

Preface

This text has grown over many years from a set of class notes for an undergraduate linear programming course offered at the University of Wisconsin-Madison. Though targeted to Computer Science undergraduates, the course has attracted both undergraduates and beginning graduate students from many other departments, including Industrial and Systems Engineering, Statistics, and Mathematics. The course aims to provide a one-semester elementary introduction to linear programming formulations, algorithms, computations, and applications. Only basic knowledge of linear algebra and calculus is required.

One feature of our approach is the use of MATLAB codes to demonstrate the computational aspects of the course, from the elementary manipulations that form the building blocks of algorithms to full implementations of revised simplex and interior-point methods. (The latter are clearly *not* robust or efficient enough to solve larger practical problems, but they do illustrate the basic principles of the computational methods in question.) The MATLAB codes (and associated mex files) are distributed on the web site associated with the book: www.siam.org/books/mp07.

We have included a chapter on quadratic programs and complementarity problems, which are topics whose importance in a number of application areas appears to be growing by the day. The final chapter deals with approximation and classification problems, which are of interest to statisticians and others, showing how these problems can be formulated and solved as linear or quadratic programs. An earlier chapter deals with the topic of duality, which is of interest not only because of the insight it provides into the beautiful theory underlying linear programming but also because of its usefulness in formulating practical problems. (The dual of a problem may be easier to solve than the primal, or it might provide a bound on the optimal solution value or other useful information.)

A one-semester undergraduate class should include most of the chapters in the text. If time is pressing, some of the later chapters could be omitted in part or in their entirety. However, we believe that all topics covered are interesting and relevant to the intended student audience, and so we hope that most teachers can find a way to incorporate them into their curriculum.

We thank the students and colleagues who have given us feedback on the manuscript during its development, particularly our colleague Bob Meyer. We are also grateful to the referees of the manuscript who read it thoroughly and provided valuable suggestions for improvement, most of which we adopted. Finally, we thank our wives and families for their love and support over many years.

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