9-1-2000

Review of: Dilemmas of Transition: The Hungarian Experience by Aurel Braun and Zoltan Barany

Patrick H. O'neil
University of Puget Sound, poneil@pugetsound.edu

Citation
O'neil, Patrick H.. 2000. "Dilemmas of transition: The Hungarian experience." Slavic Review 59(3): 651-652.

they possess the high sensibility to inhomogeneities of the water column and boundary roughnesses of various kinds." This reviewer originally thought that the word "sensibility" should have been "sensitivity," but the sentence would be incorrect in that case. Probably it is a mistranslation. Fortunately, there are few such instances. (I note that the authors have given this reviewer the wrong middle initial in two references for Chapter 7.)

In summary, I can recommend *Fundamentals of Ocean Acoustics* as an excellent reference tool for practitioners in the field of ocean acoustics and related areas of oceanography. This book should be readily accessible to all such researchers. It can also serve as a textbook for a graduate-level course in the subject. For the latter purpose, the addition of problem sections in the text would have been most useful.

REFERENCE

[1] F. B. JENSEN, W. A. KUPERMAN, M. B. PORTER, AND H. SCHMIDT, *Computational Ocean Acoustics*, Springer-Verlag, New York, 1997.

RALPH N. BAER
Naval Research Laboratory

Discrete Mathematics. ***By László Lovász, József Pelikán, and Katalin K. Vesztergombi.*** **Springer-Verlag, New York, 2003. $69.95. ix+290 pp., hardcover. ISBN 0-387-95584-4.**

This entry in Springer's *Undergraduate Texts in Mathematics* series is meant as an introduction to discrete mathematics, possibly as an alternative to a calculus course for a student's first collegiate course in mathematics. While the title says "discrete mathematics," the authors admit in the preface that primarily they cover combinatorics and graph theory with some number theory, probability, and combinatorial geometry mixed in. While the style is informal and the narrative crisp, the authors still stress the importance of proofs, only grudgingly conceding that some necessary results might have proofs beyond the scope of the book. The level of the text would make it most suitable for upper division undergraduates, but it might be used successfully with sophomores or talented freshmen. It might also be suitable as an engaging choice for independent study.

The first section of the first chapter discusses a fictional party involving seven friends who encounter, and reason through, several combinatorial problems during the evening's activities. In these four pages we briefly, but accurately, consider: the number of edges in the complete graph K_7 as everybody shakes hands; the number of circular permutations as the seven are seated around a table; the multiplication principle as dance partners are chosen; binomial coefficients as they purchase lottery tickets and play a game of bridge; and multinomial coefficients as they formulate a small chess tourney. This entertaining introduction sets the tone for the remainder of the book, which is written in the kind of "lean and lively" style that would make the erstwhile reformers of calculus texts green with envy.

The first and third chapters concentrate on counting problems, covering most of the various combinations of arrangements and distributions, with and without repetition, etc. The second chapter includes the standard topics of induction, inclusion-exclusion, and the pigeonhole principle. However, in this introduction to basic combinatorics, there is no discussion of problems that lead to the Bell or Stirling numbers, or partitions of integers. Similarly, there is no discussion of methods for solving simple recurrence relations. Were these topics to be added, the text could serve as an excellent introduction to combinatorics and graph theory.

Later chapters (six in total) cover the basics of graph theory, such as Eulerian and Hamiltonian graphs, trees, planar graphs, and coloring. Combinatorial optimization is introduced via Steiner trees, the traveling salesman problem, and matchings.

Which topics make this book different? From early on, as might be expected from authors with Hungarian roots, the notions of asymptotic analysis and probability are woven throughout the text. Indeed, an early chapter titled "Combinatorial Probability" presents results like the law of large numbers. The basics of number theory are covered carefully in Chapter 6 and employed profitably in the final chapter, where notions of complexity and cryptography are introduced. The penultimate chapter has a good introduction to finite geometries and designs (dubbed "pretty creatures") and their connections with coding theory. A chapter on "Combinatorics in Geometry" rounds out the collection of atypical topics.

Exercises are included, sometimes inserted in the narrative; otherwise they appear at the ends of sections. Every problem has an entry in the "Answers" section at the back of the book, and often these are detailed explanations rather than just numerical final answers. The exercises are not as numerous as one would like to see in a textbook, and in some areas are lacking (e.g., only one problem in the section on inclusion-exclusion). Instructors considering using this text might contemplate whether they are prepared to supplement the exercises. That said, the exercises seem to be designed carefully and the student that works them diligently will benefit.

The authors intend this book to be an engaging introduction to the principal topics covered by the umbrella term of "discrete mathematics," and on this score they have succeeded admirably. The text is readable and entertaining, without sacrificing any rigor or cutting any corners. In the preface the authors say that "the aim of this book is not to cover discrete mathematics in depth." Consistent with this statement, certain decisions have been made about what to leave in and what to leave out. The title of the book contains the subtitle *Elementary and Beyond*, and in this respect they have also succeeded. Topics such as complexity, cryptography, coding theory, and finite geometries give the interested reader a glimpse into more advanced topics that build on the basic material and that might be sufficient to whet one's appetite for more.

This text is a welcome addition to the collection of undergraduate texts that cover combinatorics and graph theory. Its style and the inclusion of nontrivial advanced topics distinguish it from many others. With the addition of more basic counting concepts and more high-quality exercises it could be a real standout. It is worthy of serious consideration by an instructor for use in an appropriate course, or by a curious individual for independent study.

ROBERT A. BEEZER
University of Puget Sound

Advances in Dynamic Equations on Time Scales. *Edited by Martin Bohner and Allan Peterson.* Birkhäuser Boston, Boston, MA, 2003. $69.95. xi+348 pp., hardcover. ISBN 0-8176-4293-5.

The theory of time scales was introduced in 1988 by Stefan Hilger in his Ph.D. thesis [1] (under the supervision of Bernd Aulbach) as a means to both unify and generalize continuous and discrete analysis. Many results in differential equations have analogous or at least similar counterparts in difference equations, and the theory of time scales aims at providing a framework to describe the two classical dynamic systems simultaneously and offering a deeper understanding of the *raison d'être* for a particular type of method, independent of the particular case that spawned it. A second goal of this unified theory is to create a systematic approach to extend results beyond the classical cases and discover new settings and new results for dynamics of, e.g., q-difference equations or even dynamics induced by the Cantor middle third set.

A time scale is defined as any closed subset of the real numbers with the topology that it inherits from the reals, the latter set being equipped with the standard topology. For an arbitrary time scale, the so-called *delta derivative* was introduced by Hilger, which for the time scale $\mathbb{R}$ is just the usual derivative d/dt, while in the case of the time scale $\mathbb{Z}$, this derivative is the forward difference operator. He also introduced—via antiderivatives—*delta integration*, which for $\mathbb{R}$ is the usual integral for continuous functions, whereas for $\mathbb{Z}$ this corresponds to summation over a corresponding set of integers. These two operations allowed the initial development of time scales calculus and the introduction of *dynamic equations* on time scales.