Name: _____Solution_____ (please print)

Signature: _____

ECE 2201 – Quiz #5
November 21, 2019

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.

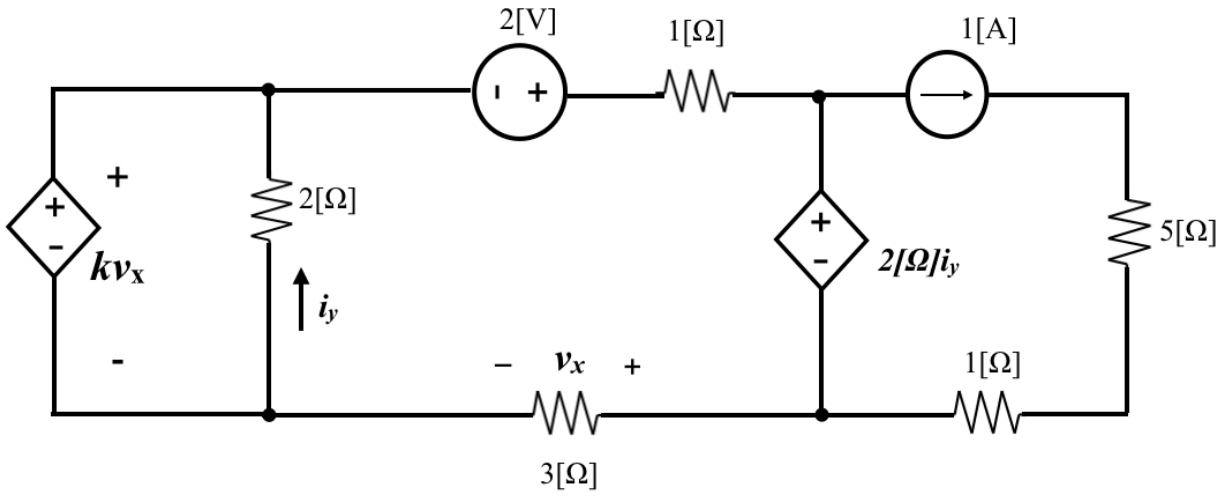
_____/25

Room for extra work

Use the circuit shown below to solve for the numerical values of $\boldsymbol{k}$ and $\boldsymbol{v_x}$.

a) Find the Thevenin equivalent of this circuit as seen **by** the dependent voltage source kv_x.

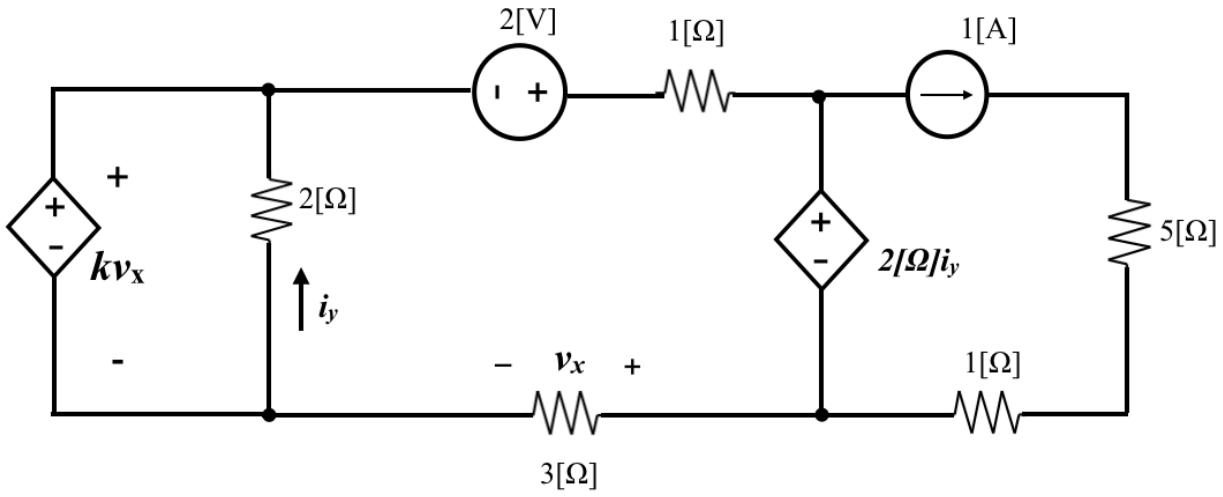
b) The voltage measured at terminals of the source kv_x is $0.5V_{TH}$.



