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MATLAB Mathematical Analysis

Cesar Perez Lopez

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MATLAB Mathematical Analysis is a reference book that presents the techniques of mathematical analysis through examples and exercises resolved with MATLAB software. The purpose is to give you examples of the mathematical analysis functions offered by MATLAB so that you can use them in your daily work regardless of the application. The book supposes proper training in the mathematics and so presents the basic knowledge required to be able to use MATLAB for calculational or symbolic solutions to your problems for a vast amount of MATLAB functions.

The book begins by introducing the reader to the use of numbers, operators, variables and functions in the MATLAB environment. Then it delves into working with complex variables. A large section is devoted to working with and developing graphical representations of curves, surfaces and volumes. MATLAB functions allow working with two-dimensional and three-dimensional graphics, statistical graphs, curves and surfaces in explicit, implicit, parametric and polar coordinates. Additional work implements twisted curves, surfaces, meshes, contours, volumes and graphical interpolation.

The following part covers limits, functions, continuity and numerical and power series. Then differentiation is addressed in one and several variables including differential theorems for vector fields. Thereafter the topic of integration is handled including improper integrals, definite and indefinite integration, integration in multiple variables and multiple integrals and their applications.

Differential equations are exemplified in detail, Laplace transforms, Tayor series, and the Runga-Kutta method and partial differential equations.

What you'll learn

In order to understand the scope of this book it is probably best to list its content:

The MATLAB environment, numerical calculus, symbolic calculus, MATLAB and Maple graphics with MATLAB, help with commands, escape and exit commands to the MS-DOS environment, MATLAB and programming, limits and continuity, one and several variables limits, lateral limits, continuity in one or more variables, directional limits, numerical series and power series, convergence criteria, numerical series with non negative terms, numerical alternate series, formal powers series, development in Taylor, Laurent, Pade and Chebyshev series, derivatives and applications in one and several variables, calculation of derivatives, tangents, asymptotes, concavity, convexity, maximum, minimum, inflection points and growth, applications to practical problems partial derivatives, implicit derivatives, differentiation in several variables, maxima and minima of functions of several variables, Lagrange multipliers, applications of maxima and minima in several variables, vector differential calculus and theorems in several variables, vector differential calculus concepts, the chain rule theorem, change of variable theorem, Taylor to n variables theorem, Fields vectors,applications of integrals, integration by substitution (or change of variable) integration by parts, integration reduction and cyclic integration, definite and indefinite integrals, integral arc of curve, area including between curves, revolution of surfaces, volumes of revolution, curvilinear integrals, integration approximation, numeric and improper integrals, parameter–dependent integrals, Riemann integral, integration in several variables and applications, double integration, Area of surface by double integration,

calculation volume by double integrals, calculation volumes and triple integrals, Green's theorem, Divergence theorem, Stokes theorem, differential equations, homogeneous differential equations, exact differential equations, linear differential equations, ordinary high –order equations, linear higher-order homogeneous in constant coefficients equations, homogeneous equations in constant coefficients, variation of parameters, non-homogeneous equations with variable coefficients, Cauchy-Euler equations, Laplace transforms, systems of homogeneous linear equations with constant coefficients, systems of non-homogeneous linear equations with constant coefficients, equation order, linear and nonlinear, approximation methods, Taylor series method, The Runge -Kutta method, Partial differential equations, equations of finite differences and more....

Who this book is for

This handy desktop reference is for people in a wide range of jobs that utilize various mathematical analysis tools, or for academic pursuits, including researchers and students. It teaches how to use the most widely used analysis techniques in MATLAB to solve and or graph problems without being burdened with theory.

Table of Contents

Chapter 1: MATLAB Introduction and Working Environment

Chapter 2: Numbers, Operators, Variables, and Functions

Chapter 3: Complex Numbers and Complex Variable Functions

Chapter 4: Graphics in MATLAB Curves, Surfaces, and Volumes

Chapter 5: Limits of Successions and Functions, Continuity, and One and Several Variables Systems

Chapter 6: Numerical Series, Power Series, and Developments in Series

Chapter 7: Derivatives in One and Several Variables

Chapter 8: Integration of One and Several Variables and Applications of Developments in Series

Chapter 9: Differential Equations

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