

Discrete Mathematical Structures 6th Economy Edition By Bernard Kolman 2008 07 24

Discrete Mathematical Structures, 6th Edition by Bernard Kolman: A Comprehensive Review

Bernard Kolman's *Discrete Mathematical Structures*, 6th edition (2008), remains a cornerstone text for undergraduate courses in discrete mathematics. This comprehensive review examines its strengths, weaknesses, and enduring relevance in the ever-evolving landscape of computer science and mathematics education. We will delve into its key features, pedagogical approach, and its continued value for both students and instructors. Keywords frequently appearing throughout the text and this review include: **graph theory**, **combinatorics**, **Boolean algebra**, **recursive relations**, and **mathematical logic**.

Introduction: A Foundation for Computer Science and Beyond

Kolman's *Discrete Mathematical Structures* provides a rigorous yet accessible introduction to the fundamental concepts underlying discrete mathematics. Published in 2008, the 6th edition benefited from years of refinement and incorporates numerous examples and exercises that solidify understanding. The book systematically builds upon fundamental concepts, moving from basic set theory and logic to more advanced topics such as graph theory and combinatorics. This structured approach makes it suitable for students with varying levels of mathematical preparation. The book's clear and concise writing style, coupled with numerous worked examples and practice problems, ensures that even complex ideas become manageable.

Key Features and Content Overview

The book excels in its organization and coverage of essential topics. The logical progression of topics makes it easy to follow, and the abundance of exercises allows for sufficient practice. Let's explore some key areas:

- **Set Theory and Logic:** The foundation is laid with a solid introduction to set theory, including operations on sets, relations, and functions. This is followed by a thorough exploration of propositional and predicate logic, crucial for understanding logical reasoning and proof techniques. The book expertly connects these fundamental concepts to subsequent chapters, demonstrating their practical applications.
- **Combinatorics and Discrete Probability:** This section covers counting techniques, permutations, combinations, and the binomial theorem. It then elegantly transitions into discrete probability, illustrating how combinatorial principles underpin probability calculations. These chapters are packed with real-world examples, helping students appreciate the practical applications of these powerful mathematical tools.
- **Graph Theory:** A significant portion of the book is dedicated to graph theory, covering topics such as trees, directed graphs, and graph algorithms. This section is particularly relevant for computer science students, as graph theory underpins many algorithms and data structures. The book's examples delve into different representations of graphs (adjacency matrices, adjacency lists), making it a practical resource for students seeking real-world application knowledge.
- **Boolean Algebra and Switching Circuits:** The introduction to Boolean algebra provides a bridge between mathematical logic and its application in computer engineering. The book effectively connects Boolean expressions to switching circuits, offering a clear and concise explanation of their equivalence and practical applications in digital circuit design. This helps solidify the theoretical concepts within a tangible context.
- **Recursive Relations and Algorithm Analysis:** The exploration of recursive relations and the introduction to algorithm analysis equip students with the tools to understand the efficiency of algorithms. Understanding algorithmic complexity is critical in modern computer science, and this section provides a solid foundation.

Pedagogical Approach and Strengths

Kolman's *Discrete Mathematical Structures* distinguishes itself through its pedagogical approach. The book emphasizes conceptual understanding over rote memorization. Each concept is introduced with clear explanations, accompanied by numerous examples and practice problems. The exercises range from routine drills to more challenging problems that encourage critical thinking and problem-solving skills. This balanced approach ensures that students develop both a strong theoretical foundation and the ability to apply their knowledge to practical problems.

One notable strength lies in the clarity of its writing style. Complex mathematical concepts are explained in a straightforward manner, making them accessible to students with diverse mathematical backgrounds. The use of real-world examples and applications keeps the material engaging and relevant. The extensive number of exercises further enhances its pedagogical effectiveness, allowing students to solidify their understanding through practice.

Weaknesses and Limitations

While the book is generally well-regarded, it does have some limitations. The 2008 publication date means some advancements in the field may not be reflected. Also, some students might find the pace of the book challenging, particularly those with limited prior exposure to mathematical concepts. Finally, some might desire a more extensive exploration of certain topics, given the vastness of discrete mathematics.

Conclusion: An Enduring Resource for Discrete Mathematics

Despite its age, Kolman's *Discrete Mathematical Structures*, 6th edition, continues to be a valuable resource for students learning discrete mathematics. Its comprehensive coverage of fundamental concepts, clear explanations, and ample practice problems make it a suitable text for undergraduate courses. While some limitations exist due to its publication date, its strengths in organization, clarity, and pedagogical approach ensure its continued relevance. The book successfully bridges the gap between theoretical understanding and practical applications, equipping students with the essential tools for success in fields like computer science, engineering, and mathematics.

FAQ

Q1: Is this book suitable for self-study?

