

# Lecture Notes on

## **Unit 01 Differential Equations**

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The contents of these pages constitute my authorized exam notes for Unit 01 of Differential Equations. This exam will take place at the Lake Worth campus under the supervision of Professor Tamara Johns on Wednesday, February 18, 2026 at 10:00 AM, in her physical office.

This is a retake opportunity granted after my initial Exam 01 Attempt 01 score of 25%, and these notes have been prepared to support a stronger performance on the retake. During the exam, I am permitted to reference these notes. The material included here is compiled directly from the following resource(s), which I consulted while preparing:

1. Lecture Recordings and Handouts from Prof. Johns
2. Differential Equations Textbook By Blanchard, Hall, and Devaney
3. [Online notes by Professor Lebl](#)
4. [Houston Math's Youtube Channel](#)

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## **1 DEFINITIONS AND TERMINOLOGY, IVP, AND SLOPE FIELDS**

**1.1 (1.1) - Definitions and Terminology**

**1.2 (1.2) - Initial Value Problems**

**1.3 (2.1) - Solution Curves Without A Formula**

## **2 SEPARABLE EQUATIONS**

### **2.1 (2.2) - (General Overview) Separable Equations**

### **2.2 Graphical Interpretations**

### **2.3 Initial Value Problems (continued)**

### **3 LINEAR EQUATIONS**

#### **3.1 (2.3) - (General Overview) Linear Equations**

#### **3.2 Integrating Factor Method**

#### **3.3 Interpret and Understand the Structure and Behavior of Solutions and Their Domain**

## **4 EXACT EQUATIONS**

### **4.1 (2.4) - (General Overview) Exact Equations**

### **4.2 Classifying and Solving Potential Functions**

### **4.3 Solving Equations by Integration and Applying Initial Conditions**

## **5 SOLUTIONS BY SUBSTITUTION**

### **5.1 (2.5) - (General Overview) Solutions By Substitutions**

### **5.2 Homogeneous Equations**

### **5.3 Bernoulli Equations**

### **5.4 Other substitutions and methods**

## **6 LINEAR MODELS**

### **6.1 (3.1) - (General Overview) Modeling with 1st Order Differential Equations**

### **6.2 Exponential Growth and Decay**

### **6.3 Newton's Law Of Cooling**

### **6.4 Mixing Problems**

### **6.5 Proportional Change Models**