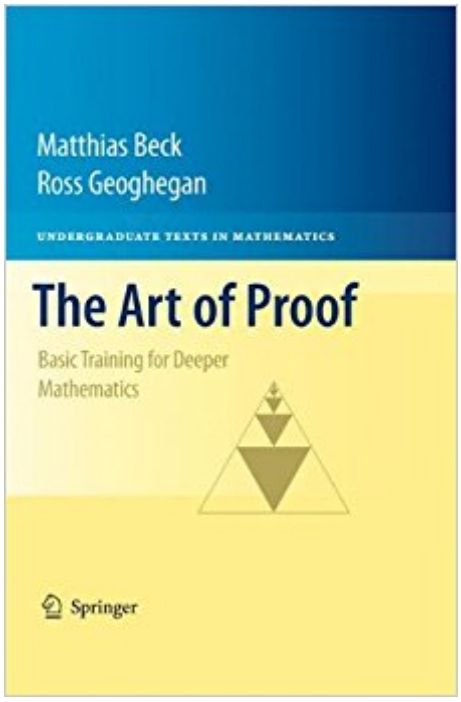
# The Art Of Proof: Basic Training For Deeper Mathematics (Undergraduate Texts In Mathematics)



## Synopsis

The Art of Proof is designed for a one-semester or two-quarter course. A typical student will have studied calculus (perhaps also linear algebra) with reasonable success. With an artful mixture of chatty style and interesting examples, the student's previous intuitive knowledge is placed on solid intellectual ground. The topics covered include: integers, induction, algorithms, real numbers, rational numbers, modular arithmetic, limits, and uncountable sets. Methods, such as axiom, theorem and proof, are taught while discussing the mathematics rather than in abstract isolation. The book ends with short essays on further topics suitable for seminar-style presentation by small teams of students, either in class or in a mathematics club setting. These include: continuity, cryptography, groups, complex numbers, ordinal number, and generating functions.

## Book Information

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## Customer Reviews

From the reviews:"The Art of Proof is a surprising union of rigor with taste and wit.Ã Â The authors take a hard-core axiomatic approach, but the writing is never dry.Ã Â Instead, topics are carefully chosen and meticulously developed with grace and humor, careful attention to detail, and just the right number of skill-building exercises and thought-provoking problems."The text is spareÃ¢â ¬â ¢well under two hundred pagesÃ¢â ¬â ¢but contains a thorough axiomatic development of the integers and the reals, along with non-standard optional topics such as Cayley graphs and generating functions.Ã Â Instead of the standard scattershot "symbolic logic-set

theory-functions-proof by contradiction-zzzz..." books, this text keeps its focus on just a few fundamental ideas, of which induction is the most important.Ã Â This helps my students toÃ Â feel that they are participants in a grand undertakingÃ¢â ¬â ¢the construction of a number systemÃ¢â ¬â ¢rather than passive victims of one proof technique after another." Ã¢â ¬â ¢Paul Zeitz (Mathematics Professor at the University of San Francisco)Ã¢â ¬Å“This qualitative transition presents a most acute pedagogical challenge. Ã¢â ¬Â¦ This book does feature definite mathematical content, contrasting with works that aim at decoupling purely logical apparatus from strictly mathematical concerns. Ã¢â ¬Â¦ The authors write with the authority of research mathematicians and clearly mean to open that avenue to students. Summing Up: Recommended. Upper-division undergraduates through professionals.Ã¢â ¬Â• (D. V. Feldman, Choice, Vol. 48 (8), April, 2011)Ã¢â ¬Å“This book offers an approach well-balanced between rigor and clarifying simplification. Dilbert and Foxtrot cartoons with philosophical quotes presage the introduction of axioms and preliminary propositions. This graceful and witty blend succeeds well in a textbook for a post-calculus course transitioning a student to higher mathematics. The Art of Proof can also well serve independent readers looking for a solitary path to a vista on higher mathematics.Ã¢â ¬Â• (Tom Schulte, The Mathematical Association of America, November, 2010)Ã¢â ¬Å“This is an undergraduate text to extend, in a deeper and formal way, the usual initial knowledge of mathematics. The book deals with classical topics like integers, induction, algorithms, real numbers, rational numbers, modular arithmetic, limits, uncountable sets Ã¢â ¬Â¦ . The publication may be useful for people using the book to teach a course on the above mentioned topics. Ã¢â ¬Â¦ The aim behind this textbook is teaching how to read and write mathematics as well as understanding key methods and concepts.Ã¢â ¬Â• (Claudi Alsina, Zentralblatt MATH, Vol. 1198, 2010)

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mathematics club setting. These include: continuity, cryptography, groups, complex numbers, ordinal number, and generating functions.

I think the unique format of this textbook is fantastic. When I read it, I can almost hear the authors voice. The material is very dense so it’s definitely not meant for speed reading. The way the information is presented is straightforward -- it doesn’t try to go over your head.Get ready to learn mathematics from the ground up! Exciting stuff!

