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The most crucial ability for machine learning and data science is mathematical logic for grasping their essence rather than relying on knowledge or experience. This textbook addresses the fundamentals of kernel methods for machine learning by considering relevant math problems and building Python programs. The book's main features are as follows: The content is written in an easy-to-follow and self-contained style. The book includes 100 exercises, which have been carefully selected and refined. As their solutions are provided in the main text, readers can solve all of the exercises by reading the book. The mathematical premises of kernels are proven and the correct conclusions are provided, helping readers to understand the nature of kernels. Source programs and running examples are presented to help readers acquire a deeper understanding of the mathematics used. Once readers have a basic understanding of the functional analysis topics covered in Chapter 2, the applications are discussed in the subsequent chapters. Here, no prior knowledge of mathematics is assumed. This book considers both the kernel for reproducing kernel Hilbert space (RKHS) and the kernel for the Gaussian process; a clear distinction is made between the two. With examples and activities that help you achieve real results, applying calculus and statistical methods relevant to advanced data science has never been so easy

Key Features

- Discover how most programmers use the main Python libraries when performing statistics with Python
- Use descriptive statistics and visualizations to answer business and scientific questions
- Solve complicated calculus problems, such as arc length and solids of revolution using derivatives and integrals

Book Description

Are you looking to start developing artificial intelligence applications? Do you need a refresher on key mathematical concepts? Full of engaging practical exercises, *The Statistics and Calculus with Python Workshop* will show you how to apply your understanding of advanced mathematics in the context of Python. The book begins by giving you a high-level overview of the libraries you'll use while performing statistics with Python. As you progress, you'll perform various mathematical tasks using the Python programming language, such as solving algebraic functions with Python starting with basic functions, and then working through transformations and solving equations. Later chapters in the book will cover statistics and calculus concepts and how to use them to solve problems and gain useful insights. Finally, you'll study differential equations with an emphasis on numerical methods and learn about algorithms that directly calculate values of functions. By the end of this book, you'll have learned how to apply essential statistics and calculus concepts to develop robust Python applications that solve business challenges. What you will learn

- Get to grips with the fundamental mathematical functions in Python
- Perform calculations on tabular datasets using pandas
- Understand the differences between polynomials, rational functions, exponential functions, and trigonometric functions
- Use algebra techniques for solving systems of equations
- Solve real-world problems with probability
- Solve optimization problems with derivatives and integrals

Who this book is for

If you are a Python programmer who wants to develop intelligent solutions that solve challenging business problems, then this book is for you. To better grasp the concepts explained in this book, you must have a thorough understanding of advanced mathematical concepts, such as Markov chains, Euler's formula, and Runge-Kutta methods as the book only explains how these techniques and concepts can be implemented in Python. *Doing Math with Python* shows you how to use Python to delve into high school-level math topics like statistics, geometry, probability, and calculus. You'll start with simple projects, like a factoring program and a quadratic-equation solver, and then create more complex projects once you've gotten the hang of things. Along the way, you'll discover new ways to explore math and gain valuable programming skills that you'll use throughout your study of math and computer science.

Learn how to:

- Describe your data with statistics, and visualize it with line graphs, bar charts, and scatter plots
- Explore set theory and probability with programs for coin flips, dicing, and other games of chance
- Solve algebra problems using Python's symbolic math functions
- Draw geometric shapes and explore fractals like the Barnsley fern, the Sierpinski triangle, and the Mandelbrot set
- Write programs to find derivatives and integrate functions

Creative coding challenges and applied examples help you see how you can put your new math and coding skills into practice. You'll write an inequality

solver, plot gravity's effect on how far a bullet will travel, shuffle a deck of cards, estimate the area of a circle by throwing 100,000 "darts" at a board, explore the relationship between the Fibonacci sequence and the golden ratio, and more. Whether you're interested in math but have yet to dip into programming or you're a teacher looking to bring programming into the classroom, you'll find that Python makes programming easy and practical. Let Python handle the grunt work while you focus on the math.

