Linear Programming Sample Problems With Solutions

Linear Programming has progressed a great deal during last two decades. It is becoming increasingly sophisticated with the availability of computer facilities and infusion of new concepts. The text of this book has been presented in easy and simple language. Throughout the text, the two streams theory and technique run side by side. Each technique is preceded by the relevant theory followed by suitable examples. A large number of important problems mostly drawn from university examination papers has been included. Contents: Time Minimization Problem, Transportation Problem, Sensitivity Analysis, Duality.

This Fourth Edition introduces the latest theory and applications in optimization. It emphasizes constrained optimization, beginning with a substantial treatment of linear programming and then proceeding to convex analysis, network flows, integer programming, quadratic programming, and convex optimization. Readers will discover a host of practical business applications as well as non-business applications. Topics are clearly developed with many numerical examples worked out in detail. Specific examples and concrete algorithms precede more abstract topics. With its focus on solving practical problems, the book features free C programs to implement the major algorithms covered, including the two-phase simplex method, primal-dual simplex method, path-following interior-point method, and homogeneous self-dual methods. In addition, the author provides online JAVA applets that illustrate various pivot rules and variants of the simplex method, both for linear programming and for network flows. These C programs and JAVA tools can be found on the book's website. The website also includes new online instructional tools and exercises.

Integer Programming: Theory and Practice contains refereed articles that explore both theoretical aspects of integer programming as well as major applications. This volume begins with a description of new constructive and iterative search methods for solving the Boolean optimization problem (BOOP). Following a review of recent developments on convergent Lagrangian techniques that use objective level-cut and domain-cut methods to solve separable nonlinear integer-programming problems, the book discusses the generalized assignment problem (GAP). The final theoretical chapter analyzes the use of decomposition methods to obtain bounds on the optimal value of solutions to integer linear-programming problems. The first application article contains models and solution algorithms for the rescheduling of airlines following the temporary closure of airports. The next chapters deal with the determination of an optimal mix of chartered and self-owned vessels needed to transport a product. The book then presents an application of integer programming that involves the capture, storage, and transmission of large quantities of data collected during testing scenarios involving military applications related to vehicles, medicine, equipment, missiles, and aircraft. The next article develops an integer linear-programming model to determine the assortment of products that must be carried by stores within a retail chain to maximize profit, and the final article contains an overview of noncommercial software tools for the solution of mixed-integer linear programs (MILP). The authors purposefully include applications and theory that are usually not found in contributed books in order to appeal to a wide variety of researchers and practitioners.

Motivation Stochastic Linear Programming with recourse represents one of the more widely applicable models for incorporating uncertainty within in which the SLP optimization models. There are several arenas model is appropriate, and such models have found applications in air line yield management, capacity planning, electric power generation planning, financial planning, logistics, telecommunications network planning, and many more. In some of these applications, modelers represent uncertainty in terms of only a few seenarios and formulate a large scale linear program which is then solved using LP software. However, there are many applications, such as the telecommunications planning problem discussed in this book, where a handful of seenarios do not capture variability well enough to provide a reasonable model of the actual decision-making problem. Problems of this type easily exceed the capabilities of LP software by several orders of magnitude. Their solution requires the use of algorithmic methods that exploit the structure of the SLP model in a manner that will accommodate large scale applications.

The book helps readers in understanding problem-solving methods based on a careful discussion of model formulation, solution procedures and analysis. It is intended to serve as a core textbook for students of BBA, B Com, CA and ICWA courses who need to

Optimization models play an increasingly important role in financial decisions. This is the first textbook devoted to explaining how recent advances in optimization models, methods and software can be applied to solve problems in computational finance more efficiently and accurately. Chapters discussing the theory and efficient solution methods for all major classes of optimization problems alternate with chapters illustrating their use in modeling problems of mathematical finance. The reader is guided through topics such as volatility estimation, portfolio optimization problems and constructing an index fund, using techniques such as nonlinear optimization models, quadratic programming formulations and integer programming models respectively. The book is based on Master's courses in financial engineering and comes with worked examples, exercises and case studies. It will be welcomed by applied mathematicians, operational researchers and others who work in mathematical and computational finance and who are seeking a text for self-learning or for use with courses.

This book reviews the fundamentals, background and theoretical concepts of optimization principles in comprehensive manner along with their potentials applications and implementation strategies. The book will be very useful for wide spectrum of target readers such as research scholars, academia, and industry professionals.

