Applied General Statistics

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When you cannot measure what you are speaking about, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely in your thoughts advanced to the stage of a *science*, whatever the matter may be.

—*Lord Kelvin.*

* * *

When the facts are gathered or discovered, when they are disentangled and identified, when they are sifted and verified, when they are counted and measured, the real task of the scholar is not ended —it is not even begun, but only prepared for him.

—*MacIver.*

PREFACE

This book is intended for the use of readers who are interested in the understanding of statistical methods, and in their application in various fields, especially the social sciences. Consequently, the illustrative material has been drawn mainly from the fields of economics, sociology, and business, but occasionally from others.

The arrangement of the topics treated in this volume is about the same as in the authors' earlier book, *Practical Business Statistics*. The present text, however, does not stress business applications of statistical methods, but does present a greatly amplified treatment of analytical methods. The extensive discussion of the description and analysis of statistical data and of the making of statistical inferences will, we hope, make it useful to a wide group of teachers emphasizing various aspects of statistics.

Although the treatment of the material in this text is intended to be at an elementary level, probably its scope is so great that it cannot be covered adequately in most introductory courses. Thus, many instructors will deem it advisable to omit certain material in the first course and reserve it for a second, more advanced or more specialized course. Among the chapters which may be completely omitted in a short course without disturbing the continuity of treatment are Chapters XIII, XVI, XVIII, XXIII, and XXIV. Parts of other chapters may, of course, be left out at the discretion of the instructor. In the table of contents, chapters or sections which could well be omitted from an elementary course have been starred.

One problem of the statistician, especially the teacher, is that of selecting symbols which are simple and clear. Some of the symbols used in the present volume differ from those used in the authors'

earlier text. This departure was made in an attempt to arrive at symbols which would be more easily understood and which would, consequently, facilitate the teaching process.

If this volume has any merit, it must be at least partly because of those who first introduced the authors to statistical methods; because of those texts (and other publications) which have preceded this; because of those publishers and individuals who have allowed us to reproduce charts or data of particular value, specific acknowledgment of which is made in the appropriate connection; and because of numerous individuals who have assisted with the task of completing the book. The authors especially extend their thanks to Mr. Morton S. Nagelberg, who assisted in the construction of charts and in connection with certain of the mathematical developments; to Dr. James D. Paris, who assisted and advised concerning a number of charts; to Brant Bonner, Herbert Wolf, and John W. Gunter, for aid in making computations and preparing charts; and to Rosetta R. Croxton, for assistance in the reading of proof.

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(For a short course in statistical methods, the chapters or sections which are starred in this table of contents may be omitted without destroying the continuity of treatment.)