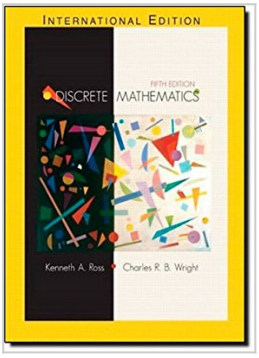

Discrete Mathematics (5th Edition)

By Kenneth A. Ross, Charles R. Wright

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Key Benefit: This book presents a sound mathematical treatment that increases smoothly in sophistication. **Key Topics:** The book presents utility-grade discrete math tools so that any reader can understand them, use them, and move on to more advanced mathematical topics. **Market:** A handy reference for computer scientists.

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Editorial Review

From the Publisher
Informal but thorough in its coverage, this introduction to discrete mathematics offers a carefully graded treatment of the basics essential to computer science.

From the Back Cover
Key Benefit: This book presents a sound mathematical treatment that increases smoothly in sophistication. Key Topics: The book presents utility-grade discrete math tools so that any reader can understand them, use them, and move on to more advanced mathematical topics. Market: A handy reference for computer scientists.

In writing this book we have had in mind both computer science students and mathematics majors. We have aimed to make our account simple enough that these students can learn it and complete enough that they won't have to learn it again.

The most visible changes in this edition are the 274 new supplementary exercises and the new chapters on probability and on algebraic structures. The supplementary exercises, which have complete answers in the back of the book, ask more than 700 separate questions. Together with the many end-of-section exercises and the examples throughout the text, these exercises let students practice using the material they are studying.

One of our main goals is the development of mathematical maturity. Our presentation starts with an intuitive approach that becomes more and more rigorous as the students' appreciation for proofs and their skill at building them increase.

Our account is careful but informal. As we go along, we illustrate the way mathematicians attack problems, and we show the power of an abstract approach. We and our colleagues at Oregon have used this material successfully for many years to teach students who have a standard precalculus background, and we have found that by the end of two quarters they are ready for upperclass work in both computer science and mathematics. The math majors have been introduced to the mathematics culture, and the computer science students have been equipped to look at their subject from both mathematical and operational perspectives.

Every effort has been made to avoid duplicating the content of mainstream computer science courses, but we are aware that most of our readers will be coming in contact with some of the same material in their other classes, and we have tried to provide them with a clear, *mathematical* view of it. An example of our approach can be seen first in Chapter 4, where we give a careful account of while loops. We base our discussion of mathematical induction on these loops, and also, in Chapter 4 and subsequently, show how to use them to design and verify a number of algorithms. We have deliberately stopped short of looking at implementation details for our algorithms, but we have provided most of them with time complexity analyses. We hope in this way to develop in the reader the habit of automatically considering the running time of any algorithm. In, addition, our analyses illustrate the use of some of the basic tools we have been developing for estimating efficiency.

The overall outline of the book is essentially that of the fourth edition, with the addition of two new chapters

and a large number of supplementary exercises. The first four chapters contain what we regard as the core material of any serious discrete mathematics course. These topics can readily be covered in a quarter. A semester course can add combinatorics and some probability or can pick up graphs, trees, and recursive algorithms.

We have retained some of the special features of previous editions, such as the development of mathematical induction from a study of while loop invariants, but we have also looked for opportunities to improve the presentation, sometimes by changing notation. We have gone through the book section by section looking for ways to provide more motivation, with the result that many sections now begin where they used to end, in the sense that the punch lines now appear first as questions or goals that get resolved by the end of the section.

We have added another "Office Hours" section at the end of Chapter 1, this one emphasizing the importance of learning definitions and notation. These sections, which we introduced in the fourth edition, allow us to step back a bit from our role as text authors to address the kinds of questions that our own students have Asked. They give us a chance to suggest how to study the material and focus on what's important. You may want to reinforce our words, or you may want to take issue with them when you talk with your own students. In any case, the Office Hours provide an alternative channel for us to talk with our readers without being formal, and perhaps they will help your students open up with their own questions in class or in the office.

We have always believed that students at this level learn best from examples, so we have added examples to the large number already present and have revised others, all to encourage students to read the book. Our examples are designed to accompany and illustrate the mathematical ideas as we develop them. They let the instructor spend time on selected topics in class and assign reading to fill out the presentation. Operating in this way, we have found that we can normally cover a section a day in class. The instructor's manual, available from Prentice Hall, indicates which sections might take longer and contains a number of suggestions for emphasis and pedagogy, as well as complete answers to all end-of-section exercises.

The end-of-chapter supplementary questions, which are a new feature of this edition, are designed to give students practice at thinking about the material. We see these exercises as representative of the sorts of questions students should be able to answer after studying a chapter. We have deliberately not arranged them in order of difficulty, and we have deliberately also not keyed them to sections—indeed, many of the exercises bring together material from several sections. To see what we mean, look at the supplementary exercises for Chapter 5, on combinatorics, where we have included an especially large number of problems, many of which have a variety of essentially different parts. A few of the supplementary questions, such as the ones in Chapter 12 on algorithms to solve the Chinese Remainder and Polynomial Interpolation problems, also extend the text account in directions that would have interrupted the flow of ideas if included in the text itself. Some of the questions are very easy and some are harder, but none of them are meant to be unusually difficult. In any case, we have provided complete answers to all of them, not just the odd-numbered ones, in the back of the book, where students can use them to check their understanding and to review for exams.

The new chapters on probability and algebraic structures respond to requests from current and past users who were disappointed that we had dropped these topics in going from the third edition to the fourth. Since those were two of our favorite chapters, we were happy to reinstate them and we have taken this opportunity to completely revise each of them. In Chapter 9 we now work in the setting of discrete probability, with only tantalizing, brief allusions to continuous probability, most notably in the transition to normal distributions from binomial distributions. The material on semigroups, rings, and fields in Chapter 12 is not changed much from the account in the third edition, but the discussion of groups is dramatically different. The emphasis is still on how groups act on sets, but in the context of solving some intriguing combinatoric problems we can

develop basic abstract ideas of permutation group theory without getting bogged down in the details of cycle notation. As another response to reader feedback, we have moved the section on matrix multiplication from Chapter 3 to Chapter 11, which is the first place we need it.

Naturally, we think this edition is a substantial improvement and worth all of the effort it has taken. We hope you will agree. We welcome any comments and of course especially welcome reports of errors or misprints that we can correct in subsequent printings.

Supplements

The Instructor's Resource Manual, which course instructors may obtain gratis from Prentice Hall, contains complete answers to all exercises in the text. In addition, Prentice Hall publishes inexpensive student workbooks of practice problems on discrete mathematics, with full solutions to all exercises. The Prentice Hall Companion Web site for this text contains information about such materials.

Users Review

From reader reviews:

Winston Nakashima:

Now a day folks who Living in the era wherever everything reachable by interact with the internet and the resources inside it can be true or not call for people to be aware of each facts they get. How people have to be smart in acquiring any information nowadays? Of course the solution is reading a book. Looking at a book can help persons out of this uncertainty Information specifically this Discrete Mathematics (5th Edition) book as this book offers you rich info and knowledge. Of course the knowledge in this book hundred pct guarantees there is no doubt in it everbody knows.

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