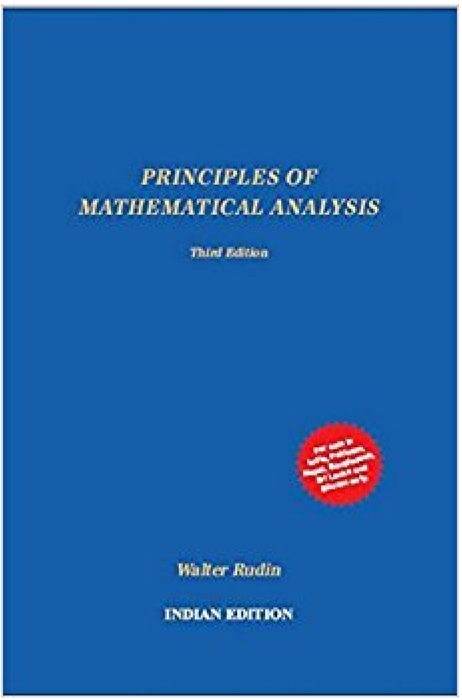
# Principles Of Mathematical Analysis



## Synopsis

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## Customer Reviews

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First off, this book is dense. I bought this book for an introductory undergraduate course in real analysis. Through one full semester, we got through the first four chapters. That being said, for those brave enough to answer the call, Rudin leaves readers with a solid understanding of analysis.I bought the international edition, a.k.a. paperback version. My roommate has the hardcover version. My paperback took a lot of abuse over the semester, but it held up very well. The outside of the book is a little scuffed up from being stuff in my backpack, but, overall, it’s still in good shape. My roommate’s hardcover copy held up slightly better and looks a little nicer on the shelf... But, at a fraction of the cost of the hardcover, I am overall satisfied (it helped me get an A :) ).

Rudin is always a tough read, but if you’re planning to learn real analysis you better be up for the challenge. Don’t expect to flip through this textbook. Each page is dense with info and requires a good deal of thought. If you make it through a chapter and truly understand what you read, you are a step closer to a fundamental understanding of analysis.In terms of the physical book, expect thin pages. As long as you’re not extremely rough, I had no problems and the book held up well.

Brilliantly constructed. Although, Rudin’s way of thinking is a bit unusual to me and takes a while to get used to. When I say this, I am not talking about the terseness of the proofs. I am talking about his way of thinking and the way his proofs flow logically. His way of thinking is somewhat unusual and takes time to adjust to. As other reviewers have mentioned, he flys through the section on Topology. It is helpful to have prior experience studying metric spaces, etc. But not required. I believe this faster than normal pace is due to the fact that this isn’t a course on Topology, but a course on analysis and the purpose of this chapter is to set the stage for the rest of the book.Unlike other reviewers, I don’t necessarily agree that you need to be familiar with the material prior to reading the book. Everything is there you need to understand it. He intentionally stays on the terse side because he expects you to fill in the details yourself as a way to become more mathematically mature. This book might be challenging for a first rigorous book in mathematics, but it is certainly not impossible.

Perfect in its outline and development, this book formalizes difficult analytic concepts within the confines of a few pages. Rudin not only rigorously defines mathematical ideas central to analysis as concisely and clearly as possible, but also directly attacks important exercises often left to the readers in other books- read his exposition on the exponential function and all of his derivations of its properties in Chapter 8, done in a decisive style that takes up just a few pages but leaves the reader with a rigorous presentation of the most important results. Not even the great Apostol (who, along with Abbott and Pugh, has written landmark analysis books you should consider supplementing this text with) assumes so little until it is actually developed in the text.If this is your first time through Analysis, this book will be hard, but worth every minute. Avoid the eleventh chapter and instead pick up and continue with his "Real and Complex Analysis" when you’re done with this magnificent volume.

This is an old book on mathematics and a must have if you are studying Analysis. This book is affectionately called baby Rudin. This provides a solid introduction to Analysis but leaves some gaps when you get to Algebras and Lebesgue Integration Buying the international edition of the book will surely save you a bunch of money but be warned that paper and printing are of inferior quality to that of the hardcover edition. If you are looking to keep this book for a long time I recommend splurging for the hardcover.

