PREFACE

Statistical techniques are now used throughout modern industrial societies for analysis of data, to explain observations, and to help make rational decisions. Modern communication techniques have also meant a widespread use of statistical ideas and techniques in presenting and analysing data for public consumption. For example, the way election night results are presented has been revolutionised over the past few decades with all sorts of technical props at the fingertips of the presenters. But it should be remembered that statistics alone does not solve problems and indeed can come up with the wrong conclusions. This was borne out by the failure of political pollsters to correctly predict the result of the 1992 election in the UK.

Nevertheless this is just one instance of where statistical analysis did not provide correct answers; there are many instances when it does, and perhaps more importantly, instances where statistical analysis helps decision making. We live in a stochastic world, that is, one that is not predetermined. Governments and local authorities use statistical techniques for planning and development, allocating resources, controlling the economy and indeed gauging public opinion on topical issues. The range and scope of the techniques available has increased considerably over the past few decades, and most importantly the technology is now available to cope, relatively cheaply, with large amounts of data. Even the smallest business can afford its own computing power which can be used to monitor and predict future trading patterns.

This text has been written with the aim of giving readers a thorough understanding of statistical ideas and concepts, based on **probability theory**. It is not a recipe of what to do - there are plenty of good texts that fit that bill already – but attempts to show why a particular technique is used as well as explaining how to use it. We want readers to get a feel for statistics – both its potential and its limitations. There are many worthy techniques not included in this text, but readers gaining a sound understanding of probability and statistics should have little difficulty in coping with these techniques if they are needed later.

This text has been produced for students and includes examples, activities and exercises. It should be noted that the activities are **not** optional but are an important part of the learning philosophy in which you are expected to take a very active part. The text integrates

- **Exposition**   in which the concept is explained;

- **Examples**   which show how the techniques are used;

- **Activities**   which either introduce new concepts or reinforce techniques;

- **Discussion Points** which are essentially 'stop and think points, where discussion with other students and teachers will be helpful;

- **Exercises** at the end of most sections in order to provide further practice;

- **Miscellaneous Exercises** at the end of each chapter which provide opportunities for reinforcement of the main points of the chapter.

Discussion points are written in a special typeface as illustrated here.

Note that answers to the exercises are given at the back of the text. You are expected to have a calculator available throughout your study of this text and occasionally to have access to a computer.

Some of the sections, exercises and questions are marked with an asterisk (*). This means that they are either **not** central to the development of the topics in this text and can be omitted without causing problems, or they are regarded as particularly challenging.

There are many books available containing **statistical tables**; tables can also be found online.

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