

# PREFACE

EARLIER EDITIONS of this book have been used extensively both as texts for introductory courses in statistics and as reference sources for statistical techniques needed by those who collect and analyze data. As a text, the book contains ample material for a course extending throughout the academic year. A suggested list of topics for a one-term course precedes the preface. In most of the book the mathematical level required is little more than elementary algebra.

In this edition some rewriting and rearranging has been done in the hope of making the book easier to use and to make the chapters somewhat shorter. Chapter 1 now introduces the types of data with which the book mainly deals—sample surveys, controlled experiments, and comparative observational studies—plus the concept of random sampling. Then follow chapters on frequency distributions, the mean and standard deviation, the normal distribution, and tests of hypotheses.

Later chapters follow the same general course as in the sixth edition except that the material on the random effects model in the analysis of variance is now in a separate chapter, as is the material on failures in the assumptions in the analysis of variance.

The calculations for fitting a multiple linear regression have been changed to the use of the sweep operator. This is a routine method that is easily learned and easily programmed on an electronic computer. Also, by the use of dummy  $X$ -variables to represent classifications, the calculations for analyses of variance and covariance can be done by a computer program for fitting multiple linear regressions. Teachers are not agreed on whether a standard programming language should be learned and used for an introductory course in statistics. Perhaps the most common technique at present is to construct simple programs that can be used by the students without learning any programming language and that will do the calculations for the numerical examples in the introductory course. No programs are presented in this edition, but

comments are made from time to time on how computers are likely to present results and on calculations that may be available on demand in computer outputs.

Topics that appear for the first time in this edition are:

Probability paper (section 2.6)

The probability of at least one success in a series of trials (section 7.5)

Levene's robust test for the equality of a set of estimated variances (section 13.11)

Balancing the order in which treatments are given in a repeated measurements experiment (section 14.9)

Simultaneous study of the different effects of a transformation in the analysis of variance (section 15.15)

Yates' algorithm in factorial experiments (section 16.12)

Experiments with repeated measurements (section 16.16)

Mallows  $C_p$  criterion for choosing a subset of predictor variables in multiple regression (section 17.14)

Nonsampling errors in sample surveys (section 21.13)

A number of tables for the detection of outliers have been added: Table A 16 of the 5% and 1% levels maximum normed residual  $\max |X - \bar{X}| / \sqrt{\sum (X - \bar{X})^2}$  for a normal sample and of the related quantity  $\max |d| / \sqrt{\sum d^2}$  for independent normal  $d$ 's; table A 18 of the significance levels of the maximum normed residual in a two-way classification; table A 17 of Dixon's criteria for quick tests of outliers. In addition, some previous tables have been expanded.

A list of symbols frequently used in this book follows the preface.

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