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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.

Riemannian Manifolds. An Introduction to Curvature. By John M. Lee. Graduate Texts in Mathematics, Vol. 176, (Springer-Verlag, Berlin Heidelberg New York London Paris Tokyo Hong Kong 1997.) approx. 240 pp., Softcover sFr. 54.00; DM 59.00 – ISBN 0–387–98322–8. Hardcover sFr. 142.50; DM 148.00 – ISBN 0–387–98271–X.

This text is designed for a one-quarter or one-semester graduate course in Riemannian geometry. It focuses on developing an intimate acquaintance with the geometric meaning of curvature and thereby introduces and demonstrates all the main technical tools needed for a more advanced course on Riemannian manifolds.

The book begins with a careful treatment of the machinery of metrics, connections, and geodesics, and then introduces the Riemann curvature tensor, before moving on the submanifold theory, in order to give the curvature tensor a concrete quantitative interpretation. The remainder of the text is devoted to proving the four most fundamental theorems relating curvature and topology: the Gauss-Bonnet Theorem, the Cartan-Hadamard Theorem, Bonnet's Theorem, and a special case of the Cartan-Ambrose-Hicks Theorem.

This unique volume will especially appeal to students by presenting a selective introduction to the main ideas of the subject in an easily accessible way. The material is ideal for a single course, but broad enough to provide students with a firm foundation from which to pursue research or develop applications in Riemannian geometry and other fields that use its tools. Of special interest are the "exercises" and "problems" dispersed throughout the text. The exercises are carefully chosen and timed so as to give the reader opportunities to review material that has just been introduced, to practice working with the definitions, and to develop skills that are used later in the book.

Foundations of Modern Probability. By Olav Kallenberg. Probability and its Applications: A Series of the Applied Probability Trust. (Springer-Verlag, Berlin Heidelberg New York London Paris Tokyo Hong Kong 1997.) approx. 530 pp., Hardcover sFr. 102.00; DM 112.00 – ISBN 0–387–94957–7.

This book is unique for its broad and yet comprehensive coverage of modern probability theory, ranging from first principles and standard textbook material to more advanced topics. In spite of the economical exposition, careful proofs are provided for all main results.

After a detailed discussion of classical limit theorems, martingales, Markov chains, random walks, and stationary processes, the author moves on to a modern treatment of Brownian motion, L vy processes, weak convergence, It calculus, Feller processes, and SDEs. The more advanced parts include material on local time, excursions and additive functionals, diffusion processes, PDEs and potential theory, predictable processes, and general semimartingales.

Though primarily intended as a general reference for researchers and graduate students in probability theory and related areas of analysis, the book is also suitable as a text for graduate and seminar courses on all levels, from elementary to advanced. Numerous easy to more challenging exercises are provided, especially for the early chapters.

Olav Kallenberg was educated in Sweden, where he received his Ph.D. in 1972 from Chalmers University. After teaching for many years at Swedish universities, he moved in 1985 to the U.S., where he is currently a Professor of Mathematics at Auburn University. He is known for his book "Random Measures" (4th edition, 1986) and for numerous research papers in all areas of probability.