Solutions Of Scientific Computing Heath

Applying the principles of human-centered design to real-world health care challenges, from drug packaging to early detection of breast cancer. This book makes a case for applying the principles of design thinking to real-world health care challenges. As health care systems around the globe struggle to expand access, improve outcomes, and control costs, Health Design Thinking offers a human-centered approach for designing health care products and services, with examples and case studies that range from drug packaging and exam rooms to internet-connected devices for early detection of breast cancer. Written by leaders in the field—Bon Ku, a physician and founder of the innovative Health Design Lab at Sidney Kimmel Medical College, and Ellen Lupton, an award-winning graphic designer and curator at Cooper Hewitt Smithsonian Design Museum—the book outlines the fundamentals of design thinking and highlights important products, prototypes, and research in health design. Health design thinking uses play and experimentation rather than a rigid methodology. It draws on interviews, observations, diagrams, storytelling, physical models, and role playing; design teams focus not on technology but on problems faced by patients and clinicians. The book's diverse case studies show health design thinking in action. These include the development of PillPack, which frames prescription drug delivery in terms of user experience design; a credit card–size device that allows patients to generate their own electrocardiograms; and improved emergency room signage. Drawings, photographs, storyboards, and other visualizations accompany the case studies. Copublished with Cooper Hewitt, Smithsonian Design Museum
This book presents methods for the computational solution of differential equations, both ordinary and partial, time-dependent and steady-state. Finite difference methods are introduced and analyzed in the first four chapters, and finite element methods are studied in chapter five. A very general-purpose and widely-used finite element program, PDE2D, which implements many of the methods studied in the earlier chapters, is presented and documented in Appendix A. The book contains the relevant theory and error analysis for most of the methods studied, but also emphasizes the practical aspects involved in implementing the methods. Students using this book will actually see and write programs (FORTRAN or MATLAB) for solving ordinary and partial differential equations, using both finite differences and finite elements. In addition, they will be able to solve very difficult partial differential equations using the software PDE2D, presented in Appendix A. PDE2D solves very general steady-state, time-dependent and eigenvalue PDE systems, in 1D intervals, general 2D regions, and a wide range of simple 3D regions. Contents:Direct Solution of Linear SystemsInitial Value Ordinary Differential EquationsThe Initial Value Diffusion ProblemThe Initial Value Transport and Wave ProblemsBoundary Value ProblemsThe Finite Element MethodsAppendix A — Solving PDEs with PDE2DAppendix B — The Fourier Stability MethodAppendix C — MATLAB ProgramsAppendix D — Answers to Selected Exercises Readership: Undergraduate, graduate students and researchers. Key Features:The discussion of stability, absolute stability and stiffness in Chapter 1 is clearer than in other textsStudents will actually learn to write programs solving a range of simple PDEs using the finite element method in chapter 5In Appendix A, students will be able to solve quite difficult PDEs, using the author's software package, PDE2D. (a free version is available which solves small to moderate sized problems)Keywords:Differential Equations;Partial Differential Equations;Finite Element Method;Finite Difference Method;Computational Science;Numerical AnalysisReviews: "This book is very well written and it is relatively easy to read. The presentation is clear and straightforward but quite rigorous. This book is suitable for a course on the numerical solution of ODEs and PDEs problems, designed for senior level undergraduate or beginning level graduate students. The numerical techniques for solving problems presented in the book may also be useful for experienced researchers and practitioners both from universities or industry."

