

# Differential Equations – Homework 16

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## Homework 16

### Reading

Next class we are jumping forward to a new topic, Integral Transforms! Chapter 7.1.

### Directions: Do the following book problems

Chapter 3.8 Problems: 3 and 5 - More practice with Eigenvalue Problems

### CHOOSE ONE

You are going to try to apply physical reasoning and really understand one application of ODEs:

1. Chapter 3.6 carefully read the section on **Damped Forced Oscillations** and do Example 6. Fully explain all the parts and recreate the plots using Desmos.com or Python.
2. Explain how **Electrical Circuits** can be modeled, the beginning of Chapter 3.7, and then do Example 1
3. Explain how **Electrical Circuits** can be modeled, the beginning of Chapter 3.7, and then investigate Electrical Resonance, follow the work in the book.
4. Explain fully the derivation for Chapter 3.8, **The Deflection of a Uniform Beam** then do Example 5.
5. Explain fully the derivation for Chapter 3.8, **The Buckled Rod** then do Example 7.

### Other Notes:

1. Reading mathematics can be challenging. Here are some tips for getting better at it:
  - (a) Sometimes it helps to read through quickly first, just to see where you are going and then read the second time through very carefully.
  - (b) When reading carefully, don't leave a step until you understand all of the equations/definitions/arguments!
  - (c) You should be following along by doing the calculations on paper. You need to do more than copy! You need to fill in all of the logical details between the steps shown in the book.
  - (d) Try to be self-reflective... Where are you missing out on the logic? What parts of your foundational skills might need strengthening? Review NOW not later!
2. If you would like to make a video to present one of the Choose one problems, let me know! It would be great to have a "whiteboard" walk through of how these applications make sense in your minds.