# Buchanzeigen

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**Modular Forms and Fermat's Last Theorem.** By Gary Cornell, Joseph H. Silverman and Glenn Stevens (Eds.). (Springer-Verlag, Berlin Heidelberg New York London Paris Tokyo Hong Kong 1997.), approx. 590 pp, Hardcover sFr. 81.00; DM 89.00 – ISBN 0–387–94609–8.

This volume contains expanded versions of lectures given at an instructional conference on number theory and arithmetic geometry held August 9 through 18, 1995 at Boston University. The purpose of the conference, and of this book, is to introduce and explain the many ideas and techniques used by Wiles in his proof that every (semi-stable) elliptic curve over Q is modular, and to explain how Wiles' result can be combined with Ribet's theorem and ideas of Frey and Serre to show, at long last, that Fermat's Last Theorem is true.

The book begins with an overview of the complete proof, followed by several introductory chapters surveying the basic theory of elliptic curves, modular functions, modular curves, Galois cohomology, and finite group schemes. Representation theory, which lies at the core of Wiles' proof, is dealt with in a chapter on automorphic representations and the Langlands-Tunnell theorem, and this is followed by in-depth discussions of Serre's conjectures, Galois deformations, universal deformation rings, Hecke algebras, complete intersections and more, as the reader is led step-by-step through Wiles' proof.

In recognition of the historical significance of Fermat's Last Theorem, the volume concludes by looking both forward and backward in time, reflecting on the history of the problem, while placing Wiles' theorem into a more general Diophantine context suggesting future applications.

**Fibrewise Homotopy Theory.** By Michael Crabb and Ioan M. James. (Springer-Verlag, Berlin Heidelberg New York London Paris Tokyo Hong Kong 1998.) VIII, 341 pp., Hardcover sFr. 144.00; DM 159.00 – ISBN 1–85233–014–7.

Topology occupies a central position in the mathematics of today. The concept of the fibre bundle provides an appropriate framework for studying differential geometry. There is a large amount of literature on this subject already, so this book fulfils its aim of being a research stimulant and develops theories such as homotopy, equivariant homotopy, fibrewise homotopy and much more. Part 2 does assume a certain familiarity with the basic ideas from Part 1, but is written in such a way that the reader interested mainly in stable theory should be able to begin with Part 2 and refer back to Part 1 as necessary. Details on specific sections can be found in the introductions at the beginning of each part.

Part 1: A Survey of Fibrewise Homotopy Theory. Introduction to Fibrewise Homotopy Theory. The Pointed Theory. Applications.

Part 2: An Introduction to Fibrewise Stable Homotopy Theory. Foundations. Fixed-Point Methods. Manifold Theory. Homology Theory.

**Visual Explorations in Finance.** By Guido J. Deboeck and Teuvo K. Kohonen (Eds.). With Self-Organising Maps (Springer-Verlag, Berlin Heidelberg New York London Paris Tokyo Hong Kong 1998.) XIV, 258 pp., Hardcover sFr. 144.00; DM 159.00 – ISBN 3–540–76266–3.

Self-organizing maps (SOM) have proven to be of significant economic value in the areas of finance, economic and marketing applications. As a result, this area is rapidly becoming a non-academic technology. This book looks at near state-of -the-art SOM applications in the above areas, and is a multi-authored volume, edited by Guido Deboeck, a leading exponent in the use of computational methods in financial and economic forecasting, and by the originator of SOM, Teuvo Kohonen. The book contains chapters on applications of unsupervised neural networks using Kohonen's self-organizing map approach.

**The Four-Color Theorem.** By Rudolf Fritsch, Gerda Fritsch and Julie Peschke. (Springer-Verlag, Berlin Heidelberg New York London Paris Tokyo Hong Kong 1998.), approx. 225 pp, Hardcover sFr. 63.00; DM 69.00 – ISBN 0–387–98497–6.

This elegant little book discusses a famous problem that helped to definite the field now known as topology: What is the minimum number of colors required to print a map such that no two adjoining countries have the same color, no matter how convoluted their boundaries. Many famous mathematicians have worked on the problem, but the proof eluded formulation until the 1950s, when it was finally cracked with a brute-force approach using a computer. The book begins by discussing the history of the problem, and then goes into the mathematics, both pleasantly enough that anyone with an elementary knowledge of geometry can follow it, and still with enough rigor that a mathematician can also read it with pleasure. The authors discuss the mathematics as well as the philosophical debate that ensued when the proof was announced: Just what is a mathematical proof, if it takes a computer to provide one – and is such a thing a proof at all?

Its History.-Topological maps.- Topological Version of The Four-Color Theorem.- From Topology to Combinatorics.- The Combinatorial Version of The Four-Color Theorem.- Reducibility.- The Quest for Unavoidable Sets.

**Riemannian Geometry.** By Peter Petersen. Graduate Texts in Mathematics, Vol. 171, edited by S. Axler, F.W. Gehring and P.R. Halmos, (Springer-Verlag, Berlin Heidelberg New York London Paris Tokyo Hong Kong 1997.) approx. 415 pp., Hardcover sFr. 81.00; DM 89.00 – ISBN 0–387–98212–4.

This book is intended for a one year course in Riemannian Geometry. It will serve as a single source, introducing students to the important techniques and theorems while also containing enough background on advanced topics to appeal to those students wishing to specialize in Riemannian Geometry. Instead of variational techniques, the author uses a unique approach emphasizing distance functions and special coordinate systems. He also uses standard calculus with some techniques from differential equations, instead of variational calculus, thereby providing a more elementary route for students. Many of the chapters contain material typically found in specialized texts and never before published together in one source.

Key sections include noteworthy coverage of: geodesic geometry, Bochner technique, symmetric spaces, holonomy, comparison theory for both Ricci and sectional curvature, and convergence theory. This volume is one of the few published works to combine both the geometric parts of Riemannian geometry and the analytic aspects of the theory as well as presenting the most up-to-date research including sections on convergence and compactness of families of manifolds. This book will appeal to readers with a knowledge of standard manifold theory, including such topics as tensors and Stoke's theorem. Scattered throughout the text is a variety of exercises which will help to motivate readers to deepen their understanding of the subject.

Contents: Introduction.- Riemannian Metrics.- Curvature.- Examples.- Hypersurfaces.- Geodesics and Distance.- Sectional Curvature Comparison I.- The Bochner Technique.- Symmetric Spaces and Holonomy.- Ricci Curvature Comparison.- Convergence.- Sectional Curvature Comparison II.- Appendices. A: DeRham Cohomology. B: Principal Bundles. C: Spinors.- Bibliography.