

## Book Reviews

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## BOOK REVIEWS

*M. Giaquinta, G. Modica*: MATHEMATICAL ANALYSIS. LINEAR AND METRIC STRUCTURES AND CONTINUITY. Birkhäuser, Basel, 2007, ISBN 978-0-8176-4375-1, 470 pages, EUR 55.–.

The book “M. Giaquinta, G. Modica: Mathematical Analysis. Linear and Metric Structures and Continuity” is a lovely book which should be in the bookcase of every expert in mathematical analysis. The book is divided into three parts. The first part is devoted to the linear algebra. Chapter 1 studies finite dimensional vector spaces, linear operators and the corresponding matrices. The Jordan canonical form of matrices is derived in Chapter 2. Chapter 3 deals with Euclidean and Hermitian spaces. The Gram-Schmidt algorithm for the construction of an orthonormal basis is presented. A similar result is obtained also for symmetric bilinear forms. The spectral theorem for self-adjoint and normal operators in finite dimensions is presented in Chapter 4. The second part of the book discusses the fundamental notions of general topology in metric spaces. Chapter 5 is concerned with metric spaces and continuous mapping between them. Chapter 6 introduces the notions of a compact metric space and a connected metric space. The properties of continuous and semicontinuous functions on compact metric spaces are studied. Section 7 proceeds with the study of curves. Chapter 8 illustrates the notions of homotopy and degree, and Brouwer’s and Borsuk’s theorems with applications to the topology of the Euclidean spaces. The third part of the book is devoted to Banach spaces. Chapter 9 reviews some of the standard facts on Banach spaces and bounded linear operators between them. Special attention is given to spaces of functions and approximation in these spaces. Some of classical fixed point theorems are presented. Chapter 10 deals with the theory of Hilbert spaces and the spectral theory of compact operators. Chapter 11 illustrates some of applications of the theory.

*Dagmar Medková*, Praha

*A. Pietsch*: HISTORY OF BANACH SPACES AND LINEAR OPERATORS. Birkhäuser, Boston, 2007, 855 pages, EUR 109.–.

Functional analysis was born in the first half of the 20th century and has since attracted many researchers who have started working in the field. Gradually, it became an indispensable tool for numerous disciplines of modern mathematics, and is now a standard part of curricula at many universities. Quite naturally, functional analysis also became a subject of investigation for historians of mathematics.

There is a relatively large amount of works devoted to the prehistory of functional analysis and its birth in the classical Banach period, but this monograph is exceptional in its focus on the whole 20th century. Although it is now probably impossible to cover the whole range of functional-analytic topics in a single book, the author, who is himself a renowned expert in this field of mathematics, has successfully brought together a respectable amount of material concerning Banach spaces and linear operators. The topics chosen by the author certainly provide a clear picture of the breadth of current functional analysis.

The history of the subject itself is divided into seven chapters and covers almost 600 pages. The eighth chapter contains various biographical information, which is often difficult to find

elsewhere; particularly valuable is an overview of functional-analytic schools and researchers in different countries. Finally, the bibliography occupies another 150 pages.

The book will be certainly useful not only to researchers, but also to students. Each section starts with definitions of concepts necessary for understanding the text, followed by a discussion of the most important achievements in the given area. The text is accompanied by numerous original quotations in English, German and French.

It is quite interesting to learn about the problems and motivation which have led to the discovery of famous theorems, and also to observe that the development was not always as smooth and straightforward as it might seem when reading a modern textbook. Using author's own words, I can warmly recommend this book "to all who love Banach spaces".

*Antonín Slavík, Praha*

*W. D. Wallis: A BEGINNER'S GUIDE TO GRAPH THEORY.* Birkhäuser, Boston, 2007, 2nd ed., 280 pages, 160 figs., EUR 35.–.

This book is intended as an introductory course in Graph Theory, one of the fastest growing disciplines of modern Mathematics.

Contents: 1. Graphs, 2. Walks, Paths, and Cycles, 3. Connectivity, 4. Trees, 5. Linear Spaces Associated with Graphs, 6. Factorizations, 7. Graph Colorings, 8. Planarity, 9. Labeling, 10. Ramsey Theory, 11. Digraphs, 12. Critical Paths, 13. Flows in Networks, 14. Computational Considerations, 15. Communication Networks and Small Worlds; References, Hints, Answers and Solutions.

While the introductory chapters of the book provide an overview of the main topics in Graph Theory, some of the subsequent chapters contain more specialized (and sometimes even more advanced) topics and applications. The book is nicely written, the presentation is comprehensible but at the same time mathematically precise. The text is supplemented with many figures, with historical notes to many topics and with many examples. At the end of every section there are numerous exercises, and many of them are provided with hints and/or solutions at the end of the book.

Summarizing, this is a nice book, useful not only as an introductory reading for "beginners" in Graph Theory, but also for those who teach introductory courses in Graph Theory.

*Zdeněk Ryjáček, Plzeň*

*Andreas K. Heyne, Alice K. Heyne, Elena S. Pini: LEONHARD EULER. A MAN TO BE RECKONED WITH.* Birkhäuser, Basel, 2007, 50 pages, ISBN 978-3-7643-8332-9, EUR 20.–.

The book written in English by Andreas K. Heyne and Alice K. Heyne and illustrated by Elena S. Pini is dedicated to the life and work of Leonhard Euler (1707–1783) who was one of the greatest mathematicians of all time over all the world.

The authors and illustrator describe the most important moments from Euler's live in Switzerland, Russia and Germany. They show his significant discoveries in fields as divers as analysis, algebra, geometry, topology, mechanics, optics, astronomy, geography etc.

The book written like a modern comics is a remarkable and easily readable story and can be recommended to children, students and their teachers to attract their interest to mathematics and scientific research.

*Martina Bečvářová, Praha*