

Sketches Of An Elephant A Topos Theory Compendium

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A First Course in Topos Quantum Theory

Cecilia Flori 2013-03-27 In the last five decades various attempts to formulate theories of quantum gravity have been made, but none has fully succeeded in becoming the quantum theory of gravity. One possible explanation for this failure might be the unresolved fundamental issues in quantum theory as it stands now. Indeed, most approaches to quantum gravity adopt standard quantum theory as their starting point, with the hope that the theory's unresolved issues will get solved along the way. However, these fundamental issues may need to be solved before attempting to define a quantum theory of gravity. The present text adopts this point of view, addressing the following basic questions: What are the main conceptual issues in quantum theory? How can these issues be solved within a new theoretical framework of quantum theory? A possible way to overcome critical issues in present-day quantum physics – such as a priori assumptions about space and time that are not compatible with a theory of quantum gravity, and the impossibility of talking about systems without reference to an external observer – is through a reformulation of quantum theory in terms of a different mathematical framework called topos theory. This course-tested primer sets out to explain to graduate students and newcomers to the field alike, the reasons for choosing topos theory to resolve the above-

mentioned issues and how it brings quantum physics back to looking more like a “neo-realist” classical physics theory again.

Reductive Logic and Proof-search David J. Pym 2004-04-29 This book is a specialized monograph on the development of the mathematical and computational metatheory of reductive logic and proof-search, areas of logic that are becoming important in computer science. A systematic foundational text on these emerging topics, it includes proof-theoretic, semantic/model-theoretic and algorithmic aspects. The scope ranges from the conceptual background to reductive logic, through its mathematical metatheory, to its modern applications in the computational sciences. Suitable for researchers and graduate students in mathematical, computational and philosophical logic, and in theoretical computer science and artificial intelligence, this is the latest in the prestigious world-renowned Oxford Logic Guides, which contains Michael Dummett's Elements of intuitionism (2nd Edition), Dov M. Gabbay, Mark A. Reynolds, and Marcelo Finger's Temporal Logic Mathematical Foundations and Computational Aspects , J. M. Dunn and G. Hardegree's Algebraic Methods in Philosophical Logic, H. Rott's Change, Choice and Inference: A Study of Belief Revision and Nonmonotonic Reasoning , and P. T. Johnstone's Sketches of an Elephant: A Topos Theory Compendium: Volumes 1 and 2 .

Theories, Sites, Toposes Olivia Caramello 2018

This book introduces a set of methods and techniques for studying mathematical theories and relating them to each other through the use of Grothendieck toposes.

From a Geometrical Point of View Jean-Pierre Marquis 2008-11-20 From a Geometrical Point of View explores historical and philosophical aspects of category theory, trying therewith to expose its significance in the mathematical landscape. The main thesis is that Klein's Erlangen program in geometry is in fact a particular instance of a general and broad phenomenon revealed by category theory. The volume starts with Eilenberg and Mac Lane's work in the early 1940's and follows the major developments of the theory from this perspective. Particular attention is paid to the philosophical elements involved in this development. The book ends with a presentation of categorical logic, some of its results and its significance in the foundations of mathematics. From a Geometrical Point of View aims to provide its readers with a conceptual perspective on category theory and categorical logic, in order to gain insight into their role and nature in contemporary mathematics. It should be of interest to mathematicians, logicians, philosophers of mathematics and science in general, historians of contemporary mathematics, physicists and computer scientists.

Simplicity Theory Byunghan Kim 2014 An up-to-date account of the current techniques and results in Simplicity Theory, which has been a focus of research in model theory for the last decade. Suitable for logicians, mathematicians and graduate students working on model theory.