Andrzej Icha Pomeranian Academy in S?upsk Poland
The second edition of a comprehensive introduction to machine learning approaches used in predictive data analytics, covering both theory and practice. Machine learning is often used to build predictive models by extracting patterns from large datasets. These models are used in predictive data analytics applications including price prediction, risk assessment, predicting customer behavior, and document classification. This introductory textbook offers a detailed and focused treatment of the most important machine learning approaches used in predictive data analytics, covering both theoretical concepts and practical applications. Technical and mathematical material is augmented with explanatory worked examples, and case studies illustrate the application of these models in the broader business context. This second edition covers recent developments in machine learning, especially in a new chapter on deep learning, and two new chapters that go beyond predictive analytics to cover unsupervised learning and reinforcement learning.
Leverage the numerical and mathematical modules in Python and its standard library as well as popular open source numerical Python packages like NumPy, SciPy, FiPy, matplotlib and more. This fully revised edition, updated with the latest details of each package and changes to Jupyter projects, demonstrates how to numerically compute solutions and mathematically model applications in big data, cloud computing, financial engineering, business management and more. Numerical Python, Second Edition, presents many brand-new case study examples of applications in data science and statistics using Python, along with extensions to many previous examples. Each of these demonstrates the power of Python for rapid development and exploratory computing due to its simple and high-level syntax and multiple options for data analysis. After reading this book, readers will be familiar with many computing techniques including array-based and symbolic computing, visualization and numerical file I/O, equation solving, optimization, interpolation and integration, and domain-specific computational problems, such as differential equation solving, data analysis, statistical modeling and machine learning. What You'll Learn Work with vectors and matrices using NumPy Plot and visualize data with Matplotlib Perform data analysis tasks with Pandas and SciPy Review statistical modeling and machine learning with statsmodels and scikit-learn Optimize Python code using Numba and Cython Who This Book Is For Developers who want to understand how to use Python and its related ecosystem for numerical computing.
Foreword. A transformed scientific method. Earth and environment. Health and wellbeing. Scientific infrastructure. Scholarly communication.
This IMA Volume in Mathematics and its Applications ALGORITHMS FOR PARALLEL PROCESSING is based on the proceedings of a workshop that was an integral part of the 1996-97 IMA program on "MATHEMATICS IN HIGH-PERFORMANCE COMPUTING. " The workshop brought together algorithm developers from theory, combinatorics, and scientific computing. The topics ranged over models, linear algebra, sorting, randomization, and graph algorithms and their analysis. We thank Michael T. Heath of University of Illinois at Urbana (Com puter Science), Abhiram Ranade of the Indian Institute of Technology (Computer Science and Engineering), and Robert S. Schreiber of Hewlett Packard Laboratories for their excellent work in organizing the workshop and editing the proceedings. We also take this opportunity to thank the National Science Founda tion (NSF) and the Army Research Office (ARO), whose financial support made the workshop possible. A vner Friedman Robert Gulliver v PREFACE The Workshop on Algorithms for Parallel Processing was held at the IMA September 16 - 20, 1996; it was the first workshop of the IMA year dedicated to the mathematics of high performance computing. The work shop organizers were Abhiram Ranade of The Indian Institute of Tech nology, Bombay, Michael Heath of the University of Illinois, and Robert Schreiber of Hewlett Packard Laboratories. Our idea was to bring together researchers who do innovative, exciting, parallel algorithms research on a wide range of topics, and by

sharing insights, problems, tools, and methods to learn something of value from one another. This book differs from traditional numerical analysis texts in that it focuses on the motivation and ideas behind the algorithms presented rather than on detailed analyses of them. It presents a broad overview of methods and software for solving mathematical problems arising in computational modeling and data analysis, including proper problem formulation, selection of effective solution algorithms, and interpretation of results.? In the 20 years since its original publication, the modern, fundamental perspective of this book has aged well, and it continues to be used in the classroom. This Classics edition has been updated to include pointers to Python software and the Chebfun package, expansions on barycentric formulation for Lagrange polynomial interpretation and stochastic methods, and the availability of about 100 interactive educational modules that dynamically illustrate the concepts and algorithms in the book. Scientific Computing: An Introductory Survey, Second Edition is intended as both a textbook and a reference for computationally oriented disciplines that need to solve mathematical problems.

Does entropy really increase no matter what we do? Can light pass through a Big Bang? What is certain about the Heisenberg uncertainty principle? Many laws of physics are formulated in terms of differential equations, and the questions above are about the nature of their solutions. This book puts together the three main aspects of the topic of partial differential equations, namely theory, phenomenology, and applications, from a contemporary point of view. In addition to the three principal examples of the wave equation, the heat equation, and Laplace's equation, the book has chapters on dispersion and the Schrödinger equation, nonlinear hyperbolic conservation laws, and shock waves. The book covers material for an introductory course that is aimed at beginning graduate or advanced undergraduate level students. Readers should be conversant with multivariate calculus and linear algebra. They are also expected to have taken an introductory level course in analysis. Each chapter includes a comprehensive set of exercises, and most chapters have additional projects, which are intended to give students opportunities for more in-depth and open-ended study of solutions of partial differential equations and their properties.