Uses Python 3 This book presents computer programming as a key method for solving mathematical problems. There are two versions of the book, one for MATLAB and one for Python. The book was inspired by the Springer book TCSE 6: A Primer on Scientific Programming with Python (by Langtangen), but the style is more accessible and concise, in keeping with the needs of engineering students. The book outlines the shortest possible path from no previous experience with programming to a set of skills that allows the students to write simple programs for solving common mathematical problems with numerical methods in engineering and science courses. The emphasis is on generic algorithms, clean design of programs, use of functions, and automatic tests for verification. This open access book offers an initial introduction to programming for scientific and computational applications using the Python programming language. The presentation style is compact and example-based, making it suitable for students and researchers with little or no prior experience in programming. The book uses relevant examples from mathematics and the natural sciences to present programming as a practical toolbox that can quickly enable readers to write their own programs for data processing and mathematical modeling. These tools include file reading, plotting, simple text analysis, and using NumPy for numerical computations, which are fundamental building blocks of all programs in data science and computational science. At the same time, readers are introduced to the fundamental concepts of programming, including variables, functions, loops, classes, and object-oriented programming. Accordingly, the book provides a sound basis for further computer science and programming studies. With examples and activities that help you achieve real results, applying calculus and statistical methods relevant to advanced data science has never been so easy

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Book Description Are you looking to start developing artificial intelligence applications? Do you need a refresher on key mathematical concepts? Full of engaging practical exercises, The Statistics and Calculus with Python Workshop will show you how to apply your understanding of advanced mathematics in the context of Python. The book begins by giving you a high-level overview of the libraries you'll use while performing statistics with Python. As you progress, you'll perform various mathematical tasks using the Python programming language, such as solving algebraic functions with Python starting with basic functions, and then working through transformations and solving equations. Later chapters in the book will cover statistics and calculus concepts and how to use them to solve problems and gain useful insights. Finally, you'll study differential equations with an emphasis on numerical methods and learn about algorithms that directly calculate values of functions. By the end of this book, you'll have learned how to apply essential statistics and calculus concepts to develop robust Python applications that solve business challenges. What you will learn

Get to grips with the fundamental mathematical functions in Python Perform calculations on tabular datasets using pandas Understand the differences between polynomials, rational functions, exponential functions, and trigonometric functions Use algebra techniques for solving systems of equations Solve real-world problems with probability Solve optimization problems with derivatives and integrals

Who this book is for If you are a Python programmer who wants to develop intelligent solutions that solve challenging business problems, then this book is for you. To better grasp the concepts explained in this book, you must have a thorough understanding of advanced mathematical concepts, such as Markov chains, Euler's formula, and Runge-Kutta methods as the book only explains how these techniques and concepts can be implemented in Python. Learning to code is an attractive option for many parents and elementary-aged students. Most simple computer programs, however, rely on math concepts that are not yet part of a typical, elementary school curriculum. This text solves that problem by presenting math concepts selected for their importance to computer science in a way that is accessible to a younger audience through: visual models and worked examples; thoughtfully sequenced, scaffolded practice problems; written introductions, illustrations and word problems that provide real-world context; coding examples and projects written in Python; coding challenges and extensions; solutions to all practice problems, comprehension questions and selected challenges. While many math and computer science courses equip students to complete problems by rote and copy an instructor's code, this curriculum is aimed toward facilitating the meaningful learning necessary for students to solve problems and produce original work. Note: it is recommended that students are reading at a third grade level and familiar with whole-number addition, subtraction, multiplication and division.

Introduction to the Python computer language for mathematicians and scientists. Topics in scientific computation drawn from statistics, machine learning, mathematics, geometry, and the sciences. Target audience: students with calculus and linear algebra but no previous programming background. Includes over 300 exercises and projects for students. The most crucial ability for machine learning and data science is mathematical logic for grasping their essence rather than knowledge and experience. This textbook approaches the essence of sparse estimation by considering math problems and building R programs. Each chapter introduces the notion of sparsity and provides procedures followed by mathematical derivations and source programs with examples of execution. To maximize readers' insights into sparsity, mathematical proofs are presented for almost all propositions, and programs are described without depending on any packages. The book is carefully organized to provide the solutions to the exercises in each chapter so that readers can solve the total of 100 exercises by simply following the contents of each chapter. This textbook is suitable for an undergraduate or graduate course consisting of about 15 lectures (90 mins each). Written in an easy-to-follow and self-contained style, this

book will also be perfect material for independent learning by data scientists, machine learning engineers, and researchers interested in linear regression, generalized linear lasso, group lasso, fused lasso, graphical models, matrix decomposition, and multivariate analysis. This book is one of a series of textbooks in machine learning by the same author. Other titles are: - Statistical Learning with Math and R (<https://www.springer.com/gp/book/9789811575679>) - Statistical Learning with Math and Python (<https://www.springer.com/gp/book/9789811578762>) - Sparse Estimation with Math and Python

Discover easy-to-follow solutions and techniques to help you to implement applied mathematical concepts such as probability, calculus, and equations using Python's numeric and scientific libraries

Key Features

- Compute complex mathematical problems using programming logic with the help of step-by-step recipes
- Learn how to utilize Python's libraries for computation, mathematical modeling, and statistics
- Discover simple yet effective techniques for solving mathematical equations and apply them in real-world statistics