Categories for the Working Philosopher Elaine M. Landry 2017 This is the first book on category theory for a broad philosophical readership. There is no other discussion of category theory comparable in its scope. It is designed to show the interest and significant of category theory for philosophers working in a range of areas, including mathematics, proof theory, computer science, ontology, physics, biology, cognition, mathematical modelling, the structure of scientific theories, and the structure of the world. Moreover, it does this in a way that is accessible to non specialists. Each chapter is written by either a category-theorist or a

philosopher working in one of the represented fields, in a way that builds on the concepts already familiar to philosophers working in these areas. The book is split into two halves. The 'pure' chapters focus on the use of category theory for mathematical, foundational, and logical purposes, while the 'applied' chapters consider the use of category theory for representational purposes, investigating category theory as a framework for theories of physics and biology, for mathematical modelling more generally, and for the structure of scientific theories. Book jacket.

Monoidal Topology Dirk Hofmann 2014-07-31 Based on lax-algebraic and categorical methods, Monoidal Topology provides a unified theory for metric and topological structures with far-reaching applications.

Objects, Structures, and Logics Gianluigi Oliveri 2022-03-08 This edited collection casts light on central issues within contemporary philosophy of mathematics such as the realism/anti-realism dispute; the relationship between logic and metaphysics; and the question of whether mathematics is a science of objects or structures. The discussions offered in the papers involve an in-depth investigation of, among other things, the notions of mathematical truth, proof, and grounding; and, often, a special emphasis is placed on considerations relating to mathematical practice. A distinguishing feature of the book is the multicultural nature of the community that has produced it. Philosophers, logicians, and mathematicians have all contributed high-quality articles which will prove valuable to researchers and students alike.

Relations and Kleene Algebra in Computer Science Rudolf Berghammer 2009-11-03 The book constitutes the joint refereed proceedings of the 11th International Conference on Relational Methods in Computer Science, RelMiCS 2009, and the 6th International Conference on Applications of Kleene Algebras, AKA 2009, held in Doha, Qatar in November 2009. The 22 revised full papers presented together with 2 invited papers were carefully reviewed and selected from numerous submissions. The papers describe the calculus of relations and similar algebraic formalisms as methodological and conceptual tools with special

focus on formal methods for software engineering, logics of programs and links to neighbouring disciplines. Their scope comprises relation relation algebras and Kleene algebras, related formalisms such as process algebras, fixed point calculi, idempotent semirings, quantales, allegories, dynamic algebras, cylindric algebras and their applications in areas such as verification, analysis and development of programs and algorithms relational formal methods such as B or Z, tabular methods, algebraic approaches to logics of programs, modal and dynamic logics, interval and temporal logics, algebraic semantics of programming languages , graph theory and combinatorial optimization, games, automata and language theory, mechanised and automated reasoning, decision procedures, spatio-temporal reasoning, knowledge acquisition, preference and scaling methods or information systems.

Concepts of Proof in Mathematics,

Philosophy, and Computer Science Dieter Probst 2016-07-25 A proof is a successful demonstration that a conclusion necessarily follows by logical reasoning from axioms which are considered evident for the given context and agreed upon by the community. It is this concept that sets mathematics apart from other disciplines and distinguishes it as the prototype of a deductive science. Proofs thus are utterly relevant for research, teaching and communication in mathematics and of particular interest for the philosophy of mathematics. In computer science, moreover, proofs have proved to be a rich source for already certified algorithms. This book provides the reader with a collection of articles covering relevant current research topics circled around the concept 'proof'. It tries to give due consideration to the depth and breadth of the subject by discussing its philosophical and methodological aspects, addressing foundational issues induced by Hilbert's Programme and the benefits of the arising formal notions of proof, without neglecting reasoning in natural language proofs and applications in computer science such as program extraction.

