Zbl 1077.26001

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Multidimensional real analysis I: Differentiation. Transl. from the Dutch by J. P. van Braam Houckgeest. (English)

The book under review is the first volume of a two volume set of an introduction to the theory of vector-valued functions on the Euclidean space. It is based on the authors extensive teaching experients at Utrecht University. The present volume I is devoted to differentiation. The material is arranged as follows: 1. Continuity, 2. Differentiation, 3. Inverse function and implicit function theorems, 4. Manifolds, 5. Tangent spaces. Exercises.

The presentation of the material makes a balance between concrete and abstract: a treatment of differential calculus in $\mathbb{R}^n$ by efficient methods (eliminating coordinates) and using contemporary terminology preparing reading of more advanced works (e.g., differential geometry, functional analysis). Reading of the book requires a working knowledge of analysis of one real analysis and the basics of linear algebra. Throughout the notation is carefully organized and all proofs are complete and rigorous. The text is completed by carefully worked examples, many of them are illustrated by drawings.

A special feature of the book is the extensive collection of exercises (334 exercises, out of a total of 568, occupying pp. 175-410). The exercises offer variations and applications of the main theory, and run from routine to advanced topics. Many exercises are accompanied by hints, and a number of exercises goes beyond the scope of the book.

The book is a good preparation for readers who wish to go on to more advanced studies in analysis. It can be also highly recommended as a text for a course or for self study. (See also Zbl 1077.26002 for the review of Part II.)

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Keywords : continuous mappings; differentiable mappings; inverse function theorem; implicit function theorem; manifolds

Classification :

    ∗26-01 Textbooks (real functions)

     26B05 Continuity and differentiation questions (several real variables)

     26B10 Implicit function theorems, etc. (several real variables)