Book Description

Python, one of the world's most popular programming languages, has a number of powerful packages to help you tackle complex mathematical problems in a simple and efficient way. These core capabilities help programmers pave the way for building exciting applications in various domains, such as machine learning and data science, using knowledge in the computational mathematics domain. The book teaches you how to solve problems faced in a wide variety of mathematical fields, including calculus, probability, statistics and data science, graph theory, optimization, and geometry. You'll start by developing core skills and learning about packages covered in Python's scientific stack, including NumPy, SciPy, and Matplotlib. As you advance, you'll get to grips with more advanced topics of calculus, probability, and networks (graph theory). After you gain a solid understanding of these topics, you'll discover Python's applications in data science and statistics, forecasting, geometry, and optimization. The final chapters will take you through a collection of miscellaneous problems, including working with specific data formats and accelerating code. By the end of this book, you'll have an arsenal of practical coding solutions that can be used and modified to solve a wide range of practical problems in computational mathematics and data science. What you will learn

- Get familiar with basic packages, tools, and libraries in Python for solving mathematical problems
- Explore various techniques that will help you to solve computational mathematical problems
- Understand the core concepts of applied mathematics and how you can apply them in computer science
- Discover how to choose the most suitable package, tool, or technique to solve a certain problem
- Implement basic mathematical plotting, change plot styles, and add labels to the plots using Matplotlib
- Get to grips with probability theory with the Bayesian inference and Markov Chain Monte Carlo (MCMC) methods

Who this book is for

This book is for professional programmers and students looking to solve mathematical problems computationally using Python. Advanced mathematics knowledge is not a requirement, but a basic knowledge of mathematics will help you to get the most out of this book. The book assumes familiarity with Python concepts of data structures. Demonstrates the programming language's strength as a Web development tool, covering syntax, data types, built-ins, the Python standard module library, and real world examples. Python is the ideal language to learn programming. It is a powerful language that will immerse you in the world of algorithms. This book guides you step by step through original mathematical and computer activities adapted to high school. It is complemented by online resources: all the Python codes and colourful chapters. You have everything you need to succeed!

- * Hello world!
- * Turtle (Scratch with Python)
- * If ... then ...
- * Functions
- * Arithmetic - While loop - I
- * Strings - Analysis of a text
- * Lists I
- * Statistics - Data visualization
- * Files
- * Arithmetic - While loop - II
- * Binary I
- * Lists II
- * Binary II
- * Probabilities - Parrondo's paradox
- * Find and replace
- * Polish calculator
- Stacks
- * Text viewer
- Markdown
- * L-systems
- * Dynamic images
- * Game of life
- * Ramsey graphs and combinatorics
- * Bitcoin
- * Random blocks
- * Using a novel integration of mathematics and Python codes, this book illustrates the fundamental concepts that link probability, statistics, and machine learning, so that the reader can not only employ statistical and machine learning models using modern Python modules, but also understand their relative strengths and weaknesses. To clearly connect theoretical concepts to practical implementations, the author provides many worked-out examples along with "Programming Tips" that encourage the reader to write quality Python code. The entire text, including all the figures and numerical results, is reproducible using the Python codes provided, thus enabling readers to follow along by experimenting with the same code on their own computers. Modern Python modules like Pandas, Sympy, Scikit-learn, Statsmodels, Scipy, Xarray, Tensorflow, and Keras are used to implement and visualize important machine learning concepts like the bias/variance trade-off, cross-validation, interpretability, and regularization. Many abstract mathematical ideas, such as modes of convergence in probability, are explained and illustrated with concrete numerical examples. This book is suitable for anyone with undergraduate-level experience with probability, statistics, or machine learning and with rudimentary knowledge of Python programming. Doing Math with Python shows you how to use Python to delve into high school-level math topics like statistics, geometry, probability, and calculus. You'll start with simple projects, like a factoring program and a quadratic-equation solver, and then create more complex projects once you've gotten the hang of things. Along the way, you'll discover new ways to explore math and gain valuable programming skills that you'll use throughout your study of math and computer science. Learn how to:

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classroom, you'll find that Python makes programming easy and practical. Let Python handle the grunt work while you focus on the math. Uses Python 3 A unique approach to mathematical logic where students implement the underlying concepts and proofs in the Python programming language. Corrected and revised with additional material. Computers are wonderful things. They improve our lives and produce works of art. Information and communication are free and available in ways that were undreamed of by many a generation ago. And yet computers inspire fear when they are used improperly or misunderstood. Everyone uses computers today. The typical student uses at least three: a portable notebook computer, a tablet, and a cell phone. None of these even existed before this year's college graduating class was born. So a reasonable amount of computer literacy is expected of everyone these days. Though inspired by mathematics, much of the mathematical beauty of computation is largely ignored by both elementary computer science and introductory programming books. This book is designed to help math junkies - anyone who likes math, studies math, or uses math in their daily life - learn about computation. The emphasis is on algorithms. It is appropriate for students with no prior programming experience as well as professional scientists. Contents: Python programs, iPython notebooks, expressions, statements, types, lists, arrays, functions, classes, plotting, list comprehension, recursion. Applications include linear systems, computational geometry, root finding, interpolation, polynomial least squares, discrete systems, differential equations, principal component analysis, singular value decomposition, fractals, chaos, and satellite orbit propagation. Also covers numpy, plotting with pyplot, and basics maps with basemap. Now includes more than 200 exercises for students. Target audience: undergraduate math and science students entering their upper level curriculum. Calculus and some linear algebra background is helpful; a review of linear algebra is included as an appendix. No prior programming experience is expected A new kind of math book! Explore math topics from arithmetic to calculus by creating your own graphing and solving tools using Python. Create 2D and 3D graphics, harmonograph and spirograph designs, and fractals in this interactive and visual exploration of mathematics. "A great resource to play with Math and Python via the turtle module, solving equations numerically and 3D graphics via Pi3D." - Amit Saha, author of Doing Math With Python Imagine learning math and Python programming at the same time! You'll learn to use loops, variables, functions, conditionals and lists and apply them to all your math problems. No previous computer experience is required. This book is designed for middle school students and new programming language learners. Computer science has continuously escalated in popularity over the last decade, as students are increasingly showing interest in coding at a young age. In this book you will find a total of 150 math questions, ranging in difficulty from beginner to advanced, with accompanying Python programming language solutions. Python is one of the most popular coding languages and is comparatively easy to learn. With this book, students will be able to increase their proficiency in coding and math computing. This book can be used as a reference for math and computer science teachers for interdisciplinary purposes and will help students improve their skills and critical thinking. This practically-focused study guide introduces the fundamentals of discrete mathematics through an extensive set of classroom-tested problems. Each chapter presents a concise introduction to the relevant theory, followed by a detailed account of common challenges and methods for overcoming these. The reader is then encouraged to practice solving such problems for themselves, by tackling a varied selection of questions and assignments of different levels of complexity. This updated second edition now covers the design and analysis of algorithms using Python, and features more than 50 new problems, complete with solutions. Topics and features: provides a substantial collection of problems and examples of varying levels of difficulty, suitable for both laboratory practical training and self-study; offers detailed solutions to each problem, applying commonly-used methods and computational schemes; introduces the fundamentals of mathematical logic, the theory of algorithms, Boolean algebra, graph theory, sets, relations, functions, and combinatorics; presents more advanced material on the design and analysis of algorithms, including Turing machines, asymptotic analysis, and parallel algorithms; includes reference lists of trigonometric and finite summation formulae in an appendix, together with basic rules for differential and integral calculus. This hands-on workbook is an invaluable resource for undergraduate students of computer science, informatics, and electronic engineering. Suitable for use in a one- or two-semester course on discrete mathematics, the text emphasizes the skills required to develop and implement an algorithm in a specific programming language. Learn math by getting creative with code! Use the Python programming language to transform learning high school-level math topics like algebra, geometry, trigonometry, and calculus! Math Adventures with Python will show you how to harness the power of programming to keep math relevant and fun. With the aid of the Python programming language, you'll learn how to visualize solutions to a range of math problems as you use code to explore key mathematical concepts like algebra, trigonometry, matrices, and cellular automata. Once you've learned the programming basics like loops and variables, you'll write your own programs to solve equations quickly, make cool things like an interactive rainbow grid, and automate tedious tasks like factoring numbers and finding square roots. You'll learn how to write functions to draw and manipulate shapes, create oscillating sine waves, and solve equations graphically. You'll also learn how to: - Draw and transform 2D and 3D graphics with matrices - Make colorful designs like the Mandelbrot and Julia sets with complex numbers - Use recursion to create fractals like the Koch snowflake and the Sierpinski triangle - Generate virtual sheep that graze on grass and multiply autonomously - Crack secret codes using genetic algorithms As you work through the book's numerous examples and increasingly challenging exercises, you'll code your own solutions, create beautiful visualizations, and see just how much more fun math can be! A practical guide simplifying discrete math for curious minds and demonstrating its application in solving problems related to software development, computer algorithms, and data science Key FeaturesApply the math of countable objects to practical problems in computer scienceExplore modern Python libraries such as scikit-learn, NumPy, and SciPy for performing mathematicsLearn complex statistical and mathematical concepts with the help of hands-on examples and expert guidanceBook Description Discrete mathematics deals