Interpolation and Definability Dov M. Gabbay 2005-05-12 This book is a specialized monograph on interpolation and definability, a notion central in pure logic and with significant

meaning and applicability in all areas where logic is applied, especially computer science, artificial intelligence, logic programming, philosophy of science and natural language. Suitable for researchers and graduate students in mathematics, computer science and philosophy, this is the latest in the prestigious world-renowned Oxford Logic Guides, which contains Michael Dummett's Elements of intuitionism (second edition), J. M. Dunn and G. Hardegree's Algebraic Methods in Philosophical Logic, H. Rott's Change, Choice and Inference: A Study of Belief Revision and Nonmonotonic Reasoning, P. T. Johnstone's Sketches of an Elephant: A Topos Theory Compendium: Volumes 1 and 2, and David J. Pym and Eike Ritter's Reductive Logic and Proof Search: Proof theory, semantics and control. The Structure of Models of Peano Arithmetic Roman Kossak 2006-06-29 Aimed at graduate students, research logicians and mathematicians, this much-awaited text covers over 40 years of work on relative classification theory for nonstandard models of arithmetic. The book covers basic isomorphism invariants: families of type realized in a model, lattices of elementary substructures and automorphism groups.

New Structures for Physics Bob Coecke 2011-01-15 This volume provides a series of tutorials on mathematical structures which recently have gained prominence in physics, ranging from quantum foundations, via quantum information, to quantum gravity. These include the theory of monoidal categories and corresponding graphical calculi, Girard's linear logic, Scott domains, lambda calculus and corresponding logics for typing, topos theory, and more general process structures. Most of these structures are very prominent in computer science; the chapters here are tailored towards an audience of physicists.

Category Theory in Context Emily Riehl 2017-03-09 Introduction to concepts of category theory — categories, functors, natural transformations, the Yoneda lemma, limits and colimits, adjunctions, monads — revisits a broad range of mathematical examples from the categorical perspective. 2016 edition.

Computability and Randomness André Nies 2012-03-29 The interplay between computability

and randomness has been an active area of research in recent years, reflected by ample funding in the USA, numerous workshops, and publications on the subject. The complexity and the randomness aspect of a set of natural numbers are closely related. Traditionally, computability theory is concerned with the complexity aspect. However, computability theoretic tools can also be used to introduce mathematical counterparts for the intuitive notion of randomness of a set. Recent research shows that, conversely, concepts and methods originating from randomness enrich computability theory. The book covers topics such as lowness and highness properties, Kolmogorov complexity, betting strategies and higher computability. Both the basics and recent research results are described, providing a very readable introduction to the exciting interface of computability and randomness for graduates and researchers in computability theory, theoretical computer science, and measure theory.

Consequence Relations Alex Citkin 2022-07-29 The publication of Rasiowa and Sikorski's *The Mathematics of Metamathematics* (1970), Rasiowa's *An Algebraic Approach to Non-Classical Logics* (1974), and Wójcicki's *Theory of Logical Calculi* (1988) created a niche in the field of mathematical and philosophical logic. This in-depth study of the concept of a consequence relation, culminating in the concept of a Lindenbaum-Tarski algebra, fills this niche. Citkin and Muravitsky consider the problem of obtaining confirmation that a statement is a consequence of a set of statements as prerequisites, on the one hand, and the problem of demonstrating that such confirmation does not exist in the structure under consideration, on the other hand. For the second part of this problem, the concept of the Lindenbaum-Tarski algebra plays a key role, which becomes even more important when the considered consequence relation is placed in the context of decidability. This role is traced in the book for various formal objective languages. The work also includes helpful exercises to aid the reader's assimilation of the book's material. Intended for advanced undergraduate and graduate students in mathematics and philosophy, this book can be used to teach special courses in logic with an emphasis on

algebraic methods, for self-study, and also as a reference work.

A Functorial Model Theory Cyrus F. Nourani 2016-04-19 This book is an introduction to a functorial model theory based on infinitary language categories. The author introduces the properties and foundation of these categories before developing a model theory for functors starting with a countable fragment of an infinitary language. He also presents a new technique for generating generic models with categories by inventing infinite language categories and functorial model theory. In addition, the book covers string models, limit models, and functorial models.

