

Homework #1: Section 1.1

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1. (a) What is a differential equation? Give an example different from the one in lecture.  
(b) Define the order of a differential equation. Give an example of a second order differential equation as well as an example of a higher order differential equation.
2. (a) Define a linear differential equation. Give an example of both a linear and nonlinear differential equation different from the ones in lecture.  
(b) What is a solution to a differential equation? Verify that both  $y = e^{3x}$  and  $y = 2e^{3x}$  are solutions of the following differential equation

$$\frac{dy}{dx} = 3y.$$

3. **Bonus:** (2 points) Describe how differential equations arises in either your major or one of your academic interests.