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22nd International Conference, TPHOLs 2009, Munich, Germany, August 17-20, 2009, Proceedings
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Categorical Logic and Type Theory
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The Uncertain Reasoner's Companion
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Taking the Curry-Howard Correspondence Seriously

FINLEY SHAYLEE

An Introduction
PediaPress
Type theory is a fast-evolving field at the crossroads of logic, computer science and mathematics. This gentle step-by-step introduction is ideal for graduate students and researchers who need to understand the ins and outs of the mathematical machinery, the role of logical rules therein, the essential contribution of definitions and the decisive nature of well-structured proofs. The authors begin with untyped lambda calculus and proceed to several fundamental type systems, including the well-known and powerful Calculus of Constructions. The book also covers the essence of proof checking and proof development, and the use of dependent type theory to formalise mathematics. The only prerequisite is a basic knowledge of undergraduate mathematics. Carefully chosen examples illustrate the theory throughout. Each chapter ends with a summary of the content, some historical context, suggestions for further reading and a selection of exercises to help readers familiarise themselves with the material.
Concise Encyclopedia of Semantics
Cambridge University Press

Concise Encyclopedia of Semantics is a comprehensive new reference work aiming to systematically describe all aspects of the study of meaning in language. It synthesizes in one volume the latest scholarly positions on the construction, interpretation, clarification, obscurity, illustration, amplification, simplification, negotiation, contradiction, contraction and paraphrasing of meaning, and the various concepts, analyses, methodologies and technologies that underpin their study. It examines not only semantics but the impact of semantic study on related fields such as morphology, syntax, and typologically oriented studies such as ‘grammatical semantics’, where semantics has made a considerable contribution to our understanding of verbal categories like tense or aspect, nominal categories like case or possession, clausal categories like causatives, comparatives, or conditionals, and discourse phenomena like reference and anaphora. COSE also examines lexical semantics and its relation to syntax, pragmatics, and cognitive linguistics; and the study of how ‘logical semantics’ develops and thrives, often in interaction with computational linguistics. As a derivative volume from

Encyclopedia of Language and Linguistics, Second Edition, it comprises contributions from 150 of the foremost scholars of semantics in their various specializations and draws on 20+ years of development in the parent work in a compact and affordable format. Principally intended for tertiary level inquiry and research, this will be invaluable as a reference work for undergraduate and postgraduate students as well as academics inquiring into the study of meaning and meaning relations within languages. As semantics is a centrally important and inherently cross-cutting area within linguistics it will therefore be relevant not just for semantics specialists, but for most linguistic audiences. The first encyclopedia ever published in this fascinating and diverse field Combines the talents of the world's leading semantics specialists The latest trends in the field authoritatively reviewed and interpreted in context of related disciplines Drawn from the richest, most authoritative, comprehensive and internationally acclaimed reference resource in the linguistics area Compact and affordable single volume reference format

A Philosophical Biography Cambridge University Press

With the omnipresence

of micro devices in our daily lifes embedded software has gained tremendous importance in both science and industry.This volume contains 34 invited papers from the First International Workshop on Embedded Systems. They present latest research results from different areas of computer science that are traditionally distinct but relevant to embedded software development (such as, for example, component based design, functional programming, real-time Java, resource and storage allocation, verification). Each paper focuses on one topic, showing the inter-relationship and application to the design and implementation of embedded software systems.

Type Theory and Formal Proof University of Chicago Press

Unified and self-contained introduction to term-rewriting; suited for students or professionals.

