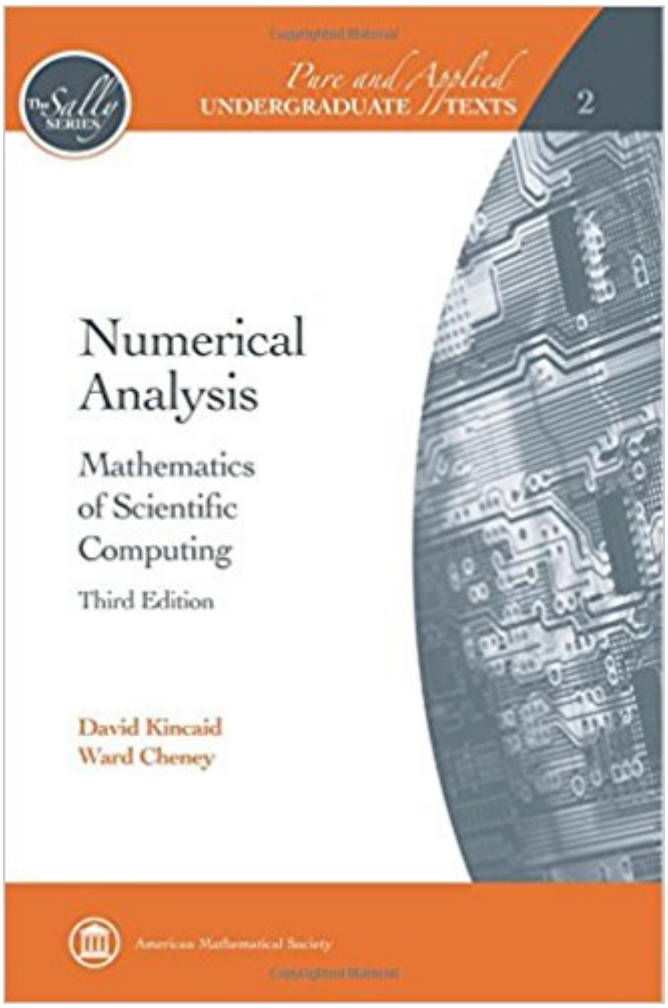
Numerical Analysis: Mathematics Of Scientific Computing (The Sally Series; Pure And Applied Undergraduate Texts, Vol. 2)



Synopsis

This book introduces students with diverse backgrounds to various types of mathematical analysis that are commonly needed in scientific computing. The subject of numerical analysis is treated from a mathematical point of view, offering a complete analysis of methods for scientific computing with appropriate motivations and careful proofs. In an engaging and informal style, the authors demonstrate that many computational procedures and intriguing questions of computer science arise from theorems and proofs. Algorithms are presented in pseudocode, so that students can immediately write computer programs in standard languages or use interactive mathematical software packages. This book occasionally touches upon more advanced topics that are not usually contained in standard textbooks at this level.

Book Information

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Customer Reviews

This text offers a thorough and elegant presentation of basic topics in numerical analysis. ... the text is skillfully written, by authors who are among the best in the field. Throughout, the presentation shows the unique insights that each brings to the subject. In all, it is an enjoyable text to use.
--Bulletin of Mathematics Books and Computer Science

The most important thing to understand about this book is that it is an introduction to the mathematical theory of numerical analysis and not a more applied textbook on numerical methods.It’s one thing for a student to be able to program a numerical method taken out of cookbook and hope that it works. It’s a totally different thing for a student to be able to implement a method, understand why it works, and be able to obtain a good bound on the error in the result.

Beyond that, there’s the even bigger step that some PhD level students will take to doing their own research in numerical analysis. This book is appropriate for courses aimed at advanced undergraduate students in mathematics that have the objective of getting students to actually understand and analyze numerical methods. It would also be a good introduction for students who want to specialize in numerical analysis at the graduate level.I’ve just completed teaching an introductory numerical analysis course using the book. My students were mostly senior level mathematics majors. All had taken or were taking proof based courses in analysis, linear algebra, etc. For this group of students, the mathematical level of the book was appropriate. The proofs are presented in enough detail and the authors made limited use of more advanced mathematical machinery, so that my students could follow the text. This book would not have been appropriate for a less mathematically mature audience. In particular, this book wouldn’t be accessible to most engineering and science students who haven’t done any proof based mathematics courses.

Unnecessarily verbose on insignificant aspects, like showing computational data and slight variations of algorithmic codes.Important theorems are relegated as exercises, which is very bad when you want to reference general ideas and see how they work.Relies too much on reader to "work out" the steps between different theorems. Proofs are not intuitively explained.No solutions to odd answers or any answers.This book is the prototypical textbook that makes people lose interest in the material they study as an undergrad. The material is frustrating to work through because there are too many gaps in the explanations and examples are sparse. It’s great to work through problems to improve retention and understanding, but this book makes the process very inefficient. As a math major with average intelligence at a top 10 US university, I found this book to be as helpful as the Wikipedia articles w/ respect to most topics.An example of skipping too many steps: On Page 582, the authors use phi(z) to represent all the computational steps behind the shooting method, and then goes on to describe interpolation of the results of phi(z) to find a good approximation for z. Having no background of shooting methods, I was forced to discover the calculation process via YouTube, which took a good 30 minutes, to understand what phi represents. There were no worked out shooting method examples in the text before this.This book is definitely NOT suitable for undergraduate study in its current state. Motivating examples are near non existent for upper level topics. I highly suggest readers to pick up a more introductory text to accompany this book for self-study.

Book was hard to follow at times and requires a high level of linear algebra.

Most of the numerical analysis books for the beginners seem to be very compact. This book on the other hand is more elaborate and explains how all the formulas are derived rather than just stating it. So, if a student wants a clear understanding of the theoretical aspect of the subject rather than just applying it, this book can be a valuable collection.

I have read better textbooks, and while this one is well organized, it does not go into detail into critical topics, nor does it provide adequate examples for it’s problems. It does have a few pseudo-code examples, but these examples are meaningless when the general formula is to elaborate to understand.Anyone who tells you there isn’t a better Numerical Analysis textbook out there is lying. David S. Watkins Fundamentals of Matrix of Computations is a great start for understanding matrix methods and computational applications. It goes into great detail and has fantastic examples.

This book is good at explaining some of the theorem involves and derivation of the algorithm/pseudo-codes. However, it makes certain assumption that should not be make lightly. Some of the problems indicated the matrix is using the concept of principle minor. If the reader did not read the section, they will not see the part where the book indicated to treat principle minor as leading principle minor. Since the two concepts are not the same, the book could be confusing to those that understand the concept and just want to practice the question, or simply scan the text before trying out the questions. The book also assume the reader have extensive knowledge of linear algebra. Therefore, this book is not for reader with basic linear algebra concept.Edit: I have even more trouble reading this book than any other textbook I encounter. The concept of Aitken Acceleration was not clear on how it is used in the algorithm. It seems like the idea was inserted in between power method and inverse power method. There was no noticeable use of the Aitken Acceleration in the inverse power method where you would assume some relation to the theorem just mentioned. Really not for a student who is learning all these new concepts.

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