EGR 271 Due date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Circuit Theory I

File: EGR271M2A

**MATLAB Assignment #2**

Work each problem below and submit the assignment to the instructor. You can ask other students questions, but you work should essentially be your own. Copying others files is strictly prohibited. Evidence of copying will result in grades of 0 for all parties involved.

In general submit the following items:

* All required hand calculations
* All MATLAB programs
  + Be sure to begin with a block of comments including name, course number, assignment number, problem, and a brief description of the problem.
  + Include comments throughout each program. Use comments to indicate units for variables.
* All required MATLAB outputs

1. ***Node equations (30 pts)***: For problem 4.12 in Electric Circuits, 10E, by Nilsson:
2. Draw the circuit with the nodes labeled. Write ***node equations*** to solve for V1 and V2 (do not solve the equations yet.)
3. Arrange the equations in Ax = b form.
4. Write a MATLAB program (with comments as described above) to solve the equations using

x = A\b. (Answers: V1 = 100V, V2 = 20V)

1. Submit your hand calculations from parts A and B along with a copy of the MATLAB program and the results from running the MATLAB program.
2. ***Mesh equations (30 pts)***: For problem 4.36 in Electric Circuits, 10E, by Nilsson:
3. Draw the circuit with clockwise mesh currents labeled. Write ***mesh equations*** to solve for I1, I2, and I3 (do not solve the equations yet).
4. Arrange the equations in Ax = b form.
5. Write a MATLAB program (with comments as described above) to solve the equations using x = A\b. (Answers: I1 = -10.6 A, I2 = 4.4 A, I3 = -36.8 A)
6. Submit your hand calculations from parts A and B along with a copy of the MATLAB program and the results from running the MATLAB program.
7. ***Gauss Jordan reduction and MATLAB solutions (40 pts)***: For problem 4.11 in Electric Circuits, 10E, by Nilsson:
8. Draw the circuit with CW mesh currents IA, IB, and IC labeled. Verify that the ***mesh equations*** are:



1. Arrange the equations in Ax = b form.
2. Form the augmented matrix using matrices A and b above and use Gauss-Jordan reduction ***by hand*** to reduce the augmented matrix into reduced row echelon form. Show all steps in the Gauss-Jordan reduction and use the notation indicated in the corresponding MATLAB lecture notes

(for example, → R1 + 3R2 → ) (Answers: IA = -6.8A, IB = -9.5A, IC = -12A)

1. Write a MATLAB program (with comments as described above) to solve the mesh equations three ways listed below. Also display titles for each part (for example: ‘Solution using x = inv(A)\*b’)

* Using x = inv(A)\*b
* Using rref( )
* Using x = A\b. (Answers: IA = -6.8A, IB = -9.5A, IC = -12A)

1. Submit your hand calculations from parts A, B, and C along with a copy of the MATLAB program and the results from running the MATLAB program.