
Preface to the First Edition

The purpose of this book is to provide the reader with a solid background and understanding of the basic results and methods in probability theory before entering into more advanced courses (in probability and/or statistics). The presentation is fairly thorough and detailed with many solved examples. Several examples are solved with different methods in order to illustrate their different levels of sophistication, their pros, and their cons. The motivation for this style of exposition is that experience has proved that the hard part in courses of this kind usually is the application of the results and methods; to know how, when, and where to apply what; and then, technically, to solve a given problem once one knows how to proceed. Exercises are spread out along the way, and every chapter ends with a large selection of problems.

Chapters 1 through 6 focus on some central areas of what might be called pure probability theory: multivariate random variables, conditioning, transforms, order variables, the multivariate normal distribution, and convergence. A final chapter is devoted to the Poisson process because of its fundamental role in the theory of stochastic processes, but also because it provides an excellent application of the results and methods acquired earlier in the book. As an extra bonus, several facts about this process, which are frequently more or less taken for granted, are thereby properly verified. The book concludes with three appendixes: In the first we provide some suggestions for further reading and in the second we provide a list of abbreviations and useful facts concerning some standard distributions. The third appendix contains answers to the problems given at the end of each chapter.

The level of the book is between the first undergraduate course in probability and the first graduate course. In particular, no knowledge of measure theory is assumed. The prerequisites (beyond a first course in probability) are basic analysis and some linear algebra.

Chapter 5 is, essentially, a revision of a handout by professor Carl-Gustav Esseen. I am most grateful to him for allowing me to include the material in the book.

The readability of a book is not only a function of its content and how (well) the material is presented; very important are layout, fonts, and other aesthetical aspects. My heartfelt thanks to Anders Vretblad for his ideas, views, and suggestions, for his design and creation of the `allan.sty` file, and for his otherwise most generous help.

I am also very grateful to Svante Janson for providing me with various index-making devices and to Lennart Norell for creating Figure 3.6.1.¹ Ola Hössjer and Pontus Andersson have gone through the manuscript with great care at different stages in a search for misprints, slips, and other obscurities; I thank them so much for every one of their discoveries as well as for many other remarks (unfortunately, I am responsible for possible remaining inadvertencies). I also wish to thank my students from a second course in probability theory in Uppsala and Jan Ohlin and his students from a similar course at the Stockholm University for sending me a list of corrections on an earlier version of this book.

Finally, I wish to thank Svante Janson and Dietrich von Rosen for several helpful suggestions and moral support, and Martin Gilchrist of Springer-Verlag for the care and understanding he has shown me and my manuscript.

Uppsala
May 1995

Allan Gut

¹ Figure 3.7.1 in this, second, edition.

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The first edition of this book appeared in 1995. Some misprints and (minor) inadvertencies have been collected over the years, in part by myself, in part by students and colleagues around the world. I was therefore very happy when I received an email from John Kimmel at Springer-Verlag asking whether I would be interested in an updated second edition of the book.

And here it is!

In addition to the cleaning up and some polishing, I have added some remarks and clarifications here and there, and a few sections have moved to new places.

More important, this edition features a new chapter, which provides an introductory outlook into further areas and topics, such as stable distributions and domains of attraction, extreme value theory and records, and, finally, an introduction to a most central tool in probability theory and the theory of stochastic processes, namely the theory of martingales. This chapter is included mainly as an appetizer to the more advanced theory, for which suggested further reading is given in Appendix A. I wish to thank Svante Janson for a careful reading of the chapter and for several remarks and suggestions.

I conclude the preface of this second edition by extending my heartfelt thanks to John Kimmel for his constant support and encouragement—for always being there—over many years.

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