with studying countable, distinct elements, and its principles are widely used in building algorithms for computer science and data science. The knowledge of discrete math concepts will help you understand the algorithms, binary, and general mathematics that sit at the core of data-driven tasks. Practical Discrete Mathematics is a comprehensive introduction for those who are new to the mathematics of countable objects. This book will help you get up to speed with using discrete math principles to take your computer science skills to a more advanced level. As you learn the language of discrete mathematics, you'll also cover methods crucial to studying and describing computer science and machine learning objects and algorithms. The chapters that follow will guide you through how memory and CPUs work. In addition to this, you'll understand how to analyze data for useful patterns, before finally exploring how to apply math concepts in network routing, web searching, and data science. By the end of this book, you'll have a deeper understanding of discrete math and its applications in computer science, and be ready to work on real-world algorithm development and machine learning. What you will learn

Understand the terminology and methods in discrete math and their usage in algorithms and data problems
Use Boolean algebra in formal logic and elementary control structures
Implement combinatorics to measure computational complexity and manage memory allocation
Use random variables, calculate descriptive statistics, and find average-case computational complexity
Solve graph problems involved in routing, pathfinding, and graph searches, such as depth-first search
Perform ML tasks such as data visualization, regression, and dimensionality reduction

Who this book is for This book is for computer scientists looking to expand their knowledge of discrete math, the core topic of their field. University students looking to get hands-on with computer science, mathematics, statistics, engineering, or related disciplines will also find this book useful. Basic Python programming skills and knowledge of elementary real-number algebra are required to get started with this book. This book teaches algebra and geometry. The authors dedicate chapters to the key issues of matrices, linear equations, matrix algorithms, vector spaces, lines, planes, second-order curves, and elliptic curves. The text is supported throughout with problems, and the authors have included source code in Python in the book. The book is suitable for advanced undergraduate and graduate students in computer science.

Never HIGHLIGHT a Book Again Includes all testable terms, concepts, persons, places, and events. Cram101 Just the FACTS101 studyguides gives all of the outlines, highlights, and quizzes for your textbook with optional online comprehensive practice tests. Only Cram101 is Textbook Specific. Accompanies: 9780982477540. This item is printed on demand. Get complete instructions for manipulating, processing, cleaning, and crunching datasets in Python. Updated for Python 3.6, the second edition of this hands-on guide is packed with practical case studies that show you how to solve a broad set of data analysis problems effectively. You'll learn the latest versions of pandas, NumPy, IPython, and Jupyter in the process. Written by Wes McKinney, the creator of the Python pandas project, this book is a practical, modern introduction to data science tools in Python. It's ideal for analysts new to Python and for Python programmers new to data science and scientific computing. Data files and related material are available on GitHub. Use the IPython shell and Jupyter notebook for exploratory computing

Learn basic and advanced features in NumPy (Numerical Python)
Get started with data analysis tools in the pandas library
Use flexible tools to load, clean, transform, merge, and reshape data
Create informative visualizations with matplotlib
Apply the pandas groupby facility to slice, dice, and summarize datasets
Analyze and manipulate regular and irregular time series data
Learn how to solve real-world data analysis problems with thorough, detailed examples

In Math for Programmers you'll explore important mathematical concepts through hands-on coding. Filled with graphics and more than 300 exercises and mini-projects, this book unlocks the door to interesting—and lucrative!—careers in some of today's hottest fields. As you tackle the basics of linear algebra, calculus, and machine learning, you'll master the key Python libraries used to turn them into real-world software applications. Summary To score a job in data science, machine learning, computer graphics, and cryptography, you need to bring strong math skills to the party. Math for Programmers teaches the math you need for these hot careers, concentrating on what you need to know as a developer. Filled with lots of helpful graphics and more than 200 exercises and mini-projects, this book unlocks the door to interesting—and lucrative!—careers in some of today's hottest programming fields. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the technology Skip the mathematical jargon: This one-of-a-kind book uses Python to teach the math you need to build games, simulations, 3D graphics, and machine learning algorithms. Discover how algebra and calculus come alive when you see them in code!