"This comprehensive treatment of the fundamental ideas and principles of linear programming covers basic theory, selected applications, network flow problems, and advanced techniques. Using specific examples to illuminate practical and theoretical aspects of the subject, the author clearly reveals the structures of fully detailed proofs. The presentation is geared toward modern efficient implementations of the simplex method and appropriate data structures for network flow

problems. Completely self-contained, it develops even elementary facts on linear equations and matrices from the beginning."--Back cover.

"I would not hesitate to recommend the book." — Industrial Engineering. Entertaining, nontechnical introduction covers basic concepts of linear programming and its relationship to operations research; geometric interpretation and problem solving, solution techniques, network problems, much more. Appendix offers precise statements of definitions, theorems, and techniques, additional computational procedures. Only high-school algebra needed. Bibliography.

The book presents a snapshot of the state of the art in the field of fully fuzzy linear programming. The main focus is on showing current methods for finding the fuzzy optimal solution of fully fuzzy linear programming problems in which all the parameters and decision variables are represented by non-negative fuzzy numbers. It presents new methods developed by the authors, as well as existing methods developed by others, and their application to real-world problems, including fuzzy transportation problems. Moreover, it compares the outcomes of the different methods and discusses their advantages/disadvantages. As the first work to collect at one place the most important methods for solving fuzzy linear programming problems, the book represents a useful reference guide for students and researchers, providing them with the necessary theoretical and practical knowledge to deal with linear programming problems under uncertainty.

The Subject Operations Research Is A Branch Of Mathematics. Many Authors Have Written Books On Operations Research. Most Of Them Have Mathematical Approach Rather Than Decision-Making Approach. Actually The Subject Deals With Applied Decision Theory, So I Have Dealt With The Subject With Decision-Theory Approach. The Book Has Fifteen Chapters.The First Five Chapters Deal With Linear Programming Problems, Such As Resource Allocation Problem, Transportation Problem And Assignment Problem Both Maximization And Minimization Versions. In The First Chapter, The Historical Background Of Operations Research (O.R.) And Definition And Objective Of The Subject Matter Along With Model Building Is Discussed To Help The Learners To Have Basic Knowledge Of O.R. Typical Problems Of Mathematical Orientation And Decision Making Orientation Have Been Solved. In Transportation Model And In Assignment Model, Problems Useful To Production And Operations Management Have Been Solved To Make The Students To Know The Application Part Of The Subject.The Sixth Chapter Deals With Sequencing Model, Where The Importance And Application Of The Models Is Dealt In Detail. The Problem Of Replacement Is Discussed In Chapter-7. Inventory Model With Certain Topics Like Abc, Ved, Fsn, P-System And Q-System Is Discussed To Make The Students Aware Of The Importance Of Inventory Model.Chapter-9 Deals With Waiting Line Model And Its Application With Certain Useful Problems And Their Solutions. Game Theory Or Competitive Theory Is Discussed In Chapter-10 With Certain Problems, Which Have Their Application In Real World Situation.Dynamic Programming Is Dealt In Chapter-11. The Problems Worked Out Have Practical Significance. Chapter-12 Deals With Decision Theory Where The Usefulness Of Decision Tree Is Discussed. Non-Linear Programming Is Briefly Discussed In Chapter-14 With Certain Useful Problems. In Chapter -15, The Two Network Techniques I.E. Pert And Cpm Have Been Discussed With Typical Worked Out Examples.At The End Of The Book, Objective Type Questions, Which Are Helpful For Competitive Examinations Are Given To Help The Students To Prepare For Such Examinations.

Linear Programming has progressed a great deal during last two decades. It is becoming increasingly sophisticated with the availability of computer facilities and infusion of new chapters. The text of this book has been presented in easy and simple language. Throughout the text, the two streams theory and technique run side by side. Each technique run side by side. Each technique is preceded by the relevant theory followed by suitable examples. A large number of important problems mostly drawn from university examination papers has been included.