Category Theory in Context Cambridge University Press

This two-volume set LNAI 12166 and 12167 constitutes the refereed proceedings of the 10th International Joint Conference on Automated Reasoning, IJCAR 2020, held in Paris, France, in July 2020.* In 2020, IJCAR was a merger of the following leading events, namely CADE (International Conference on Automated Deduction), FroCoS (International

Symposium on Frontiers of Combining Systems), ITP (International Conference on Interactive Theorem Proving), and TABLEAUX (International Conference on Analytic Tableaux and Related Methods). The 46 full research papers, 5 short papers, and 11 system descriptions presented together with two invited talks were carefully reviewed and selected from 150 submissions. The papers focus on the following topics: Part I: SAT; SMT and QBF; decision procedures and combination of theories; superposition; proof procedures; non classical logics Part II: interactive theorem proving/ HOL; formalizations; verification; reasoning systems and tools *The conference was held virtually due to the COVID-19 pandemic. Chapter 'A Fast Verified Liveness Analysis in SSA Form' is available open access under a Creative Commons Attribution 4.0 International License via link.springer.com.

Type Theory and Formal Proof Cambridge University Press

A concise introduction to structural proof theory, a branch of logic studying the general structure of logical and mathematical proofs.

Derivation and Computation Courier Dover Publications

The Cambridge Advanced Learner's Dictionary gives the vital support which

advanced students need, especially with the essential skills: reading, writing, listening and speaking. In the book: * 170,000 words, phrases and examples * New words: so your English stays up-to-date * Colour headwords: so you can find the word you are looking for quickly * Idiom Finder * 200 'Common Learner Error' notes show how to avoid common mistakes * 25,000 collocations show the way words work together * Colour pictures: 16 full page colour pictures On the CD-ROM: * Sound: recordings in British and American English, plus practice tools to help improve pronunciation * UNIQUE! Smart Thesaurus helps you choose the right word * QUICKfind looks up words for you while you are working or reading on screen * UNIQUE! SUPERwrite gives on screen help with grammar, spelling and collocation when you are writing * Hundreds of interactive exercises

Categories for Types

Cambridge University Press

This book constitutes the thoroughly refereed revised selected papers of the 20th International Symposium on Trends in Functional Programming, TFP 2019, held in Vancouver, Canada, in June 2019. The 6 revised full papers were selected from 11 submissions and present papers in all aspects of functional programming, taking a broad view of current

and future trends in the area. It aspires to be a lively environment for presenting the latest research results, and other contributions, described in draft papers submitted prior to the symposium.
Quantum Computation and Quantum Information MIT Press
Bertrand Russell ranks as one of the giants of twentieth-century philosophy. Through his books, journalism, correspondence and political activity he exerted a profound influence on modern thought. This companion centers on Russell's contributions to modern philosophy and, therefore, concentrates on the early part of his career. There are chapters on Russell's contributions to the foundations of mathematics, and on his development of logical methods in philosophy and their application to such fields as epistemology, metaphysics and the philosophy of language. The intellectual background to his work is covered, as is his engagement with such contemporaries as Frege and G. E. Moore. The final chapter considers Russell as a moral philosopher. New readers will find this the most convenient and accessible guide to Russell available. Advanced students and specialists will find a conspectus of recent developments in the interpretation of Russell.
10th International Joint Conference, IJCAR 2020, Paris, France, July 1–4, 2020,

Proceedings, Part II Cambridge University Press
This is an introduction to the mathematical foundations of uncertain reasoning.
An Introduction Cambridge University Press
This book constitutes the refereed proceedings of the 5th International Colloquium on Theoretical Aspects of Computing, ICTAC 2008 held in Istanbul, Turkey in September 2008. The 27 revised full papers were carefully reviewed and selected from over 70 submissions. The aim of the colloquium is to bring together practitioners and researchers from academia, industry and government to present research results, and exchange experience, ideas, and solutions for their problems in theoretical aspects of computing such as automata theory and formal languages, principles and semantics of programming languages, software architectures and their description languages, software specification, refinement, and verification, model checking and theorem proving, real-time, embedded and hybrid systems, theory of parallel, distributed, and internet-based (grid) computing, simulation and modeling, and service-oriented development.
To Truth Through Proof Cambridge University Press
An introduction to category theory as a rigorous, flexible, and coherent modeling

