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Unbiased Estimators and their Applications
Volume 2: Multivariate Case

TABLE OF CONTENTS

Chapter I summarizes basic definitions relevant to the multivariate distributions (both discrete and continuous ones) as pdf, cdf, marginal and conditional distributions, moments, characteristic function etc. Aside that, multivariate normal distribution as well as some other most typical (and useful) discrete and continuous multivariate distributions are characterized in details.

Chapter II describes shortly basic concepts and principles of the (point) statistical estimation as the risk, consistency, unbiasedness, sufficiency, completeness and unbiasedness. Multivariate versions of the Rao–Cramer inequality and the Rao–Blackwell–Kolmogorov theorems are given in details. Quite a lot of space is devoted to the normal distribution and to the Stein's "shrinkage approach" for the improvement of estimators.

Chapter III, which presents techniques for the construction of the unbiased estimators, forms the *first key part* of the book. The ideas are closely connected to the first volume of this monograph without which it is not always easy to follow the text in detail. The aim is concentrated on the unbiased estimation of the multivariate probability density functions and MVUE's for multivariate power series distributions.

Several interesting applications of unbiased estimators can be found in Chapter IV.

The *second key part* is formed by Appendix 1 containing more than 40 pages of tables of unbiased estimators for the most typical multivariate distributions. In Appendix 2 a technique for evaluating of some multiple integrals encountered in statistics is discussed. Finally, Appendix 3 is devoted to the problem of the construction of partitions.

Also of interest might be the first volume *Unbiased Estimators and their Applications. Vol. I: Univariate Case* written by the same authors, Kluwer Academic Press, Dordrecht, The Netherlands, ISBN 0-7923-2382-3.

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Jaromír Antoch

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STEVEN G. KRANTZ
Techniques of Problem Solving

American Mathematical Society, Providence 1997.
xiii + 367 + 98 pages, 186 figures.
ISBN 0-8218-0619-X.

The problem solving in its general sense is inseparable from perhaps all scientific and creative activities. The analytical approach to the existing problems to be solved and good handling the techniques of their treatment are the principal ways to satisfactory solutions.

The referred book offers a representative overview of basic mathematical and analytical ideas of effective problem solving. They include counting, logic (induction and contradiction in proving), graphical and visual techniques, recursion methods, generating functions, some probabilistic and statistical ideas, etc.

The text of the book is divided into eight main chapters. The first one introduces the *Basic Concepts* like method of counting, logical concepts, parity, and several illustrative examples. The second chapter, *Deeper Look at Geometry*, is characterized by its title, as well as the third one, *Problems Involving Counting*. The following chapter, *Problems of Logic*, deals with concepts like straight logic but also games, parity, tracing routes and it also includes arithmetic problems. The fifth chapter is titled *Recreational Math* and, in accordance with this title, it is focused to the topics like magic squares and weightings. The following chapter is oriented to more advanced mathematics, namely *Algebra and Analysis*. The last but one chapter, *Miscellany*, deals with two topics – with variations of the "crossing the river" problem, and with analysis of hidden mistakes in impossible statements. Finally, the last chapter is titled *Real Life* and it deals with practical (and "less practical") problems connected with real objects. They are based on the ingenious application of geometry or statistics or of other smart approaches to the analysis of the problems.

The book is completed by *Bibliography* (37 items) and *Index*.

Each chapter is concluded by several numbered *Exercises*. Their solutions (prepared by Luis Fernández and Haedeh Gooransarab) is the conclusive part of the referred volume.

The book was evidently written for students but it can serve as a training material for anybody who is to be familiar with various problem solving techniques and with their "philosophy". Even if most (but not all) of the problems presented in the volume are of mathematical structure, the "radiation" of the presented methods reaches much wider class of practical, theoretical or "recreational" problems. In this sense the referred book can be recommended to everyone who looks for a vivid and widely treated presentation of approaches to problems to be solved.

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Milan Mareš

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