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

Circuit Theory I

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**MATLAB Assignment #3**

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
* If an y graphs are required, they should be properly formatted.

1. ***Table of values (30 pts)***: The voltage across a 100 uF capacitor is v(t) = 10e-20t V.
   1. Find expressions for i(t), p(t), and w(t) by hand.
   2. Write a MATLAB program to form a table of values for t, v(t), i(t), p(t), and w(t). Include a table heading with variable names and units. Let t vary from 0 to 0.25 in increments of 0.01. The table might look something like the one shown below:

T (s) v (V) I (A) p(W) w(J)

0.00

0.01

0.25

1. ***Graphing***: Write a single MATLAB program to graph each of the following functions. All graphs should be properly formatted.
2. V1(t) = 250sin(500t) as t varies linearly from 0 to 40ms using 100 points. Use linear scales for the graph.
3. I2(t) = 10te-0.2t A as t varies linearly from 0 to 25 using an increment of 0.5. Use linear scales for the graph.
4. V3(t) = 25e-tcos(2πt) as t varies linearly from 0 to 5 using 200 points. Use linear scales for the graph.
5. 

Use a linear scale for the y axis and a log scale for the x axis.

(continued)

1. ***Max Power Transfer Graph (40 pts)***:

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200 V

25

R

1. For the circuit provided above, derive (by hand) the following expression for the power to R:



1. For what value of R will maximum power be delivered to R?
2. Calculate Pmax.
3. Use MATLAB to graph P versus R as R varies logarithmically from 1 to 100 ohms. Use 50 points per decade. The graph should be nicely labeled.
4. Compare (in a table) the value of Pmax from the graph and the corresponding value of R to the values found by hand in parts B and C. Discuss any differences.