## **Table of Contents for Differential Equations Lecture Notes**

## 1.1 Modeling via Diff Eqs, direction fields, some solutions and definitions

Sections in Boyce/DePrima – 1.1-1.3

Sections in Zill – 1.1, 2.1.1

## 2.1 Linear Equations/Integrating Factors

Sections in Boyce/DePrima – 2.1

Sections in Zill – 2.3

## 2.2 Separable Equations

Sections in Boyce/DePrima – 2.2

Sections in Zill –2.2

## 2.3 Separable Homogeneous Equations and the Substitution Method

Sections in Boyce/DePrima – 2.2

Sections in Zill –2.5

## 2.4 Modeling with Differential Equations

Sections in Boyce/DePrima – 2.3

Sections in Zill –3.1

# 2.5 Modeling with differential equations - More Problems

Sections in Boyce/DePrima – 2.3

Sections in Zill – 3.1

#### 2.6 Existence and Uniqueness of Solutions

Sections in Boyce/DePrima – 2.4

Sections in Zill –1.2

# **2.7** Autonomous Equations and Population dynamics

Sections in Boyce/DePrima – 2.5

Sections in Zill -2.1.2

# 2.8 Exact Equations

Sections in Boyce/DePrima – 2.6

Sections in Zill –2.4

#### 2.9 Euler's Method

Sections in Boyce/DePrima – 2.7

Sections in Zill – 2.6

#### 3.1 2nd Order Linear Equations - Homogeneous Eqs with Constant Coefficients

Sections in Boyce/DePrima – 3.1

Sections in Zill – 4.1,2

#### 3.2 Solutions to Linear Equations; the Wronskian

Sections in Boyce/DePrima – 3.2

Sections in Zill – 4.1

#### **3.3 Complex Roots of the Characteristic Equation**

Sections in Boyce/DePrima – 3.3

Sections in Zill – 4.3

## 3.4 Repeated Roots; reduction of order

Sections in Boyce/DePrima – 3.4

Sections in Zill – 4.2

#### **3.5 non-Homogeneous - Method of undetermined Coefficients**

Sections in Boyce/DePrima – 3.5

Sections in Zill – 4.4

# **3.6 Variation of Parameters**

Sections in Boyce/DePrima – 3.6

Sections in Zill – 4.6

#### **3.7 Mechanical and Electrical Vibrations**

Sections in Boyce/DePrima – 3.7

Sections in Zill –5.1.1-5.1.2

# **3.8 Forced Vibrations**

Sections in Boyce/DePrima – 3.8

Sections in Zill – 5.1.3

## 4.1 Higher Order Systems

Sections in Boyce/DePrima – 4.1

Sections in Zill – 4.1

#### 4.2 The Method of Undetermined Coefficients

Sections in Boyce/DePrima – 4.2

Sections in Zill – 4.1/4.4

#### 6.1 Definition of the Laplace Transform

Sections in Boyce/DePrima – 6.1

Sections in Zill – 7.1

# 6.2 Solutions to Initial Value Problems

Sections in Boyce/DePrima – 6.2

Sections in Zill –7.2

# 6.3 Step Functions

Sections in Boyce/DePrima – 6.3

Sections in Zill –7.3-7.4

# 6.4 ODEs with Discontinuous Forcing functions

Sections in Boyce/DePrima – 6.4

Sections in Zill – 7.3-7.4

## 6.5 Impulse Functions

Sections in Boyce/DePrima – 6.5

Sections in Zill – 7.5

## 6.6 The Convolution Integral

Sections in Boyce/DePrima – 6.6

#### 7.1 Systems of First Order Linear Equations

Sections in Boyce/DePrima – 7.1

Sections in Zill - 8.1

# 7.2 Review of Matrices

Sections in Boyce/DePrima – 7.2

Sections in Zill – 8.1

## 7.3 Systems of Linear Equatiosn: Linear Independence, Eigenvalues, Eigenvectors

Sections in Boyce/DePrima – 7.3

Sections in Zill – 8.1/8.2.1

## 7.4 Linearity principle

Sections in Boyce/DePrima – 7.4

Sections in Zill – 8.1

# 7.5 Basic Theory of Systems of 1st Order Linear EQs

Sections in Boyce/DePrima – 7.5

Sections in Zill – 8.1

# 7.6 Phase Portraits for system w/real eigenvalues

Sections in Boyce/DePrima – 7.5

Sections in Zill – 8.2.1

# 7.7 Complex Eigenvalues

Sections in Boyce/DePrima – 7.6

Sections in Zill – 8.2.3

# 7.8 Repeated and zero eigenvalues

Sections in Boyce/DePrima – 7.7

Sections in Zill – 8.2.2

# 7.9 Non-homegeneous Linear Equations

Sections in Boyce/DePrima – 7.8

Sections in Zill – 8..3