Computer Ethics: A Case-based Approach teaches students to solve ethical dilemmas in the field of computing, taking a philosophical, rather than a legal, approach to the topic. It first examines the principles of Idealism, Realism, Pragmatism, Existentialism, and Philosophical Analysis, explaining how each of them might be adopted as a basis for solving computing dilemmas. The book then presents a worksheet of key questions to be used in solving dilemmas. Twenty-nine cases, drawn from the real-life experiences of computer professionals, are included in the book as a means to let students experiment with solving ethical dilemmas and identify the philosophical underpinnings of the solutions.

Authors Ward Cheney and David Kincaid show students of science and engineering the potential computers have for solving numerical problems and give them ample opportunities to hone their skills in programming and problem solving. NUMERICAL MATHEMATICS AND COMPUTING, 7th Edition also helps students learn about errors that inevitably accompany scientific computations and

arms them with methods for detecting, predicting, and controlling these errors. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

This book introduces finite difference methods for both ordinary differential equations (ODEs) and partial differential equations (PDEs) and discusses the similarities and differences between algorithm design and stability analysis for different types of equations. A unified view of stability theory for ODEs and PDEs is presented, and the interplay between ODE and PDE analysis is stressed. The text emphasizes standard classical methods, but several newer approaches also are introduced and are described in the context of simple motivating examples. The mathematical sciences are part of nearly all aspects of everyday life-the discipline has underpinned such beneficial modern capabilities as Internet search, medical imaging, computer animation, numerical weather predictions, and all types of digital communications. The Mathematical Sciences in 2025 examines the current state of the mathematical sciences and explores the changes needed for the discipline to be in a strong position and able to maximize its contribution to the nation in 2025. It finds the vitality of the discipline excellent and that it contributes in expanding ways to most areas of science and engineering, as well as to the nation as a whole, and recommends that training for future generations of mathematical scientists should be re-assessed in light of the increasingly cross-disciplinary nature of the mathematical sciences. In addition, because of the valuable interplay between ideas and people from all parts of the mathematical sciences, the report emphasizes that universities and the government need to continue to invest in the full spectrum of the mathematical sciences in order for the whole enterprise to continue to flourish long-term.

Regional health care databases are being established around the country with the goal of providing timely and useful information to policymakers, physicians, and patients. But their emergence is raising important and sometimes controversial questions about the collection, quality, and appropriate use of health care data. Based on experience with databases now in operation and in development, Health Data in the Information Age provides a clear set of guidelines and principles for exploiting the potential benefits of aggregated health data--without jeopardizing confidentiality. A panel of experts identifies characteristics of emerging health database organizations (HDOs). The committee explores how HDOs can maintain the quality of their data, what policies and practices they should adopt, how they can prepare for linkages with computer-based patient records, and how diverse groups from researchers to health care administrators might use aggregated data. Health Data in the Information Age offers frank analysis and guidelines that will be invaluable to anyone interested in the operation of health care databases.

This book discusses the interplay of stochastics (applied probability theory) and numerical analysis in the field of quantitative finance. The stochastic models,

numerical valuation techniques, computational aspects, financial products, and risk management applications presented will enable readers to progress in the challenging field of computational finance.When the behavior of financial market participants changes, the corresponding stochastic mathematical models describing the prices may also change. Financial regulation may play a role in such changes too. The book thus presents several models for stock prices, interest rates as well as foreign-exchange rates, with increasing complexity across the chapters. As is said in the industry, 'do not fall in love with your favorite model.' The book covers equity models before moving to short-rate and other interest rate models. We cast these models for interest rate into the Heath-Jarrow-Morton framework, show relations between the different models, and explain a few interest rate products and their pricing.The chapters are accompanied by exercises. Students can access solutions to selected exercises, while complete solutions are made available to instructors. The MATLAB and Python computer codes used for most tables and figures in the book are made available for both print and e-book users. This book will be useful for people working in the financial industry, for those aiming to work there one day, and for anyone interested in quantitative finance. The topics that are discussed are relevant for MSc and PhD students, academic researchers, and for quants in the financial industry.