Explaining how to apply to mathematical programming to network design and control, Linear Programming and Algorithms for Communication Networks: A Practical Guide to Network Design, Control, and Management fills the gap between mathematical programming theory and its implementation in communication networks. From the basics all the way through to more advanced concepts, its comprehensive coverage provides readers with a solid foundation in mathematical programming for communication networks. Addressing optimization problems for communication networks, including the shortest path problem, max flow problem, and minimum-cost flow problem, the book covers the fundamentals of linear programming and integer linear programming required to address a wide range of problems. It also: Examines several problems on finding disjoint paths for reliable communications Addresses optimization problems in optical wavelength-routed networks Describes several routing strategies for maximizing network utilization for various traffic-demand models Considers routing problems in Internet Protocol (IP) networks Presents mathematical puzzles that can be tackled by integer linear programming (ILP) Using the GNU Linear Programming Kit (GLPK) package, which is designed for solving linear programming and mixed integer programming problems, it explains typical problems and provides solutions for communication networks. The book provides algorithms for these problems as well as helpful examples with demonstrations. Once you gain an understanding of how to solve LP problems for communication networks using the GLPK descriptions in this book, you will also be able to easily apply your knowledge to other solvers.

This major new volume provides business decisionmakers and analysts with a tool that provides a logical structure for understanding problems as well as a mathematical technique for solving them. The primary tool presented throughout Optimization for Profit is linear programming (LP)--a medium that can be mastered by any individual who seeks to improve his/her analytical and decisionmaking skills. One of the special features of Optimization for Profit is the illustration of activity analysis as the technique used to formulate problems. By using activity analysis as the problem structure, linear programming become a natural extension of the way decision makers approach problems. As a result, linear programming becomes an integral part of the thinking process of the individual. Consequently, students or practitioners can readily create a linear programming model of an entire business or any part of a business. Several chapters are devoted to describing this technique and illustrating its application to many different types of companies, including an oil refinery, a marmalade production company, and a chicken processing plant. A thorough study of Optimization for Profit will enable you to work with any manufacturer or service industry and model all or part of the operation, and then solve the model to determine how best to minimize costs or maximize profits. Many firms save hundreds of thousands of dollars each year through the application of linear programming. The authors have presented the material in this vital book so clearly and thoroughly that an individual could master the material through self-study. The inclusion of problems at the end of each chapter makes this book suitable as a textbook at the advanced undergraduate or beginning graduate level at most colleges or universities for students of management science, operations research personnel, and applied mathematicians working in industry, government, or academia. Notable features of the book include: the practical aspects of modeling a business or any part of a business using linear programming a unique approach to explain the simplex method for solving linear programming problems real life, practical problems that are presented and solved in detail detailed instructions for those interested in solving linear programming problems on all types of computers from mainframes to PCs numerous problems provided for the benefit of the student and all of the linear programming models described in these problems as well as in the text itself are available on a diskette

"Combines the theoretical and practical aspects of linear and integer programming. Provides practical case studies and techniques, including rounding-off, column-generation, game theory, multiobjective optimization, and goal programming, as well as real-world solutions to the transportation and transshipment problem, project scheduling, and decentralization."

Comprehensive, well-organized volume, suitable for undergraduates, covers theoretical, computational, and applied areas in linear programming. Expanded, updated edition; useful both as a text and as a reference book. 1995 edition.

Designed for engineers, mathematicians, computer scientists, financial analysts, and anyone interested in using numerical linear algebra, matrix theory, and game theory concepts to maximize efficiency in solving applied problems. The book emphasizes the solution of various

types of linear programming problems by using different types of software, but includes the necessary definitions and theorems to master theoretical aspects of the topics presented. Features: Emphasizes the solution of various types of linear programming problems by using different kinds of software, e.g., MS-Excel, solutions of LPPs by Mathematica, MATLAB, WinQSB, and LINDO Provides definitions, theorems, and procedures for solving problems and all cases related to various linear programming topics Includes numerous application examples and exercises, e.g., transportation, assignment, and maximization Presents numerous topics that can be used to solve problems involving systems of linear equations, matrices, vectors, game theory, simplex method, and more.

Due To The Availability Of Computer Packages, The Use Of Linear Programming Technique By The Managers Has Become Universal. This Text Has Been Written Primarily For Management Students And Executives Who Have No Previous Background Of Linear Programming. The Text Is Oriented Towards Introducing Important Ideas In Linear Programming Technique At A Fundamental Level And Help The Students In Understanding Its Applications To A Wide Variety Of Managerial Problems. In Order To Strengthen The Understanding, Each Concept Has Been Illustrated With Examples. The Book Has Been Written In A Simple And Lucid Language And Has Avoided Mathematical Derivations So As To Make It Accessible To Every One.The Text Can Be Used In Its Entirely In A Fifteen Session Course At Programmes In Management, Commerce, Economics, Engineering Or Accountancy. The Text Can Be Used In One/Two Week Management/Executive Development Programmes To Be Supplemented With Some Cases. Practicing Managers And Executives, Computer Professionals, Industrial Engineers, Chartered And Cost Accountants And Economic Planners Would Also Find This Text Useful.