language that can be used across the sciences. Category theory was invented in the 1940s to unify and synthesize different areas in mathematics, and it has proven remarkably successful in enabling powerful communication between disparate fields and subfields within mathematics. This book shows that category theory can be useful outside of mathematics as a rigorous, flexible, and coherent modeling language throughout the sciences. Information is inherently dynamic; the same ideas can be organized and reorganized in countless ways, and the ability to translate between such organizational structures is becoming increasingly important in the sciences. Category theory offers a unifying framework for information modeling that can facilitate the translation of knowledge between disciplines. Written in an engaging and straightforward style, and assuming little background in mathematics, the book is rigorous but accessible to non-mathematicians. Using databases as an entry to category theory, it begins with sets and functions, then introduces the reader to notions that are fundamental in mathematics: monoids, groups, orders, and graphs—categories in disguise. After explaining the “big three” concepts of category

theory—categories, functors, and natural transformations—the book covers other topics, including limits, colimits, functor categories, sheaves, monads, and operads. The book explains category theory by examples and exercises rather than focusing on theorems and proofs. It includes more than 300 exercises, with solutions. Category Theory for the Sciences is intended to create a bridge between the vast array of mathematical concepts used by mathematicians and the models and frameworks of such scientific disciplines as computation, neuroscience, and physics.

Notes on Logic and Set Theory Cambridge University Press

Type theory is one of the most important tools in the design of higher-level programming languages, such as ML. This book introduces and teaches its techniques by focusing on one particularly neat system and studying it in detail. By concentrating on the principles that make the theory work in practice, the author covers all the key ideas without getting involved in the complications of more advanced systems. This book takes a type-assignment approach to type theory, and the system considered is the simplest polymorphic one. The author covers all the basic ideas, including the system's relation to propositional logic, and

gives a careful treatment of the type-checking algorithm that lies at the heart of every such system. Also featured are two other interesting algorithms that until now have been buried in inaccessible technical literature. The mathematical presentation is rigorous but clear, making it the first book at this level that can be used as an introduction to type theory for computer scientists.

11th International Symposium, FoIKS 2020, Dortmund, Germany, February 17–21, 2020, Proceedings

Cambridge University Press

Combinatory logic and lambda-calculus, originally devised in the 1920's, have since developed into linguistic tools, especially useful in programming languages. The authors' previous book served as the main reference for introductory courses on lambda-calculus for over 20 years: this long-awaited new version is thoroughly revised and offers a fully up-to-date account of the subject, with the same authoritative exposition. The grammar and basic properties of both combinatory logic and lambda-calculus are discussed, followed by an introduction to type-theory. Typed and untyped versions of the systems, and their differences, are covered. Lambda-calculus models, which lie behind much of the semantics of

programming languages, are also explained in depth. The treatment is as non-technical as possible, with the main ideas emphasized and illustrated by examples. Many exercises are included, from routine to advanced, with solutions to most at the end of the book.
Category Theory for the Sciences Elsevier
First-ever comprehensive introduction to the major new subject of quantum computing and quantum information.
Practical Foundations for Programming Languages Cambridge University Press
A comprehensive investigation of the sentence connectives--and, or, if, not--with special attention to their logical properties. In The Connectives, Lloyd Humberstone examines the semantics and pragmatics of natural language sentence connectives (and, or, if, not), giving special attention to their formal behavior according to proposed logical systems and the degree to which such treatments capture their intuitive meanings. It will be an essential resource for philosophers, mathematicians, computer scientists, linguists, or any scholar who finds connectives, and the conceptual issues surrounding them, to be a source of interest. This landmark work offers both general material on sentence

connectives in formal logic, such as truth-functionality and unique characterization by rules, and information on specific connectives (including conjunction and disjunction), considering their pragmatic and semantic properties in natural language as well as various attempts to simulate the latter in the formal languages of different systems of propositional logic. Chapters are divided into sections, and each section ends with notes and references for material covered in that section. If a section covers numerous topics separately, the notes and references are divided into parts, each with its own topic-indicating heading. When topics are not covered in detail but are relevant to matters under discussion, the notes and references provide pointers to the literature. Readers may find it useful to browse through a topic of interest and then follow the references within it forward and backward on the topic in question, or those to the extensive literature outside it.

