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Elements of Mathematical Ecology

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with Applications to Biology

Differential Equations

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An Introduction to Differential Equations

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Optimization of Human Cancer Radiotherapy

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for the Life Sciences

First-Order Linear Equations

and Their Applications

Matrices and Linear Systems

Second-Order Linear Equations

and Applications

Systems of First-Order Linear Equations

The Vector Space of a Single Variable: Early

Transcendental Functions

Applied Calculus/Differential Equations

and Mathematical Biology

Computational Mathematics

and Applications

Single Variable Calculus

The Origins of Economic

Growth

Engineering Mathematics

Through Applications

Nonlinear Systems

Calculus - AP Edition

Calculus: Early Transcendental Functions

Proceedings of the International Conference on

Combinatorics, Cryptography, and

Mathematical Sciences

and Their Interactions

Differential Equations

and Boundary Value Problems Nonstandard Finite Difference Models of Differential Equations

This book provides a self-study program on how mathematics, computer science and science can be used usefully and sensitively intertwined. Learning to use ideas from mathematics and

computer science is essential for understanding the applications to cognitive and biological science. As such the book covers calculus on one and two variables and works through a number of

interesting first-order ODE models. It clearly uses Matlab in computational exercises where the models cannot be solved by hand, and also helps readers to understand that approximations cause errors - a fact that must always be kept in mind.

This is a collection of invited and reviewed chapters on state-of-the-art developments in interdisciplinary mathematics. The book discusses recent developments in the fields of

theoretical and applied mathematics, covering areas of interest to mathematicians, scientists, engineers, industrialists, researchers, faculty, and students. Readers will be exposed to topics

chosen from a wide range of areas including differential equations, integral reforms, operational calculus, numerical analysis, fluid mechanics, and computer science. The aim of the book is to

provide brief and reliably expressed research topics that will enable those new or not aware of mathematical sciences in this part of the world.

While the book has not been precisely planned to address any branch of mathematics, it presents contributions of the relevant topics to do so. The topics chosen for the book are those that we have found of significant interest to many researchers in the world. These topics are applied in many fields of theoretical and applied mathematics. This book constitutes the first attempt in jordanian literature to scientifically consider the extensive need of research development at the national and international levels with which mathematics deals. The book grew not only from the international collaboration between the authors but also from the long need for a research-based book from different parts of the world for researchers and professionals working in computational and applied mathematics. This is the modified version of the back-cover text on the print book

Brannan/Boyce's Differential Equations: An Introduction to Modern Methods and Applications, 3rd Edition is consistent with the way engineers and scientists use mathematics in their daily work. The text emphasizes a systems approach to the subject and integrates the use of modern computing technology in the context of contemporary applications from engineering and science. The focus on fundamental skills, careful application of technology, and practice in modeling complex systems prepares students for the realities of the new millennium, providing the building blocks to be successful problem-solvers in today's workplace. Section exercises throughout the text provide hands-on experience in modeling, analysis, and computer experimentation. Projects at the end of each chapter provide additional opportunities for students to explore the role played by differential equations in the sciences and engineering. Diffusion and growth phenomena abound in the real world surrounding us. Some examples: growth of the world's population, growth rates of humans, public interest in news events, growth rates of certain diseases, spread of pollution in the marine environment, spread of agricultural pests. These and many other phenomena are illustrated of typical growth and diffusion problems confronted in many branches of the physical, biological and social sciences as well as in various areas of agriculture, business, education, engineering medicine and public health. The book presents a large number of mathematical models to provide frameworks for analysis and display of many of these. The models developed and utilized with relatively simple exponential, logistic and normal distribution functions. Considerable attention is given to time dependent growth coefficients and carrying capacities. The topics of discrete and distributed time delays, spatial-temporal diffusion and diffusion with reaction are examined. Throughout the book there are a great many numerical. In addition and most importantly, there are more than 50 in-depth 'illustrations' of the application of a particular mathematical model based on real world problems. These examples provide a link with an appreciation of the phenomena involved by the reader mainly in the biological and social sciences. The only mathematical background assumed is elementary calculus. Methods are developed as required, and the reader can thus acquire useful tools for planning, analyzing, designing and evaluating studies of growth transfer and diffusion phenomena. The book draws on the author's own hands-on experience in problems of environmental diffusion and dispersion, as well as in technology transfer and innovation-diffusion.

We dedicate this book to professor C. T. de Wit (1924 - 1993) who initiated Production Ecology as a school of thought at the Wageningen Agricultural University (see Robbenj et al., 1990).

To acknowledge the leading role of C. T. de Wit, a recently formed graduate school at this university in Production Ecology was named after him.