Praise for the Second Edition: "This is quite a well-done book: very tightly organized,better-than-average exposition, and numerous examples,illustrations, and applications." —Mathematical Reviews of the American MathematicalSociety An Introduction to Linear Programming and Game Theory, ThirdEdition presents a rigorous, yet accessible, introduction tothe theoretical concepts and computational techniques of linearprogramming and game theory. Now with more extensive modelingexercises and detailed integer programming examples, this bookuniquely illustrates how mathematics can be used in real-worldapplications in the social, life, and managerial sciences,providing readers with the opportunity to develop and apply theiranalytical abilities when solving realistic problems. This Third Edition addresses various new topics and improvementsin the field of mathematical programming, and it also presents twosoftware programs, LP Assistant and the Solver add-in for MicrosoftOffice Excel, for solving linear programming problems. LPAssistant, developed by coauthor Gerard Keough, allows readers toperform the basic steps of the algorithms provided in the book andis freely available via the book's related Web site. The use of thesensitivity analysis report and integer programming algorithm fromthe Solver add-in for Microsoft Office Excel is introduced soreaders can solve the book's linear and integer programmingproblems. A detailed appendix contains instructions for the use ofboth applications. Additional features of the Third Edition include: A discussion of sensitivity analysis for the two-variableproblem, along with new examples demonstrating integer programming,non-linear programming, and make vs. buy models Revised proofs and a discussion on the relevance and solution ofthe dual problem A section on developing an example in Data EnvelopmentAnalysis An outline of the proof of John Nash's theorem on the existenceof equilibrium strategy pairs for non-cooperative, non-zero-sumgames Providing a complete mathematical development of all presentedconcepts and examples, Introduction to Linear Programming andGame Theory, Third Edition is an ideal text for linearprogramming and mathematical modeling courses at theupper-undergraduate and graduate levels. It also serves as avaluable reference for professionals who use game theory inbusiness, economics, and management science.

The starting point of this volume was a conference entitled "Progress in Mathematical Programming," held at the Asilomar Conference Center in Pacific Grove, California, March 1-4, 1987. The main topic of the conference was developments in the theory and practice of linear programming since Karmarkar's algorithm. There were thirty presentations and approximately fifty people attended. Presentations included new algorithms, new analyses of algorithms, reports on computational experience, and some other topics related to the practice of mathematical programming. Interestingly, most of the progress reported at the conference was on the theoretical side. Several new polynomial algorithms for linear program ming were presented (Barnes-Chopra-Jensen, Goldfarb-Mehrotra, Gonzaga, Kojima-Mizuno-Yoshise, Renegar, Todd, Vaidya, and Ye). Other algorithms presented were by Betke-Gritzmann, Blum, Gill-Murray-Saunders-Wright, Nazareth, Vial, and Zikan-Cottle. Efforts in the theoretical analysis of algo rithms were also reported (Anstreicher, Bayer-Lagarias, Imai, Lagarias, Megiddo-Shub, Lagarias, Smale, and Vanderbei). Computational experiences were reported by Lustig, Tomlin, Todd, Tone, Ye, and Zikan-Cottle. Of special interest, although not in the main direction discussed at the conference, was the report by Rinaldi on the practical solution of some large traveling salesman problems. At the time of the conference, it was still not clear whether the new algorithms developed since Karmarkar's algorithm would replace the simplex method in practice. Alan Hoffman presented results on conditions under which linear programming problems can be solved by greedy algorithms."

Includes one IBM/PC floppy disk. System Requirements: Monochrome monitors, IBM-compatible machines, minimum: 286 IBM, DOS 2.0 or higher. This book gives a complete, concise introduction to the theory and applications of linear programming. It emphasizes the practical applications of mathematics, and makes the subject more accessible to individuals with varying mathematical abilities. It is one of the first rigorous linear programming texts that does not require linear algebra as a prerequisite. In addition, this text contains a floppy disk containing the program SIMPLEX, designed to help students solve problems using the computer. Key Features * Less rigorous mathematically - will appeal to individuals with varying mathematical abilities * Includes a floppy disk containing the program SIMPLEX and an appendix to help students solve problems using the computer * Includes chapters on network analysis and dynamic programming - topics of great interest to business majors and industrial engineers * Includes modem applications - selected computer programs for solving various max/min applications