Doing Research in Applied Linguistics: Realities, dilemmas, and solutions provides insight and guidance for those undertaking research, and shows the reader how to deal with the challenges of this research involving real people in real settings. Featuring over twenty chapters by experienced and up-and-coming researchers from around the world, this book: outlines the steps involved in solving the problem and completing a successful, and publishable, project; provides case studies of obstacles faced at each stage of research, from preliminary planning to report writing; addresses issues of validity and reliability during data collection and analysis; discusses ethical issues in research dealing with vulnerable groups including children, refugees, and students; includes examples from longitudinal studies, and both qualitative and quantitative research. Doing Research in Applied Linguistics is essential reading for students studying research methods, or for those embarking on their first research project in applied linguistics or language education.

In the United States, some populations suffer from far greater disparities in health than others. Those disparities are caused not only by fundamental differences in health status across segments of the population, but also because of inequities in factors that impact health status, so-called determinants of health. Only part of an individual's health status depends on his or her behavior and choice; community-wide problems like poverty, unemployment, poor education, inadequate housing, poor public transportation, interpersonal violence, and decaying neighborhoods also contribute to health inequities, as well as the historic and ongoing interplay of structures, policies, and norms that shape lives. When these factors are not optimal in a community, it does not mean they are intractable: such inequities can be mitigated by social policies that can shape health in powerful ways. Communities in Action: Pathways to Health Equity seeks to delineate the causes of and the solutions to health inequities in the United States. This report focuses on what communities can do to promote health equity, what actions are needed by the many and varied stakeholders that are part of communities or support them, as well as the root causes and structural barriers that need to be overcome.

This well-respected text gives an introduction to the theory and application of modern numerical approximation techniques for students taking a one- or two-semester course in numerical analysis. With an accessible treatment that only requires a calculus prerequisite, Burden and Faires explain how, why, and when approximation techniques can be expected to work, and why, in some situations, they fail. A wealth of examples and exercises develop students' intuition, and demonstrate the subject's practical applications to important everyday problems in math, computing, engineering, and physical science disciplines. The first book of its kind built from the ground up to serve a diverse undergraduate audience, three decades later Burden and Faires remains the definitive introduction to a vital and practical subject. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Parallel processing has been an enabling technology in scientific computing for more than 20 years. This book is the first in-depth discussion of parallel computing in 10 years; it reflects the mix of topics that mathematicians, computer scientists, and computational scientists focus on to make parallel processing effective for scientific problems. Presently, the impact of parallel processing on scientific computing varies greatly across disciplines, but it plays a vital role in most problem domains and is absolutely essential in many of them. Parallel Processing for Scientific Computing is divided into four parts: The first concerns performance modeling, analysis, and optimization; the second focuses on parallel algorithms and software for an array of problems common to many modeling and simulation applications; the third emphasizes tools and environments that can ease and enhance the process of application development; and the fourth provides a sampling of applications that require parallel computing for scaling to solve larger and realistic models that can advance science and engineering.

Why is it so hard to make lasting changes in our companies, in our communities, and in our own lives? The primary obstacle is a conflict that's built into our brains, say Chip and Dan Heath, authors of the critically acclaimed bestseller Made to Stick. Psychologists have discovered that our minds are ruled by two different systems - the rational mind and the emotional mind—that compete for control. The rational mind wants a great beach body; the emotional mind wants that Oreo cookie. The rational mind wants to change something at work; the emotional mind loves the comfort of the existing routine. This tension can doom a change effort - but if it is overcome, change can come quickly. In Switch, the Heaths show how everyday people - employees and managers, parents and nurses - have united both minds and, as a result, achieved dramatic results: • The lowly medical interns who managed to defeat an entrenched, decades-old medical practice that was endangering patients • The home-organizing guru who developed a simple technique for overcoming the dread of housekeeping • The manager who transformed a lackadaisical customer-support team into service zealots by removing a standard tool of customer service In a compelling, story-driven narrative, the Heaths bring together decades of counterintuitive research in psychology, sociology, and other fields to shed new light on how we can effect transformative change. Switch shows that successful changes follow a pattern, a pattern you can use to make the changes that matter to you, whether your interest is in changing the world or changing your waistline.

