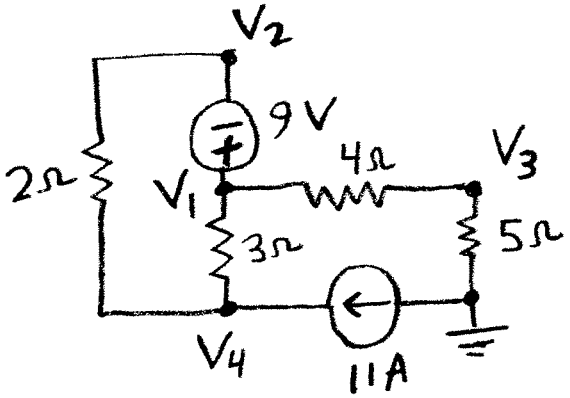

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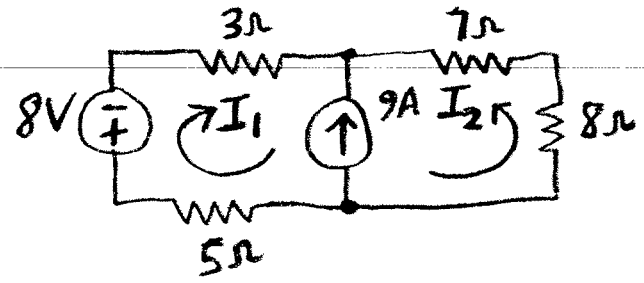
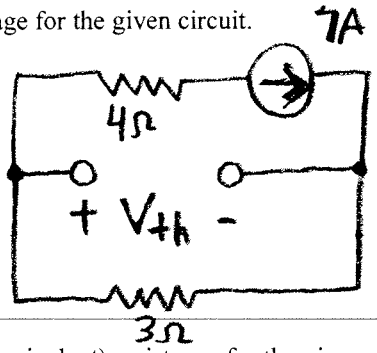
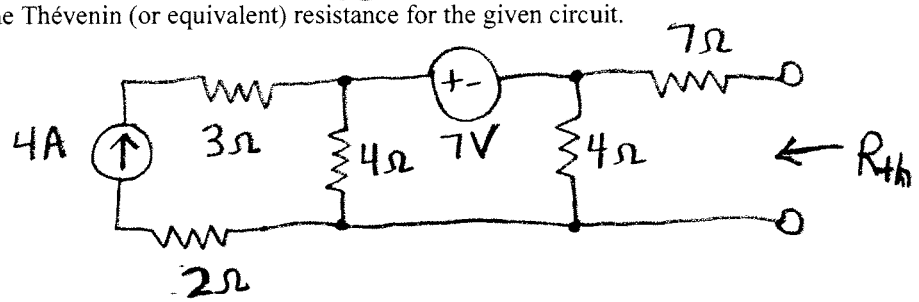


14. Determine the Thévenin voltage for the given circuit.



15. Determine the Thévenin (or equivalent) resistance for the given circuit.



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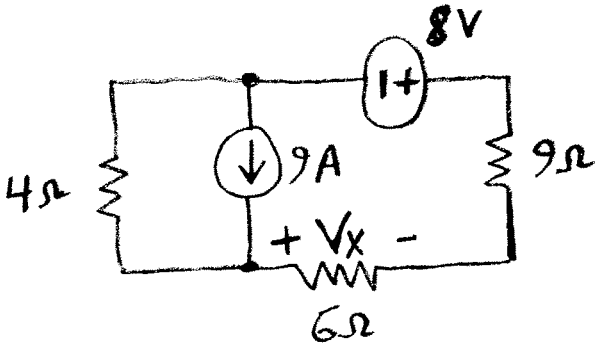

Ken Kaiser

Winter 2008 9

51 pts total

Printed Name: SOLN

Signature:

Answer Sheet (Provide Units) UNITS +2

1 1. pass PE/EIT etc.

1 2. 24 W ½ pt sign

1 3. B & C

1 4. -1 A

1 5. 15 V

2 6. $(5//7) + (8//9) + 11$ Ω

2 7. 21 kΩ

4 8. $\frac{-8}{(2//4)+3} \cdot \frac{(2//4)}{4}$ A

3 9. $5\,(3//7)$ V

4 10. $\frac{-5}{(4//6)+3} \cdot \frac{6}{4+6}$ A

3 11. $5 \cdot \frac{5}{(3\|4)+5}$ V

8 12. $V_1 - V_2 = 9$,

$\frac{V_4 - V_2}{2} + \frac{V_4 - V_1}{3} - 11 = 0$, , $\frac{V_1 - V_4}{3} + \frac{V_1 - V_3}{4}$

$\frac{V_3 - 0}{5} + \frac{V_3 - V_1}{4} = 0$

$+ \frac{V_2 - V_4}{2} = 0$

4 13. $9 = -I_1 - I_2$

$5I_1 + 8 + 3I_1 - 7I_2 - 8I_2 = 0$

3 14. -7.3 V

3 15. 9 Ω

4\|4+1 2pts

8 16. $-8 \cdot \frac{6}{4+6+9} + 9 \cdot \frac{4}{4+6+9} \cdot 6$ V

OR

$9 \cdot [(6+9)\|4] \cdot \frac{6}{6+9}$