Modeling and Solving Linear Programming with ROmniaScience

A differential correction technique for solving nonlinear minimax problems is presented. The basis of the technique is a linear programing algorithm which solves the linear minimax problem. By linearizing the original nonlinear equations about a nominal solution, both nonlinear approximation and estimation problems using the minimax norm may be solved iteratively. Some consideration is also given to improving convergence and to the treatment of problems with more than one measured quantity. A sample problem is treated with this technique and with the least-squares differential correction method to illustrate the properties of the minimax solution. The results indicate that for the sample approximation problem, the minimax technique provides better estimates than the least-squares method if a sufficient amount of data is used. For the sample estimation problem, the minimax estimates are better if the mathematical model is incomplete.

Stressing the use of several software packages based on simplex method variations, this text teaches linear programming's four phases through actual practice. It shows how to decide whether LP models should be applied, set up appropriate models, use software to solve them, and examine solutions to a

Designed primarily for economists and those interested in management economics who are not necessarily accomplished mathematicians, this text offers a clear, concise exposition of the relationship of linear programming to standard economic analysis. The research and writing were supported by The RAND Corporation in the late 1950s. Linear programming has been one of the most important postwar developments in economic theory, but until publication of the present volume, no text offered a comprehensive treatment of the many facets of the relationship of linear programming to traditional economic theory. This book was the first to provide a wide-ranging survey of such important aspects of the topic as the interrelations between the celebrated von Neumann theory of games and linear programming, and the relationship between game theory and the traditional economic

theories of duopoly and bilateral monopoly. Modern economists will especially appreciate the treatment of the connection between linear programming and modern welfare economics and the insights that linear programming gives into the determinateness of Walrasian equilibrium. The book also offers an excellent introduction to the important Leontief theory of input-output as well as extensive treatment of the problems of dynamic linear programming. Successfully used for three decades in graduate economics courses, this book stresses practical problems and specifies important concrete applications.

A modern, up-to-date introduction to optimization theory andmethods This authoritative book serves as an introductory text tooptimization at the senior undergraduate and beginning graduatelevels. With consistently accessible and elementary treatment ofall topics, An Introduction to Optimization, Second Edition helpsstudents build a solid working knowledge of the field, includingunconstrained optimization, linear programming, and constrainedoptimization. Supplemented with more than one hundred tables and illustrations,an extensive bibliography, and numerous worked examples toillustrate both theory and algorithms, this book alsoprovides: * A review of the required mathematical background material * A mathematical discussion at a level accessible to MBA andbusiness students * A treatment of both linear and nonlinear programming * An introduction to recent developments, including neuralnetworks, genetic algorithms, and interior-point methods * A chapter on the use of descent algorithms for the training offeedforward neural networks * Exercise problems after every chapter, many new to thisedition * MATLAB(r) exercises and examples * Accompanying Instructor's Solutions Manual available onrequest An Introduction to Optimization, Second Edition helps studentsprepare for the advanced topics and technological developments thatlie ahead. It is also a useful book for researchers andprofessionals in mathematics, electrical engineering, economics,statistics, and business. An Instructor's Manual presenting detailed solutions to all theproblems in the book is available from the Wiley editorialdepartment.

The book is an introductory textbook mainly for students of computer science and mathematics. Our guiding phrase is "what every theoretical computer scientist should know about linear programming". A major focus is on applications of linear programming, both in practice and in theory. The book is concise, but at the same time, the main results are covered with complete proofs and in sufficient detail, ready for presentation in class. The book does not require more prerequisites than basic linear algebra, which is summarized in an appendix. One of its main goals is to help the reader to see linear programming "behind the scenes".

Linear programming is one of the most extensively used techniques in the toolbox of quantitative methods of optimization. One of the reasons of the popularity of linear programming is that it allows to model a large variety of situations with a simple framework. Furthermore, a linear program is relatively easy to solve. The simplex method allows to solve most linear programs efficiently, and the Karmarkar interior-point method allows a more efficient solving of some kinds of linear programming. The power of linear programming is greatly enhanced when came the opportunity of solving integer and mixed integer linear programming. In these models all or some of the decision variables are integers, respectively. In this book we provide a brief introduction to linear programming, together with a set of exercises that introduce some applications of linear programming. We will also provide an introduction to solve linear programming in R. For each problem a possible solution through linear programming is introduced, together with the code to solve it in R and its numerical solution.

Disk contains: linear programming code SMPX.