Production Ecology is the study of ecological processes, with special attention to flows of energy and matter as factors that determine the productivity of ecological systems. Agro-ecosystems are a special case of ecosystems which are much more intensively and directly manipulated by humans.

The book is intended as an introductory text on the theory and practice of modeling and simulation in an agro-ecosystem. The book is divided into three parts. Part I focuses on the general biological background of ecological systems and their parameters. Part II is devoted to the application of models to the study of agricultural systems. Part III describes the use of models in the design and planning of agricultural systems. The book is designed to be used as a textbook for students of agriculture, biology, forestry, economics, and ecology.

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Mathematical Models in Biology is an introductory book for readers interested in biological applications of mathematics and modeling in biology. A favorite in the mathematical biology community, this book gives simple mathematical treatments of interesting conclusions, to a vast array of topical applications that covers a wide range of mathematical disciplines, including stochastic models, differential equations, difference equations, linear and nonlinear algebra, and optimization. The book is the result of about 20 years of teaching and collaboration with colleagues who have been interested in the use of mathematics in biology. The book is intended for students of any background and has been used by scientists and students from many different disciplines, including biology, ecology, epidemiology, and medicine.

The book provides a comprehensive introduction to the study of mathematical models in biology, appropriate for students with a wide range of backgrounds. It covers a variety of topics, including population growth, disease spread, and evolutionary processes. The book is accessible to students with a basic understanding of calculus and linear algebra, and it includes numerous examples and exercises to help students develop their skills in mathematical modeling.

The book is written to be used as a textbook for courses in mathematical biology, and it includes a variety of exercises and projects to help students apply the concepts they have learned. It is designed to be used by students in a variety of disciplines, including biology, ecology, epidemiology, and medicine.

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The book provides an extensive overview of the diffusion of Information and Communication Technologies (ICTs) in developing countries between 2000 and 2012. It covers issues such as country-specific ICT diffusion patterns, technological substitution and technological convergence. By identifying social, economic and institutional prerequisites and analyzing critical country-specific conditions, the author develops a new approach to explaining the emergence of their technological takeoff. Readers will discover how developing countries are now adopting ICTs, rapidly catching up with the developed world in terms of ICT access and use.

Designed for the three-semester engineering calculus course.

CALCULUS: EARLY TRANSCENDENTAL FUNCTIONS

Se, continues to offer instructors and students innovative teaching tools.

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improvements comprise ways of delivering radiation to the malignant cies so as to create considerable damage to tumor cells while sparing neighboring normal tissues. There is no unique way of doing this to accept that treatment protocols. Accord ingly, are given. Each preserved a number of options, but none optimization, of radioresection. This book is a collection of key ideas concerned with the optimization of cancer radiation therapy. It is hoped that readers will build on this collection and develop new approaches for the understanding of ways to improve therapy. The author owes a special debt of thanks to Kathy Priddle who breezed through the typing of this book with efficiency and skill. To Dr. Jennifer Correct and Professors Interactions: Introduction to the Theory of Ordinary Differential Equations 1.1. 3 2 Mathematical Models of Tumor Growth 12.1 4 Current Distribution of the Radiation Dose Chapter 2 SURVIVAL CURVES FROM STATISTICAL MODELS 24.2 2 The Target Model 26.2 3 Single-hit-to-kill Model 27.2 4 Multitarget. Single-hit Survival 29.2 5 Multitarget, Multihit Survival 32.6 2 Single-target, Multihit Survival 31.2.

The goal of this book is to search for a balance between simple and analyzable models and unsolvable models which are capable of addressing important questions on population biology. Part I focusses on single species simple models including those which have been used to predict the growth of human and animal population in the past. Single species population models are, in some sense, the most fundamental for the study of ecological and demographic processes including the role of population structure and spatial heterogeneity – the subject of Part III. This book, which will include both examples and exercises, is of use to practitioners, graduate students, and scientists working in the field.

CALCULUS OF A SINGLE VARIABLE: EARLY TRANSCENDENTALS, Sixth Edition, offers students innovative learning resources. Every edition from the first to the sixth edition of CALCULUS: EARLY TRANSCENDENTALS has made the mastery of traditional calculus skills a priority, while embracing the best features of new technology and, when appropriate, calculus reform ideas. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Table of contents

