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Erickson, Martin

Pearls of discrete mathematics.

Discrete Mathematics and its Applications. Boca Raton, FL: CRC Press (ISBN 978-1-4398-1616-5/pbk). x, 270 p. (2010).

In this wide ranging introduction to discrete mathematics the author covers a broad variety of subjects in an entertaining manner. The twenty-four chapters are divided into eight topics; Counting (basic, intermediate and advanced), Discrete probability, Number theory, Information theory, Games and Algorithms. The counting topics, which occupy the first nine chapters of the book, covers basic material like subsets of a set, Pascal's triangle, binomial coefficient identities, recurrence relations, and generating functions, as well as some more unusual material like the enumeration of incongruent integer triangles. Thereafter the remaining topics are each divided into three chapters. Every chapter begins with a mathematical teaser, representing a particularly elegant or surprising result. The book is intended to be suitable for self-study, as well as for a topics course. Chapters are kept short, ranging in length from two to about ten pages to facilitate use for self-study purposes. Numerous concrete examples are explored, with theory being introduced as it is needed. At the end of each chapter we find many exercises, ranging in difficulty from easy to challenging, with hints or solutions provided at the back of the book. Various interesting problems are included that would not normally be covered in an introductory course. Some examples include, Rook and Queen paths, Shannon's theorems of information theory, higher-dimensional tic-tac-toe, and an algorithm for solving Sudoku puzzles. The author has a background of over twenty-five years of teaching experience, which guides his concrete approach to the material by way of intriguing examples. Some of the exercises seem quite hard, particularly in view of the brevity of the material presented in each chapter, so the reader may wish to supplement his or her studies by using this book in conjunction with a more standard textbook in discrete mathematics or combinatorics. Similarly, an instructor of a course may wish to use this book for enrichment, together with an introductory book that has more emphasis on theorems and proofs.

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Classification: N70 K20 K50 M40 M50 F60

Keywords: discrete mathematics; counting; combinatorics; discrete probability; number theory; information theory; games; algorithms