Bolzano's Logical System Ettore Casari 2016-09-08 This book is focused on the first three parts of Bolzano's *Theory of Science* and introduces a more systematic reconsideration of Bolzano's logical thought. In undertaking this task, the book is intended as an exploration, not so much of the more specifically discursive aspects of Bolzano's logical thought - already amply studied - as much as on identifying the singularly coherent and systematic nature of the logic presented in Bolzano's work. Casari presents this within a formal system and adopts the approach of the predicate calculus with identity and choice operator by using Hilbert's epsilon calculus (the logical formalism developed by David Hilbert in the service of his program in the foundations of mathematics).

From Sets and Types to Topology and Analysis Laura Crosilla 2005-10-06 This edited collection bridges the foundations and practice of constructive mathematics and focusses on the contrast between the theoretical developments, which have been most useful for computer science (eg constructive set and type theories), and more specific efforts on constructive analysis, algebra and topology. Aimed at academic logicians, mathematicians, philosophers and computer scientists Including, with contributions from leading researchers, it is up-to-date, highly topical and broad in scope. This is the latest volume in the *Oxford Logic Guides*, which also includes: 41. J.M. Dunn and G. Hardegree: *Algebraic Methods in Philosophical Logic* 42. H. Rott: *Change, Choice and Inference: A study of belief revision and nonmonotonic reasoning* 43. Johnstone: *Sketches*

of an Elephant: A topos theory compendium, volume 1 44. Johnstone: Sketches of an Elephant: A topos theory compendium, volume 2 45. David J. Pym and Eike Ritter: Reductive Logic and Proof Search: Proof theory, semantics and control 46. D.M. Gabbay and L. Maksimova: Interpolation and Definability: Modal and Intuitionistic Logics 47. John L. Bell: Set Theory: Boolean-valued models and independence proofs, third edition

Logic, Language, Information, and

Computation Juliette Kennedy 2017-07-10

Edited in collaboration with FoLLI, the Association of Logic, Language and Information this book constitutes the refereed proceedings of the 24th Workshop on Logic, Language, Information and Communication, WoLLIC 2017, held in London, UK, in August 2017. The 28 contributed papers were carefully reviewed and selected from 61 submissions. They cover interdisciplinary research in pure and applied logic, aiming at interactions between logic and the sciences related to information and computation.

Fragments of First-Order Logic Ian Pratt-Hartmann 2023-02-18 A sentence of first-order logic is satisfiable if it is true in some structure, and finitely satisfiable if it is true in some finite structure. The question arises as to whether there exists an algorithm for determining whether a given formula of first-order logic is satisfiable, or indeed finitely satisfiable. This question was answered negatively in 1936 by Church and Turing (for satisfiability) and in 1950 by Trakhtenbrot (for finite satisfiability). In contrast, the satisfiability and finite satisfiability problems are algorithmically solvable for restricted subsets---or, as we say, fragments---of first-order logic, a fact which is today of considerable interest in Computer Science. This book provides an up-to-date survey of the principal axes of research, charting the limits of decision in first-order logic and exploring the trade-off between expressive power and complexity of reasoning. Divided into three parts, the book considers for which fragments of first-order logic there is an effective method for determining satisfiability or finite satisfiability. Furthermore, if these problems are decidable for some fragment, what is their computational complexity? Part I focusses on fragments defined

