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BOOK REVIEWS

Advanced Courses in Mathematical Analysis, III, Proceedings of the Third International School, JUan M. Delgado Sánchez and Tomás Domínguez Benavides (Editors), World Scientific Publishers, London - Singapore 2008, xiv+194 pp, ISBN:13 978-981-281-844-7 and 10-981-281-844-8.

Several Andalusian universities decided to organize an International Course on Mathematical Analysis in Andalusia, a task that was achieved by the friendly cooperation of several research groups in analysis and by the support of Spanish National Government, of several universities and from several private companies as well. The first course took place in Cádiz (2002), followed by the second in Granada (2004). The success these courses had determined the organization of the third one in La Rábida (Huelva) from 3 to 7 September, 2007. The aim of these courses is to provide an extensive overview, by leading experts, of the research in various areas of analysis -real analysis, complex analysis, functional analysis.

The present course was attended by more that 70 participants from various countries, who had the opportunity to here eleven plenary lectures and to participate to three seminars, delivered by invited distinguished mathematicians from all over the world. The volume contains the written (and usually expanded) versions of the talks and covers a lot of topics in various areas of mathematical analysis, applications to economy, or history of mathematics (a nice paper by Beckenstein and Narici on the life of E. Helly and the Hahn-Banach theorem). The eleven survey papers included in this volume deal with topics as: Dynamics in one complex variable (M. Abate, Univ. di Pisa), Bilinear Hilbert transform and multipliers (O. Blasco, Univ. de Valencia), Functions whose translations generate $L^1(\mathbb{R})$ (J. Bruna, Univ. Autònoma de Barcelona), Compactness and distances to function spaces (C. Angosto and B. Cascales, Univ. de Murcia), Spaces of smooth functions (E. Harboure, Wayne State Univ., Detroit), Domination by positive operators and singularity (F. L. Hernández, Univ. Complut. de Madrid), The Hahn-Banach theorem and the sad life of E. Helly (L. Narici and E. Beckenstein, St. John's Univ., NY), Small subspaces of the space L_p (E. Odell, Univ. of Texas, Austin), Hypercyclic operators (H. N. Salas, Univ. de Puerto Rico), Operator spaces (B. M. Schreiber, Wayne State Univ., Detroit), Mathematics and markets - competitive equilibrium (A. Villar, Univ. Pablo de Olavide, Sevilla), Ideals in F-algebras (W. Żelazko, Mathematical Institute, Warszawa).

By the survey papers on topics of current interest, written by mathematicians with substantial contributions to the subject, this collection of papers will be very useful to graduate students (post-graduate as well) desiring to learn about topics of high research interest from leading experts.

S. Cobzaş

Ben Klemens, ***Modeling with Data. Tools and Techniques for Scientific Computing,*** Princeton University Press, Princeton and Oxford, 2009, XIV+454 pp; ISBN: 978-0-691-13414-0.

This book presents an original, cheap and powerful solution to the problem of analysis of large data sets. The solution combines C language, data base query and management, statistics and data visualization. The book intends to be an alternative to classical statistical books: it does not separate descriptive and inferential statistics, simple models are combined into more complex model in a hierarchical way and it is computer oriented.

All software tools used by author are *free* and reliable: GNU C Compiler, SQLite and MySQL, GNU Scientific Library (GSL), Gnuplot and Graphviz. Each of them may be considered ugly for nonprofessional users. The way the author uses them and the accessibility of presentation endows the user with a set of open and unlimited tools to solve the difficult tasks of statistical data analysis.

The first part part of the book (six chapters) is devoted to computing. Chapter 2 introduces the basics of C programming language. The next chapter is on data bases and SQL query language, since working with large data sets is now more necessary than ever. Chapter 4 presents matrices and vectors from GSL ad Apophenia library, built upon the GSL. Computer graphics is the topic of Chapter 5. Gnuplot interpreter assures a simple way to plot and portability. The last chapter of the first part emphasizes the features of C language already presented and introduces data structures like linked lists and binary trees.

The second part, Statistics, does not deals with very advanced concepts, but their combination into a creative manner allow the modeling and handling of situations of arbitrary complexity. Chapter 7 treats numerical characteristics of samples and classical probability distributions. Principal component analysis, ordinary least squares and related methods, and multilevel modeling are the topics of Chapter 8. The next chapter is devoted to Central Limit Theorem and hypothesis testing. Chapter 10 introduce Maximum Likelihood Estimation and related statistical inferential procedures. The last Chapter, 11, is devoted to Monte Carlo techniques, and related subject like random number generation, bootstrapping and resampling.