This book demonstrates scientific computing by presenting twelve computational projects in several disciplines including Fluid Mechanics, Thermal Science, Computer Aided Design, Signal Processing and more. Each follows typical steps of scientific computing, from physical and mathematical description, to numerical formulation and programming and critical discussion of results. The text teaches practical methods not usually available in basic textbooks: numerical checking of accuracy, choice of boundary conditions, effective solving of linear systems, comparison to exact solutions and more. The final section of each project contains the solutions to proposed exercises and guides the reader in using the MATLAB scripts available online.

This work addresses the increasingly important role of numerical methods in science and engineering. It combines traditional and well-developed topics with other material such as interval arithmetic, elementary functions, operator series, convergence acceleration, and continued fractions.

While many fields such as e-learning, business, and marketing have taken advantage of the potential of gamification, the healthcare domain has just started to exploit this emerging trend, still in an ad-hoc fashion. Despite the huge potential of applying gamification on several topics of healthcare, there are scarce theoretical studies regarding methodologies, techniques, specifications, and frameworks. These applications must be examined further as they can be used to solve major healthcare-related challenges such as care plan maintenance, medication adherence, phobias treatment, or patient education. Handbook of Research on Solving Modern Healthcare Challenges With Gamification aims to share new approaches and methodologies to build e-health solutions using gamification and identifies new trends on this topic from pedagogical strategies to technological approaches. This book serves as a collection of knowledge that builds the theoretical foundations that can be helpful in creating sustainable e-health solutions in the future. While covering topics such as augmented and virtual reality, ethical issues in gamification, e-learning, telehealth services, and digital applications, this book is essential for research scholars, healthcare/computer science teachers and students pursuing healthcare/computer science-related subjects, enterprise developers, practitioners, researchers, academicians, and students interested in the latest developments and research solving healthcare challenges with modern e-health solutions using gamification.

Wall Street Journal Bestseller New York Times bestselling author Dan Heath explores how to prevent problems before they happen, drawing on insights from hundreds of interviews with unconventional problem solvers. So often in life, we get stuck in a cycle of response. We put out fires. We deal with emergencies. We stay downstream, handling one problem after another, but we never make our way upstream to fix the systems that caused the problems. Cops chase robbers, doctors treat patients with chronic illnesses, and call-center reps address customer complaints. But many crimes, chronic illnesses, and customer complaints are preventable. So why do our efforts skew so heavily toward reaction rather than prevention? Upstream probes the psychological forces that push us downstream—including "problem blindness," which can leave us oblivious to serious problems in our midst. And Heath introduces us to the thinkers who have overcome these obstacles and scored massive victories by switching to an upstream mindset. One online travel website prevented twenty million customer service calls every year by making some simple tweaks to its booking system. A major urban school district cut its dropout rate in half after it figured out that it could predict which students would drop out—as early as the ninth grade. A European nation almost eliminated teenage alcohol and drug

abuse by deliberately changing the nation's culture. And one EMS system accelerated the emergency-response time of its ambulances by using data to predict where 911 calls would emerge—and forward-deploying its ambulances to stand by in those areas. Upstream delivers practical solutions for preventing problems rather than reacting to them. How many problems in our lives and in society are we tolerating simply because we've forgotten that we can fix them? This book distinguishes itself from the many other textbooks on the topic of linear algebra by including mathematical and computational chapters along with examples and exercises with Matlab. In recent years, the use of computers in many areas of engineering and science has made it essential for students to get training in numerical methods and computer programming. Here, the authors use both Matlab and SciLab software as well as covering core standard material. It is intended for libraries; scientists and researchers; pharmaceutical industry. Science is continually confronted by new and difficult social and ethical problems. Some of these problems have arisen from the transformation of the academic science of the prewar period into the industrialized science of the present. Traditional theories of science are now widely recognized as obsolete. In Scientific Knowledge and Its Social Problems (originally published in 1971), Jerome R. Ravetz analyzes the work of science as the creation and investigation of problems. He demonstrates the role of choice and value judgment, and the inevitability of error, in scientific research. Ravetz's new introductory essay is a masterful statement of how our understanding of science has evolved over the last two decades.

