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John W. Gray and Andre Scedrov, Editors

Category theory has had important uses in logic since the invention of topos theory in the early 1960s, and logic has always been an important component of theoretical computer science. A new development has been the increase in direct interactions between category theory and computer science. In June 1987, an AMS-IMS-SIAM Summer Research Conference on Categories in Computer Science and Logic was held at the University of Colorado in Boulder. The aim of the conference was to bring together researchers working on the interconnections between category theory and computer science or between computer science and logic. The conference emphasized the ways in which the general machinery developed in category theory could be applied to specific questions and be used for category-theoretic studies of concrete problems. This volume represents the proceedings of the conference. (Some of the participants' contributions have been published elsewhere.)

The papers published here relate to three different aspects of the conference. The first concerns topics relevant to all three fields, including, for example, Horn logic, lambda calculus, normal form reductions, algebraic theories, and categorical models for computability theory. In the area of logic, topics include semantical approaches to proof-theoretical questinos, internal properties of specific objects in (pre-) topoi and their representations, and categorical sharpening of model theoretic notions. Finally, in the area of computer science, the use of category theory in formalizing aspects of computer programming and program design is discussed.

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Randolph E. Bank, Editor (Lectures in Applied Mathematics, Volume 25)

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This volume contains the proceedings of the AMS-SIAM Summer Seminar on Computational Aspects of VLSI Design, held at the Institute for Mathematics and Its Applications at the University of Minnesota, in the spring of 1987. The seminar featured presentations by some of the top experts working in this area. Their contributions to this volume form an excellent overview of the mathematical and computational problems arising in this area.

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The Mathematics Behind the Computer Graphics Robert L. Devaney and Linda Keen, Editors

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MATHEMATICIANS AND EDUCATION REFORM

Naomi Fisher, Harvey Keynes, and Philip Wagreich, Editors (CBMS Issues in Mathematics Education, Volume 1)

Educational issues are receiving unprecedented attention in the broad mathematical sciences community, as mathematicians and other scientists have become concerned about the quality of instruction in the nation's schools, colleges, and universities. A mathematically literate population is crucial to supporting our increasingly technological society. In addition, the mathematical sciences community faces the challenge of increasing the number of students who are prepared to pursue a career in mathematics, science, or engineering. This challenge requires not only raising the quality of mathematics education, but also showing students the beauty and usefulness of the subject. In these ways, mathematical scientists can make crucial contributions to educational reform.

In response to these concerns, the Conference Board of the Mathematical Sciences has launched a new book series published by the American Mathematical Society in cooperation with the Mathematical Association of America entitled Issues in Mathematics Education. The purpose of this new series is to stimulate the flow of information among mathematical scientists, mathematics educators, and mathematics teachers about innovative efforts to revitalize the teaching of mathematics and statistics at all levels.

The present volume, *Mathematicians and Education Reform*, the first in this new series, contains the proceedings of the Mathematicians and Education Reform workshop held in July 1988, at the University of Illinois at Chicago. The workshop provided an opportunity for participants to share ideas about the various ongoing precollege projects organized and directed by mathematicians and to reflect on the most effective ways that mathematicians can contribute to educational reform. The major part of the proceedings is devoted to in-depth articles that explore the process of designing an educational project. A section on issues and reactions presents a forum for exchanging ideas on more general issues.

From practical information about organizing a program to exploration of the intellectual issues of educational reform, this volume presents a range of views on various aspects of the involvement of mathematicians in educational change. While it will prove especially useful for those considering involvement in an educational program, this book is also important reading for the entire community, for the issues explored here will be of increasing importance for the future of the mathematical sciences.



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Michael H. Freedman and Feng Luo

(University Lecture Series, Volume 1)

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Keeping technical details to a minimum, the authors lead the reader on a fascinating exploration of several developments in geometric topology. They begin with the notions of manifold and smooth structures and the Gauss-



and proceed to the topology and geometry of foliated 3-manifolds. They also explain, in terms of general position, why four-dimensional space has special attributes, and they examine the insight Donaldson theory brings. The book ends with a chapter on exotic structures on \mathbb{R}^2 , with a discussion of the two competing theories of four-dimensional manifolds, one topological and one smooth

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