Name: _____ (please print)

Signature: _____

ECE 2201 – Quiz #4
April 8, 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.

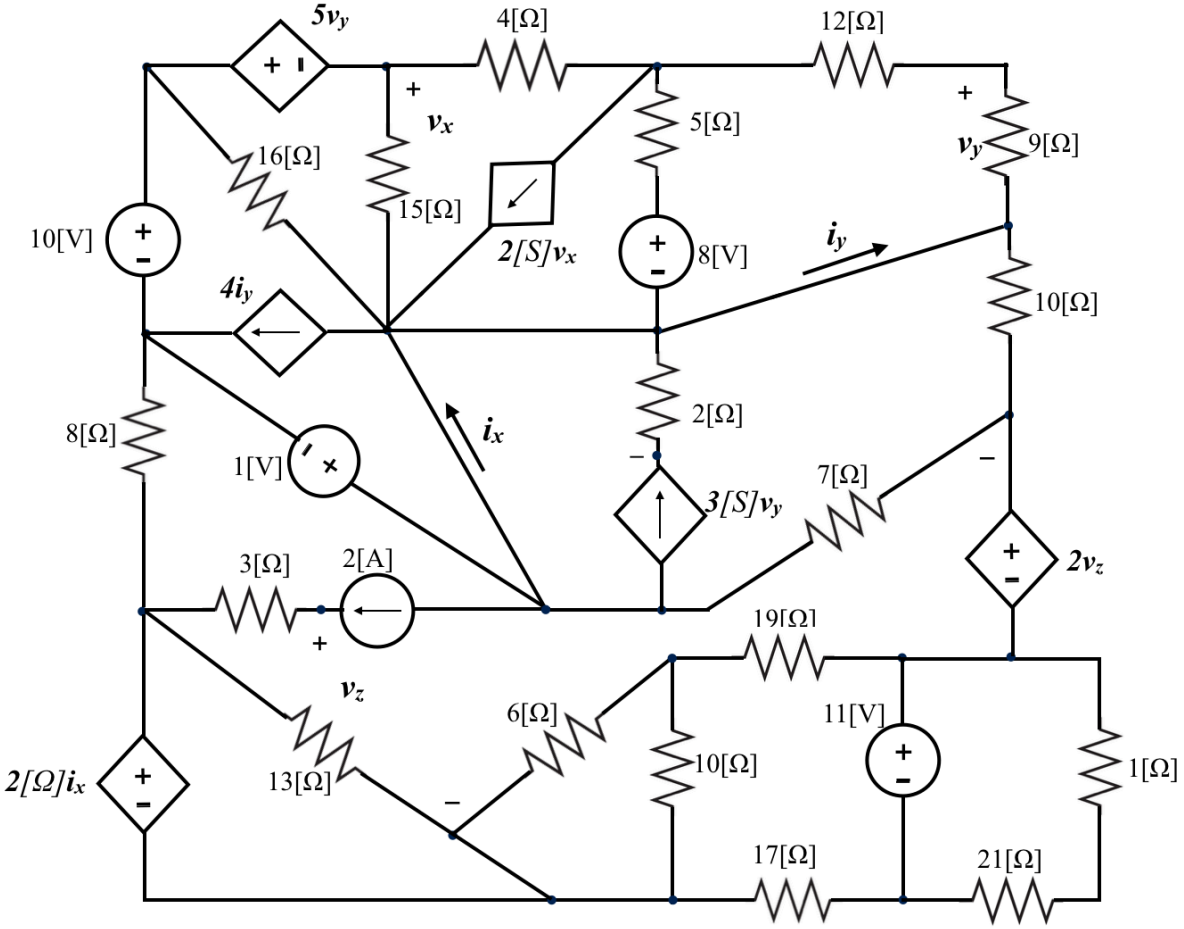
_____/20

1pm class

Room for extra work

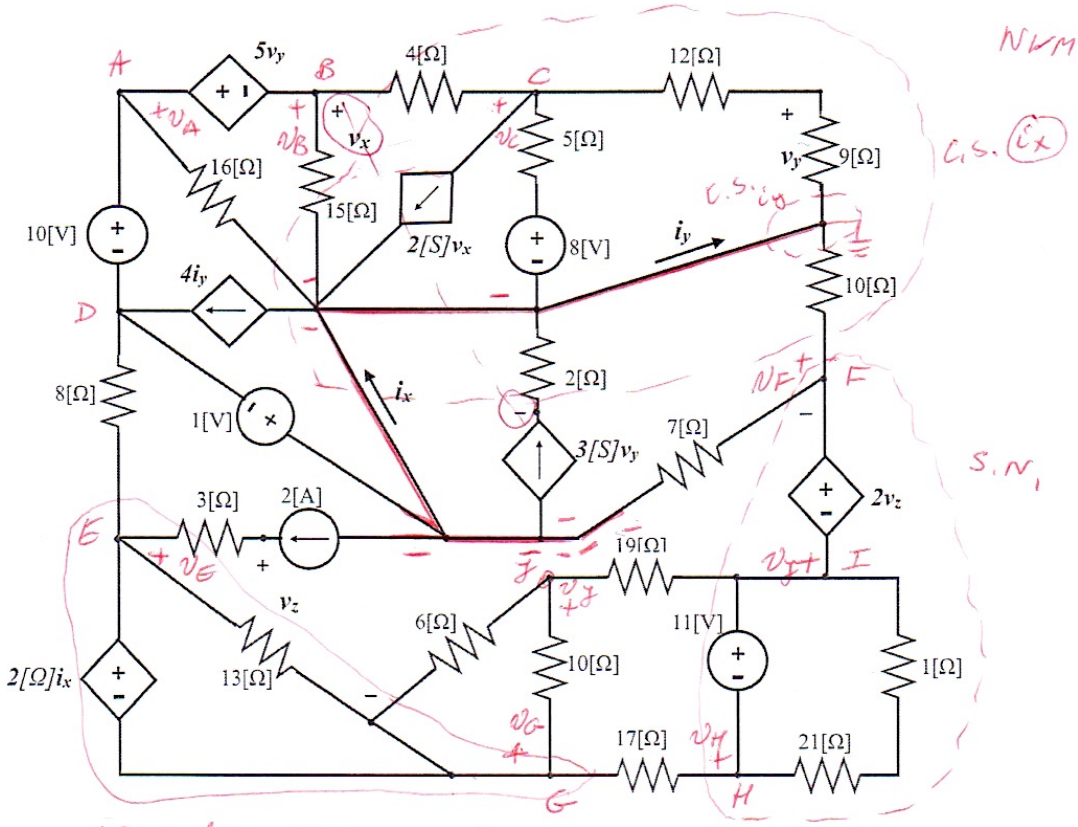
1pm class

Use either the **node-voltage method** or the **mesh-current method** to write a complete set of equations that could be used to solve this circuit. Do not simplify the circuit. Do not attempt to solve or simplify your equations. Define all variables.



1pm class

Use either the **node-voltage method** or the **mesh-current method** to write a complete set of equations that could be used to solve this circuit. Do not simplify the circuit. Do not attempt to solve or simplify your equations. Define all variables.



10 nodes eqs
5 auxiliary eqs. } 15 eqs,