by restricting the set of available formulas. Topics covered include the Aristotelian syllogistic and its relatives, the two-variable fragment, the guarded fragment, the quantifier-prefix fragments and the fluted fragment. Part II investigates logics with counting quantifiers. Starting with De Morgan's numerical generalization of the Aristotelian syllogistic, we proceed to the two-variable fragment with counting quantifiers and its guarded subfragment, explaining the applications of the latter to the problem of query answering in structured data. Part III concerns logics characterized by semantic constraints, limiting the available interpretations of certain predicates. Taking propositional modal logic and graded modal logic as our cue, we return to the satisfiability problem for two-variable first-order logic and its relatives, but this time with certain distinguished binary predicates constrained to be interpreted as equivalence relations or transitive relations. The work finishes, slightly breaching the bounds of first-order logic proper, with a chapter on logics interpreted over trees. Reality and Measurement in Algebraic Quantum Theory Masanao Ozawa 2018-11-02 This volume contains papers based on presentations at the "Nagoya Winter Workshop 2015: Reality and Measurement in Algebraic Quantum Theory (NWW 2015)", held in Nagoya, Japan, in March 2015. The foundations of quantum theory have been a source of mysteries, puzzles, and confusions, and have encouraged innovations in mathematical languages to describe, analyze, and delineate this wonderland. Both ontological and epistemological questions about quantum reality and measurement have been placed in the center of the mysteries explored originally by Bohr, Heisenberg, Einstein, and Schrödinger. This volume describes how those traditional problems are nowadays explored from the most advanced perspectives. It includes new research results in quantum information theory, quantum measurement theory, information thermodynamics, operator algebraic and category theoretical foundations of quantum theory, and the interplay between experimental and theoretical investigations on the uncertainty principle. This book is suitable for a broad audience of mathematicians, theoretical and experimental physicists, and philosophers of

science.

Category Theory Steve Awodey 2010-06-17 A comprehensive reference to category theory for students and researchers in mathematics, computer science, logic, cognitive science, linguistics, and philosophy. Useful for self-study and as a course text, the book includes all basic definitions and theorems (with full proofs), as well as numerous examples and exercises.

Sketches of an Elephant: A Topos Theory Compendium P. T. Johnstone 2002-09-12 Topos Theory is an important branch of mathematical logic of interest to theoretical computer scientists, logicians and philosophers who study the foundations of mathematics, and to those working in differential geometry and continuum physics. This compendium contains material that was previously available only in specialist journals. This is likely to become the standard reference work for all those interested in the subject.

Handbook of Spatial Logics Marco Aiello 2007-09-04 The aim of this handbook is to create, for the first time, a systematic account of the field of spatial logic. The book comprises a general introduction, followed by fourteen chapters by invited authors. Each chapter provides a self-contained overview of its topic, describing the principal results obtained to date, explaining the methods used to obtain them, and listing the most important open problems. Jointly, these contributions constitute a comprehensive survey of this rapidly expanding subject.

Sketches of an Elephant Peter T. Johnstone 2002-06 Topos Theory is a subject that stands at the junction of geometry, mathematical logic and theoretical computer science, and it derives much of its power from the interplay of ideas drawn from these different areas. Now available in this two volume set, it contains all the important information both volumes provides. Considered to be a complete benefit for all researchers and academics in theoretical computer science, logicians and philosophers who study the foundations of mathematics, and those working in differential geometry and continuum physics.

Set Theory John L. Bell 2011-05-05 This third edition, now available in paperback, is a follow up to the author's classic Boolean-Valued Models

and Independence Proofs in Set Theory,. It provides an exposition of some of the most important results in set theory obtained in the 20th century: the independence of the continuum hypothesis and the axiom of choice. Aimed at graduate students and researchers in mathematics, mathematical logic, philosophy, and computer science, the third edition has been extensively updated with expanded introductory material, new chapters, and a new appendix on category theory. It covers recent developments in the field and contains numerous exercises, along with updated and increased coverage of the background material. This new paperback edition includes additional corrections and, for the first time, will make this landmark text accessible to students in logic and set theory.

Introducing String Diagrams Ralf Hinze 2023-07-31 String diagrams are powerful graphical methods for reasoning in elementary category theory. Written in an informal expository style, this book provides a self-contained introduction to these diagrammatic techniques, ideal for graduate students and researchers. Much of the book is devoted to worked examples highlighting how best to use string diagrams to solve realistic problems in elementary category theory. A range of topics are explored from the perspective of string diagrams, including adjunctions, monad and comonads, Kleisli and Eilenberg-Moore categories, and endofunctor algebras and coalgebras. Careful attention is paid throughout to exploit the freedom of the graphical notation to draw diagrams that aid understanding and subsequent calculations. Each chapter contains plentiful exercises of varying levels of difficulty, suitable for self-study or for use by instructors.

