# ECE 45 – Circuits and Systems
# Spring 2023

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## Homework #1
## Due: January 10 at 1:00pm, submitted via GradeScope.

You can make multiple upload attempts to experiment with the system and the best way to upload. You must correctly mark the answers to the problems in GradeScope, e.g. problem 1, problem 2, problem 3, to get full credit. Note that you must tag your problems when uploading to GradeScope or they will not be graded and you will not receive credit. Any regrade requests must be placed through GradeScope within one week of the return of the homework.

Remember, discussion of homework questions is encouraged. Please be absolutely sure to submit your own independent homework solution.

1. (40 points) Mathematics review. We will use these calculations in various parts of the course.
   (a) $\int_0^\infty e^{-t}dt$
   (b) $\int_1^\infty e^{-t}dt$
   (c) $\int_{-1}^\infty e^{-t}dt$
   (d) $\int_{-\infty}^\infty e^{-2|t|}dt$
   (e) $\int_0^\infty te^{-t}dt$
   (f) $\int_0^\infty e^{-\beta t}dt$ where $\beta \in \mathbb{R}$. Hint: Be sure to carefully consider the values of the real variable $\alpha$ as the integral does not always exist.
   (g) Rewrite $4 + 4j$ in polar coordinates.
   (h) Simplify the following and put in polar form $(4 + 3j) - (2 - 6j)$.
   (i) Use Euler's formula to write $f(t) = e^{jt} - e^{-jt} + 2e^{3jt}$ as a finite sum of sinusoidal functions.
   (j) Use Euler's formula to write $g(t) = 1+\cos(t)+\sin(2t)$ as a finite sum of complex exponentials.
   (k) Determine the phasor associated with the voltage signal $v(t) = 4\cos(4t) - 4\sin(4t)$.

2. (40 pts) Complete the MATLAB Onramp course.

   `https://matlabacademy.mathworks.com`

3. (10 pts) Write one sequence of prompts for your favorite AI engine to help you brush up on some relevant material and give the results. For example, Prof. Heath tried the prompt: "Help me to understand the two argument tangent function."

4. (10 pts) Write an acknowledgement that you have reviewed all the course policies from the syllabus including but not limited to (a) the requirement to mark problems when you submit to GradeScope to receive any credit for the problem, and (b) policies related to no late submission of assignments.