Logic and Discrete Mathematics

A Concise Introduction

WILLEM CONRADIE
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Logic And Discrete Mathematics A Concise Introduction

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Logic And Discrete Mathematics A Concise Introduction:

   Logic and Discrete Mathematics Willem Conradie,Valentin Goranko,2015-04-16 A concise yet rigorous introduction to logic and discrete mathematics This book features a unique combination of comprehensive coverage of logic with a solid exposition of the most important fields of discrete mathematics presenting material that has been tested and refined by the authors in university courses taught over more than a decade The chapters on logic propositional and first order provide a robust toolkit for logical reasoning emphasizing the conceptual understanding of the language and the semantics of classical logic as well as practical applications through the easy to understand and use deductive systems of Semantic Tableaux and Resolution The chapters on set theory number theory combinatorics and graph theory combine the necessary minimum of theory with numerous examples and selected applications Written in a clear and reader friendly style each section ends with an extensive set of exercises most of them provided with complete solutions which are available in the accompanying solutions manual Key Features Suitable for a variety of courses for students in both Mathematics and Computer Science Extensive in depth coverage of classical logic combined with a solid exposition of a selection of the most important fields of discrete mathematics Concise clear and uncluttered presentation with numerous examples Covers some applications including cryptographic systems discrete probability and network algorithms Logic and Discrete Mathematics A Concise Introduction is aimed mainly at undergraduate courses for students in mathematics and computer science but the book will also be a valuable resource for graduate modules and for self study   **Logic and Discrete Mathematics** Willem Conradie,Valentin Goranko,Claudette Robinson,2015-06-15 Solutions manual to accompany Logic and Discrete Mathematics A Concise Introduction This book features a unique combination of comprehensive coverage of logic with a solid exposition of the most important fields of discrete mathematics presenting material that has been tested and refined by the authors in university courses taught over more than a decade Written in a clear and reader friendly style each section ends with an extensive set of exercises most of them provided with complete solutions which are available in this accompanying solutions manual   **Discrete Mathematics** George Tourlakis,2024-01-03 This book is ideal for a first or second year discrete mathematics course for mathematics engineering and computer science majors The author has extensively class tested early conceptions of the book over the years and supplements mathematical arguments with informal discussions to aid readers in understanding the presented topics Safe that is paradox free informal set theory is introduced following on the heels of Russell s Paradox as well as the topics of finite countable and uncountable sets with an exposition and use of Cantor s diagonalisation technique Predicate logic for the user is introduced along with axioms and rules and extensive examples Partial orders and the minimal condition are studied in detail with the latter shown to be equivalent to the induction principle Mathematical induction is illustrated with several examples and is followed by a thorough exposition of inductive definitions of functions and sets Techniques for solving recurrence relations including generating functions the O and o notations and

trees are provided Over 200 end of chapter exercises are included to further aid in the understanding and applications of discrete mathematics   A Concise Introduction to Mathematical Logic Wolfgang Rautenberg,2006 This book is unique in treating mathematical logic in a concise and streamlined fashion This allows many important topics to be covered in a one semester course Although the book is intended for use as a graduate text the first three chapters can be understood by undergraduates interested in mathematical logic The remaining chapters contain material on logic programming for computer scientists model theory recursion theory Godel s Incompleteness Theorems and applications of mathematical logic Philosophical and foundational problems of mathematics are discussed throughout the text and the author has provided exercises for each chapter as well as hints to selected exercises Traditional logic as a part of philosophy is one of the oldest scientific disciplines Mathematical logic however is a relatively young discipline and arose from the endeavors of Peano Frege Russell and others to create a logistic foundation for mathematics   Discrete Mathematics Dr. Rifaqat Ali, Dr. R. Suryanarayana, Dr. S. V. Subrahmanyam, Miss Prem Lata ,2025-09-15 Discrete Mathematics is the study of mathematical structures that are fundamentally discrete rather than continuous It provides the theoretical foundation for computer science and information technology The course covers key topics such as set theory logic relations functions combinatorics graph theory and Boolean algebra   **Discrete Mathematics and Its Applications** Dr. R. Pushpalatha, Dr Lalit Mohan Trivedi, Dr. Javid Iqbal, Dr. D. Srinivasa Rao,2026-01-30 Discrete Mathematics and Its Applications introduces the fundamental mathematical structures and techniques used in computer science and engineering The subject covers logic set theory relations functions combinatorics graph theory trees and Boolean algebra It emphasizes problem solving methods proof techniques and mathematical reasoning essential for algorithm design and analysis The course also explores applications in data structures cryptography network modeling and digital systems It provides a strong theoretical foundation for advanced studies in computer science information technology and related fields   *Logic as a Tool* Valentin Goranko,2016-10-17 Written in a clear precise and user friendly style Logic as a Tool A Guide to Formal Logical Reasoning is intended for undergraduates in both mathematics and computer science and will guide them to learn understand and master the use of classical logic as a tool for doing correct reasoning It offers a systematic and precise exposition of classical logic with many examples and exercises and only the necessary minimum of theory The book explains the grammar semantics and use of classical logical languages and teaches the reader how grasp the meaning and translate them to and from natural language It illustrates with extensive examples the use of the most popular deductive systems axiomatic systems semantic tableaux natural deduction and resolution for formalising and automating logical reasoning both on propositional and on first order level and provides the reader with technical skills needed for practical derivations in them Systematic guidelines are offered on how to perform logically correct and well structured reasoning using these deductive systems and the reasoning techniques that they employ Concise and systematic exposition with semi formal but rigorous treatment of the minimum

