

## PREFACE

This book is designed for the undergraduate mostly sociology students we taught at UCLA in courses on mathematical sociology and social networks. They were interested in sociological issues, and they had no background in mathematics beyond high school algebra and the statistics course they were required to take as part of the sociology major. Increasingly, they were aware of the importance of mathematical models and computer simulations in the social sciences, and, of course, over the years they were increasingly comfortable and at ease with the computer. Teaching them a usable amount of calculus would have been a major undertaking, but we knew that interesting uses of finite mathematics were well within their reach.

This book introduces all the mathematics it uses: set theory, the probability function, matrix multiplication, graphs, elementary game theory, groups and their graphs, and Markov chains. Its most distinctive aspect, and what sets it off from earlier books on mathematical sociology and most more recent books on mathematics in the social sciences, is its emphasis on social networks, an area that is clearly the most exciting and fastest growing of mathematical sociology. Moreover, students know they live in an increasingly complex, interdependent, and networked world, and they want to know more about it.

This book is also distinctive in its use of embedded computer demonstrations that are used in the homework and can be used in class. It was the availability of Mathematica Player, a free download available from Wolfram Research, that energized us to rewrite this book. Most of the demonstrations were written by us; a few we downloaded from the Mathematica web site. Player demonstrations do not require that students program. They need only move sliders and press buttons to explore models by varying their parameters. The demonstrations are available from the web and can be run either within Mathematica or with the Mathematica Player, available for free on the web. The simulations are used to increase student understanding of the material, for homework assignments, and, on occasion, to describe models that are intractable mathematically.

All the simulations are available for download at the following website: <http://press.princeton.edu/titles/9741.html>.

The book teaches all the mathematics that is required. We decided not to include any calculus; the student wanting to use calculus is better served by taking a standard calculus class. We decided not to teach any computer programming. It's difficult to teach both programming and substance in the

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same course. We decided not to focus on agent-based modeling of complex systems. Our feeling is that one can go pretty far with mathematics alone.

We have found that two different quarter-long courses can be taught from this text, one focusing on social networks and the other not. For the social-network-oriented course we use chapters 1, 4–7, 9–13, and the Afterword. For the mathematical sociology course without an emphasis on networks, we assign chapters 1, 2, 3, 7, 8, 14–16, 18, and the Afterword.