Preface to Third Edition

This book is different from the several other books on the general topic of "matrix algebra and statistics" or "linear algebra and statistics" in its more extensive coverage of the applications to statistical linear models (mostly in Chapter 9) and the discussions of numerical computations (mostly in Part III).

As in the revisions for the second edition, in this third edition I have corrected all known remaining typos and other errors; I have (it is hoped) clarified certain passages; I have added some additional material; and I have enhanced the Index. I have also added exercises in some of the chapters.

The overall organization of chapters has been preserved, but some sections have been changed. The two chapters that have been changed most are the original Chapter 4, which is now Chapter 7 and has more coverage of multivariate probability distributions, and Chapter 9, with more material on linear models.

In this edition, I use the R software system frequently. It is likely that most readers know R, but I give a brief introduction to R in Chapter 1, then in Chapter 2, I mention R functions that operate on vectors, and then in Chapter 4, I mention R functions that operate on matrices. R, as any sofware system, is learned through usage. Finally, in Chapter 9, I mention some of the functions for applications in statistics. The most commonly used objects in this book are of class `matrix`, but I use `data.frame` for the linear models of Chapter 9. I do not use any of the objects, functions, or operators in the set of Tidy packages, which are very popular nowadays.

I require use of R in several exercises, and assume the reader/user has, or will develop, at least a moderate level of competence in use of R. Some of the exercises, especially in Part III, require competence in Fortran or C.

The notation and terms that I use are "standard"; that is, they are (I think) the most commonly used ones in discussions of matrices and linear algebra, especially by statisticians. Before delving into the book, the reader may want to take a quick look at Appendix A, and then refer to it whenever it is necessary to refresh the recognition of a symbol or term.

In previous editions, I had included answers to selected exercises. In this edition, I have moved the solutions to the webpage for the book.

I thank the readers of the first and second editions who informed me of errors, or made suggestions for improvement. I particularly thank Professor M. Yatov for extensive comments on notation and definitions, as well as for noting several errata and gaps in logic. Any remaining typos, omissions, and so on are entirely my responsibility.

I thank John Chambers, Robert Gentleman, and Ross Ihaka for their foundational work on R. I thank the R Core Team and the many package developers and those who maintain the packages that make R more useful.

Again, I thank my wife, María, to whom this book is dedicated, for everything.

I would appreciate receiving suggestions for improvement and notification of errors. Notes on this book, hints and solutions to exercises, and errata, are available at

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https://mason.gmu.edu/~jgentle/books/matbk/
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