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# Applied Statistics

## Analysis of Variance and Regression

Third Edition

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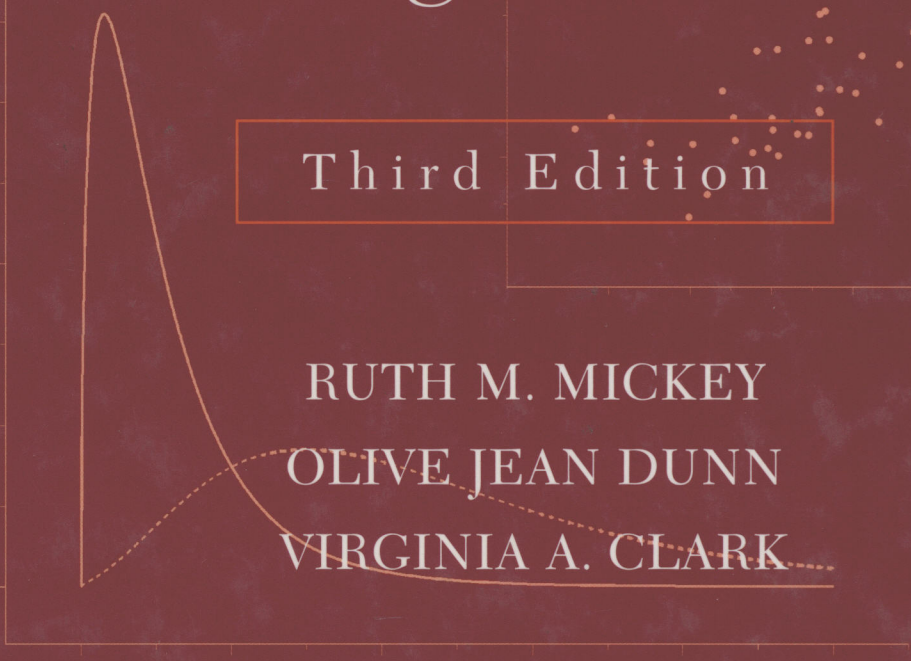

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*Wiley Series in Probability and Statistics*

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## *Analysis of Variance and Regression*

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# *Applied Statistics*

Third Edition

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# *Preface*

## What This Book Is About

The objectives of this third edition of *Applied Statistics: Analysis of Variance and Regression* are to be a textbook for a one year or, with omissions, a one-semester course in analysis of variance and regression and also to be a useful reference. In each chapter, we give an example, discuss how to summarize the data, state the model and the assumptions, give confidence intervals and tests, describe how to tell if the assumptions are satisfied, and offer advice on what to do if they are not satisfied. To illustrate the analysis of data that do not meet all the assumptions, in some of the examples the assumptions are not fully met. The statistical methods are given in a general context and are illustrated in terms of the chapter example. With this organization, the student is exposed to the whole data analysis process, starting from a data set to the presentation and interpretation of its statistical analyses. A low level of mathematics is assumed and clear statements of the model assumptions are made.

## What Changes Have Been Made in this 3rd Edition

There is now greater emphasis on data screening. This is introduced in the first chapter and continues to be addressed in subsequent chapters. Interpretation of computer program results are included so the reader will know how

to perform and interpret real life analyses. We have added sections on how to explain the statistical methods used and the results of the analyses.

We have included a wider variety of homework problems at the end of each chapter. Some problems make use of small, artificial data sets, which lend themselves to focusing on the statistical methods addressed in each chapter. These emphasize straightforward applications of the statistical methods or their verification by spreadsheet or by hand. Other problems make use of larger, real data sets; these are particularly useful for illustrating violations of the assumptions and other practical problems that can arise in real world applications. Finally, we have developed a limited number of problems that involve simulations. Large data sets are available on the Wiley ftp given below.

Some of the more technical material (such as general rules for deriving the formulae given in the chapters and some illustrative examples) is now in an appendix. Students can read through the material in a chapter and stay focused on the application and interpretation of the statistical methods; for interested students who need or want to verify formulae, the appendix is a good source of information. We reference relevant books and journal articles at the end of each chapter. We have tried to include both standard references as well as some very practical articles that have appeared in *The American Statistician*.

The first four chapters of the second edition were deleted as this introductory material would likely not now be covered in a course in analysis of variance and regression. However, some key topics in those deleted chapters are incorporated into other chapters or included in the appendix. We also dropped material that seems more appropriate for a course in experimental design: factorial designs with each factor at two levels and the Latin square design. Finally, we eliminated detailed computing formulas.

## Use of the Computer and the Wiley ftp Site

We recognize that there are numerous software packages that are available and have not written this book with any particular one in mind. We performed our data analyses using SAS and Minitab and occasionally S-PLUS; the graphs were generated using S-PLUS. We have tried to be aware of alternative names that the different packages use to describe the same thing and mention them in the text. The ftp site associated with this book is `ftp://ftp.wiley.com/public/sci_tech_med/applied_statistics`. We will use this site to store the larger data sets used in the text, selected computer programs that we created, additional homework problems, and errata.

## Acknowledgements

Many people contributed to this revision. Dr Mickey, who has used this material in her teaching, has taken a lead role in this new edition and she has been backstopped by Dr Clark. We both have benefited from the clarity of thinking and writing of Dr Dunn in earlier editions. We thank Dr Philip Ades, Dr Lorraine Berkett, Dr Richard Branda, Dr Elena Garcia, Neil Kamman, and Scott Pfister for generously giving us their data sets. We thank Welden Clark for his assistance with figures and tables and his help in putting the entire work together. We thank Steve Quigley, Executive Editor, and the editorial and production staff at Wiley—Heather Bergman, Rosalyn Farkas, and Susanne Steitz, for their patience and advice.

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