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Written in a clear and lively tone, *Statistics Using IBM SPSS* provides a data-centric approach to statistics with integrated SPSS (version 22) commands, ensuring that students gain both a deep conceptual understanding of statistics and practical facility with the leading statistical software package. With one hundred worked examples, the textbook guides students through statistical practice using real data and avoids complicated mathematics. Numerous end-of-chapter exercises allow students to apply and test their understanding of chapter topics, with detailed answers available online. The third edition has been updated throughout and includes a new chapter on research design, new topics (including weighted mean, resampling with the bootstrap, the role of the syntax file in workflow management, and regression to the mean), and new examples and exercises. Student learning is supported by a rich suite of online resources, including answers to end-of-chapter exercises, real data sets, PowerPoint slides, and a test bank.

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AN INTEGRATIVE APPROACH
Third Edition

SHARON LAWNER WEINBERG

New York University

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Drew University

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Preface

This text, in its third edition, capitalizes on the widespread availability of menu-driven software packages to create a course of study that links good statistical practice to the analysis of real data, and the many years of our combined experience teaching statistics to undergraduate students at a liberal arts university and to graduate students at a large research university from a variety of disciplines including education, psychology, sociology, health, and policy analysis. The third edition continues to embrace and be motivated by several important guiding principles.

First, and perhaps most important, we believe that a good data analytic plan must serve to uncover the story behind the numbers, what the data tell us about the phenomenon under study. To begin, a good data analyst must know his/her data well and have confidence that it satisfies the underlying assumptions of the statistical methods used. Accordingly, we emphasize the usefulness of diagnostics in both graphical and statistical form to expose anomalous cases, which might unduly influence results, and to help in the selection of appropriate assumption-satisfying transformations so that ultimately we may have confidence in our findings. We also emphasize the importance of using more than one method of analysis to answer fully the question posed and understanding potential bias in the estimation of population parameters. In keeping with these principles, the third edition contains an even more comprehensive coverage of essential topics in introductory statistics not covered by other such textbooks, including robust methods of estimation based on resampling using the bootstrap, regression to the mean, the weighted mean, Simpson's Paradox, counterfactuals and other topics in research design, and data workflow management using the SPSS syntax file. A central feature of the book that continues to be embraced in the third edition is the integration of SPSS in a way that reflects practice and allows students to learn SPSS along with each new statistical method.

Second, because we believe that data are central to the study of good statistical practice, the textbook's website contains several data sets used throughout the text. Two are large sets of real data that we make repeated use of in both worked-out examples and end-of-chapter exercises. One data set contains forty-eight variables and five hundred cases from the education discipline; the other contains forty-nine variables and nearly forty-five hundred cases from the health discipline. By posing interesting questions about variables in these large, real data sets (e.g., is there a gender difference in eighth graders' expected income at age thirty?), we are able to employ a more meaningful and contextual approach to the introduction of statistical methods and to engage students more actively in the learning process. The repeated use of these data sets also contributes to creating a more cohesive presentation of statistics; one that links different methods of analysis to each other and

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avoids the perception that statistics is an often-confusing array of so many separate and distinct methods of analysis, with no bearing or relationship to one another.

Third, we believe that the result of a null hypothesis test (to determine whether an effect is real or merely apparent), is only a means to an end (to determine whether the effect being studied is important or useful), rather than an end in itself. Accordingly, in our presentation of null hypothesis testing, we stress the importance of evaluating the magnitude of the effect if it is deemed to be real, and of drawing clear distinctions between statistically significant and substantively significant results. Toward this end, we introduce the computation of standardized measures of effect size as common practice following a statistically significant result. While we provide guidelines for evaluating, in general, the magnitude of an effect, we encourage readers to think more subjectively about the magnitude of an effect, bringing into the evaluation their own knowledge and expertise in a particular area.

Fourth, a course in applied statistics should not only provide students with a sound statistical knowledge base but also with a set of data analytic skills. Accordingly, we have incorporated the latest version of SPSS, a popularly-used statistical software package, into the presentation of statistical material using a highly integrative approach. SPSS is used to provide students with a platform for actively engaging in the learning process associated with what it means to be a good data analyst by allowing them to apply their newly-learned knowledge to the real world of applications. This approach serves also to enhance the conceptual understanding of material and the ability to interpret output and communicate findings.

Finally, we believe that a key ingredient of an introductory statistics text is a lively, clear, conceptual, yet rigorous approach. We emphasize conceptual understanding through an exploration of both the mathematical principles underlying statistical methods and real world applications. We use an easy-going, informal style of writing that we have found gives readers the impression that they are involved in a personal conversation with the authors. And, we sequence concepts with concern for student readiness, reintroducing topics in a spiralling manner to provide reinforcement and promote the transfer of learning.

New to the third edition are the addition of other essential topics in introductory statistics, including robust methods of estimation based on resampling using the bootstrap, regression to the mean, the weighted mean and Simpson's Paradox, counterfactuals, potential sources of bias in the estimation of population parameters based on the analysis of data from quasi-experimental designs, other issues related to research design contained in a new chapter on research design, the importance of the SPSS Syntax file in workflow management, an expanded bibliography of references to relevant books and journal articles, and many more end-of-chapter exercises, with detailed answers on the textbook's website. Along with topics from the second edition, such as data transformations, diagnostic tools for the analysis of model fit, the logic of null hypothesis testing, assessing the magnitude of effects, interaction and its interpretation in two-way analysis of variance and multiple regression, and nonparametric statistics, the third edition provides comprehensive coverage of essential topics in introductory statistics. In so doing, the third edition gives instructors flexibility in curriculum planning and provides students with more advanced material for future work in statistics. Also new is a companion website that includes copies of the data sets and other ancillary materials. These materials are available at www.cambridge.org/weinberg3appendix under the Resources tab.

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The book, consisting of seventeen chapters, is intended for use in a one- or two-semester introductory applied statistics course for the behavioral, social, or health sciences at either the graduate or undergraduate level, or as a reference text as well. It is not intended for readers who wish to acquire a more theoretical understanding of mathematical statistics. To offer another perspective, the book may be described as one that begins with modern approaches to Exploratory Data Analysis (EDA) and descriptive statistics, and then covers material similar to what is found in an introductory mathematical statistics text, such as for undergraduates in math and the physical sciences, but stripped of calculus and linear algebra and instead grounded in data examples. Thus, theoretical probability distributions, The Law of Large Numbers, sampling distributions, and The Central Limit Theorem are all covered, but in the context of solving practical and interesting problems.

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