About the book In Math for Programmers you'll explore important mathematical concepts through hands-on coding. Filled with graphics and more than 300 exercises and mini-projects, this book unlocks the door to interesting—and lucrative!—careers in some of today's hottest fields. As you tackle the basics of linear algebra, calculus, and machine learning, you'll master the key Python libraries used to turn them into real-world software applications. What's inside Vector geometry for computer graphics
Matrices and linear transformations
Core concepts from calculus
Simulation and optimization
Image and audio processing
Machine learning algorithms for regression and classification

About the reader For programmers with basic skills in algebra. About the author Paul Orland is a programmer, software entrepreneur, and math enthusiast. He is co-founder of Tachyus, a start-up building predictive analytics software for the energy industry. You can find him online at www.paulor.land. Table of Contents 1 Learning math with code PART I - VECTORS AND GRAPHICS 2 Drawing with 2D vectors 3 Ascending to the 3D world 4 Transforming vectors and graphics 5 Computing transformations with matrices 6 Generalizing to higher dimensions 7 Solving systems of linear equations PART 2 - CALCULUS AND PHYSICAL SIMULATION 8 Understanding rates of change 9 Simulating moving objects 10 Working with symbolic expressions 11 Simulating force fields 12 Optimizing a physical system 13 Analyzing sound waves with a Fourier series PART 3 - MACHINE LEARNING APPLICATIONS 14 Fitting functions to data 15 Classifying data with logistic regression 16 Training neural networks "We have developed 120 Python programs and more than 110 illustrations in a work that will

be useful both to students of science of the first university science courses, as well as high school students and teachers, and to anyone interested in Python programming intending to acquire new tools to expose mathematical concepts in a didactic and modern fashion ... The book begins with a detailed introduction to Python, followed by ten chapters of mathematics with its corresponding Python programs, results and graphs."--Cover. Introduce children to the popular Python programming language through relatable examples and fun projects! Python has now surpassed Java as the most commonly used programming language. As the language rises in popularity, this complete guide can teach basic Python concepts to kids with its simple, friendly format. Bite-Size Python: An Introduction to Python Programming provides children with a foundation in the Python language. This unique book shares knowledge through easy-to-understand examples, fast exercises, and fun projects! As children learn, their parents, caregivers, and instructors can also join in their discoveries. Bite-Size Python is ideal for those who are new to programming, giving kids ages 9 and up a beginners' approach to learning one of the most important programming languages. Gives an overview of Python Provides exciting programming projects Offers instruction on how to download and install Python Presents key programming language concepts Simplifies technical definitions With this playful guide to learning Python, readers can try out activities on their computers for a hands-on learning experience. The artwork in Bite-Size Python represents children of various backgrounds, so any child who picks up this book will be empowered to learn and young readers will love showing their projects to friends and family! The fundamental mathematical tools needed to understand machine learning include linear algebra, analytic geometry, matrix decompositions, vector calculus, optimization, probability and statistics. These topics are traditionally taught in disparate courses, making it hard for data science or computer science students, or professionals, to efficiently learn the mathematics. This self-contained textbook bridges the gap between mathematical and machine learning texts, introducing the mathematical concepts with a minimum of prerequisites. It uses these concepts to derive four central machine learning methods: linear regression, principal component analysis, Gaussian mixture models and support vector machines. For students and others with a mathematical background, these derivations provide a starting point to machine learning texts. For those learning the mathematics for the first time, the methods help build intuition and practical experience with applying mathematical concepts. Every chapter includes worked examples and exercises to test understanding. Programming tutorials are offered on the book's web site. Discover the art and science of solving artificial intelligence problems with Python using optimization modeling. This book covers the practical creation and analysis of mathematical algebraic models such as linear continuous models, non-obviously linear continuous models, and pure linear integer models. Rather than focus on theory, Practical Python AI Projects, the product of the author's decades of industry teaching and consulting, stresses the model creation aspect; contrasting alternate approaches and practical variations. Each model is explained thoroughly and written to be executed. The source code from all examples in the book is available, written in Python using Google OR-Tools. It also includes a random problem generator, useful for industry application or study. What You Will Learn Build basic Python-based artificial intelligence (AI) applications Work with mathematical optimization methods and the Google OR-Tools (Optimization Tools) suite Create several types of projects using Python and Google OR-Tools Who This Book Is For Developers and students who already have prior experience in Python coding. Some prior mathematical experience or comfort level may be helpful as well. Practical Numerical and Scientific Computing with MATLAB® and Python concentrates on the practical aspects of numerical analysis and linear and non-linear programming. It discusses the methods for solving different types of mathematical problems using MATLAB and Python. Although the book focuses on the approximation problem rather than on error analysis of mathematical problems, it provides practical ways to calculate errors. The book is divided into three parts, covering topics in numerical linear algebra, methods of interpolation, numerical differentiation and integration, solutions of differential equations, linear and non-linear programming problems, and optimal control problems. This book has the following advantages: It adopts the programming languages, MATLAB and Python, which are widely used among academics, scientists, and engineers, for ease of use and contain many libraries covering many scientific and engineering fields. It contains topics that are rarely found in other numerical analysis books, such as ill-conditioned linear systems and methods of regularization to stabilize their solutions, nonstandard finite differences methods for solutions of ordinary differential equations, and the computations of the optimal controls. It provides a practical explanation of how to apply these topics using MATLAB and Python. It discusses software libraries to solve mathematical problems, such as software Gekko, pulp, and pyomo. These libraries use Python for solutions to differential equations and static and dynamic optimization problems. Most programs in the book can be applied in versions prior to MATLAB 2017b and Python 3.7.4 without the need to modify these programs. This book is aimed at newcomers and middle-level students, as well as members of the scientific community who are interested in solving math problems using MATLAB or Python. Scientific Python is taught from scratch in this book via copious, downloadable, useful and adaptable code snippets. Everything the working scientist needs to know is covered, quickly providing researchers and research students with the skills to start using Python effectively. The book serves as a first introduction to computer programming of scientific applications, using the high-level Python language. The exposition is example and problem-oriented, where the applications are taken from mathematics, numerical calculus, statistics, physics, biology and finance. The book teaches "Matlab-style" and procedural programming as well as object-oriented programming. High school mathematics is a required background and it is advantageous to study classical and numerical one-variable calculus in parallel with reading this book. Besides learning how to program computers, the reader will also learn how to solve mathematical problems, arising in various branches of science and engineering, with the aid of numerical methods and programming. By blending programming, mathematics and scientific applications, the book lays a solid foundation for practicing computational science. From the reviews: Langtangen ... does an excellent job of introducing

