

had a bearing on his later mathematical work, which was mainly concerned with probability. So much so, that he focused his attention on the applications of the calculus of probability rather than on its foundations.

The weakest essays are perhaps those in which logic is at stake. Borel, like Poincaré and most other eminent mathematicians, had no patience with the new logic and the new philosophy of mathematics. His insistence on the need for invention and the value of intuitability was beside the point in discussing the worth of logic. His criticism of the logician and philosopher Couturat - the importer of mathematical logic into France - was ferocious and unjust. Borel misread Couturat as claiming that mathematical invention is a deductive process, while all Couturat had pointed out is that the justification of any mathematical invention requires logic. Eventually, logic took its revenge: forty years later Borel published an almost worthless book on mathematical logic.

The reader will have to make a selection by himself, for this collection is really a Borel set, as it includes not only the union of all its subsets but also all its intersections, which are often nonempty. At least half of the essays might have been omitted, for they deal with dead issues, such as defending set theory, probability theory and aviation against their critics half a century ago. Also, the set might have been ordered, if not by subject at least chronologically. But the chaos just adds interest to the exploration of one of the most perceptive and universal mathematical brains of all times. One may apply to Borel what he himself said of Bergson: "Même à ceux qui ne partagent pas toujours sa manière de voir, il donne à penser, ce qui est le rôle essentiel du philosophe".

Mario Bunge

Topological groups, by L.S. Pontryagin. Second edition. Translated by Arlen Brown. Gordon and Breach, New York 1966. xiv + 543 pages. Ref. ed. \$32.50, Prof. ed. \$47.50.

This is a translation from the Russian of the revised edition. The Russian edition was published in 1954, so while this translation is a welcome addition to the literature, the delay in making an English version available is regrettable.

A large number of changes and additions have been made. One of the more important changes is the treatment now of compact and locally compact abelian groups without the added restriction of a countable basis for the open sets. A major addition to the book is the final chapter on compact Lie groups. This is an exposition of the Killing - Cartan - Weyl theory of the structure of compact Lie groups based on properties of their Lie algebras.

A chapter on topological division rings has also been added. Here the author presents the structure theory of nondiscrete topological division rings. In the original edition the author had devoted a section of the chapter on locally compact abelian groups to the structure of locally compact connected division rings.

Every chapter has been revised and augmented. To the first chapter a section on rings, fields and projective geometry has been added. The chapter on topological spaces has been thoroughly revised and now is a more standard (but still not very elegant) treatment of the subject. In the chapter on compact groups a more detailed discussion of integral equations is given. The author has included a section on analytic and differentiable manifolds and their connection with Lie groups. Topological transformation groups are introduced in the chapter on topological groups, and a section of the chapter on the structure of compact groups has been devoted to the Montgomery - Zippin result that an effective compact transformation group that acts transitively on a locally connected finite dimensional space is a Lie group. The discussion of covering spaces in the chapter on locally isomorphic groups has also been expanded.

There are many additions and changes other than the ones mentioned above. In particular the author has added over thirty examples to the text.

The book is very readable and this reviewer feels that the translator has done a very good job. The translator has added a number of helpful footnotes and made a number of changes in terminology.

There are a number of shortcomings. The complete absence of any reasonable system of references to earlier results via section numbers etc. is a constant frustration to the reader. There are a very large number of misprints, including such unpardonable ones as $M\cup N = M\cup N$ in the axioms for a topological space. The printing and binding are not of a very high quality. One of the more remarkable accomplishments of the publishers was to make the book 2 1/2 times the width of the earlier Princeton edition and increase the selling price by an even greater factor.

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Éléments de mathématique, fascicule 22; Théorie des ensembles, Chapitre 4: Structures, by Nicolas Bourbaki. Hermann, Paris, 1966. Deuxième édition, 108 pages, broché. 36 francs.

This is a new edition of the 1957 original. The main change is the deletion of a 19 page appendix on "criteria of transportability". The booklet now consists of two parts of equal length: the chapter on "structures" and a historical note on the foundations of mathematics. The latter goes not only with chapter 4, but also with the preceding