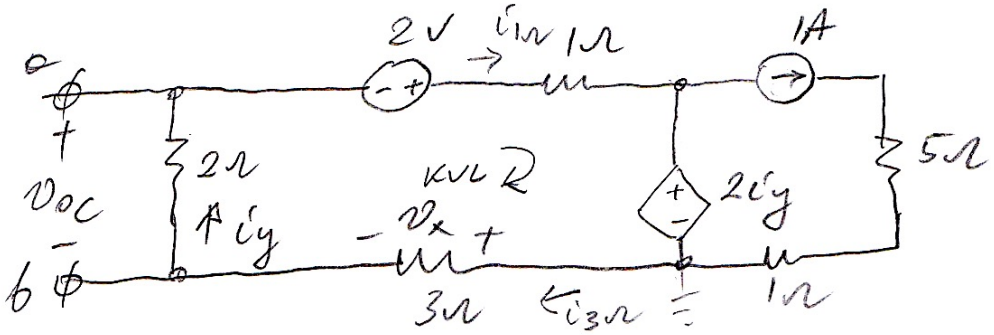
Use the circuit shown below to solve for the numerical values of k and v_x.

a) Find the Thevenin equivalent of this circuit as seen **by** the dependent voltage source kv_x.

b) The voltage measured at terminals of the source kv_x is $0.5V_{TH}$.



kv_x source will be removed → v_{oc} will be calculated



$$-2V + 1\Omega \cdot i_y + 2i_y + 3\Omega \cdot i_y + 2\Omega \cdot i_y = 0$$

$$i_y = \frac{2V}{8\Omega} = 0.25A$$

$$v_{oc} = -2\Omega \cdot 0.25A = -0.5V$$

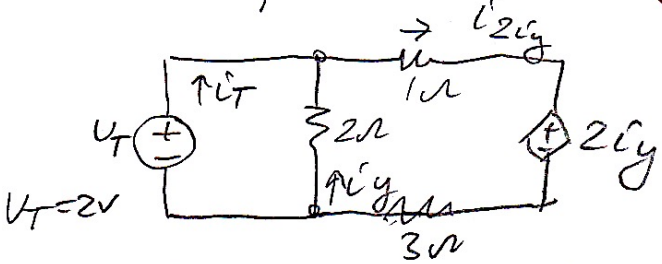
R_T → use test source or i_{sc}.

↓

deactivate all independent sources

Room for extra work

Th. equivalent (V_T)



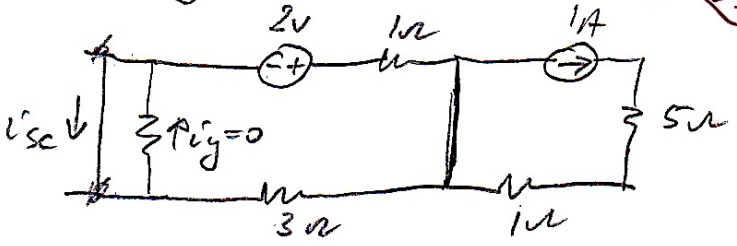
$i'_T = -i'_y + 2i'_y$; $i'_y = -\frac{V_T}{2\Omega} = -1A$

$i'_{2i_y} = \frac{2V - 2i_y}{4\Omega} = 1A$

$i'_T = 2A$

$R_T = \frac{2V}{2A} = 1\Omega$

or (i'_{sc})

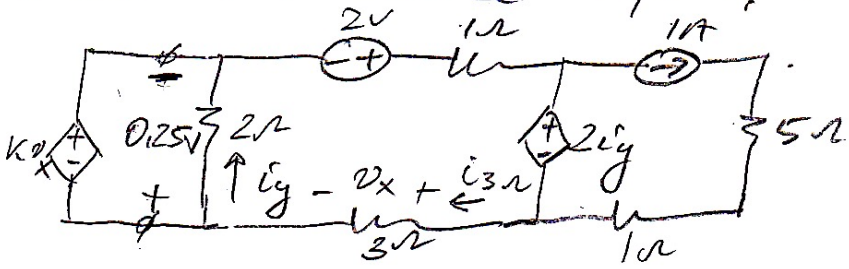


$i'_{sc} = \frac{-2V}{4\Omega} = -0.5A$

$v_{oc} = -0.5V$

$R_T = \frac{v_{oc}}{i'_{sc}} = 1[\Omega]$

b) Attach the source again, to the circuit



$kv_x = 0.5 \cdot v_{TH} = -0.25V$

$i'_y = \frac{0.125V}{2\Omega} = 0.125A$

$v_x = 3\Omega \cdot \frac{2V - 2(0.125) - 0.25V}{1\Omega + 3\Omega} = \boxed{1.125V}$

$k = -\frac{0.25}{1.125} = \boxed{-0.22}$