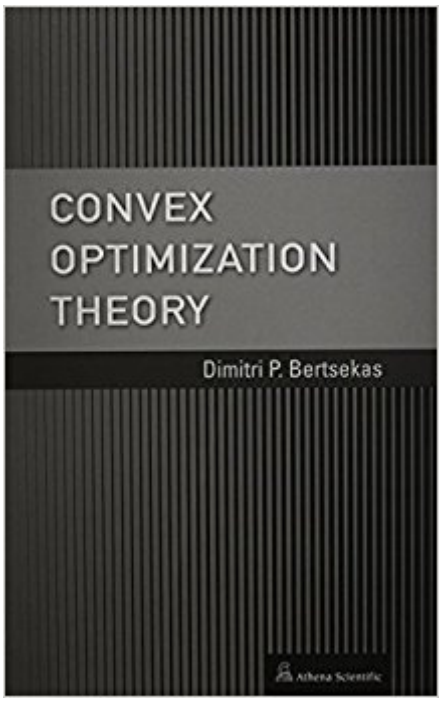
Convex Optimization Theory



Synopsis

An insightful, concise, and rigorous treatment of the basic theory of convex sets and functions in finite dimensions, and the analytical/geometrical foundations of convex optimization and duality theory. Convexity theory is first developed in a simple accessible manner, using easily visualized proofs. Then the focus shifts to a transparent geometrical line of analysis to develop the fundamental duality between descriptions of convex sets and functions in terms of points and in terms of hyperplanes. Finally, convexity theory and abstract duality are applied to problems of constrained optimization, Fenchel and conic duality, and game theory to develop the sharpest possible duality results within a highly visual geometric framework. The book may be used as a text for a theoretical convex optimization course; the author has taught several variants of such a course at MIT and elsewhere over the last ten years. It may also be used as a supplementary source for nonlinear programming classes, and as a theoretical foundation for classes focused on convex optimization models (rather than theory). It is an ideal companion to the books Convex Optimization Algorithms, and Nonlinear Programming by the same author.

Book Information

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Customer Reviews

The textbook, Convex Optimization Theory (Athena) by Dimitri Bertsekas, provides a concise, well-organized, and rigorous development of convex analysis and convex optimization theory. Several texts have appeared recently on these subjects ... The text by Bertsekas is by far the most geometrically oriented of these books. It relies on visualization to explain complex concepts at an intuitive level and to guide mathematical proofs. Nearly, all the analysis in the book is geometrically

motivated, and the emphasis is on rigorous, polished, and economical arguments, which tend to reinforce the geometric intuition. --Panos Pardalos (Optimization Methods and Sofware, 2010)This is another useful contribution to convex analysis and optimization by D. P. Bertsekas, a prolific author who is able to put together a rigorous treatment of the subjects and a skillful didactic presentation. .... Unlike some other books on the same subject (for example the famous book by R. T. Rockafellar ... which does not contain a single figure), the book of Bertsekas abounds in geometrical illustrations of the properties and visual treatments of the problems. ... Some results stem directly from the author’s research. Some of the more standard results are not usually found in other conventional textbooks on convexity. --Giorgio Giorgi (Mathematical Reviews 2012)

Dimitri P. Bertsekas studied engineering at the National Technical University of Athens, Greece, obtained his MS in electrical engineering at the George Washington University, Wash. DC in 1969, and his Ph.D. in system science in 1971 at the Massachusetts Institute of Technology. Bertsekas has held faculty positions with the Engineering-Economic Systems Dept., Stanford University (1971-1974) and the Electrical Engineering Dept. of the University of Illinois, Urbana (1974-1979). Since 1979 he has been teaching at the Electrical Engineering and Computer Science Department of the Massachusetts Institute of Technology (M.I.T.), where he is currently McAfee Professor of Engineering. He consults regularly with private industry and has held editorial positions in several journals. His research at M.I.T. spans several fields, including optimization, control, large-scale computation, and data communication networks, and is closely tied to his teaching and book authoring activities. He has written numerous research papers, and fourteen books, several of which are used as textbooks in MIT classes. Professor Bertsekas was awarded the INFORMS 1997 Prize for Research Excellence in the Interface Between Operations Research and Computer Science for his book "Neuro-Dynamic Programming" (co-authored with John Tsitsiklis), the 2000 Greek National Award for Operations Research, the 2001 ACC John R. Ragazzini Education Award, the 2009 INFORMS Expository Writing Award, the 2014 Bellman Heritage Award, the 2014 Kachiyan Prize, and the 2015 Dantzig Prize. In 2001, he was elected to the United States National Academy of Engineering for "pioneering contributions to fundamental research, practice and education of optimization/control theory, and especially its application to data communication networks.

Awesome book.

sucks. The book is all about proofs with no applications.There are some supplementary problems

on the website though.As an engineering guy, I was very disappointed with this book. The book is full of proofs with overwhelming math notations,and there is no worked out examples or anything to explain the concepts to beginners.If you are a mathematician looking for proofs of fancy theorems, this book is for you.Be aware that there are many errata so you need to manually go to the website and fix them yourself.

Convex Analysis and Nonlinear Optimization: Theory and Examples (CMS Books in Mathematics) Convex Optimization Theory Convex Optimization Convex Optimization of Power Systems Convex Bodies: The Brunn-Minkowski Theory (Encyclopedia of Mathematics and its Applications) The Little Book on Digital Marketing SEO - Search Engine Optimization: Tips and tricks for keyword research in SEO or Search Engine Optimization Engineering Design Optimization using Calculus Level Methods: A Casebook Approach: Math Modeling, Simulation, & Optimization Introduction to Linear Optimization (Athena Scientific Series in Optimization and Neural Computation, 6) Pyomo Ã¢â ¬â ¢ Optimization Modeling in Python (Springer Optimization and Its Applications) Convex Analysis (Princeton Landmarks in Mathematics and Physics) Interior Point Polynomial Algorithms in Convex Programming (Siam Studies in Applied Mathematics) The Volume of Convex Bodies and Banach Space Geometry (Cambridge Tracts in Mathematics) A First Course in Optimization Theory Graph Theory (Wiley Series in Discrete Mathematics and Optimization) Mathematical Optimization and Economic Theory (Prentice-Hall series in mathematical economics) Mathematical Optimization and Economic Theory (Classics in Applied Mathematics) Mathematical Optimization and Economic Theory Optimization in Economic Theory Music Theory: From Beginner to Expert - The Ultimate Step-By-Step Guide to Understanding and Learning Music Theory Effortlessly (Music Theory Mastery Book 1) Recursion Theory, Godel's Theorems, Set Theory, Model Theory (Mathematical Logic: A Course With Exercises, Part II)