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Elements of the History of Mathematics

Translated from the French original Eléments d'histoire des mathématiques,
published by Masson Editeur, Paris 1984.
Springer–Verlag, Berlin – Heidelberg – New York 1994.
301 pages.

The English translation of the referred book written by famous collective author offers the
non-French speaking reader three hundreds of terse pages on the sources of mathemati-
cal thinking. The text is divided into 26 sections devoted, e.g., to the foundations and
notations, various algebraic topics, elementary geometry, topological, uniform and metric
spaces, exponentials and logarithms, real, complex and more-dimensional space, infinitesi-
mal calculus, function and topological spaces, integration and measures, groups, Lie groups,
and some other topics. The bibliography offering 245 items, and a name-index conclude
the volume.

The book offers a brief but compact and very instructive survey of the roots of modern
mathematics, as well as on the sense of its concepts. It is extremely interesting for every-
body who wants to know more about the ideas being behind the definitions and theorems
known from the classical mathematical works.

Milan Mareš

MILAN MAREŠ

Computation over Fuzzy Quantities

CRC Press, Boca Raton 1994.
157 pages, ISBN 0-8493-7635-1.

This slight book is focused on a specific and very important part of fuzzy set theory
which is *fuzzy arithmetics*. The author makes distinction between fuzzy quantities and
fuzzy numbers. Fuzzy quantities are special fuzzy sets on real numbers which are sup-
normal (existence of an element with the membership degree 1 is not assured) and non-
zero membership degrees may occur only in some interval. Fuzzy numbers are, on the
other hand, fuzzy quantities which are convex and there is exactly one element with the
membership degree 1. Hence, the results presented in this book are more general than the
results about fuzzy numbers generally presented elsewhere. Let us stress that the book
contains many original results obtained by the author.

The book is written in an excellent and clear style, accompanied by many examples
demonstrating the presented computational methods. Though mathematically precise,
the book contains no proof and thus it does not possess the typical mathematical style
"definition – theorem – proof." Therefore, it may be useful also for non-mathematicians
and engineers who seek especially methods. Very nice on this book is that clear and precise
explanation pulls the reader into the subject so that he may be able to give the proofs
himself.

The book consists of 14 short chapters and is very compact. The author divides it
into four parts: Fundamentals (Chapters 1–3), Algebra of Fuzzy Quantities (Chapters 4–
5), Related topics (Chapters 6–9) and Applications. It is a pity that these parts are not
mentioned in the Table of Contents.

After short overview of the basic notions, the arithmetics of fuzzy quantities is intro-
duced and some its properties are demonstrated. Third and fourth parts are devoted to

some generalizations and applications. Very interesting is the extension to the multidimensional case in Chapter 6 which leads to the calculus of vectors of fuzzy numbers. Chapter 8 presents the convolutive method for operations with fuzzy numbers. Comparison with classical extension principle method and some its advantages are also presented. This part is closed by the concept of $\mathcal{L}$-fuzzy quantities.

Applications (Chapters 10–14) concern methods related especially to economy and marketing, namely critical path method, multicriteria decision-making and game theory. Especially interesting are the first two. Though decision-making is extensively studied in the literature, the author managed to present all these topics in a concise way fully integrated with the previous explanation.

Except for 116 references, the reader finds also a list of journals which publish works dealing or applying the fuzzy set theory.

As I have already stressed, the global impression of this book is very positive and this cannot be harmed by few deficiencies which occur in every book. Probably most striking is the use of the term "representation principle" instead of the common "extension principle" (introduced already by L. A. Zadeh), without mentioning the latter. I also lack figures demonstrating the operations which would improve the readability of the book. The author time to time mixes uncertainty with vagueness though originally he makes clear distinction between these two phenomena.

Highly valuable is the specialization of this book as the applications of fuzzy arithmetics are very important and increasing. Some questions might be elaborated into more details. The book would be extremely useful for engineers if it contained tables summarizing the most important methods and properties of relations introduced in the text. I hope that this will be added, if the second edition of this nice book appears. Anyway, I can recommend the book to everybody who is interested or wants to apply fuzzy arithmetics.

Vilém Novák