necessary theory amply illustrated with examples Emphasis both on conceptual understanding and on developing practical skills Solid and balanced coverage of syntactic semantic and deductive aspects of logic Includes extensive sets of exercises many of them provided with solutions or answers Supplemented by a website including detailed slides additional exercises and solutions For more information browse the book s website at https logicasatool wordpress com *Discrete Mathematics and Graph Theory* K. Erciyes,2021-01-28 This textbook can serve as a comprehensive manual of discrete mathematics and graph theory for non Computer Science majors as a reference and study aid for professionals and researchers who have not taken any discrete math course before It can also be used as a reference book for a course on Discrete Mathematics in Computer Science or Mathematics curricula The study of discrete mathematics is one of the first courses on curricula in various disciplines such as Computer Science Mathematics and Engineering education practices Graphs are key data structures used to represent networks chemical structures games etc and are increasingly used more in various applications such as bioinformatics and the Internet Graph theory has gone through an unprecedented growth in the last few decades both in terms of theory and implementations hence it deserves a thorough treatment which is not adequately found in any other contemporary books on discrete mathematics whereas about 40% of this textbook is devoted to graph theory The text follows an algorithmic approach for discrete mathematics and graph problems where applicable to reinforce learning and to show how to implement the concepts in real world applications **Introduction to Discrete Mathematics via Logic and Proof** Calvin Jongsma,2019-11-08 This textbook introduces discrete mathematics by emphasizing the importance of reading and writing proofs Because it begins by carefully establishing a familiarity with mathematical logic and proof this approach suits not only a discrete mathematics course but can also function as a transition to proof Its unique deductive perspective on mathematical logic provides students with the tools to more deeply understand mathematical methodology an approach that the author has successfully classroom tested for decades Chapters are helpfully organized so that as they escalate in complexity their underlying connections are easily identifiable Mathematical logic and proofs are first introduced before moving onto more complex topics in discrete mathematics Some of these topics include Mathematical and structural induction Set theory Combinatorics Functions relations and ordered sets Boolean algebra and Boolean functions Graph theory Introduction to Discrete Mathematics via Logic and Proof will suit intermediate undergraduates majoring in mathematics computer science engineering and related subjects with no formal prerequisites beyond a background in secondary mathematics A Concise Introduction to Computer Languages Daniel Cooke,2003 Daniel Cooke s new text provides an innovative approach that makes the teaching of methods and mathematical tools employed in designing a language accessible to students Although many professors find this material to be important some limit the coverage of language design topics as a result of students struggles with mathematics The author covers material on language syntax language semantics and language translation in the first half of the book while relying on the mathematics students have

learned in their previous classes He continues to draw on this material throughout the book as needed after students have received the background they need in the formal underpinnings of all languages The author presents paradigms and languages in the context of language design For instance in Chapter 5 he introduces imperative and procedural programming as the foundations of other languages along with input output if and else statements loop statements and arithmetics As new paradigms are introduced he revisits these basic constructs and discusses the decisions to add modify and or delete them based on the problem solving abstraction As a result students are better able to grasp new languages by understanding their unique features as well as features shared with other languages **N-ary Relations for Logical Analysis of Data and Knowledge** Kulik, Boris,Fridman, Alexander,2017-11-30 Mathematics has been used as a tool in logistical reasoning for centuries Examining how specific mathematic structures can aid in data and knowledge management helps determine how to efficiently and effectively process more information in these fields N ary Relations for Logical Analysis of Data and Knowledge is a critical scholarly reference source that provides a detailed study of the mathematical techniques currently involved in the progression of information technology fields Featuring relevant topics that include algebraic sets deductive analysis defeasible reasoning and probabilistic modeling this publication is ideal for academicians students and researchers who are interested in staying apprised of the latest research in the information technology field

