

CONTENTS

Math 226

Chapter I Introduction

Students read:

- 1.1 Classification of Differential Equations
- 1.2 Historical Remarks

Chapter 2 First Order Differential Equations

10 classes - 1 class period for test:

- 2.1 Linear Equations
- 2.2 Further Discussion of Linear Equations
- 2.3 Separable Equations
- 2.4 Differences Between Linear and Nonlinear Equations
- 2.5 Modeling with Linear Equations
- 2.6 Population Dynamics and Some Related Problems
- 2.7 Some Problems in Mechanics
- 2.8 Exact Equations and Integrating Factors
- 2.9 Homogeneous Equations
- 2.10 Miscellaneous Problems and Applications

Chapter 3 Second Order Linear Equations

3 classes:

- 3.1 Homogeneous Equations with Constant Coefficients
- 3.2 Fundamental Solutions of Linear Homogeneous Equations
- 3.3 Linear Independence and the Wronskian

5 classes:

- 3.4 Complex Roots of the Characteristic Equation
- 3.5 Repeated Roots; Reduction of Order
- 3.6 Nonhomogeneous Equations; Method of Undetermined

Coefficients

- 3.7 Variation of Parameters
- 3.8 Mechanical and Electrical Vibrations

Chapter 5 Series Solutions of Second Order Linear Equations

6 classes:

- 5.1 Review of Power Series
- 5.2 Series Solutions near an Ordinary Point, Part I

- 5.3 Series Solutions near an Ordinary Point, Part II
- 5.4 Regular Singular Points
- 5.5 Euler Equations
 - 1 class period for test
 - 2 classes
- 5.6 Series Solutions near a Regular Singular Point Part I
- 5.7 Series Solutions near a Regular Singular Point, Part II

$3\frac{1}{2}$ classes

1. Systems of Linear Equations

- 1.1 Introduction to Gaussian Elimination
- 1.2 General Linear System with m Equations and n Unknowns
- 1.3 Homogeneous Systems

2. Matrices

3. Systems and Matrices

- 3.1 Systems in Matrix Form
- 3.2 The Inverse of a Square Matrix
- 3.3 Homogeneous Systems and the Rank of a Matrix

3 classes

4. Vector Spaces

- 4.1 The Vector Spaces \mathbb{R}^n and \mathbb{C}^n
- 4.2 Vector Spaces
- 4.3 Subspaces
- 4.4 Linear Independence, Basis and Dimension
- 4.5 The Row Space and Column Space of a Matrix

5. Vector Spaces and Systems

$\frac{1}{2}$ class

6. The Dot Product

$1\frac{1}{2}$ classes

- 6.1 The Dot Product and its Properties
 - 6.2 Projections and the Gram-Schmidt Process
 - 6.3 Dot Products and Matrix Products
- 1 class period for text

2 classes

7. Linear Transformations

8. Determinants

8.1 Definition of the Determinant of a Square Matrix

8.2 Properties of Determinants

8.3 Using Determinants to find A^{-1}

8.4 Using Determinants to Solve $n \times n$ Systems

classes

9. Introduction to Eigenvalues and Eigenvectors

9.1 Finding Eigenvalues and Eigenvectors

9.2 Diagonalization of a Matrix

MATH 323: INTRODUCTION TO PROBABILITY

Spring semester 1997

1992-93 Bulletin description:

An introductory course in probability, with applications to the physical sciences and engineering. Topics will include: Discrete and continuous random variables, conditional probability and independent events, generating functions, special discrete and continuous random variables, laws of large numbers and the central limit theorem. Emphasis will be placed on computations with the standard distributions of probability theory and classical applications of them.

Textbook: Introduction to Probability 2nd Edition by Richard L. Scheaffer, PWS-Kent

Prerequisites: Math 226

Topics:

1. Probability: formal definition, counting rules, conditional probability and independence
2. Discrete Probability Distributions: random variables, expected values, the Bernoulli, binomial, geometric, negative binomial, Poisson and hypergeometric distributions, moment-generating and probability-generating functions
3. Continuous Probability Distributions: continuous random variables, the uniform, exponential, gamma, normal, beta and Weibull distributions
4. Multivariate Probability Distributions: bivariate and marginal distributions, independent random variables, multinomial distribution, conditional expectations, queues
5. Functions of Random Variables: methods of distribution functions, transformations and conditioning, order statistics, probability-generating functions, arrival times for the Poisson process, infinite-server queue
6. Approximations to Probability Distributions - Limit Theorems: convergence in probability and distribution, central limit theorem, renewal theory (reliability)