Differential Equations Student Notebook

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Chapter 1

Preface

Welcome to my *Differential Equations Student Notebook*. I created this "borderline text-book" notebook as a way for me and others to study and/or learn Differntial Equations from. You may be asking: "What qualifications do you have to be making this *Differential Equations Notebook*?" and my response to that is that I am not. **I AM NOT QUALIFIED**. I am just a student who thought that making a textbook would assist me in learning about DEs. However, I have taken Calculus I, II, III, Discrete Mathematics, Linear Algerbra, and any other foundation-building mathematical class that University of Houston - Clear Lake provides (if that makes you trust me more).

It would be greatly appreciated if you simply took this as a study resource for any current, soon-to-be-current, already-took-this-and-just-forgot student. Therefore, without further ado, lets begin our dive into DIFFERENTIAL EQUATIONS.

Chapter 2

The Very Beginning

2.1 Requirements

As it is in every area of mathematics, there is a certain level of knowledge that is to be expected to be known by students. Requirements for *Differential Equations* is prior experience in Calculus I and II.

Of course, it is **expected that you are a BORDERLINE SAVANT in Calculus**. If you are not absolutely comfortable with Calculus, I reccommend that you REALLY go over it.

2.2 Types of Differential Equations

There are two types of Differential Equations: Ordinary Differential Equations (ODEs) and Partial Differential Equations (PDEs). The two differences between a **ODE** and a **PDE** is that an ODE is (as the name suggests) an equation that contains ordinary differentials. An example of an ODE is as follows:

$$\frac{dy}{dx} = 4y - 2x \tag{2.1}$$

An example of a PDE is as follows:

$$\frac{\partial y}{\partial x} = 17x^2 - 3y * \sin y \tag{2.2}$$

Did you spot the difference? The differentiating factor between example 2.1 and 2.2 is $\frac{dy}{dx}$ and $\frac{\partial y}{\partial x}$. *One contains partials while the other does not.*