I am not strong when it comes to the more theoretical side of math. So I tend to rely on the strength of my textbooks and instructors for help in understanding the material.The Art of Proof was not the strongest it could have been. It was easy to read, and re-read, and re-read, and re-read again... So that was a plus, however, the cause for re-reading each section so many times kept happening every chapter. The book feels like its missing something. The explanations it gives mostly make sense, Chapter 9 and 13 dealing with Injective, Surjective and Bijective functions were extremely confusing, however the explanations seem to fall just short of actually explaining what is to be done with the topic. I often felt like I must have skipped a part when reading by mistake but no matter how often I re-read the section my same questions would remain afterward.I like the approach of simplicity but I do think perhaps it has been overly simplified to the point of being detrimental at times making it a challenge to understand anything about the Art of Proof.I would not be completely against using this textbook again because I did like that they at least attempted to write in more basic terms so anyone could understand however I would like more supplemental books or an instructor who is willing to fill in where this book sometimes drops off. I do wish that this had not been our primary text for my class as it did leave many questions behind after reading it many times over.

This is at best a brisk outline of some key topics that hopefully your professor will flesh out in class. The only function this might have is as a study guide to supplement an alternative text with a bit more substance (i.e. more detailed explanations, examples, solutions, etc.).

The binder on the book was broken!

PERFECT!!!

Like many instructors, I picked this book after spending a few hours looking at each of several different possibilities. The price was attractive and the book looked good based on a superficial reading and closer consideration of a few selected sections. As one example, I was attracted by the appendix titled Public-Key Cryptography. However, based on using the book in class, it is unsuitable for the course for which it is intended. It would be even worse for self-study. Other prospective buyers should pick it only after more careful consideration. This review discusses three main flaws. First, the book does not develop the primary skills that are the main goal of this course -- finding and writing correct and readable proofs. Second, as the authors write repeatedly, this is a book that must be read "line by line," -- there is no coherent narrative. Finally, with the notable exception of the previously mentioned appendix, the book is very much a "pure" mathematics book and as such is ill-suited to the needs and opportunities of the modern mathematical sciences and especially computer science.From the very beginning, the book glosses over rigorous formal reasoning. Indeed, I was originally attracted to the book in part because it began with simple proofs and then appeared to progress to more careful reasoning. The problem is that there are only isolated and incomplete hints of rigorous reasoning. My students are still having understandable difficulty determining what is correct and what is not. The book has no coherent organization -- a fatal flaw for a book that is supposed to develop a logical structure with later proofs building on earlier ones. For example, students attempting to find proofs in elementary set theory must do so without a preceding solid treatment of the logical connectives "and," "or," and "not." This book focuses on completed proofs. There is no discussion at all about how we discover proofs, how informal proofs can be expressed more formally, and how proofs can be organized to make them more understandable and more readable. This book omits what should be a central theme -- the link between intuitive understanding and formal reasoning and expression.Each chapter concludes with a "weekly reminder" -- "Reading mathematics is not like reading novels or history. You need to think about every sentence. Usually, you will need to reread the same material later, often more than one rereading." Aside from the gratuitous insults to literature and history, this weekly scolding betrays the lack of narrative. This book was apparently written line-by-line. As one example, the book develops the usual concepts of equivalence relations and equivalence classes but does not, for example, use them to build the rational numbers. It treats the successive number systems as examples of axiomatic systems with no sense of the engaging and beautiful story of building from the natural numbers, through the integers, to the rational numbers, and the reals. It skips the rational numbers and then makes a big deal (in a separate chapter) of embedding the integers in the reals. The book is awkward where it should be elegant.The connections between computer

science and the subject matter of this course present enormous opportunities for the course. Computer languages are formal languages and, because many of our students have some experience with computer programming, we should leverage the connection between computer languages and the formal language of mathematics. As one example, we use the words "and" and "or" and the "if ... then ... " construction in both programming and elementary logic. As another example, breaking a long and complex argument into lemmas, theorems, and corollaries is very much analogous to breaking a long program into structured pieces. As yet another example, students often have difficulty with "dummy variables" whether in summations, in logical statements like "for all x, (P(x) implies Q(x))," or in iteration statements like For(x = 0, x < 100, x = x + 1). The connections among the appearances of dummy variables in these different settings can help students understand dummy variables and how they are used. Finally, the book ignores the synergies between the theory of computing and mathematical logic. Except for being written in TeX, this book ignores computer science.We close this review where we began -- with the caution that "prospective buyers should pick it only after more careful consideration" than this instructor gave it. All books have shortcomings and can benefit from supplementary notes written by the instructor. This book is more deeply flawed.

This book is truly more about art than science or methodology. You pretty much have to freestyle through the material, relying on your mathematical imagination to make sense of it. As the authors' admit, this book "is not for self-study". Indeed it reads like a stack of supplementary class handouts but costs as much a textbook.The other reviewer was absolutely correct in saying this book was a collection of propositions. The book lays out no coherent methodology for proofs and offers the most threadbare discussion of topics. Each section begins with useless colloquial chatter and continues with smatterings of isolated axioms, definitions and propositions. Many new and important definitions are merely stated without any demonstration of their applications. Trivial concepts get as much space as challenging ones.I can't even see anyone using such a slim book as a reference manual.An *average* student relying on this book is liable to waste time trying to *guess* the correct way of doing the problems. And without correct syntax, a proof is pretty much wrong. If you want to be sure you're on the right track, either get a more powerful brain - or just get a different freaking textbook.

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