super node B-A-D does not need KCL here because the nodes are determined by voltage sources

(D) $v_D = -1[V]$

(A) $v_A = v_D + 10[V]$

(B) $v_B = v_A - 5v_y$

(C) $\frac{v_C - v_B}{4[\Omega]} + 2v_x + \frac{v_C - 8[V]}{5[\Omega]} + \frac{v_C}{(12+9)[\Omega]} = 0$

(E) + (G) $\frac{v_E - v_D}{8[\Omega]} - 2[A] + \frac{v_G - v_J}{6[\Omega]} + \frac{v_G - v_I}{10[\Omega]} + \frac{v_G - v_H}{17[\Omega]} = 0$

E+G $v_E - v_G = 2i_x$

1pm class

Room for extra work

(F)+(I)+(H) $\frac{v_F}{10[\Omega]} + \frac{v_F}{7[\Omega]} + \frac{v_I - v_J}{19[\Omega]} + \frac{v_H - v_G}{17[\Omega]} = 0$

(F+I) $v_F - v_I = 2\,v_z$

(I+H) $v_I - v_H = 11[V]$

(J) $\frac{v_J - v_G}{6[\Omega]} + \frac{v_J - v_G}{10[\Omega]} + \frac{v_J - v_I}{19[\Omega]} = 0$

(i_x) $-i_x + 4\,i_y - \frac{v_A}{16[\Omega]} - \frac{v_B}{15[\Omega]} + \frac{v_B - v_C}{4[\Omega]} - \frac{v_F}{10[\Omega]} - 3\,v_y = 0$

