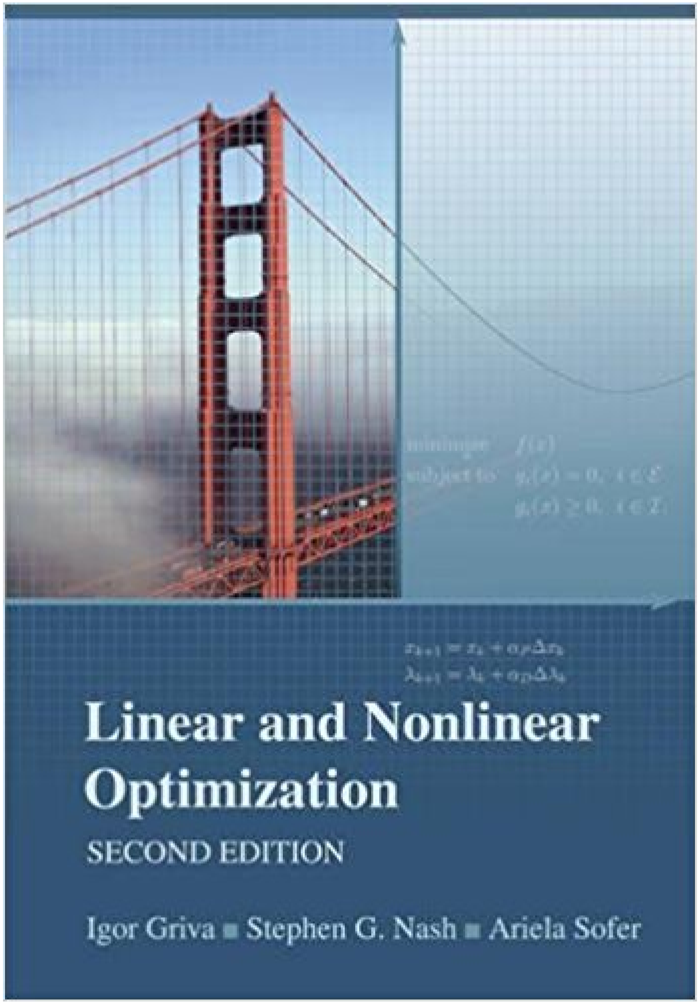
Linear And Nonlinear Optimization, Second Edition



Synopsis

This book introduces the applications, theory, and algorithms of linear and nonlinear optimization, with an emphasis on the practical aspects of the material. Its unique modular structure provides flexibility to accommodate the varying needs of instructors, students, and practitioners with different levels of sophistication in these topics. The succinct style of this second edition is punctuated with numerous real-life examples and exercises, and the authors include accessible explanations of topics that are not often mentioned in textbooks, such as duality in nonlinear optimization, primal-dual methods for nonlinear optimization, filter methods, and applications such as support-vector machines. Part I of Linear and Nonlinear Optimization, Second Edition provides fundamentals that can be taught in whole or in part at the beginning of a course on either topic and then referred to as needed. Part II on linear programming and Part III on unconstrained optimization can be used together or separately, and Part IV on nonlinear optimization can be taught without having studied the material in Part II. In the preface the authors suggest course outlines that can be adjusted to the requirements of a particular course on both linear and nonlinear optimization, or to separate courses on these topics. Three appendices provide information on linear algebra, other fundamentals, and software packages for optimization problems. A supplemental website offers auxiliary data sets that are necessary for some of the exercises. Audience: This book is primarily intended for use in linear and nonlinear optimization courses for advanced undergraduate and graduate students. It is also appropriate as a tutorial for researchers and practitioners who need to understand the modern algorithms of linear and nonlinear optimization to apply them to problems in science and engineering. Contents: Preface; Part I: Basics; Chapter 1: Optimization Models; Chapter 2: Fundamentals of Optimization; Chapter 3: Representation of Linear Constraints; Part II: Linear Programming; Chapter 4: Geometry of Linear Programming; Chapter 5: The Simplex Method; Chapter 6: Duality and Sensitivity; Chapter 7: Enhancements of the Simplex Method; Chapter 8: Network Problems; Chapter 9: Computational Complexity of Linear Programming; Chapter 10: Interior-Point Methods of Linear Programming; Part III: Unconstrained Optimization; Chapter 11: Basics of Unconstrained Optimization; Chapter 12: Methods for Unconstrained Optimization; Chapter 13: Low-Storage Methods for Unconstrained Problems; Part IV: Nonlinear Optimization; Chapter 14: Optimality Conditions for Constrained Problems; Chapter 15: Feasible-Point Methods; Chapter 16: Penalty and Barrier Methods; Part V: Appendices; Appendix A: Topics from Linear Algebra; Appendix B: Other Fundamentals; Appendix C: Software; Bibliography; Index

Book Information

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Customer Reviews

Flexible graduate textbook that introduces the applications, theory, and algorithms of linear and nonlinear optimization in a clear succinct style, supported by numerous examples and exercises. It introduces important realistic applications and explains how optimization can address them.

