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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.

Matrix Algebra From a Statistician's Perspective. By David A. Harville. (Springer-Verlag, Berlin Heidelberg New York London Paris Tokyo Hong Kong 1997.), approx. 640 pp., Hardcover sFr. 98.50; DM 108.00 – ISBN 0–387–94978–X.

This book presents matrix algebra in a way that is well-suited for those with an interest in statistics or a related discipline. It provides thorough and unified coverage of the fundamental concepts along with the specialized topics encountered in areas of statistics such as linear statistical models and multivariate analysis. It includes a number of very useful results that have heretofore only been available from relatively obscure sources. Detailed proofs are provided for all results.

David A. Harville is a research staff member in the Mathematical Sciences Department of the IBM T.J. Watson Research Center. Prior to joining the Research Center he spent ten years as a mathematical statistician in the Applied Mathematics Research Laboratory of the Aerospace Research Laboratories (at Wright-Patterson, AFB, Ohio) followed by twenty years as a full professor in the Department of Statistics at Iowa State University. He has extensive experience in the area of linear statistical models, having taught (on numerous occasions) M.S. and Ph.D.level courses on that topic.

An Introduction to Knot Theory. By W.B.R. Lickorish. Graduate Texts in Mathematics, Vol. 175, edited by S. Axler, F.W. Gehring and P.R. Halmos. (Springer-Verlag, Berlin Heidelberg New York London Paris Tokyo Hong Kong 1997.) approx. 230 pp., Hardcover sFr. 81.00; DM 89.00 – ISBN 0–387–98254–X.

This volume is an introduction to mathematical Knot Theory; the theory of knots and links of simple closed curve in three-dimensional space. It consists of a selection of topics which graduate students have found to be a successful introduction to the field. Three distinct techniques are employed; Geometric Topology Manoeuvres, Combinatorics, and Algebraic Topology. Each topic is developed until significant results are achieved and chapters end with exercises and brief accounts of state-of-the-art research.

What may reasonably be referred to as Knot Theory has expanded enormously over the last decade and while the author describe important discoveries throughout the twentieth century, the latest discoveries such as quantum invariants of 3-manifolds as well as generalizations and applications of the Jones polynomial are also included, presented in an easily understandable style. Thus this constitutes a comprehensive introduction to the field, presenting modern developments in the context of classical material. Readers are assumed to have knowledge of the basic ideas of the fundamental group and simple homology theory although explanations throughout the text are plentiful and well-done.

Written by an internationally known expert in the field, this volume will appeal to graduate students, mathematicians and physicists with a mathematical background who wish to gain new insights in this area.

Apprendre et Maitriser MATLAB. Mohand Mokhtari et Abdelhalim Mesbah. (Springer-Verlag, Berlin Heidelberg New York London Paris Tokyo Hong Kong 1997.) XVI, 728 pp., avec disquette PC 3 1/4", Softcover sFr. 89.50; DM 98.00 – ISBN 3–540–57060–8.

MATLAB est devenu un standard pour la recherche scientifique et l'ingénierie. Cet ouvrage en permet une initiation et une maîtrise. Il s'adresse à un public varié: étudiants, enseignants, chercheurs et ingénieurs. La première partie est une prise en main rapide de MATLAB. Des examples clairs et concis permettent d'apprêhender le langage. Dans la deuxième partie, sont présentées et approfondies les immenses possibilités de MATLAB. Un chapitre est consacré à l'utilisation de SIMULINK. La troisième partie, présente des applications du monde réel, extraites de différents domaines tels que l'analyse numérique, les probabilités et statistiques, le contrôle de procédés, le traitement du signal déterministe et aléatoire et la reconaissance des formes.

Prise en main de MATLAB.- Approfondissement de MATLAB.- Les vecteurs et matrices.- Le traitement de chaînes de caractères, dates et heures.- Les nombres complexes.- Les polynômes.- Fonctions spéciales.- La programmation avec MATLAB.- Les entrées/ sorties et l'environnement MATLAB.- Les graphiques.- Interfacer MATLAB avec des langages et applications.- Réalisation d'Interfaces Graphiques (GUI).- MATLAB 5.- SIMULINK.- Des Applications de MATLAB.- Analyse numérique.- Probabilités et statistiques.- Classification et régressions.- Contrôles de procédés.- Traitemant numérique des signaux déterministes.- Filtrage numérique des signaux aléatoires.- Annexe 1: Installation de la disquette de programmes.- Annexe 2: MATLAB et Internet.- Références Bibliographiques.- Index.

Geometry V. Minimal Surfaces. By Robert Osserman. Encyclopaedia of Mathematical Sciences, Volume 90, edited by R.V. Gamkrelidze. (Springer-Verlag, Berlin Heidelberg New York London Paris Tokyo Hong Kong 1997.) IX, 272 pp., Hardcover sFr. 143.00; DM 158.00 – ISBN 3–540–60523–1.

The theory of minimal surfaces has expanded in many directions over the past decade or two. This volume gathers in one place an overview of some of the most exciting developments, presented by five of the leading contributors to those developments. H. Fujimoto, who obtained the definitive results on the Gauss map of minimal surfaces, reports on Minimal Surfaces and Nevanlinna Theory. S. Hildebrandt provides an up-to-date account of the Plateau problem and related boundary-value problems. D. Hoffman and H. Karcher describe the wealth of results on embedded minimal surfaces from the past decade, starting with Costa's surface and the subsequent Hoffman-Meeks examples. Finally, L. Simon covers the PDE aspect of minimal surfaces, with a survey of known results both in the classical case of surfaces and the higher dimensional case.

Contents: Nevanlinna Theory and Minimal Surfaces by H. Fujimoto.- Boundary Value Problems for Minimal Surfaces by S. Hildebrandt.- Complete Embedded Minimal Surface of Finite Total Curvature by D. Hoffman and H. Karcher.- The Minimal Surface Equation by L. Simon.