(i_y) $-i_y - \frac{v_C}{(12+9)[\Omega]} - \frac{v_E}{10[\Omega]} = 0$

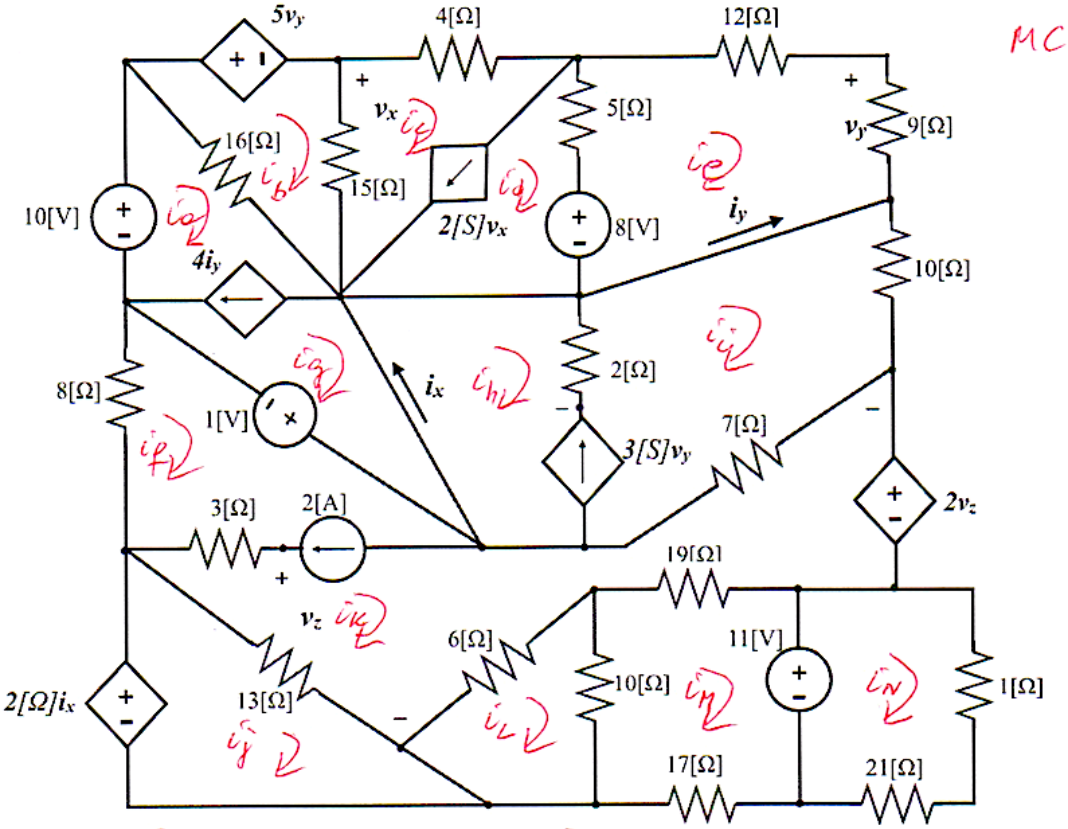
(v_x) $v_x = v_B - v_G$

(v_y) $v_y - v_F + v_C - \frac{v_C \cdot 12[\Omega]}{(12+9)[\Omega]} = 0$

(v_z) $v_z + v_G - (v_E - 3[\Omega] \cdot 2[A]) = 0$

1pm class

Use either the **node-voltage method** or the **mesh-current method** to write a complete set of equations that could be used to solve this circuit. Do not simplify the circuit. Do not attempt to solve or simplify your equations. Define all variables.



MCM

(14) Mesh currents & (5) auxiliary eqs.

$(i_a + i_g)$ $-10[V] + (i_a - i_b)\cdot 16[\Omega] - 1[V] = 0$

$(i_a + i_g)$ $i_a - i_g = 4i_y$

i_b $(i_b - i_c)\,15[\Omega] + (i_b - i_a)\,16[\Omega] + 5v_y = 0$

$(i_c + i_d)$ $(i_c - i_b)\,15[\Omega] + i_c\,4[\Omega] + (i_d - i_e)\,5[\Omega] + 8[V] = 0$

$(i_c + i_d)$ $i_c - i_d = 2v_x$

(i_e) $i_e \cdot 12[\Omega] + i_e\,9[\Omega] - 8[V] = 0$

$(i_f + i_k)$ $i_f \cdot 8[\Omega] - 1[V] + (i_k - i_i)\,7[\Omega] + 2v_z + (i_k - i_M)\,19[\Omega] +$

$(i_f + i_k)$ $i_f - i_k = 2[A]$ $\quad + (i_k - i_L)\,6[\Omega] + (i_k - i_y)\,13[\Omega] = 0$

(i_j) $-2v_x + (i_j - i_k)\,13[\Omega] = 0$

Room for extra work

i_L $\quad (i_L - i_K)\,6[\Omega] + (i_L - i_M)\,10[\Omega] = 0$

i_M $\quad (i_M - i_L)\,10[\Omega] + (i_M - i_K)\,19[\Omega] + 11[V] + i_M \cdot 17[\Omega] = 0$

i_N $\quad i_N \cdot 1[\Omega] + i_N \cdot 21[\Omega] - 11[V] = 0$

i_h $\quad i_i \cdot 10[\Omega] + (i_i - i_K)\,7[\Omega] = 0$

$+i_i$ $\quad i_i - i_h = 3\,v_y$

i_x $\quad i_x = i_h - i_g$

i_y $\quad i_y = i_i - i_e$

v_x $\quad v_x = (i_b - i_c)\,15[\Omega] - 1[V] - i_f \cdot 8[\Omega] + (i_j - i_k) \cdot 13[\Omega]$

v_y $\quad v_y = i_e \cdot 9[\Omega] + i_i \cdot 10[\Omega]$

v_z $\quad v_z = 2[A] \cdot 3[\Omega] + (i_j - i_k) \cdot 13[\Omega]$

correction for v_x (+ −) - location of ⊕ & ⊖

$v_x = (i_b - i_c)\,15\Omega + (i_H - i_L) \cdot 2\Omega$

1pm class