Three appendices increase the readability of the book.

The vision of the author is to present the things as a pipeline going from raw data to a final publishable output; the pipe sections and filters assure different level of abstractions which reach to a full program.

This book includes more than 80 working programs; they allow the readers to explore the data, find out to what changes the procedure is robust and freely modify the code.

The programs, and moreover, the ability to combine the tools into a fully-functional pipeline are intended to be a natural alternative to sophisticated and expensive statistical softwares and packages.

The book is devoted mainly to the practitioner of Statistics, but is also useful to mathematicians, computer scientists, researchers and students in the biology, economics and social sciences.

Radu Trîmbiţaş

Walter Roth, *Operator-Valued Measures and Integrals of Cone-Valued Functions*, Lectures Notes in Mathematics, Vol. 1964, Springer-Verlag, Berlin - Heidelberg, 2009, x+356 pp; ISBN: 978-3-540-87564-1, e-ISBN: 978-3-540-87565-1.

The theory of locally convex cones was developed by the author and K. Keimel in a previous book, *Ordered Cones and Approximation*, Lecture Notes in Mathematics, Vol. 1517, Springer-Verlag, Berlin 1992, as a general framework for Korovkin type linear approximation theory. The aim of the present book is to use the theory of locally convex cones for developing a very general and unified theory of integration for extended real-valued, vector-valued, operator-valued and cone-valued countably additive measures and functions.

A full locally convex cone is a cone $\mathbf{P}$ endowed with an order $\leq$ compatible with the algebraic operations and a downward directed subset $\mathbf{V}$ of positive elements, closed for addition and multiplication by strictly positive scalars, called an abstract neighborhood system. An element $v \in \mathbf{V}$ determines upper and a lower neighborhoods of any element $a \in \mathbf{P}$ given by $v(a) = \{b \in \mathbf{P} : b \leq a + v\}$ and $(a)v = \{b \in \mathbf{P} : a \leq b + v\}$, respectively, and a symmetric neighborhood $v^s(a) = v(a) \cap (a)v$. A locally convex cone is a subcone $(\mathbf{Q}, \mathbf{V})$ of a full locally convex cone, not necessarily containing the abstract neighborhood system $\mathbf{V}$, equipped with the induced topologies (upper, lower and symmetric). The cancellation law $a + c = b + c \Rightarrow a = b$ need not hold in the cone $\mathbf{P}$. If it holds then $\mathbf{P}$ can be embedded in a vector space and, conversely, every cone in a vector space is cancellative.

Based on powerful Hahn-Banach type extension and separation theorems for additive and positively homogeneous functionals with respect to sublinear or superlinear functionals, one can develop a theory of locally convex cones similar to that of locally convex spaces: duality theory, weak topologies and a Mackey-Arens type

theorem, Uniform Boundedness Principle and Open Mapping Theorem. This theory is exposed in the first chapter of the book, *Locally convex spaces*, which partly has a survey character, the proofs of some theorem being referred to the above mentioned book of the author and K. Keimel.

The integration theory for cone-valued measures and functions is developed in the second chapter of the book, *Measures and integrals. The general theory.* The framework is that of two locally convex cones $\mathbf{P}$ and $\mathbf{Q}$ (the latter being supposed to be a complete lattice cone), the cone $\mathcal{L}(\mathbf{P}, \mathbf{Q})$ of additive and positively homogeneous operators from $\mathbf{P}$ to $\mathbf{Q}$, and a $\mathcal{L}(\mathbf{P}, \mathbf{Q})$-valued measure defined on a σ-field (or a σ-ring) on a set X. The lattice completeness of $\mathbf{Q}$ allows to define integrals of measurable $\mathbf{P}$-valued functions as suprema of the integrals of measurable step $\mathbf{P}$-valued functions.

The central result of the last chapter of the book, III, *Measures on locally compact spaces,* is a very general Riesz type integral representation theorem for continuous linear operators from function cones over a locally compact space X into a locally convex complete lattice cone $\mathbf{Q}$, which contains as particular cases a lot of known integral representations for compact and weakly compact operators on Banach space-valued functions, as well as some new general cases. As a very special case, one obtains also the classical spectral representation theorem for normal linear operators on a complex Hilbert space.

As the author points out, a demanding topic, of great interest, but not included in the book, is that of a Choquet-type representation theory within the general framework of locally convex cones, which could be a subject for further investigation.

Providing a very general and nontrivial approach to integration theory, the book is of interest for researchers in functional analysis, abstract integration theory and its applications to integral representations of linear operators. It can be used also for advanced post-graduate courses in functional analysis.

S. Cobzaş