For the Brave and the Determined, learning analysis from Principles of Mathematical Analysis (PMA) is a sublimely rewarding experience. (Dilettantes keep away.)PMA, a.k.a. ’Baby Rudin’, is an introductory text in analysis for the serious student of mathematics. Back in 2004, this was the text used for the first semester of Harvard's freshman analysis/linear algebra course (Math 25, modestly titled "Honors Multivariable Calculus and Linear Algebra", the lite version of the infamous Math 55 sequence). A majority of students in the course came in with a working knowledge of proof writing, through high school mathematical olympiads, upper division college classes elsewhere, or both. Although the professor (Tom Coates, now of Imperial College London) was an excellent lecturer and was very helpful and patient, students without a background like this ("mathematical maturity") were generally left in the dust. Those of us who persisted in the course after the first few weeks found ourselves spending 15 to 20 hours a week working problems assigned from PMA or written by Prof. Coates. Problems in PMA ranged simple verifications, taking maybe five minutes of thought, to problems barely within the grasp of the smartest students in the class, taking many hours of struggle spread out over a few days.Content: As many reviewers have already noted, PMA is simply the best out there in terms of clear, concise mathematical exposition of one-variable advanced calculus (Chapters 1-8). Though known by analysts for his contributions to harmonic and complex analysis, Dr. Rudin ensured himself a permanent place in the canon with the publication of this text and its graduate-level companions "Real and Complex Analysis" and "Functional Analysis". Having browsed through copies of the first (1953) and second edition (1964), it's clear that the author "perfected" an already very well written text in this third edition (1976) and said "that's it" to greedy textbook publishers wishing to make money off of newer editions. Other than correcting some typos, this text has remained the same for four decades (and will remain so with Dr. Rudin's passing in 2010). Its continued use, more than six decades after it was first published, is a testament to the quality of this textbook. Here's a brief overview of topics covered. Chapter 1 introduces the real number system, the most important concept being the least upper bound property of the real numbers. An appendix constructs R from Q using the Dedekind approach. While the entire book is succinct and fantastically organized, chapter 2 on metric space topology deserves particular mention. This concisely written chapter (only 23 pages!) is strategically placed to serve as a cornerstone for the rest of the book. Assuming only rudimentary knowledge of sets and functions, Rudin gives the reader just a taste of topology to enable subsequent discussions on continuity and convergence to proceed in a general and abstract setting. Several interesting but less pertinent ideas (like the Baire category theorem) are included as challenging exercises at the end of the chapter. Though the abstraction introduced is challenging and most beginners won't see the point (yet), the reward is substantial, enabling celebrated theorems (e.g., ArzelÃƒÂ -Ascoli, Stone-Weierstrass) to be proved cleanly and quickly later on. The usual topics (limits, continuity, differentiation, and Riemann(-Stieltjes) integration) are covered in chapters 3-6. This is followed by an in depth discussion on sequences of functions, focusing on the interchange of limiting operations and polynomial approximation, in chapter 7, topics often discussed in a cursory manner in other introductory analysis textbooks. The coverage of power series at the beginning of chapter 8 seems to come a bit too late, given the importance of this concept; Rudin uses it as a springboard for rigorously defining the functions that everyone thinks they know (exp, log, sin, cos), followed by an outline of the Beta and Gamma functions and their miscellaneous properties, and an introduction to Fourier series. The topics at the end of chapter 8, while interesting, are not essential for a first course in real analysis. Back then, in Math 25a, we covered chapters 1-7 and the first half of chapter 8, minus the appendix on Dedekind cuts at the end of chapter 1 in 14 weeks. That still left us with one week of class, during which we started to cover linear algebra to get a head start on Math 25b in which real analysis of several variables was the main topic. (My freshman year roommates could not comprehend why anyone would be such a masochist....)In the remaining chapters, Rudin covers analysis on several variables (chapters 9 and 10), including differential forms and the generalized Stokes Theorem, and measure and Lebesgue integration (chapter 11). These chapters have been the subject of criticism, mostly due to their bare bones coverage of these intricate topics. In my opinion, they really are too lean to be pedagogically useful introductions. Moreover, chapters 9 and 10 would have benefited from figures or line drawings, given the geometric nature of the topic, but PMA seems to avoid these at all costs. (Rudin’s definition of differential forms is essentially algebraic and makes no appeal to geometric intuition.) Nevertheless, because they are written in such a concise manner, they are useful as "cliff notes" or refreshers on these topics for review after learning them elsewhere. Besides the terseness, Rudin’s outlines of these topics do not provide the reader with their full mathematical machinery, leaving out many important subtleties and non-elementary constructions (e.g., PMA develops forms in a way that only implicitly references their tensorial nature, defining them as formal expressions that are only meaningful behind an integral sign, rather than a mathematical construction in their own right, while measure theory is developed somewhat unconventionally using sigma-rings rather than sigma-algebras, which actually complicates some of the subsequent propositions), so one is well-advised to find other resources to become acquainted with these topics. For