programming as a set of skills in problem solving. He guides the reader into thinking properly about producing program logic and data structures for modeling real-world problems using objects and functions and embracing the object-oriented paradigm. ... Summing Up: Highly recommended. F. H. Wild III, Choice, Vol. 47 (8), April 2010 Those of us who have learned scientific programming in Python 'on the streets' could be a little jealous of students who have the opportunity to take a course out of Langtangen's Primer." John D. Cook, The Mathematical Association of America, September 2011 This book goes through Python in particular, and programming in general, via tasks that scientists will likely perform. It contains valuable information for students new to scientific computing and would be the perfect bridge between an introduction to programming and an advanced course on numerical methods or computational science. Alex Small, IEEE, CiSE Vol. 14 (2), March /April 2012 "This fourth edition is a wonderful, inclusive textbook that covers pretty much everything one needs to know to go from zero to fairly sophisticated scientific programming in Python..." Joan Horvath, Computing Reviews, March 2015 The most crucial ability for machine learning and data science is mathematical logic for grasping their essence rather than knowledge and experience. This textbook approaches the essence of machine learning and data science by considering math problems and building Python programs. As the preliminary part, Chapter 1 provides a concise introduction to linear algebra, which will help novices read further to the following main chapters. Those succeeding chapters present essential topics in statistical learning: linear regression, classification, resampling, information criteria, regularization, nonlinear regression, decision trees, support vector machines, and unsupervised learning. Each chapter mathematically formulates and solves machine learning problems and builds the programs. The body of a chapter is accompanied by proofs and programs in an appendix, with exercises at the end of the chapter. Because the book is carefully organized to provide the solutions to the exercises in each chapter, readers can solve the total of 100 exercises by simply following the contents of each chapter. This textbook is suitable for an undergraduate or graduate course consisting of about 12 lectures. Written in an easy-to-follow and self-contained style, this book will also be perfect material for independent learning. The most crucial ability for machine learning and data science is mathematical logic for grasping their essence rather than knowledge and experience. This textbook approaches the essence of sparse estimation by considering math problems and building Python programs. Each chapter introduces the notion of sparsity and provides procedures followed by mathematical derivations and source programs with examples of execution. To maximize readers' insights into sparsity, mathematical proofs are presented for almost all propositions, and programs are described without depending on any packages. The book is carefully organized to provide the solutions to the exercises in each chapter so that readers can solve the total of 100 exercises by simply following the contents of each chapter. This textbook is suitable for an undergraduate or graduate course consisting of about 15 lectures (90 mins each). Written in an easy-to-follow and self-contained style, this book will also be perfect material for independent learning by data scientists, machine learning engineers, and researchers interested in linear regression, generalized linear lasso, group lasso, fused lasso, graphical models, matrix decomposition, and multivariate analysis. This book is one of a series of textbooks in machine learning by the same Author. Other titles are: Statistical Learning with Math and R (<https://www.springer.com/gp/book/9789811575679>) Statistical Learning with Math and Pyth (<https://www.springer.com/gp/book/9789811578762>) Sparse Estimation with Math and R Discover easy-to-follow solutions and techniques to help you to implement applied mathematical concepts such as probability, calculus, and equations using Python's numeric and scientific libraries Key FeaturesCompute complex mathematical problems using programming logic with the help of step-by-step recipesLearn how to use Python libraries for computation, mathematical modeling, and statisticsDiscover simple yet effective techniques for solving mathematical equations and apply them in real-world statisticsBook Description The updated edition of Applying Math with Python will help you solve complex problems in a wide variety of mathematical fields in simple and efficient ways. Old recipes have been revised for new libraries and several recipes have been added to demonstrate new tools such as JAX. You'll start by refreshing your knowledge of several core mathematical fields and learn about packages covered in Python's scientific stack, including NumPy, SciPy, and Matplotlib. As you progress, you'll gradually get to grips with more advanced topics of calculus, probability, and networks (graph theory). Once you've developed a solid base in these topics, you'll have the confidence to set out on math adventures with Python as you explore Python's applications in data science and statistics, forecasting, geometry, and optimization. The final chapters will take you through a collection of miscellaneous problems, including working with specific data formats and accelerating code. By the end of this book, you'll have an arsenal of practical coding solutions that can be used and modified to solve a wide range of practical problems in computational mathematics and data science. What you will learnBecome familiar with basic Python packages, tools, and libraries for solving mathematical problemsExplore real-world applications of mathematics to reduce a problem in optimizationUnderstand the core concepts of applied mathematics and their application in computer scienceFind out how to choose the most suitable package, tool, or technique to solve a problemImplement basic mathematical plotting, change plot styles, and add labels to plots using MatplotlibGet to grips with probability theory with the Bayesian inference and Markov Chain Monte Carlo (MCMC) methodsWho this book is for Whether you are a professional programmer or a student looking to solve mathematical problems computationally using Python, this is the book for you. Advanced mathematics proficiency is not a prerequisite, but basic knowledge of mathematics will help you to get the most out of this Python math book. Familiarity with the concepts of data structures in Python is assumed. Modeling and Simulation in Python teaches readers how to analyze real-world scenarios using the Python programming language, requiring no more than a background in high school math. Modeling and Simulation in Python is a thorough but easy-to-follow introduction to physical modeling—that is, the art of describing and simulating real-world systems. Readers are guided through modeling things like world population growth, infectious disease, bungee