Discrete Mathematics and Combinatorics T. Sengadir,2009-09 Discrete Mathematics and Combinatorics provides a concise and practical introduction to the core components of discrete mathematics featuring a balanced mix of basic theories and applications The book covers both fundamental concepts such as sets and logic as well as advanced topics such as graph theory and Turing machines The example driven approach will help readers in understanding and applying the concepts Other pedagogical tools illustrations practice questions and suggested reading facilitate learning and mastering the subject Cover **Discrete Mathematics** Narendra S. Chaudhari,2005 Discrete Mathematics George J. Tourlakis,2024 This book is ideal for a first or second year discrete mathematics course for mathematics engineering and computer science majors The author has extensively class tested early conceptions of the book over the years and supplements mathematical arguments with informal discussions to aid readers in understanding the presented topics Safe that is paradox free informal set theory is introduced following on the heels of Russell s Paradox as well as the topics of finite countable and uncountable sets with an exposition and use of Cantor s diagonalisation technique Predicate logic for the user is introduced along with axioms and rules and extensive examples Partial orders and the minimal condition are studied in detail with the latter shown to be equivalent to the induction principle Mathematical induction is illustrated with several examples and is followed by a thorough exposition of inductive definitions of functions and sets Techniques for solving recurrence relations including generating functions the O and o notations and trees are provided Over 200 end of chapter exercises are included to further aid in the understanding and applications of discrete mathematics In addition this book Provides a concise but

mathematically rigorous and correct approach with examples and exercises to help readers understand key definitions and theorems Features careful attention to current mathematical terminology mathematical techniques and results Presents coverage of equivalence and order relations minimal condition and inductive definitions of functions and sets   *Discrete and Algebraic Structures* Kolja Knauer,Ulrich Knauer,2025-05-24 This textbook presents the topics typically covered in a standard course on discrete structures It is aimed at students of computer science and mathematics teaching degree and Bachelor s Master s and is designed to accompany lectures for self study and for exam preparation Through explanatory introductions to definitions numerous examples counterexamples diagrams cross references and outlooks the authors manage to present the wide range of topics concisely and comprehensibly Numerous exercises facilitate the deepening of the material Due to its compact presentation of all important discrete and algebraic structures and its extensive index the book also serves as a reference for mathematicians computer scientists and natural scientists Contents From propositional and predicate logic to sets and combinatorics numbers relations and mappings graphs to the rich spectrum of algebraic structures and a brief introduction to category theory Additional chapters include rings and modules as well as matroids This book is a translation of the second German edition The translation was done with the help of artificial intelligence A subsequent human revision was done primarily in terms of content so the book may read stylistically differently from a conventional translation   **Write Your Own Proofs in Set Theory and Discrete Mathematics** Amy Babich,Laura Person,2005   A Logical Approach to Discrete Math David Gries,Fred B. Schneider,2013-03-14 This text attempts to change the way we teach logic to beginning students Instead of teaching logic as a subject in isolation we regard it as a basic tool and show how to use it We strive to give students a skill in the propo sitional and predicate calculi and then to exercise that skill thoroughly in applications that arise in computer science and discrete mathematics We are not logicians but programming methodologists and this text reflects that perspective We are among the first generation of scientists who are more interested in using logic than in studying it With this text we hope to empower further generations of computer scientists and math ematicians to become serious users of logic Logic is the glue Logic is the glue that binds together methods of reasoning in all domains The traditional proof methods for example proof by assumption con tradiction mutual implication and induction have their basis in formal logic Thus whether proofs are to be presented formally or informally a study of logic can provide understanding   **Mathematics Today** ,2002   **The Essence of Discrete Mathematics** Neville Dean,1997 Presenting a gentle introduction to all the basics of discrete mathematics this book introduces sets propositional logic predicate logic and mathematical models It discusses relations including homogeneous relations   *An Introduction to Discrete Mathematics* Steven Roman,1989 Intended for a one term course in discrete mathematics to prepare freshmen and sophomores for further work in computer science as well as mathematics Sets proof techniques logic combinatorics and graph theory are covered in concise form All topics are motivated by concrete examples often emphasizing

the interplay between computer science and mathematics Examples also illustrate all definitions Applications and references cover a wide variety of realistic situations Coverage of mathematical induction includes the stroung form of induction and new sections have been added on nonhomogeneous recurrence relations and the essentials of probability

The Enigmatic Realm of **Logic And Discrete Mathematics A Concise Introduction**: Unleashing the Language is Inner Magic

In a fast-paced digital era where connections and knowledge intertwine, the enigmatic realm of language reveals its inherent magic. Its capacity to stir emotions, ignite contemplation, and catalyze profound transformations is nothing short of extraordinary. Within the captivating pages of **Logic And Discrete Mathematics A Concise Introduction** a literary masterpiece penned by a renowned author, readers embark on a transformative journey, unlocking the secrets and untapped potential embedded within each word. In this evaluation, we shall explore the book is core themes, assess its distinct writing style, and delve into its lasting affect the hearts and minds of those that partake in its reading experience.

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