

Preface

Probability theory is an important part of contemporary mathematics. The subject plays a key role in the insurance industry, modelling financial markets, and statistics generally — including all those fields of endeavour to which statistics is applied (e.g. health, physical sciences, engineering, economics, social sciences). The twentieth century has been an important time for the subject because we have witnessed the development of a solid mathematical basis for the study of probability, especially from the Russian school of probability under the leadership of A.N. Kolmogorov. We have also seen many new applications of probability including applications of stochastic calculus in the finance industry, fundamental ideas in computer science, and internet gambling.

At the opening of the 21st century, the subject offers plenty of scope for theoretical developments, modern applications and computational problems. There is something for everyone in probability!

The idea for this text came from the book Sevastanyov, B., Christyakov, V., and Zubkov, A., *Problems in the Theory of Probability*, [59]. This work, which is now out of print, was based on the Russian school of probability and the importance which that school placed on problem solving. The problems in this book differ from problems in similar books in two ways. First, the problems tend to be quite long, verging on small projects. Many are intended to give the student the flavour of mathematical research even though the problems are not research problems *per se*. Long problems also help to dispel the feeling that all mathematics problems can be solved in half a page. Second, some problems are well known theorems (e.g. the central limit theorem). Many texts give the student the opportunity to

study the proof and to apply such theorems. The point of these problems in this book is to give the student an opportunity to experience proving the theorem.

These notes and problems are designed to:

- provide a basis for a series of lectures suitable for advanced undergraduate students on the subject of probability,
- show, through problems, the excitement of probability,
- assist students to develop interest and skills in solving problems,
- introduce students to famous works and workers in probability,
- convey classical and contemporary aspects of probability,
- allow students to experience the style of thinking involved in mathematical research,
- improve students' library research skills.

Part I consists of notes and problems; Part II consists of complete solutions and related comments. The statement of a problem often contains the answer, a hint, or a source of further information. The solutions in Part II often contain discussion and suggestions for further reading. The book is not designed to be self-contained because it is my intention that students will be driven to some of the references listed in the bibliography and thereby encounter some of the classic works in probability.

A feature of this work is the set of pen and ink drawings of the distinguished Australian artist, John Robinson. John teaches in the Department of Visual Arts at La Trobe University and his works are represented in many collections including the National Gallery of Victoria and the Queensland Art Gallery. I like his works because they appear to have mathematical themes.

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Bendigo
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