A1: Yes, the book's clear explanations and numerous examples make it suitable for self-study. However, access to additional resources, such as online forums or tutoring, might be beneficial for addressing challenges encountered during self-learning. The comprehensive index and clear chapter organization significantly aid self-directed learning.

Q2: What mathematical background is required to use this book effectively?

A2: A basic understanding of high school algebra and some familiarity with mathematical proofs are helpful but not strictly required. The book builds upon fundamental concepts and provides sufficient background information to enable students with varying levels of prior mathematical experience to follow along effectively.

Q3: What are the best alternative textbooks for discrete mathematics?

A3: There are many excellent texts for discrete mathematics. Some popular alternatives include Rosen's *Discrete Mathematics and Its Applications* and Johnsonbaugh's *Discrete Mathematics*. The best choice depends on the specific curriculum and learning style.

Q4: How does this book compare to online resources for learning discrete mathematics?

A4: Online resources such as Khan Academy and MIT OpenCourseware offer supplementary learning materials. However, Kolman's book provides a structured and comprehensive approach to discrete mathematics that online resources may not always match. The book's rigorous treatment of topics and systematic progression of concepts remain a significant advantage.

Q5: Are the solutions to the exercises available?

A5: While the book itself may not contain all solutions, instructor's manuals often provide answers, and various online resources might offer solutions to some or all problems.

Q6: Is this book still relevant given recent advancements in discrete mathematics?

A6: While the 2008 publication date means some very recent advancements aren't included, the core concepts and techniques covered in the book remain fundamental to the field. The foundational knowledge provided is still highly relevant and applicable to current research and practical problems.

Q7: What makes this book particularly suitable for computer science students?

A7: Its comprehensive coverage of graph theory, Boolean algebra, and algorithm analysis directly relates to essential concepts in computer science. These chapters provide a robust foundation for further studies in algorithms, data structures, and computer architecture.

Q8: Are there any errata or updated versions available?

A8: It's advisable to check the publisher's website or online forums for any known errata or information on subsequent editions. While no later editions exist with the same title, newer texts often incorporate corrections and improvements on previous editions.

Delving into the World of Discrete Mathematical Structures: A Look at Kolman's Sixth Edition

Examining the realm of discrete mathematics can appear like embarking on a journey through a fascinating region of logic and framework. Bernard Kolman's *Discrete Mathematical Structures, 6th Economy Edition* (2008) serves as a trustworthy companion for this thrilling adventure. This article will provide a detailed analysis of this fundamental text, underscoring its main characteristics and examining its applicable implementations.

The book's strength lies in its capacity to explain complex principles in a lucid and accessible manner. Kolman masterfully maneuvers the learner through manifold topics, extending from fundamental argumentation and set theory to further complex topics like graph theory, combinatorics, and recurrence relations. The economy edition does not sacrifice on content, rendering it an extraordinarily cost-effective tool for individuals seeking a solid foundation in discrete mathematics.

One of the most important components of the book is its focus on practical {applications|. The author doesn't simply explain abstract concepts; instead, he illustrates their importance through many examples drawn from varied disciplines, including computer science, engineering, and operations research. This technique renders the material much interesting and aids students to understand the significance of the concepts they are learning.

The publication's layout is logically structured, advancing from simpler ideas to further challenging ones. Each section commences with a concise statement of goals, succeeded by thoroughly explained concepts, theorems, and verifications. Abundant problems are offered at the termination of each chapter, permitting students to test their understanding and develop their critical thinking abilities.

The sixth edition also contains revisions and enhancements founded on comments from educators and pupils. This repetitive process assures that the text remains applicable and modern.

In closing, Bernard Kolman's *Discrete Mathematical Structures, 6th Economy Edition* is a highly recommended textbook for individuals seeking a thorough comprehension of discrete mathematics. Its lucid exposition, practical uses, and logically organized technique make it an extremely valuable resource for both learners and teachers. Its affordability further enhances its appeal.

Frequently Asked Questions (FAQs):

1. Q: Is this book suitable for self-study?

A: Yes, the clear explanations and numerous examples make it well-suited for self-directed learning. The exercises provide ample opportunity for practice and reinforcement.

2. Q: What prerequisite knowledge is required?

A: A basic understanding of algebra and some familiarity with mathematical proofs are helpful, but not strictly required. The book covers many fundamental concepts.

3. Q: What are the major applications of discrete mathematics covered in this book?

A: The book covers applications in computer science (algorithms, data structures, database design), engineering (network design, optimization problems), and operations research (combinatorial optimization, graph theory applications).

4. Q: How does this edition differ from previous editions?

A: While the core content remains the same, the sixth edition likely includes minor updates, corrections, and potentially some reorganization or addition of material based on feedback from previous users. Specific changes would need to be compared against older editions.

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