multivariable calculus, SpivakÃƒÂ¢Ã â ¬Ã â„¢s "Calculus on Manifolds" is concise though hard-to-digest without a good instructor, and it should be supplemented by HalmosÃƒÂ¢Ã â ¬Ã â„¢s "Finite-Dimensional Vector Spaces" or AxlerÃƒÂ¢Ã â ¬Ã â„¢s "Linear Algebra Done Right" to provide the requisite abstract linear and multilinear algebra background. Munkres’s "Analysis on Manifolds" is a better alternative for self study (see my Review on this book). BartleÃƒÂ¢Ã â ¬Ã â„¢s "Elements of Integration and Lebesgue Measure" provides a clear though not particularly thorough introduction to Lebesgue theory. Stein and Shakarchi "Real Analysis" also has an excellent introduction to measure theory and Lebesgue integration, and covers many other fascinating topics, but it is annoyingly not self-contained and references the earlier two volumes. (Math 25b ended up using Halmos and Spivak; Lebesgue integration wasn’t covered, so it became summer reading.)Style: With the exception of a short introductory paragraph at the beginning of each chapter, the book consists almost entirely of a series of statements labeled Definition, Theorem, or Corollary (in that order) with only an occasional Example or Remark squeezed in. (The Examples and Remarks are important -- they generally address subtleties or common points of confusion for students.) This format is probably shocking and baffling for most people who start reading PMA. Persevere -- it will grow on you! Through his austere presentation, Rudin lets the beauty of the mathematics speak for itself. Flipping through my tattered and scribbled-on copy of the book from 2004-2005, I still marvel at the elegance and polish of the proofs -- without a wasted symbol or syllable yet completely rigorous if you put in the effort to scrutinize his arguments. Precisely for these reasons, however, students will find themselves reading and re-reading the text to try to figure out how Rudin managed to construct a proof and/or where the idea behind it came from. The diligent student should have pencil and paper in hand to try to construct his/her own arguments, which should lead to insights into Rudin’s (more elegant) proofs. Also, since Rudin rarely remarks upon why the hypotheses of a theorem cannot be weakened, it is extremely useful to have concrete examples or counterexamples in mind when working through a proof. In retrospect, I found that it was this type of between-the-lines reading of the text, together with the excruciating process of working through the exercises, that led to true comprehension: no pain no gain!Ideally, a professor teaching from this text should motivate the definitions (and even some of the theorems) presented in PMA during class. (It’s not always clear why Rudin proves something; he doesn’t distinguish between main theorems and lemmas.) However, if you are teaching yourself, a less formal exposition with more examples and explanations and occasional diagrams to illustrate difficult concepts or facilitate intuition will probably be useful to read with PMA concurrently. PughÃƒÂ¢Ã â ¬Ã â„¢s "Real Mathematical Analysis," comes to mind. (Though at times wordy or long-winded, it adopts a conversational and infectiously enthusiastic tone. In addition, Pugh’s text contains a large collection of interesting and sometimes extremely challenging problems. Highly recommended as a foil to PMA!) I understand why some say that PMA should not be used as a first text. However, I feel that the point of learning analysis is to be able to appreciate a beautiful branch of mathematics (as opposed to do something useful, like with calculus or diffeqs). Rudin offers exactly this, given the proper preparation. It's well worth the time and effort to work through PMA and see analysis the way it was meant to be seen, rather than to be introduced to a dull, watered-down version.A final remark about the style: if PMA sometimes reads like a collection of lecture notes, it's probably because it started out that way. When Rudin, then a freshly minted Ph.D., started teaching real analysis as a lecturer at MIT in 1950, there were very few analysis textbooks in English. Available texts like Hardy or Titchmarsh presented the classical approach without reference to topological notions. Because of the lack of suitable modern treatments of real analysis, he ended up writing one for his course. The first edition of PMA was published only three years later in 1953, based on the class that he taught. As the first text of its kind in English, PMA provided a model for the treatment of modern ideas in almost all subsequent English language textbooks in introductory analysis.Don't get discouraged! This is probably not like any textbook you've previously encountered (but this is the way mathematicians tend to write -- they don't like extra words and they certainly don't try to spoonfeed...). Spending hours to fully comprehend a few pages might feel crushing, but unless you're clearly destined to become a math professor, it will likely happen at some point when you study Rudin (e.g. his proof on the uncountability of nonempty perfect sets in chapter 2 for me). Bravely trudge ahead when it happens; it builds character, and it will eventually lead to a deeper, more intuitive and more satisfying understanding of analysis.

Mathematical Functions: with Formulas, Graphs, and Mathematical Tables (Dover Books on Mathematics) Lecture Notes on Mathematical Olympiad Courses: For Junior Section Vol 1 (Mathematical Olympiad Series) Mathematical Apocrypha: Stories and Anecdotes of Mathematicians and the Mathematical (Spectrum) Simple Mathematical Models of Gene Regulatory Dynamics (Lecture Notes on Mathematical Modelling in the Life Sciences) Mathematical Problems from Combustion Theory (Applied Mathematical Sciences) (v. 83) Analytics: Business Intelligence, Algorithms and Statistical Analysis (Predictive Analytics, Data Visualization, Data Analytics, Business Analytics, Decision Analysis, Big Data, Statistical Analysis) Analytics: Data Science, Data Analysis and Predictive Analytics for Business (Algorithms, Business Intelligence, Statistical Analysis, Decision Analysis, Business Analytics, Data Mining, Big Data)