Over the past decade, Big Data have become ubiquitous in all economic sectors, scientific disciplines, and human activities. They have led to striking technological advances, affecting all human experiences. Our ability to manage, understand, interrogate, and interpret such extremely large, multisource, heterogeneous, incomplete, multiscale, and incongruent data has not kept pace with the rapid increase of the volume, complexity and proliferation of the deluge of digital information. There are three reasons for this shortfall. First, the volume of data is increasing much faster than the corresponding rise of our computational processing power (Kryder's law > Moore's law). Second, traditional discipline-bounds inhibit expeditious progress. Third, our education and training activities have fallen behind the accelerated trend of scientific, information, and communication advances. There are very few rigorous instructional resources, interactive learning materials, and dynamic training environments that support active data science learning. The textbook balances the mathematical foundations with dexterous demonstrations and examples of data, tools, modules and workflows that serve as pillars for the urgently needed bridge to close that supply and demand predictive analytic skills gap. Exposing the enormous opportunities presented by the tsunami of Big data, this textbook aims to identify specific knowledge gaps, educational barriers, and workforce readiness deficiencies. Specifically, it focuses on the development of a transdisciplinary

curriculum integrating modern computational methods, advanced data science techniques, innovative biomedical applications, and impactful health analytics. The content of this graduate-level textbook fills a substantial gap in integrating modern engineering concepts, computational algorithms, mathematical optimization, statistical computing and biomedical inference. Big data analytic techniques and predictive scientific methods demand broad transdisciplinary knowledge, appeal to an extremely wide spectrum of readers/learners, and provide incredible opportunities for engagement throughout the academy, industry, regulatory and funding agencies. The two examples below demonstrate the powerful need for scientific knowledge, computational abilities, interdisciplinary expertise, and modern technologies necessary to achieve desired outcomes (improving human health and optimizing future return on investment). This can only be achieved by appropriately trained teams of researchers who can develop robust decision support systems using modern techniques and effective end-to-end protocols, like the ones described in this textbook. • A geriatric neurologist is examining a patient complaining of gait imbalance and posture instability. To determine if the patient may suffer from Parkinson's disease, the physician acquires clinical, cognitive, phenotypic, imaging, and genetics data (Big Data). Most clinics and healthcare centers are not equipped with skilled data analytic teams that can wrangle, harmonize and interpret such complex datasets. A learner that completes a course of study using this textbook will have the competency and ability to manage the data, generate a protocol for deriving biomarkers, and provide an actionable decision support system. The results of this protocol will help the physician understand the entire patient dataset and assist in making a holistic evidence-based, data-driven, clinical diagnosis. • To improve the return on investment for their shareholders, a healthcare manufacturer needs to forecast the demand for their product subject to environmental, demographic, economic, and bio-social sentiment data (Big Data). The organization's data-analytics team is tasked with developing a protocol that identifies, aggregates, harmonizes, models and analyzes these heterogeneous data elements to generate a trend forecast. This system needs to provide an automated, adaptive, scalable, and reliable prediction of the optimal investment, e.g., R&D allocation, that maximizes the company's bottom line. A reader that complete a course of study using this textbook will be able to ingest the observed structured and unstructured data, mathematically represent the data as a computable object, apply appropriate model-based and model-free prediction techniques. The results of these techniques may be used to forecast the expected relation between the company's investment, product supply, general demand of healthcare (providers and patients), and estimate the return on initial investments.

