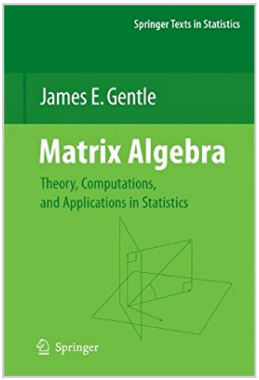


# Matrix Algebra: Theory, Computations, and Applications in Statistics (Springer Texts in Statistics)

*By James E. Gentle*



**Matrix Algebra: Theory, Computations, and Applications in Statistics (Springer Texts in Statistics)** By James E. Gentle

Matrix algebra is one of the most important areas of mathematics for data analysis and for statistical theory. This much-needed work presents the relevant aspects of the theory of matrix algebra for applications in statistics. It moves on to consider the various types of matrices encountered in statistics, such as projection matrices and positive definite matrices, and describes the special properties of those matrices. Finally, it covers numerical linear algebra, beginning with a discussion of the basics of numerical computations, and following up with accurate and efficient algorithms for factoring matrices, solving linear systems of equations, and extracting eigenvalues and eigenvectors.

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**Matrix Algebra: Theory, Computations, and Applications in Statistics (Springer Texts in Statistics) By James E. Gentle Bibliography**

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## Editorial Review

Review

From the reviews:

"[T]his well-written book on matrix algebra reminds me of many classics in the field. It is both concise and timely, and provides a good collection of overviews and reviews of important tools used in statistical methods. The book seems best suited as a supplementary text for various courses in multivariate statistical analysis or linear models. I also can safely recommend this book as a handy resource manual for researchers as well as practitioners." (Technometrics, May 2008, Vol. 50, No. 2)

"Readership: Students of a course in matrix algebra for statistics, or in statistical computing. … Recently, quite a number of books on matrices related to statistics have been published … . computational orientation of this book is probably the main difference between it and these other books. … I never thought that one could write a matrix book with statistical applications without having C.R. Rao in the references; here the book now is. … an extensive, personal, and easy-to-read matrix book of high quality. Recommended." (Simo Puntanen, International Statistical Review, Vol. 75 (3), 2007)

"This book is a remarkable and in a way unusual approach to integrate the two mega fields by a kind of interrelated guide. … Remarkably the referencing is done by pages … and the pages are precisely on target, which is proof of the careful writing and editing. … The book is a careful and interesting exposition of almost encyclopedic coverage of the interrelatedness of matrices and computation, emphasizing also statistical applications. … a strong, highly recommendable guide to the intricacies of matrices in statistics." (Götz Uebe, Advances in Statistical Analysis, Vol. 92 (3), 2008)

"This is a very refreshing book covering matrix theory and its applications in statistics and numerical analysis. It has the character of a handbook and is lucidly written. … A 14 page bibliography that is sufficient to trace the omitted proof details rounds out this book into almost a handbook of current state of the art knowledge in matrix theory and applications. There are eleven sets of exercises and detailed hints and partial solutions also." (Frank Uhlig, Zentralblatt MATH, Vol. 1133 (11), 2008)

"This book could serve as a text for a course in matrices for statistics … or, more generally, a course in statistical computing or linear models. … this can be a useful reference book for such a course or, more generally, as a reference for any statistician who uses matrix algebra extensively. … Overall, I really enjoyed reading Matrix Algebra: Theory, Computations, and Applications in Statistics, and I would recommend it as a nice reference to anyone interested in linear models, particularly its numerical aspects." (Abhyuday Mandal, Journal of the American Statistical Association, Vol. 103 (484), December, 2008)

From the Back Cover

Matrix algebra is one of the most important areas of mathematics for data analysis and for statistical theory. The first part of this book presents the relevant aspects of the theory of matrix algebra for applications in statistics. This part begins with the fundamental concepts of vectors and vector spaces, next covers the basic algebraic properties of matrices, then describes the analytic properties of vectors and matrices in the multivariate calculus, and finally discusses operations on matrices in solutions of linear systems and in

eigenanalysis. This part is essentially self-contained.

The second part of the book begins with a consideration of various types of matrices encountered in statistics, such as projection matrices and positive definite matrices, and describes the special properties of those matrices. The second part also describes some of the many applications of matrix theory in statistics, including linear models, multivariate analysis, and stochastic processes. The brief coverage in this part illustrates the matrix theory developed in the first part of the book. The first two parts of the book can be used as the text for a course in matrix algebra for statistics students, or as a supplementary text for various courses in linear models or multivariate statistics.

The third part of this book covers numerical linear algebra. It begins with a discussion of the basics of numerical computations, and then describes accurate and efficient algorithms for factoring matrices, solving linear systems of equations, and extracting eigenvalues and eigenvectors. Although the book is not tied to any particular software system, it describes and gives examples of the use of modern computer software for numerical linear algebra. This part is essentially self-contained, although it assumes some ability to program in Fortran or C and/or the ability to use R/S-Plus or Matlab. This part of the book can be used as the text for a course in statistical computing, or as a supplementary text for various courses that emphasize computations.

The book includes a large number of exercises with some solutions provided in an appendix.

James E. Gentle is University Professor of Computational Statistics at George Mason University. He is a Fellow of the American Statistical Association (ASA) and of the American Association for the Advancement of Science. He has held several national offices in the ASA and has served as associate editor of journals of the ASA as well as for other journals in statistics and computing. He is author of *Random Number Generation and Monte Carlo Methods*, Second Edition, and *Elements of Computational Statistics.*

## Users Review

**From reader reviews:**

**Edward Peterson:**

The book Matrix Algebra: Theory, Computations, and Applications in Statistics (Springer Texts in Statistics) has a lot associated with on it. So when you make sure to read this book you can get a lot of benefit. The book was written by the very famous author. The author makes some research prior to write this book. This particular book very easy to read you can find the point easily after perusing this book.

**Sarah Stiles:**

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starter.

**Brandon Adams:**

The book untitled Matrix Algebra: Theory, Computations, and Applications in Statistics (Springer Texts in Statistics) contain a lot of information on it. The writer explains her idea with easy technique. The language is very clear to see all the people, so do certainly not worry, you can easy to read the idea. The book was authored by famous author. The author provides you in the new time of literary works. It is possible to read this book because you can continue reading your smart phone, or device, so you can read the book in anywhere and anytime. In a situation you wish to purchase the e-book, you can wide open their official web-site and also order it. Have a nice examine.

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