Beyond Peaceful Coexistence Licata Ignazio 2016-03-30 'It may be that a real synthesis of quantum and relativity theories requires not just technical developments but radical conceptual renewal.' J S Bell Beyond Peaceful Coexistence: The Emergence of Space, Time and Quantum brings together leading academics in mathematics and physics to address going beyond the 'peaceful coexistence' of space-time descriptions (local and continuous ones) and quantum events (discrete and non-commutative ones). Formidable challenges waiting beyond the Standard Model require a new semantic

consistency within the theories in order to build new ways of understanding, working and relating to them. The original A. Shimony meaning of the peaceful coexistence (the collapse postulate and non-locality) appear to be just the tip of the iceberg in relation to more serious fundamental issues across physics as a whole. Chapters in this book present perspectives on emergent, discrete, geometrodynamical and topological approaches, as well as a new interpretative spectrum of quantum theories after Copenhagen, discrete time theories, time-less approaches and 'super-fluid' pictures of space-time. As well as stimulating further research among established theoretical physicists, the book can also be used in courses on the philosophy and mathematics of theoretical physics.

Logic in Question Jean-Yves Béziau 2023-01-11 This contributed volume collects papers related to the Logic in Question workshop, which has taken place annually at Sorbonne University in Paris since 2011. Each year, the workshop brings together historians, philosophers, mathematicians, linguists, and computer scientists to explore questions related to the nature of logic and how it has developed over the years. As a result, chapter authors provide a thorough, interdisciplinary exploration of topics that have been studied in the workshop. Organized into three sections, the first part of the book focuses on historical questions related to logic, the second explores philosophical questions, and the third section is dedicated to mathematical discussions. Specific topics include: • logic and analogy • Chinese logic • nineteenth century British logic (in particular Boole and Lewis Carroll) • logical diagrams • the place and value of logic in Louis Couturat's philosophical thinking • contributions of logical analysis for mathematics education • the exceptionality of logic • the logical expressive power of natural languages • the unification of mathematics via topos theory Logic in Question will appeal to pure logicians, historians of logic, philosophers, linguists, and other researchers interested in the history of logic, making this volume a unique and valuable contribution to the field.

Sketches of an Elephant: Toposes as spaces ; Toposes as theories P. T. Johnstone 2002

Topos Theory is a subject that stands at the junction of geometry, mathematical logic and theoretical computer science, and it derives much of its power from the interplay of ideas drawn from these different areas. Because of this, an account of topos theory which approaches the subject from one particular direction can only hope to give a partial picture; the aim of this compendium is to present as comprehensive an account as possible of all the main approaches and to thereby demonstrate the overall unity of the subject. The material is organized in such a way that readers interested in following a particular line of approach may do so by starting at an appropriate point in the text. Sketches of an Elephant: A Topos Theory Compendium Peter T. Johnstone 2002-09-12 Topos Theory is an important branch of mathematical logic of interest to theoretical computer scientists, logicians and philosophers who study the foundations of mathematics, and to those working in differential geometry and continuum physics. This compendium contains material that was previously available only in specialist journals. This is likely to become the standard reference work for all those interested in the subject.

