show that any map would contain one of an ‘unavoidable set’ of configurations, and on the other it was demonstrated how many awkward configurations could be ‘reduced’ by the so-called ‘method of discharging’. The eventual solution, by Kenneth Appel and Wolfgang Haken, consisted of a construction of an unavoidable set of 1482 reducible configurations, and since its publication in 1977 this has been improved to ‘only’ 633. The controversial aspect of the proof is, of course, the use of a computer in checking reducibility. The author devotes the final chapter to a discussion of this controversy. The point is made that many ‘pencil-and-paper-proofs also involve an enormous amount of checking of individual cases, and that it is possible to discover gaps in even the most prestigious arguments, particularly when they are complex and specialised. In fact there has even been criticism in the other direction, that the authors would have been well-advised to use a computer for both parts of the proof, the construction of the unavoidable set as well as reducibility, and, indeed, this is what the more recent streamlined version does.

What is uncontroversial, however, is that the proof is not a pretty one. G. H. Hardy said that there was no such thing as ugly mathematics; where does that leave this problem? The author does mention other approaches to the four-colour theorem which were believed at one time or another to be potential candidates for a more elegant solution. Amongst these the work of Tait and Tutte, in which the underlying graph is based, not on countries, but on boundaries, is surely paramount. History, however, is littered with demonstrations that the theorem is equivalent to some other formulation which looks both obvious and accessible, but eventually turns out to be just as intractable as the original statement, so perhaps there is no simple solution. One instructive anecdote concerns Hermann Minkowski, who stated in a lecture course on topology that the only reason why the problem remained unsolved was that only third-rate brains had tackled it. He claimed, somewhat rashly, that he would prove it then and there to the class and proceeded to devote several weeks to the task, before admitting defeat and returning chastened to his original subject matter.

I can thoroughly recommend this book, which is lucidly written, with excellent diagrams and plenty of photographs of the major players, for the school or even local library. It is refreshing inexpensive and gives a fascinating insight into one of the most celebrated problems in mathematics.

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Bart Holland is a professor of biostatistics and epidemiology at a New Jersey medical school, and, in this short book, he aims to explain to the lay reader some of the ways in which probability and statistics helps us to understand the real world. Almost no mathematical background is assumed – indeed, the text contains only a handful of displayed equations – and the emphasis is entirely upon practical examples of random processes and the methods which have been developed to model them.

The author writes fluently and with authority and he covers a host of different situations, including the spread of epidemics, clinical testing for disease, life expectancy, the distribution of V-2 bombs over London in WW2, Brownian motion and bunching of buses and traffic queues. Concepts from statistics are introduced where appropriate – binomial probability, confidence intervals, the Poisson
distribution, queuing theory, random walks, and so on. On many topical issues he is prepared to admit that there are no definitive answers, considering, inter alia, the following questions: how convinced are we that the trends in climate change over the past thirty years are an indication of global warming rather than just random fluctuations? how much belief can there be in miracles? is the movement of share prices better explained by chaos theory than by statistics? He also emphasizes that issues such as psychology and economic efficiency sometimes have as much of a bearing on eventual decisions as purely statistical considerations.

However, this makes no attempt to be a mathematical text and the explanation only goes as far as the author judges appropriate for a non-specialist audience. As someone who is familiar with much of (but not all) the theory, I did find myself wondering how much sense the lay reader would make of the explanation of standard error and the Central Limit Theorem, for instance. However, the strength of this book is the wealth of examples of applied probability theory which will provide useful support for any statistics course in the classroom.

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The first edition of the author's magnum opus drew universal acclaim when it appeared in 1997 for its scope, clarity and precision. It was hailed then as the ideal reference to large parts of probability theory, being both rigorous and self-contained. For the second edition, only five years later, Professor Kallenberg has added over a hundred pages in an attempt to keep it up to date with the exponentially increasing body of knowledge which is probability theory. Moreover, certain sections, such as the overview of 'all the measure theory a probabilist ought to know', have been comprehensively rewritten in order to be self-sufficient.

This is an uncompromisingly mathematical text, which spends little or no time on distractions, and yet manages to be coherent and readable and to retain a sense of direction. It is clearly organised so that it will function as an ideal reference work on, say, Markov processes, random walks, ergodic theory or martingales. Chapters on Palm distributions, entropy, information theory, ergodicity and large deviations have been added for this revision. There are challenging exercises at the end of each section, together with hints. At the end of the volume there are extensive historical and biographical notes on all the twenty-seven chapter headings, together with a lengthy list of references and author, subject and notation indices. This is an essential purchase for any serious probabilist.

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The first volume of this textbook, which was reviewed in the Gazette in July 2001 (p. 361), covered the prerequisites for the current volume, which might form the basis of a graduate-level course. The core of the book is a treatment of the related theorems of Gödel in formal arithmetic and Turing in recursion theory. Chapter five (the first) introduces recursive functions, Turing machines, the concept of recursively