jumping, baseball flight trajectories, celestial mechanics, and more while simultaneously developing a strong understanding of fundamental programming concepts like loops, vectors, and functions. Clear and concise, with a focus on learning by doing, the author spares the reader abstract, theoretical complexities and gets right to hands-on examples that show how to produce useful models and simulations. Hemos elaborado 120 programas de Python y mas de 110 ilustraciones en una obra que sera util tanto a estudiantes de ciencias de los primeros cursos universitarios, como a estudiantes y profesores de bachillerato. Puedes descargar gratuitamente un extracto de 78 paginas del libro en pdf desde nuestro sitio web www.pysamples.com. Los compradores del libro pueden descargar gratuitamente el codigo de los programas. Todos los programas y graficas se han elaborado utilizando software libre, que se puede obtener gratuita y legalmente en internet, por lo que no es necesario adquirir ningun software. Se puede programar gratuitamente en Python tanto si eres usuario de Windows como si prefieres Mac o Linux. El libro puede ser utilizado como libro de matematicas con el que tambien se puede aprender a programar, o bien como un libro de programacion en Python orientada a las ciencias. Elementary discrete math for undergraduate computer science or computer engineering students. Covers basic topics including mathematical logic, direct proof, proof by contradiction, proof by contraposition, counter-example, induction, structural induction, elementary number theory, division, sets, sequences, functions, cardinality, counting, recurrence, recursion, and graph theory. Examples are given in Python 3. The second edition of this best-selling Python book (over 500,000 copies sold!) uses Python 3 to teach even the technically uninclined how to write programs that do in minutes what would take hours to do by hand. There is no prior programming experience required and the book is loved by liberal arts majors and geeks alike. If you've ever spent hours renaming files or updating hundreds of spreadsheet cells, you know how tedious tasks like these can be. But what if you could have your computer do them for you? In this fully revised second edition of the best-selling classic Automate the Boring Stuff with Python, you'll learn how to use Python to write programs that do in minutes what would take you hours to do by hand--no prior programming experience required. You'll learn the basics of Python and explore Python's rich library of modules for performing specific tasks, like scraping data off websites, reading PDF and Word documents, and automating clicking and typing tasks. The second edition of this international fan favorite includes a brand-new chapter on input validation, as well as tutorials on automating Gmail and Google Sheets, plus tips on automatically updating CSV files. You'll learn how to create programs that effortlessly perform useful feats of automation to:

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- Send email responses and text notifications
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