Foundations of Information and Knowledge Systems

Springer Science & Business Media

Graduate text on mathematical foundations of programming languages, and operational and denotational semantics.

5th International Colloquium, Istanbul, Turkey, September 1-3,

2008, Proceedings Cambridge University Press
In case you are considering to adopt this book for courses with over 50 students, please contact ties.nijssen@springer.com for more information. This introduction to mathematical logic starts with propositional calculus and first-order logic. Topics covered include syntax, semantics, soundness, completeness, independence, normal forms, vertical paths through negation normal formulas, compactness, Smullyan's Unifying Principle, natural deduction, cut-elimination, semantic tableaux, Skolemization, Herbrand's Theorem, unification, duality, interpolation, and definability. The last three chapters of the book provide an introduction to type theory (higher-order logic). It is shown how various mathematical concepts can be formalized in this very expressive formal language. This expressive notation facilitates proofs of the classical incompleteness and undecidability theorems which are very elegant and easy to understand. The discussion of semantics makes clear the important distinction between standard and nonstandard models which is so important in understanding puzzling phenomena such as the incompleteness theorems and Skolem's

Paradox about countable models of set theory. Some of the numerous exercises require giving formal proofs. A computer program called ETPS which is available from the web facilitates doing and checking such exercises. Audience: This volume will be of interest to mathematicians, computer scientists, and philosophers in universities, as well as to computer scientists in industry who wish to use higher-order logic for hardware and software specification and verification.

Trends in Functional Programming

Cambridge University Press

This short textbook provides a succinct introduction to mathematical logic and set theory, which together form the foundations for the rigorous development of mathematics. It will be suitable for all mathematics undergraduates coming to the subject for the first time. The book is based on lectures given at the University of Cambridge and covers the basic concepts of logic: first order logic, consistency, and the completeness theorem, before introducing the reader to the fundamentals of axiomatic set theory. There are also chapters on recursive functions, the axiom of choice, ordinal and cardinal arithmetic and the incompleteness theorems. Dr Johnstone has included numerous exercises designed to illustrate the key elements of the theory

and to provide applications of basic logical concepts to other areas of mathematics. Consequently the book, while making an attractive first textbook for those who plan to specialise in logic, will be particularly valuable for mathematics and computer scientists whose primary interests lie elsewhere. Coherence in Three-Dimensional Category Theory Cambridge University Press Winner of the the Susan Elizabeth Abrams Prize in History of Science. When Isaac Newton published the Principia three centuries ago, only a few scholars were capable of understanding his conceptually demanding work. Yet this esoteric knowledge quickly became accessible in the nineteenth and early twentieth centuries when Britain produced many leading mathematical physicists. In this book, Andrew Warwick shows how the education of these "masters of theory" led them to transform our understanding of everything from the flight of a boomerang to the structure of the universe. Warwick focuses on Cambridge University, where many of the best physicists trained. He begins by tracing the dramatic changes in undergraduate education there since the eighteenth century, especially the gradual emergence of the private tutor as the most important teacher of

mathematics. Next he explores the material culture of mathematics instruction, showing how the humble pen and paper so crucial to this study transformed everything from classroom teaching to final examinations. Balancing their intense intellectual work with strenuous physical exercise, the students themselves—known as the "Wranglers"—helped foster the competitive spirit that drove them in the classroom and informed the Victorian ideal of a manly student. Finally, by investigating several historical "cases," such as the reception of Albert Einstein's special and general theories of relativity, Warwick shows how the production, transmission, and reception of new knowledge was profoundly shaped by the skills taught to Cambridge undergraduates. Drawing on a wealth of new archival evidence and illustrations, Masters of Theory examines the origins of a cultural tradition within which the complex world of theoretical physics was made commonplace.

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