Preface

In this book we bring together an overview of renewal theory. We focus on *Renewal Processes* on the positive half-line and consider the continuous case, and we also deal with discrete renewal sequences. A prerequisite for these notes is an introduction to probability theory and stochastic processes. In an appendix we let the reader get acquainted with some of the important results of regularly varying functions.

The material presented in this book is intended for (graduate) students and researchers in mathematics, probability theory, and stochastic processes who need an introduction to renewal theory.

In Chap. 1 we give an overview of ordinary renewal theory on the positive half-line and we discuss the important renewal theoretic results such as the elementary renewal theorem and Blackwell's theorem. We also discuss a variety of rate of convergence theorems and obtain the limit distribution for the lifetime and residual lifetime of the renewal process. The chapter ends with a discussion of delayed renewal processes.

Chapter 2 is devoted to discrete renewal sequences and again we discuss the important theoretical results here. We give two proofs of the Erdös–Feller–Pollard theorem and again obtain several rate of convergence results here.

In Chap. 3 we discuss various extensions of the results so far. At first we give an overview of renewal theory for the infinite means case. Furthermore, we discuss alternating renewal processes, renewal reward processes, and the superposition of renewal processes. In this chapter, we also briefly discuss bivariate renewal theory.

In the Appendix, we give a short overview of some important definitions and properties of regularly varying functions.

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