Differential Equations: Techniques, Theory, and Applications is designed for a modern first course in differential equations either one or two semesters in length. The organization of the book interweaves the three components in the subtitle, with each building on and supporting the others. Techniques include not just computational methods for producing solutions to differential equations, but also qualitative methods for extracting conceptual information about differential equations and the systems modeled by them. Theory is developed as a means of organizing, understanding, and codifying general principles. Applications show the usefulness of the subject as a whole and heighten interest in both solution techniques and theory. Formal proofs are included in where they enhance core understanding; otherwise, they are replaced by informal justifications containing key ideas of a proof in a more conversational format. Applications are drawn from a wide variety of fields: those in physical science and engineering are prominent, of course, but models from biology, medicine, ecology, economics, and sports are also featured. 1,400+ exercises are especially compelling. They range from routine calculations to large-scale projects. The more difficult problems, both theoretical and applied, are typically presented in manageable steps. The hundreds of meticulously detailed modeling problems were deliberately designed along pedagogical principles found especially effective in the NAA study Characteristics of Successful Calculus Programs, namely, that asking students to work problems that require (or even compel) them to think about the content, or even generate new ideas for the content, can help develop a more thorough understanding of the content. The inclusion of notes and commentary in these exercises gives students more guidance on how to proceed and what to look for in their work.

This text teaches math in a step-by-step fashion - ideal for students on first-year engineering and pre-degree courses. - Hundreds of examples and exercises, the majority set in an applied engineering context so that you immediately see the purpose of what you are learning. - Introductory chapter revises indices, fractions, decimals, percentages and ratios. - Fully worked solutions to every problem on the companion website at www.paugrave.com/engineering/singh plus searchable glossary, e-index, extra exercises, extra content and more! - Explains the relevance and importance of mathematical modelling for a non-academic audience.

Elements of Mathematical Ecology provides an introduction to classical and modern mathematical models, methods, and issues in population ecology. The first part of the book is devoted to simple, structured population models, that ignores the great variability found in the real world. The second part of the book will be divided into three major sections: population model, population model, and population model. In each section, the author will present the main concepts and results in the theory of population model, population model, and population model. The third part of the book will be devoted to structured population models, that covers spatially-structured population models (with a focus on reaction-diffusion models), age-structured models, and spatially-structured models.

Based on a translation of the 6th edition of Gewöhnliche Differentialgleichungen by Wolfgang Walter, this edition includes additional treatments of important subjects not found in the German text as well as material that is seldom found in textbooks, such as new proofs for basic theorems. This unique feature of the book leads to a closer look at central concepts and methods with an emphasis on subjects outside the mainstream. Exercises, which range from routine to demanding, are dispersed throughout the text and include an outline of the solutions. Applications from mechanical to mathematical biology are included and solutions of selected exercises are found at the end of the book. It is suitable for mathematics, physics, and computer science graduate students to use as collateral reading and as a reference source for mathematicians. Readers should have a sound knowledge of infinitesimal calculus and be familiar with basic notions from linear algebra; functional analysis is developed in the text when needed.

Unlike most texts in differential equations, this textbook gives an early presentation of the Laplace transform, which is then used to motivate and develop many of the remaining differential equation concepts for which it is particularly well suited. For example, the standard solution methods for constant coefficient linear differential equations are immediate and simplified, and solutions depend on the characteristic polynomial, not the coefficients in the text.

The text also includes proofs of several important theorems that are not usually given in introductory texts. These include a proof of the inductivity of the Laplace transform and a proof of the existence and uniqueness theorem for linear constant differential equations. Along with its unique traits, this text contains all the topics needed for a one-semester course in applied differential equations. It is suitable for students majoring in science or engineering. These topics include: first order differential equations, general linear differential equations with constant coefficients, second order linear differential equations with variable coefficients, power series methods, and linear systems of differential equations. It is assumed that the reader has had the equivalent of a one-semester course in college calculus.

James Stewart's CALCULUS texts are widely renowned for their mathematical precision and accuracy, clariﬁcation of exposition, and outstanding examples and problem sets. Millions of students worldwide have explored calculus through Stewart's approach, which emphasizes conceptual understanding, mathematical reasoning, and technical skills. Stewart CALCULUS, Stuart's second edition to the standard for the course while adding carefully revised content. The patient explanations, superb exercises, focus on problem solving, and carefully graded problem sets that have made Stewart's texts best-sellers continue to provide a strong foundation for the Seventh Edition. From the most unprepared student to the most mathematically gifted, Stewart's writing and presentation serve to enhance understanding and build conﬁdence. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