Igor Griva is an Assistant Professor in the Department of Computational and Data Science and the Department of Mathematical Sciences at George Mason University. His research focuses on the theory and methods of nonlinear optimization and their application to problems in science and engineering. Stephen G. Nash is a Professor of Systems Engineering and Operations Research at George Mason University. His research focuses on scientific computing, especially nonlinear optimization, along with related interests in statistical computing and optimal control. Ariela Sofer is Professor and Chair of the Systems Engineering and Operations Research Department at George Mason University. Her major areas of interest are nonlinear optimization and optimization in biomedical applications.

Just like any other technical subject, presentation is everything. You can make something of any difficulty look extremely complex or extremely simple. This book unfortunately does the former. The contents of the book are "organized" as follows (moderate paraphrasing):Chapter 1: Optimization ModelsChapter 2: FundamentalsChapter 3: Linear ConstraintsChapter 4: Geometry of Linear ProgrammingChapter 5: Simplex MethodChapter 6: Duality/SensitivityChapter 7: Enhancements of Simplex MethodChapter 8: Network ProblemsChapter 9: Linear Computational ComplexityChapter

10: Interior Point MethodsChapter 11: Unconstrained OptimizationChapter 12: Methods for Unconstrained OptimizationChapter 13: Low-Storage Methods for Unconstrained OptimizationChapter 14: Optimality Conditions for Constrained ProblemsChapter 15: Feasible-Point MethodsChapter 16: Penalty Barrier MethodsComments on this: First of all...Why on earth would a textbook have an entire chapter on a specific type of example problem? The organization makes no sense in general. As a result, the class I'm taking that uses this book jumps all over the place.. (e.g., Starts on chapter 2,3, then 14, then back to 11, etc.)., which actually helps organize the material better, but it renders the book useless to learn the theory.The fundamental issue with the book is that it takes a list/fact-based approach to the subject.. (e.g., Here are some facts and some methods that use these facts.) But the subject isn't built that way. Complex topics, Optimization included, are hierarchical; there's a pyramid of mechanisms. In good textbooks, you usually start with the basics, which might be a chore because they tend to connect least to other information, (the base of the pyramid) and then youe learn methods based off of these fundamentals which are usually very enjoyable to learn, and you're gradually going up the pyramid until you reach the peak where you get the most general approaches and can solve the most general problems. This book does NOT do this well In my opinion. Waste of $100.May I suggest an alternative (If this book is not required for your course): Convex Optimization by Boyd and Vandenberghe. They use a much more mechanistic approach. Check out the TOC:--Intro--Chapter 1: Introduction--Theory--Chapter 2: Convex SetsChapter 3: Convex FunctionsChapter 4: Convex Optimization ProblemsChapter 5: Duality--Applications--Chapter 6: Approximation and FittingChapter 7: Statistical EstimationChapter 8: Geometric Problems--Algorithms--Chapter 9: Unconstrained MinimizationChapter 10: Equality Constrained MinimizationChapter 11: Interior-Point MethodsAghh. Just from reading the table of contents, I feel like i've learned something: The main mechanism in the subject is convexity; a topic not emphasized on in Griva/Sopher/Nash. Let me be clear, though,Griva/Sopher/Nash may be better for folks practicing the art rather than learning it for the first time: it emphasizes methods and problems to solve.FYI: I was able to find digital versions of both online.

Great book for non-linear optimization

This book is ok. I found its exposition annoying because it was too heavy on examples and sometimes did not fully elaborate on how certain methods work. For example, when using tableaus to solve simplex method problems, it didn't fully explain certain conditions regarding how to set the problems up. I could give a few other examples like this. Admittedly I only used 7 or 8 of the chapters.

Exactly what I needed. Excellent condition

The numerical examples and exercise problems are good.

good

I have used this book twice teaching an introductory optimization course to third-year undergraduates. It is readable for students at that level, has lots of computational examples, and covers a fairly broad range of topics. It is not a great book, but seems to be my best textbook option again in Spring 2016. I cannot give it four stars, because of a tendency to cut corners on several topics, such as convexity theory, forcing me to write notes. As someone else noted, the exposition of convexity is meager, and incommensurate with the importance of the topic. BTW, anyone who assigns exercises from this book had better solve them completely beforehand, because the amount of work varies enormously from exercise to exercise, with no warning. There are more than a few exercises that I regard as unrealistic as part of a weekly problem set in an undergraduate course that must compete for students' time with several other courses.

This book was a Christmas present for my son. I do not know how he liked it. He read it for school and kept it.

Linear and Nonlinear Optimization, Second Edition Introduction to Linear Optimization (Athena Scientific Series in Optimization and Neural Computation, 6) Convex Analysis and Nonlinear Optimization: Theory and Examples (CMS Books in Mathematics) Numerical Methods for Unconstrained Optimization and Nonlinear Equations (Classics in Applied Mathematics) Linear and Nonlinear Programming: 116 (International Series in Operations Research & Management Science) Linear and Nonlinear Programming Linear and Nonlinear Functional Analysis with Applications Banach Space Theory: The Basis for Linear and Nonlinear Analysis (CMS Books in Mathematics) The Little Book on Digital Marketing SEO - Search Engine Optimization: Tips and tricks for keyword research in SEO or Search Engine Optimization Pyomo â • Optimization Modeling in Python (Springer Optimization and Its Applications) Engineering Design Optimization using Calculus Level Methods: A Casebook Approach: Math Modeling, Simulation, & Optimization Deterministic

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