Intermediates: A little math is needed to solve data science and machine learning. If you’re a data scientist who lacks a math or scientific background or a developer who wants to add data science to your skillset, this is your book. It’s all about linear algebra.

The course in Linear Algebra, and its companion, have helped many students learn the concept of a differential equation that brings together a set of additional constraints called the boundary conditions. As boundary value problems arise in several branches of math given the fact that any physical differential equation will have them, this book will provide a plan for the solution of an approximate equation. Organized into six chapters, this book begins with an overview of the solution of various equations. This text then outlines a non-traditional theory of the solution of approximate equations. Other chapters cover the appropriate methods for the solution of nonlinear equations and their applications in engineering, including (i) the formulation of decision-making models, (ii) the formulation of efficient solution algorithms for such models, and (iii) insights into these structures through the detailed analysis of numerous illustrative examples. The authors use a modern, “building block” approach to solving complex problems, making the topic accessible to students with limited background in physics and other fields. Solvers examples are used to introduce new concepts and each chapter ends with a set of exercises.

Differential Equations

Important concepts and methods of solving differential equations are presented in this chapter. The study of ordinary differential equations and its applications to engineering. The text is designed to serve as a first course in differential equations. Importance is given to the linear equation with constant coefficients, stability by theory, use of matrices and linear algebra, and the introduction to the Laplace transform. Engineering problems such as the water phase diagram of a bimetallic strip and the vacuum-tube circuit are also presented. Engineers, mathematicians, and engineering students will find the book invaluable.

Numerical Solutions of Boundary Value Problems

This book is self-contained with a detailed description of operation problems in power systems, including power system modeling, power system steady-state operations, power system state estimation, and electricity markets. The book provides an appropriate blend of theoretical background and practical applications, which are developed as working algorithms, coded in Octave (or Matlab) and C++. The feature presents the usefulness of the book for both students and practitioners. Students will gain an insightful understanding of current power system operation problems in engineering, including (i) the formulation of decision-making models, (ii) the formulation of efficient solution algorithms for such models, and (iii) insights into these structures through the detailed analysis of numerous illustrative examples. The authors use a modern, “building block” approach to solving complex problems, making the topic accessible to students with limited background in physics and other fields. Solvers examples are used to introduce new concepts and each chapter ends with a set of exercises.

Applications to the Solution of Systems of Linear Equations and the Determination of Eigenvalues

Boundary Value Problems for Systems of Differential, Difference and Fractional Equations: Positive Solutions discusses the concept of a differential equation that brings together a set of additional constraints called the boundary conditions. As boundary value problems arise in several branches of math given the fact that any physical differential equation will have them, this book will provide a plan for the solution of an approximate equation. Organized into six chapters, this book begins with an overview of the solution of various equations. This text then outlines a non-traditional theory of the solution of approximate equations. Other chapters cover the appropriate methods for the solution of nonlinear equations and their applications in engineering, including (i) the formulation of decision-making models, (ii) the formulation of efficient solution algorithms for such models, and (iii) insights into these structures through the detailed analysis of numerous illustrative examples. The authors use a modern, “building block” approach to solving complex problems, making the topic accessible to students with limited background in physics and other fields. Solvers examples are used to introduce new concepts and each chapter ends with a set of exercises.

Solving Systems of Polynomial Equations

This textbook provides a detailed description of operation problems in power systems, including power system modeling, power system steady-state operations, power system state estimation, and electricity markets. The book provides an appropriate blend of theoretical background and practical applications, which are developed as working algorithms, coded in Octave (or Matlab) and C++. The feature presents the usefulness of the book for both students and practitioners. Students will gain an insightful understanding of current power system operation problems in engineering, including (i) the formulation of decision-making models, (ii) the formulation of efficient solution algorithms for such models, and (iii) insights into these structures through the detailed analysis of numerous illustrative examples. The authors use a modern, “building block” approach to solving complex problems, making the topic accessible to students with limited background in physics and other fields. Solvers examples are used to introduce new concepts and each chapter ends with a set of exercises.

Computational Solution of Nonlinear Systems of Equations

This is the first systematic study of best approximation theory in inner product spaces and, in particular, in Hilbert space. Geometric considerations play a prominent role in developing and understanding the theory. The only prerequisites for reading the book are some knowledge of advanced calculus and linear algebra. The only prerequisite for the solution of systems of linear equations is an understanding of the method of a least squares. In this chapter, we will present a method for solving these equations. The method is based on the fact that the system of linear equations has a unique solution. The method is called the Gauss-Seidel method.

A First Course in Linear Algebra

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