A Course in Differential Equations with Boundary Value Problems, 2nd Edition adds additional content to the author's successful A Course on Ordinary Differential Equations, 2nd Edition. This text addresses the need when the course is expanded. The focus of the text is on applications and methods of solution, both analytical and computational, with emphasis on methods used in the typical engineering, physics, or mathematics student's field of study. The text provides sufficient proof problems so that even the pure math major will be sufficiently challenged. The authors offer a very ﬂexible approach, making it easy to cover a variety of topics. The text can be used in a traditional course on partial differential equations, or as a special topics course. It can also be used in a mathematical modeling course. It has a modern emphasis on subjects outside the mainstream. Applications show the usefulness of the subject as a whole and heighten interest in both solution techniques and theory. Formal proofs are included in cases where they enhance core understanding; otherwise, they are replaced by informal justifications containing key ideas of a proof in a more conversational format. Applications are drawn from a wide variety of fields: those in physical science and engineering are prominent, of course, but models from biology, medicine, ecology, economics, and sports are also featured. 1,400+ exercises are especially compelling. They range from routine calculations to large-scale projects. The more difﬁcult problems, both theoretical and applied, are typically presented in manageable steps. The hundreds of meticulously detailed modeling problems were deliberately designed along pedagogical principles found especially effective in the NAA study Characteristics of Successful Calculus Programs, namely, that asking students to work problems that require (or even compel) them to think about the content, or even generate new ideas for the content, can help develop a more thorough understanding of the content. The inclusion of notes and commentary in these exercises gives students more guidance on how to proceed and what to look for in their work.

This book provides a clear summary of the work of numerous scientists for the numerical integration of differential equations. The conclusion of the book is to show that discrete models of differential equations exist such that the elementary types of numerical instabilities do not occur. A consequence of this result is that in general bigger step-sizes can often be used in actual calculations and/or finite difference schemes can be constructed that are conditionally stable in many instances whereas in using standard schemes to such schemes exist. The theoretical basis of this work is centered on the concepts of 'exact' and 'best' finite difference schemes. In addition, a set of rules is given for the discrete model of derivatives and nonlinear expressions that occur in differential equations. These rules often lead to a unique nonstandard finite difference model for a given differential equation.

During the past three decades, the development of nonlinear analysis, dynamical systems and their applications to science and engineering has stimulated renewed enthusiasm for the theory of Ordinary Differential Equations (ODE). Useful book, which is based around the lecture notes of a well-received graduate course, emphasizes both theory and applications, taking numerous examples from physics and biology to illustrate the application of ODE theory and techniques. Written in a straightforward and readily accessible style, this volume presents dynamical systems in the spirit of nonlinear analysis to readers at a graduate level and serves both as a textbook or as a valuable resource for researchers.

Deeper understanding of biological phenomena Suitable for courses on differential equations with applications to mathematical biology or an introduction to mathematics, Biology and Mathematical Equations introduces students in the physical, mathematical, and biological sciences to fundamental
This text for the one semester applied or business calculus course uses intriguing real-world applications to engage students' interest and show them the practical side of calculus. The book's many applications are related to finance, business, and such general-interest topics as learning curves in airplane production, the age of the Dead Sea Scrolls, and the distance traveled by sports cars, lives saved by seat belts, and the cost of a congressional victory. The Sixth Edition maintains the hallmark features that have made APPLIED CALCULUS so popular: contemporary and interesting applications (including many that are new or updated), careful and effective use of technology, including graphing calculator and spreadsheet coverage; constant pedagogical reinforcement through section summaries, chapter summaries, annotated examples, and extra practice problems; a self-contained Time-algebra review material; and a variety of exercises and assignment options including Applied Exercises, Conceptual Exercises, and Explorations and Excursions. This edition also includes new content and features to help students get up to speed and succeed in the course, including a Diagnostic Test, an Algebra Review appendix, marginal notes that make connections with previous or future discussions, new learning prompts to direct students to examples or to the Algebra Review, and more. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Volume 1: Deterministic Modeling, Methods and Analysis. For more than half a century, stochastic calculus and stochastic differential equations have played a major role in analyzing the dynamic phenomena in the biological and physical sciences. As well as engineering. the advancement of knowledge in stochastic differential equations is spreading rapidly across the graduate and postgraduate programs in universities around the globe. This will be the first available book that can be used in any undergraduate/graduate stochastic modeling/applied mathematics courses and that can be used by an interdisciplinary researcher with a minimal academic background. An Introduction to Deterministic Equations: Volume 2 is a stochastic version of Volume 1 “An Introduction to Differential Equations: Deterministic Modeling, Methods and Analysis.” Both books have a similar design, but naturally, differ by calculus. Again, both volumes use an innovative style in the presentation of the topics, methods and concepts with adequate preparation in deterministic Calculus. Errata Errata (32 KB)

This proceedings volume consists of refereed papers presented at the Second International Conference on Computing, Mathematics and Statistics (ICMS 2015) held in Langkawi, Malaysia in November 2015. Divided into three sections - Computer Science, Mathematics and Statistics - the book includes both quantitative and qualitative research that confronts current societal issues. Within the main sections, the book also covers education based research works and the applications of computer and mathematical sciences in social science, business, industries and the life and hard sciences. Drawing on the theme Bridging Research Endeavor on Computing, Mathematics and Statistics, each of the conference papers are carefully selected and edited to cater to readers from diverse applied and social sciences backgrounds. The book allows for the contemplation and reflection on the possibility of the knowledge growth and knowledge sharing in building a better world for future generations.