Linear Programming is a well-written introduction to the techniques and applications of linear programming. It clearly shows readers how to model, solve, and interpret appropriate linear programming problems. Feiring has presented several carefully-chosen examples which provide a foundation for mathematical modelling and demonstrate the wide scope of the techniques. He subsequently develops an understanding of the Simplex Method and Sensitivity Analysis and includes a discussion of computer codes for linear programming. This book should encourage the spread of linear programming techniques throughout the social sciences and, since it has been developed from Feiring's own class notes, it is ideal for students, particularly those with a limited background in quantitative methods.

A comprehensive introduction to the tools, techniques and applications of convex optimization.

In the pages of this text readers will find nothing less than a unified treatment of linear programming. Without sacrificing mathematical rigor, the main emphasis of the book is on models and applications. The most important classes of problems are surveyed and presented by means of mathematical formulations, followed by solution methods and a discussion of a variety of "what-if" scenarios. Non-simplex based solution methods and newer developments such as interior point methods are covered.

Salient Features: This book gives methodical and step-by-step explanation of the Simplex Method which is missing in most of the available books. The book goes on as a teacher explaining and simplifying the topics to a student. All the university question paper problems with 74 examples and 81 exercises illustrate the methodology. Problems solved by Graphical Method are explained with neat and accurate graphs. Twenty-One Theorems with proofs and corollaries will facilitate logical understanding of the subject. Detailed explanations are given to make the reader confident about the subject.

To this reviewer's knowledge, this is the first book accessible to the upper division undergraduate or beginning graduate student that surveys linear programming.... Style is informal. ...Recommended highly for acquisition, since it is not only a textbook, but can also be used for independent reading and study. —Choice Reviews This is a textbook intended for advanced undergraduate or graduate students. It contains both theory and computational practice. —Zentralblatt Math

Applied Linear Programming for the Socioeconomic and Environmental Sciences discusses applications of linear and related programming to help in the transformation of the student or reader from book learning to computer use. The author reviews the theory, methods and applications of linear programming. The author also presents some programming codes that can be used in solving linear programming problems. He describes processes such as parametric programming, sensitivity analysis, and postoptimal analysis. The author lists five possible applications of linear programming, as follows: 1) estimates involving supply of and demand for services; 2) transport and schedule planning; 3) scale, technologies, and optimal site selection; (4) evaluation of impact of activates; and 5) evaluation of alternative options. The author cites a case study of solid-waste management in New Jersey that is common to other areas: availability of disposal sites, increasing amounts of garbage, and stricter environmental regulations. This book can be appreciated by environmentalist, sociologists, economists, civil engineers, and students and professors of advance mathematics and linear programming.

Some of the hardest computational problems have been successfully attacked through the use of probabilistic algorithms, which have an element of randomness to them. Concepts from the field of probability are also increasingly useful in analyzing the performance of algorithms, broadening our understanding beyond that provided by the worst-case or average-case analyses. This book surveys both of these emerging areas on the interface of the mathematical sciences and computer science. It is designed to

attract new researchers to this area and provide them with enough background to begin explorations of their own.
The contributions appearing in this book give an overview of recent research done in optimization and related areas, such as optimal control, calculus of variations, and game theory. They do not only address abstract issues of optimization theory, but are also concerned with the modeling and computer resolution of specific optimization problems arising in industry and applied sciences.
The book provides a broad introduction to both the theory and the application of optimization with a special emphasis on the elegance, importance, and usefulness of the parametric self-dual simplex method. The book assumes that a problem in "standard form," is a problem with inequality constraints and nonnegative variables. The main new innovation to the book is the use of clickable links to the (newly updated) online app to help students do the trivial but tedious arithmetic when solving optimization problems. The latest edition now includes: a discussion of modern Machine Learning applications, as motivational material; a section explaining Gomory Cuts and an application of integer programming to solve Sudoku problems. Readers will discover a host of practical business applications as well as non-business applications. Topics are clearly developed with many numerical examples worked out in detail. Specific examples and concrete algorithms precede more abstract topics. With its focus on solving practical problems, the book features free C programs to implement the major algorithms covered, including the two-phase simplex method, the primal-dual simplex method, the path-following interior-point method, and and the homogeneous self-dual method. In addition, the author provides online tools that illustrate various pivot rules and variants of the simplex method, both for linear programming and for network flows. These C programs and online pivot tools can be found on the book's website. The website also includes new online instructional tools and exercises.
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