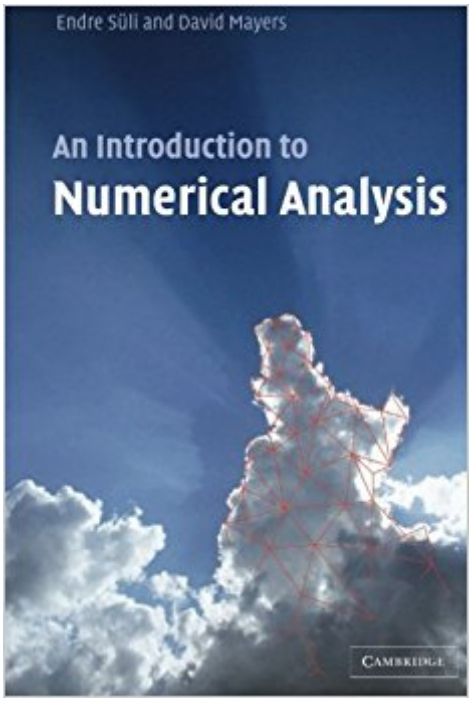
An Introduction To Numerical Analysis



Synopsis

This textbook is written primarily for undergraduate mathematicians and also appeals to students working at an advanced level in other disciplines. The text begins with a clear motivation for the study of numerical analysis based on real-world problems. The authors then develop the necessary machinery including iteration, interpolation, boundary-value problems and finite elements. Throughout, the authors keep an eye on the analytical basis for the work and add historical notes on the development of the subject. There are numerous exercises for students.

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Customer Reviews

"This book is a solid text in the basics of numerical mathematics, using more of a theoretical background than most. If you are looking for a book to use in a course in numerical analysis where there is an emphasis on the theoretical background, then this one will serve your needs." Journal of Recreational Mathematics"carefully written with a good level of rigor" SIAM Review

This textbook is written primarily for undergraduate mathematicians but it will also appeal to students working at an advanced level in other disciplines. The text begins with a clear motivation for the study of numerical analysis based on real world problems. The authors then develop the necessary machinery including iteration, interpolation, boundary value problems and finite elements. Throughout, the authors keep an eye on the analytical basis for the work and add interest with historical notes on the development of the subject. There are numerous exercises for students.

This is an excellent resource to brush up on your undergraduate numerical analysis. I've looked at many references, and this one is the best, the clearest, and the most complete. I cannot recommend this textbook highly enough.The reviewer that gave this book a bad review blames his lack of competence on the textbook. These are the most basic topics of numerical analysis, and any decent senior mathematics student should be able to comprehend the material. Real analysis results that are assumed (that usually comprise a basic university calculus courses) are outlined in detail in the appendix.

This book was used for a one semester course in numerical analysis. The companionbook wasÃ Â Numerical Linear Algebra. Together, these books make anoutstanding start to a personal numerical analysis reference shelf.The first half of the book is where pure math students may find trouble since thepresentation of linear algebra in math departments varies widely. A practical workingknowledge of basic linear algebra is necessary. A poor linear algebra background willrequire remediation before starting this book.Topics covered in this text that I have found particularly useful over the yearsinclude polynomial interpolation and quadrature. The presentation is perfect and easyto understand.Of course, no text can be everything to everyone. It helps to have an enthusiastic andknowledgeable professor leading you through the material. That said, the dedicatedstudent should have no problem navigating this text.

This book has emphasis on analysis of numerical methods, includingerror bound, consistency, convergence, stability. In most cases, anumerical method is introduced, followed by analysis and proofs. Forengineering students, who like to know more algorithms and a littlebit of analysis, this book may not be the best choice.Although this book is mainly about analysis, it does include clearpresentation of many numerical methods, including topics in nonlinearequations solving, numerical linear algebra, polynomial interpolationand integration, numerical solution of ODE. In numerical linearalgebra, it includes LU factorization with pivoting, Gerschgorin'stheorem of eigenvalue positions, Calculating eigenvalues by Jacobiplane rotation, Householder tridiagonalization, Sturm sequenceproperty for tridiagonal symmetric matrix. Interpolation includesLagrange polynomial, Hermite polynomial, Newton-Cotes integration,Improved Trapezium integration through Romberg method, Oscillationtheorem for minimax approximation, Chebyshev polynomial, least squarepolynomial approximation to a known function, Gauss quadrature usingHermite polynomial, Piecewise linear/cubic splines. Ordinaryddifferential equations section includes initial value problems withone-step and multiple steps, boundary value problems using

finitedifference and shooting method, Galerkin finite element method.The book gives basic definitions including norms, matrix conditionnumbers, real symmetric positive definite matrix, Rayleigh quotient,orthogonal polynomials, stiffness, Sobolev space.One place that is not clear is about QR algorithm for tridiagonalmatrix.In summary, the book is written clearly. Every numerical method ispresented based on mathematics. There are many proofs (there is oneproof with more than 3 pages), most of them that I decided to read arepretty easy to follow. There are not much implementation details andtricks. But this book will tell you when a method will converge andwhen a method is better. As a non-math major reader, I wish it couldpresent more algorithms, such as algorithms for eigenvalues ofnonsymmetric matrix, more details in finite difference method, alittle bit of partial differential equations etc.

I have read many numerical analysis textbooks and this is, by far, the best. However, if you are looking for a methods text (involving MATLAB, or something similar) you should probably avoid this book. It is an analysis text, and it does a great job covering the basic topics in a first year graduate course.

I had to use this textbook for a first course in Numerical Analysis. It might be one of the worst textbooks I have ever used. It contains a lot of material, but I do not feel it is well suited for a first course in Numerical Analysis at an undergraduate university.The main problem is the textbook assumes too much previous knowledge. I had difficulty understanding even the "simplest" explanations in this textbook because even those were too complicated. I often found myself searching the web and other texts for the concepts that I needed to learn, and I almost always found descriptions that I perfectly understood. Sometimes I could then go back and understand it from this textbook, but only after reading material elsewhere on the subject.Simply put, this textbook might be a decent resource for someone who already knows Numerical Analysis and has a really strong background in Math (I took the class my final semester as part of a BS in Mathematics degree, and my background was not strong enough). However, for "An intro to Numerical Analysis" as this title states, this is NOT the textbook to use.

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