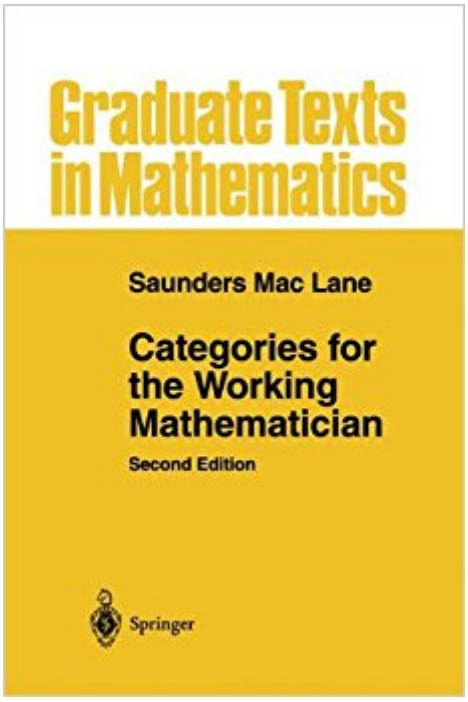
Categories For The Working Mathematician (Graduate Texts In Mathematics)



Synopsis

An array of general ideas useful in a wide variety of fields. Starting from the foundations, this book illuminates the concepts of category, functor, natural transformation, and duality. It then turns to adjoint functors, which provide a description of universal constructions, an analysis of the representations of functors by sets of morphisms, and a means of manipulating direct and inverse limits. These categorical concepts are extensively illustrated in the remaining chapters, which include many applications of the basic existence theorem for adjoint functors. The categories of algebraic systems are constructed from certain adjoint-like data and characterised by Beck's theorem. After considering a variety of applications, the book continues with the construction and exploitation of Kan extensions. This second edition includes a number of revisions and additions, including new chapters on topics of active interest: symmetric monoidal categories and braided monoidal categories, and the coherence theorems for them, as well as 2-categories and the higher dimensional categories which have recently come into prominence.

Book Information

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Customer Reviews

From the reviews of the second edition:â œThe book under review is an introduction to the theory of categories which, as the title suggests, is addressed to the (no-nonsense) working mathematician, thus presenting the ideas and concepts of Category Theory in a broad context of mainstream examples (primarily from algebra). â | the book remains an authoritative source on the foundations

of the theory and an accessible first introduction to categories. â | It is very well-written, with plenty of interesting discussions and stimulating exercises.â • (Ittay Weiss, MAA Reviews, July, 2014)Second EditionS.M. LaneCategories for the Working Mathematician"A very useful introduction to category theory."â •INTERNATIONALE MATHEMATISCHE NACHRICHTEN

I’m still, slowly, making my way through this book in my spare time. The sheer flexibility of many of the constructions in Category Theory is something I not only am finding beautiful but it also is helping to organize an connect ideas that I had no idea needed organizating and connecting. As a first year grad student in mathematical physics, I am extremely far from an expert on anything, but I am finding the stuff I learn from MacLane in this book to provide ample inspiration for novel questions and ponderings in my studies.On top of this, as time goes on the language of Category Theory seems to be rapidly making its way into daily mathematical parlance, so for any mathematician-in-the-making I feel like this book is a solid work that should be in his or her arsenal.

Well, let us think about this a little bit...You want to learn Category theory, whether for some course or just for the fun of it, and now where do you turn in order to learn the necessary concepts. If you are a mathematician and have some experience, then you turn to the masters, the originators of the given subject and read their work. Sure, being the founder of a given subject does not imply that you are a good expositor and hence are capable of revealing the necessary concepts for the beginner-allow me to inform that Mac Lane is indeed as good as an expositor as he was a mathematician. For any doubters, I point you to the only other text you should read on Category theory, namely, "Category Theory" by Horst Herrlich and compare this text with Mac Lane’s. Aside from that, and with respect to the text, for most beginners or interested readers I would suggest the following outline: Read 1.1-6; 2.1-3 & 8 possibly 2.4; all of 3; as for 4 skip section 3; 5.1-5; all of 8. Then, dependent upon your desires and or focus as well as your mathematical ability, it should become obvious which of the remaining topics should be read. Finally, the only other source I would recommend for learning Category theory can be found on-line using the keyword ’Awodey’. Anyways, Enjoy and good luck.

Beautifully written book by the founder of the subject. Always a good standard and a go-to source of reference.

It is a Great Book and it is quite helpful to me. (although some notions are old) The book is brand

new.

A great arithmetic geometer of my acquaintance once began a lecture by asserting that, "a category--it is nothing." But this is a subject capable of expressing in few words what might otherwise take pages to formulate, if at all. MacLane’s is the canonical text, geared mostly to applications in algebra and topology, areas that provided the initial impetus for the subject. Categorical proof theory, the representation of proof theory in categories, appears--at least implicitly--in the coherence theorem for monoidal categories.

This book is a classic. Clearly written, drawing on a vast number of different applications and motivations for the subject. Eilenberg and Mac Lane created category theory and this book is alive with the very style of thought Mac Lane brought to it in the first place. It is obvious that Mac Lane wrote each page, and each exercise, with a view of the whole book in mind. He starts with the very basics, assuming indeed that you know nothing of category theory. He goes on to adjunctions, limits, the adjoint functor theorems, monads (triples), monoidal categories, Abelian cateories, Kan extensions, higher dimensional categories, and categorical foundations. It is a masterpiece and one of the great books in mathematics.

Have you ever tried reading Descartes’ "Geometry"? It’s not a good place to learn about coordinate geometry. I tried. This was almost 10 years ago, but I still remember it pretty well. Ok, so maybe the experience was even a bit traumatic. Usually when someone works out a theory, it takes a fresh perspective (or two, or ... you get it) to really digest it, and come up with a reasonable way of teaching it to newcomers. It’s less evident nowadays, with improved communications technology and such, but people aren’t exactly turning to Grothendieck’s expositions as their intro to his geometry either. Mac Lane is an exception. This book seems completely inapproachable. The title is scary. The topic is scary. Open to a random page and try to judge its accessibility: scary. Well, here’s the real story: you need to know algebra through modules, and it’d be nice if this algebra background introduced "universals" like abelianization or free modules in a way that involved the diagrams and the unique mappings you get from the given ones. If this stuff makes any sense, you can read this book. It’s not that scary. If you’re up to the challenge, you might even enjoy it. This is actually my favorite book.Here’s the approach that I feel worked well for me:- gloss over the set-theoretic foundations at first. Make sure you know the proper class/set and large/small category distinctions, but don’t dwell on them much.- focus on the examples that are familiar, but read

through the others too. Mac Lane uses tons of examples to suit a variety of backgrounds, and his presentation is so clear that the theory can often explain the examples.- trust the author. It may seem like product or comma categories deserve fuller treatment with more motivation. No. Let Mac Lane's 'minimalism' infect your thinking: it's no more complicated than what's on those pages. Make sure you *know* what's there, and you will come to *understand* the material as it is fleshed out through exercises or later writing.The last point has been the most important for me. This book has been a great lesson in clear thinking, which is of extreme importance in mathematics. Why? It's complicated enough!