
Preface

This book was begun when two of the authors decided that their collaboration on their introductory probability book was both productive and fun. We cast about to find some other project on which we could continue this collaboration. At the same time, all three of the authors were working on Chance News, which is an ongoing website containing reviews of news and journal articles pertaining to probability and statistics in the real world. It was decided that we should try to write a book in which we would take some of our favorite articles in Chance News and revise and expand them.

The result is not exactly what was originally planned. Instead of having many short chapters on a variety of subjects, the present book consists of four chapters in which we go into some depth on the covered topics. In fact, it is this depth that we think makes this book different than other books that cover applications of probability and statistics to the real world.

In the first two chapters, we use some ideas from calculus. Much of the more technical mathematics has been placed in appendices so as not to break the flow of the chapters. We think that even if a reader has not studied calculus, he or she will be able to read and understand most of the material in these chapters. In particular, one

can gain much insight in these chapters from the numerous graphs found therein.

Our first chapter concerns the idea of streaks. Many participants in and observers of sports believe that individuals and teams can be “hot” or “cold.” For example, a basketball player who has made many consecutive field goals is frequently described at the time as having a “hot hand.” It turns out that in many sports, the observed streaks can be shown to fit a very simple coin-tossing model. In other words, coins (fair or otherwise) that are flipped repeatedly exhibit the same kinds of streaks, with the same distributions of lengths of these streaks as those observed in sports. The reader will note that we are not saying that such streaks do not exist, but rather that it is not necessary to posit a model that is any more sophisticated than a simple coin-tossing model to explain these streaks.

The second chapter introduces the reader to some aspects of the U.S. stock market. This is an area in which a vast amount of research has been conducted. We explain how the important class of probability distributions known as power laws can help in understanding the movements of stock prices.

The third chapter is concerned with lotteries. We take the reader through the calculations that are necessary to understand the probabilities of winning various prizes in a typical lottery. We use the Powerball lottery as an example. We also consider the effects that income tax, present value, and possible sharing of the prize have on the value of a lottery jackpot.

The last chapter contains a short history of fingerprinting and discusses some of the problems with the use of fingerprints in fighting crime. These problems are still extant and defy easy solutions.

We think that almost all of the material in this book is accessible to those who have had one semester of calculus (some of the material in the appendices requires some knowledge of power series) and much of it is accessible to all interested readers. We hope that the

material in this book is used to supplement the material in a standard probability or statistics course at the undergraduate level.

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