Here is a textbook of intuitive calculus. The material is presented in a concrete setting with many examples and problems chosen from the social, physical, behavioural and life sciences. Chapters include core material and more advanced optional sections. The book begins with a review of algebra and graphing.

This text for the one- or two-semester applied or business calculus course uses intriguing real-world applications to engage students' interest and show them the practical side of calculus. The book's many applications are related to finance, business, and such general-interest topics as learning curves in airplane production, the age of the Dead Sea Scrolls, Apple and Oracle stock prices, the distance traveled by sports cars, lives saved by seat belts, and the cost of a congressional victory. The Seventh Edition maintains the hallmark features that have made APPLIED CALCULUS so popular: contemporary and interesting applications (including many that are new or updated); careful and effective use of technology, including graphing calculator and spreadsheet coverage; constant pedagogical reinforcement through section summaries, chapter summaries, annotated examples, and extra practice problems; a self-contained Time-algebra review material; and a variety of exercises and assignment options including Applied Exercises, Conceptual Exercises, and Explorations and Excursions. This edition also includes new content and features to help students get up to speed and succeed in the course, including a Diagnostic Test, an Algebra Review appendix, marginal notes that make connections with previous or future discussions, new learning prompts to direct students to examples or to the Algebra Review, and more. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Exploring roles critical to environmental toxicology, Modeling and Simulation in Ecotoxicology with Applications in MATLAB® and Simulink® covers the steps in modeling and simulation from problem conception to validation and simulation analysis. Using the MATLAB® and Simulink® programming languages, the book presents examples of mathematical functions and simulations, with special emphasis on how to develop mathematical models and run computer simulations of ecotoxicological processes. Designed for students and professionals with little or no experience in modeling, the book includes: General principles of modeling and simulation and an introduction to MATLAB® and Simulink® Stochastic modeling where variability and uncertainty are acknowledged by making parameters random variables. Toxicological processes from the level of the individual organism, with worked examples of process models in either MATLAB® or Simulink®. Toxicological processes at the level of populations, communities, and ecosystems. Parameter estimation using least-squares regression methods. The design of simulation experiments similar to the experimental design applied to laboratory or field experiments. Methods of postsimulation analysis, including stability analysis and sensitivity analysis. Different levels of model validation and how they are related to the modeling purpose. The book also provides three individual case studies. The first involves a model developed to assess the relative risk of mortality following exposure to insecticides in different avian species. The second explores the role of diving behavior on the inhalation and distribution of oil spill naphthalene in bottlenose dolphins. The final case study looks at the dynamics of mercury in Daphnia that are exposed to simulated thermal plumes from a hypothetical power plant cooling system. Presented in a rigorous yet accessible style, the methodology is versatile enough to be readily applicable not only to environmental toxicology but a range of other biological fields.

This book provides a systematic, rigorous and self-contained treatment of positive dynamical systems. A dynamical system is positive when all relevant variables of a system are nonnegative in a natural way. This is in biology, demography or economics, where the levels of populations or prices of goods are positive. The principle also finds application in electrical engineering, physics and computer sciences. "The author has greatly expanded the field of positive systems in surprising ways." - Prof. Dr. David G. Luenberger, Stanford University(USA)

James Stewart's CALCULUS texts are widely renowned for their mathematical precision and accuracy, clarity of exposition, and outstanding examples and problem sets. Millions of students worldwide have explored calculus through Stewart's trademark style, while instructors have turned to his approach time and time again. In the Eighth Edition of CALCULUS, Stewart continues to set the standard for the course while adding carefully revised content. The patient explanations, superb exercises, focus on problem solving, and carefully graded problem sets that have made Stewart's texts best-sellers continue to provide a strong foundation for the Eighth Edition. From the most unprepared student to the most mathematically gifted, Stewart's writing and presentation serve to enhance understanding and build confidence. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Applied Delay Differential Equations is a friendly introduction to the fast-growing field of time-delay differential equations. Written to a multidisciplinary audience, it sets each area of science in his historical context and then guides the reader towards questions of current interest.

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