Quantum Field Theory Bertfried Fauser 2009-06-02 The present volume emerged from the 3rd 'Blaubeuren Workshop: Recent Developments in Quantum Field Theory', held in July 2007 at the Max Planck Institute of Mathematics in the Sciences in Leipzig/Germany. All of the contributions are committed to the idea of this workshop series: To bring together outstanding experts working in the field of mathematics and physics to discuss in an open atmosphere the fundamental questions at the frontier of theoretical physics. *Sketches of an Elephant: Toposes as categories ; 2-categorical aspects of topos theory* P. T. Johnstone 2002 Topos Theory is a subject that stands at the junction of geometry, mathematical logic and theoretical computer science, and it derives much of its power from the interplay of ideas drawn from these different areas. Because of this, an account of topos theory which approaches the subject from one particular direction can only hope to give a partial picture; the aim of this compendium is to present as comprehensive an account as possible of all the

main approaches and to thereby demonstrate the overall unity of the subject. The material is organized in such a way that readers interested in following a particular line of approach may do so by starting at an appropriate point in the text.

Topoi Robert Goldblatt 2013-07-25 A classic exposition of a branch of mathematical logic that uses category theory, this text is suitable for advanced undergraduates and graduate students and accessible to both philosophically and mathematically oriented readers.

Theory and Applications of Ontology:

Computer Applications Roberto Poli 2010-09-02 Ontology was once understood to be the philosophical inquiry into the structure of reality: the analysis and categorization of 'what there is'. Recently, however, a field called 'ontology' has become part of the rapidly growing research industry in information technology. The two fields have more in common than just their name. Theory and Applications of Ontology is a two-volume anthology that aims to further an informed discussion about the relationship between ontology in philosophy and ontology in information technology. It fills an important lacuna in cutting-edge research on ontology in both fields, supplying stage-setting overview articles on history and method, presenting directions of current research in either field, and highlighting areas of productive interdisciplinary contact. Theory and Applications of Ontology: Computer Applications presents ontology in ways that philosophers are not likely to find elsewhere. The volume offers an overview of current research in ontology, distinguishing basic conceptual issues, domain applications, general frameworks, and mathematical formalisms. It introduces the reader to current research on frameworks and applications in information technology in ways that are sure to invite reflection and constructive responses from ontologists in philosophy.

Category Theory And Applications: A Textbook For Beginners (Second Edition)

Marco Grandis 2021-03-05 Category Theory now permeates most of Mathematics, large parts of theoretical Computer Science and parts of theoretical Physics. Its unifying power brings together different branches, and leads to a better understanding of their roots. This book is addressed to students and researchers of these

fields and can be used as a text for a first course in Category Theory. It covers the basic tools, like universal properties, limits, adjoint functors and monads. These are presented in a concrete way, starting from examples and exercises taken from elementary Algebra, Lattice Theory and Topology, then developing the theory together with new exercises and applications. A reader should have some elementary knowledge of these three subjects, or at least two of them, in order to be able to follow the main examples, appreciate the unifying power of the categorical approach, and discover the subterranean links brought to light and formalised by this perspective. Applications of Category Theory form a vast and differentiated domain. This book wants to present the basic applications in Algebra and Topology, with a choice of more advanced ones, based on the interests of the author. References are given for applications in many other fields. In this second edition, the book has been entirely reviewed, adding many applications and exercises. All non-obvious exercises have now a solution (or a reference, in the case of an advanced topic); solutions are now collected in the last chapter.

From Sets and Types to Topology and

Analysis Laura Crosilla 2005-10-06 Bridging the foundations and practice of constructive mathematics, this text focusses on the contrast between the theoretical developments - which have been most useful for computer science - and more specific efforts on constructive analysis, algebra and topology.

An Invitation to Applied Category Theory

Brendan Fong 2019-07-18 Category theory reveals commonalities between structures of all sorts. This book shows its potential in science, engineering, and beyond.

Singular Coverings of Toposes Marta Bunge 2007-01-19 This volume presents a self-contained theory of certain singular coverings of toposes, including branched coverings. This book is distinguished from classical treatments of the subject by its unexpected connection with a topic from functional analysis, namely, distributions. Although primarily aimed at topos theorists, this book may also be used as a textbook for advanced graduate courses introducing topos theory with an emphasis on geometric applications.

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