Handbook of logic and proof techniques for computer science by Steven G. Krantz, Birkhauser Verlag AG, Klösterberg 23, CH 4010, Basel, Switzerland, 2002, pp. 245, CHF 98.

This book is meant as a kind of ready reckoner on the subject of logic and foundational aspects of mathematics for working mathematical scientists, particularly computer scientists and engineers. The author is a senior mathematician who has more than a dozen books on mathematics to his credit.

The author's motivation for undertaking this rather Herculean task—a handbook on a vast subject like logic written single-handedly—is that the classical handbooks on logic written by logicians for other working mathematicians (like the popular one edited by Jon Barwise) are far too technical and hence out of reach of many of their intended audience. In contrast, this handbook is aimed at readers who might have no more than a 'passing acquaintance, with logic.

One doubts though the extent to which the author's objectives has been achieved in this book. While the content is certainly fairly comprehensive, with topics ranging from axiomatic set theory to Gödels incompleteness theorems, and from elementary discrete mathematics to computability and complexity theory, there can be no substitute for clarity, insight, and detail. This is all the more vital when the intended reader is a nonspecialist. I found the book somewhat disorganized, with repeated matter and ubiquitous cross-references, and in general, very disconnected. An amateur job of typesetting and several misprints further serve to make the reader doubt the authority of the material itself, something one relies on so vitally in a handbook. As an example, it is difficult to locate references in the bibliography as the references are sorted according to author names and not according to the reference labels which appear in the book.

The book might be better described as a glossary rather than a handbook since it is more in the nature of a collection of definitions and results with few insightful elaborations. This is true of most of the book barring some material on discrete maths like elementary set theory and proof techniques like induction. Even here one is surprised to see the notation $2S$ for the power set of S attributed to the exponential number of subsets of S, rather than to the fact that XY usually denotes the set of all functions from Y to X.

Certain aspects of the handbook were nonetheless quite informative. I found the choice of topics and their encapsulation into bite-sized chapters quite appealing. The material on the foundational aspects of set theory was illuminating, particularly the use of Zermelo-Fraenkel axioms to overcome the inconsistencies in Cantorian set theory pointed out by Russel, and the rather surprising existence of counter-intuitive consequences of both the Axiom of Choice and its negation. Each chapter begins with a number of pithy quotations like this telling one in the chapter on the Axiom of Choice, attributed to Jerry Bona – "The Axiom of Choice is obviously true; the well-ordering principle is clearly false; and who can tell about Zorn's lemma?"

The book contains a fairly detailed exposition on Gödel’s incompleteness theorems and computability, but it made for rather difficult reading. I happened to refer to the same material in Dexter Kozen’s book on Automata and Computability, and couldn’t help remarking on the appreciable clarity and precision in the latter. Certainly for a computer scientist trying to understand the gist of Gödel’s results, he would be better guided towards Kozen’s book rather than this present handbook.

In summary, the book held out a great deal of promise to begin with, but failed to deliver on most fronts. The authors objective is certainly laudable, and one can see such a book fulfilling a real need of the research community. But it is going to take a lot more talent and industry than what has gone into this book. Such a task would best be undertaken by an active researcher in the area.

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