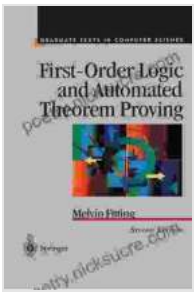
First Order Logic and Automated Theorem Proving: Essential Texts in Computer Science

First order logic (FOL) and automated theorem proving (ATP) are fundamental concepts in computer science, providing a formal system for representing and reasoning about knowledge. This article explores key textbooks that lay the foundations for this field, guiding readers through the principles and applications of FOL and ATP.



First-Order Logic and Automated Theorem Proving (Texts in Computer Science) by Melvin Fitting

4 out of 5

Language	: English
File size	: 29501 KB
Screen Reader	: Supported
Print length	: 326 pages

to First Order Logic:

- **Title:** to First-Order Logic
- **Authors:** Peter Smith
- **Description:** A comprehensive to FOL, covering syntax, semantics, proof techniques, and applications in mathematics and computer science.
- **Audience:** Students and researchers in computer science, mathematics, and related fields.

This text provides a clear and thorough exploration of FOL, with detailed examples and exercises to reinforce understanding. It emphasizes the connection between logic and computer science, highlighting its use in knowledge representation, automated reasoning, and program verification.

2. Automated Theorem Proving:

- **Title:** Automated Theorem Proving: An
- **Authors:** John Harrison
- **Description:** A concise and practical guide to ATP, covering different proof strategies, automated reasoning systems, and their applications.
- **Audience:** Students, researchers, and practitioners in software verification, artificial intelligence, and computer security.

This text focuses on the practical aspects of ATP, providing insights into the design and implementation of automated reasoning systems. It discusses various algorithms and techniques for automated proof search, such as resolution, tableau, and model checking.

3. Logic for Computer Science:

- **Title:** Logic for Computer Scientists
- **Authors:** Uwe Schöning
- **Description:** A comprehensive and in-depth treatment of logic for computer science, encompassing classical logic, modal logic, and computational logic.
- **Audience:** Advanced undergraduate and graduate students in computer science, mathematics, and related fields.

This text provides a rigorous and formal foundation in logic, exploring its applications in software engineering, program synthesis, and artificial intelligence. It covers both theoretical and practical aspects, combining logical reasoning with computer science principles.

4. Proof Engineering:

- **Title:** Proof Engineering: Automated Theorem Proving and Formal Specification
- **Authors:** Donald MacKenzie and Mojtaba Mojtahedi
- **Description:** A practical to proof engineering, focusing on the use of automated theorem provers for software specification, verification, and validation.
- **Audience:** Engineers, researchers, and developers in software development, formal methods, and computer security.

This text bridges the gap between theoretical ATP and practical software engineering. It provides detailed case studies and real-world examples, showcasing how proof engineering can enhance software quality and reliability.

5. Computational Logic:

- **Title:** Computational Logic: A Logical Approach to Problem Solving and Reasoning
- **Authors:** G. Chen, J. Shepherdson, T. Slaman, and Y. Wang
- **Description:** A comprehensive and advanced treatise on computational logic, covering higher-order logic, logic programming, and non-classical logics.

- **Audience:** Researchers and advanced students in computer science, logic, and related fields.

This text provides a comprehensive exploration of the connections between logic and computation. It discusses advanced topics such as meta-logic, deduction, and natural language processing, highlighting the role of logic in modern computing.

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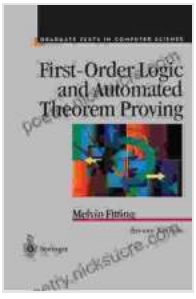
First Order Logic and Automated Theorem Proving are crucial foundations in computer science, enabling researchers and practitioners to reason formally about complex problems. These textbooks provide comprehensive and rigorous treatments of these topics, guiding readers through the theoretical and practical aspects of FOL and ATP. By mastering the concepts presented in these texts, students and researchers can gain a strong foundation for research and development in areas such as software verification, artificial intelligence, and program analysis.



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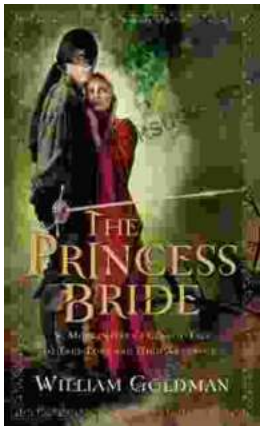

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