Revised and updated, this second edition of Walter Gautschi's successful Numerical Analysis explores computational methods for problems arising in the areas of classical analysis, approximation theory, and ordinary differential

equations, among others. Topics included in the book are presented with a view toward stressing basic principles and maintaining simplicity and teachability as far as possible, while subjects requiring a higher level of technicality are referenced in detailed bibliographic notes at the end of each chapter. Readers are thus given the guidance and opportunity to pursue advanced modern topics in more depth. Along with updated references, new biographical notes, and enhanced notational clarity, this second edition includes the expansion of an already large collection of exercises and assignments, both the kind that deal with theoretical and practical aspects of the subject and those requiring machine computation and the use of mathematical software. Perhaps most notably, the edition also comes with a complete solutions manual, carefully developed and polished by the author, which will serve as an exceptionally valuable resource for instructors.

Semantic web continues to be an increasingly important system for allowing end-users to share and communicate information online. Semantic Web: Ontology and Knowledge Base Enabled Tools, Services and Application focuses on the information systems discipline and the tools and techniques utilized for the emerging use of semantic web. Covering topics on semantic search, ontologies, and recommendation systems, this publication is essential for academics, practitioners, and industry professionals.

This book is a practical guide to the numerical solution of linear and nonlinear equations, differential equations, optimization problems, and eigenvalue problems. It treats standard problems and introduces important variants such as sparse systems, differential-algebraic equations, constrained optimization, Monte Carlo simulations, and parametric studies. Stability and error analysis are emphasized, and the Matlab algorithms are grounded in sound principles of software design and understanding of machine arithmetic and memory management. Nineteen case studies provide experience in mathematical modeling and algorithm design, motivated by problems in physics, engineering, epidemiology, chemistry, and biology. The topics included go well beyond the standard first-course syllabus, introducing important problems such as differential-algebraic equations and conic optimization problems, and important solution techniques such as continuation methods. The case studies cover a wide variety of fascinating applications, from modeling the spread of an epidemic to determining truss configurations.

Scientific ComputingAn Introductory Survey, Revised Second EditionSIAM

An accessible, comprehensive and coherent treatment of MIMO communication, drawing on ideas from information theory and signal processing.

This textbook provides and introduction to numerical computing and its applications in science and engineering. The topics covered include those usually found in an introductory course, as well as those that arise in data analysis. This includes optimization and regression based methods using a singular value decomposition. The emphasis is on problem solving, and there are numerous exercises throughout the text concerning applications in engineering and science. The essential role of the mathematical theory underlying the methods is also considered, both for understanding how the method works, as well as how the error in the computation depends on the method being used. The MATLAB codes used to produce most of the figures and data tables in the text are available on the author's website and SpringerLink. This title provides an easily accessible yet detailed discussion of IEEE Std 754-1985, arguably the most important standard in the computer industry. The result of an unprecedented

cooperation between academic computer scientists and the cutting edge of industry, it is supported by virtually every modern computer. Other topics include the floating point architecture of the Intel microprocessors and a discussion of programming language support for the standard.

Describes how to develop enterprise solutions Covers full development life cycle for PowerBuilder applications Covers testing and migration of PowerBuilder applications Includes working examples and source code Disk includes source code for tab folder interface, sample code using the ORCA API, and helpful developer utilities Advanced PowerBuilder 4 Techniques goes way beyond the scope of PowerBuilder documentation and most books on the subject, and covers all areas of version 4 including: Complete coverage of interfaces to other applications and systems, including Microsoft's Messaging API (MAPI), VIM, PVCS control software, the Open Repository CASE API (ORCA), and Windows SDK Three-tier architectures, TP monitors, and gateways Data pipelines, OLE 2, ODBC, and multiplatform issues About BSG BSG is a leading IT services company for the next generation. BSG's Stransformation (Strategy Transformed into Action) approach combines client/server systems integration, consulting, technology transfer, and education. Led by its Chairman and CEO, Steven G. Papermaster, BSG partners with companies worldwide in applying emerging technologies to meet changing business needs. Founded in 1987, BSG now has seven offices throughout the United States.Everything you need to know about PowerBuilder(r) version 4, the latest release of the most popular development tool for high-performance client/server applications. Advanced PowerBuilder 4 Techniques is the ultimate insider's guide to developing PowerBuilder applications. Written by a team with extensive experience in software development, this essential resource gives you access to the advanced tips and techniques usually discovered only after accumulating years of programming experience. Programmers, systems developers, and project managers will find this book indispensable in developing powerful object-based database applications with PowerBuilder version 4.

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