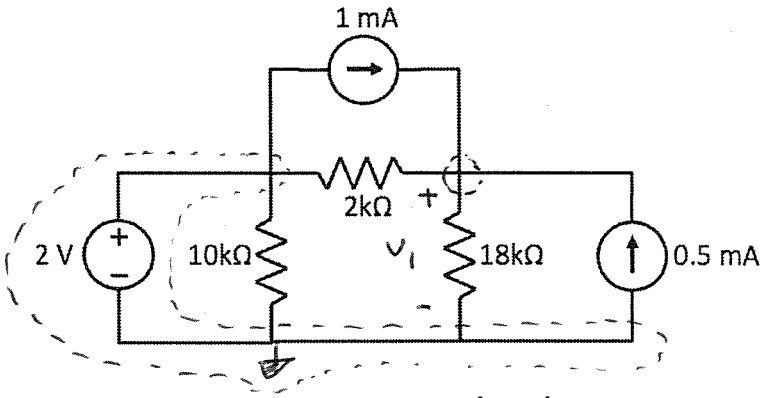
ECSE-200 Quiz # 3 ($2^{(3-1)}(2^3-1)$ Sept 2018)

NAME_____ McGill ID#_____

READ each question carefully. Do your work independently. SHOW ALL YOUR WORK. Give units on your answers (where appropriate).

Consider the circuit diagram to the right. Answer the questions.



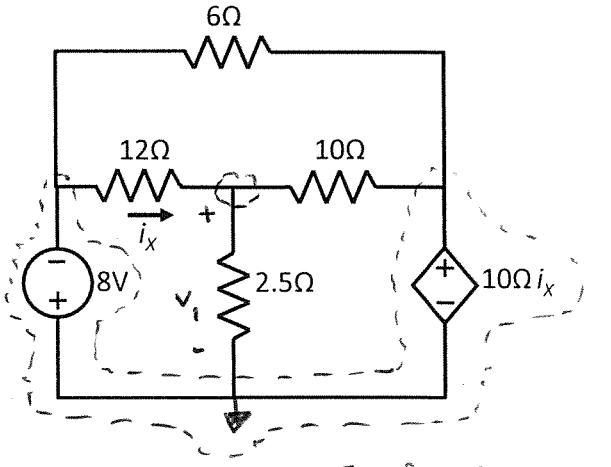
1) Write down the node voltage equation required to solve the circuit. Define your variable in the diagram clearly. [2pts]

2) Solve for the value of the node voltage variable. [2pts]

1) $0 = \frac{v_1}{18k\Omega} + \frac{v_1 - 2V}{2k\Omega} - 0.5mA - 1mA$ [+1] [+1] for diagram

2) $v_1 = \frac{2V/2k\Omega + 0.5mA + 1mA}{1/18k\Omega + 1/2k\Omega} = 4.5V$ [+2]

Consider the circuit diagram to the right. Answer the questions.



3) Write down the node voltage equation and control variable equation required to solve the circuit. Define your variable in the diagram clearly. [2pts]

4) Solve for the value of the node voltage variable and the control variable. [2pts]

1) $0 = \frac{v_1}{2.5\Omega} + \frac{v_1 - (-8V)}{12\Omega} + \frac{v_1 - 10\Omega i_x}{10\Omega}$ [+1/2]

[+1] for diagram

$i_x = \frac{-8V - v_1}{12\Omega}$ [+1/2]

2) $-\frac{2}{3} = \frac{7}{12}v_1 - i_x$

$-\frac{2}{3} = \frac{1}{12}v_1 + i_x$

$v_1 = \frac{\begin{vmatrix} -\frac{2}{3} & -1 \\ -\frac{2}{3} & +1 \end{vmatrix}}{\begin{vmatrix} 7/12 & -1 \\ 1/12 & +1 \end{vmatrix}} = -2V$ [+1]

$i_x = -0.5A$ [+1]