Computational Group Theory and the Theory of Groups, II
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Preface

This is a follow-up to the Contemporary Mathematics volume that we edited on the same topic and that was published by the American Mathematical Society in 2008. This volume consists of contributions by researchers who were invited to the Harlaxton Conference on Computational Group Theory and Cohomology, held at Harlaxton College, The British Campus of the University of Evansville, August 4-8, 2008; and to the AMS Special Session on Computational Group Theory held at Western Michigan University, October 17-19, 2008. The Harlaxton Conference was supported financially by the De Brün Centre for Computational Algebra, National University of Ireland, Galway, and the University of Evansville’s Institute for Global Enterprise in Indiana.

Both the Conference and the Special Session focused on examples of using CGT to solve problems that arise from many areas of group theory; in this volume we find applications to the enumeration of subgroups of the symmetric group, covering groups by subgroups, the ongoing co-class project for classification of $p$-groups, construction or computation of homological and cohomological invariants of groups, probabilistic group theory, and the study of free groups, among others. Computational Group Theory plays many roles in these investigations, from exploration that suggests conjectures or proofs, through performing key computations required to establish theorems.

Once again, we present these examples in the hope that they will encourage researchers and graduate students to think about ways in which they can incorporate CGT in their own research by seeing many different applications of CGT to traditional problems in Group Theory.

The Harlaxton Conference was organized by Bettina Eick, Graham Ellis, and Robert F. Morse; we thank them very much for all their work, and we also thank the de Brün Centre and the University of Evansville for their financial support.

The second editor was supported in part by a grant from the Louisiana Board of Regents. The first and third editors thank Arturo for his work managing and editing the submissions. The three of us are grateful to all the participants in the conferences, and to all authors who submitted contributions to this volume. We are also very thankful indeed to the referees who did such an excellent and timely job for both this and the previous volume. Finally, we are also very grateful to the American Mathematical Society for their help in the publication of this volume, particularly to Christine M. Thivierge for her help and patience.

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This volume consists of contributions by researchers who were invited to the Harlaxton Conference on Computational Group Theory and Cohomology, held in August of 2008, and to the AMS Special Session on Computational Group Theory, held in October 2008. This volume showcases examples of how Computational Group Theory can be applied to a wide range of theoretical aspects of group theory. Among the problems studied in this book are classification of $p$-groups, covers of Lie groups, resolutions of Bieberbach groups, and the study of the lower central series of free groups. This volume also includes expository articles on the probabilistic zeta function of a group and on enumerating subgroups of symmetric groups.

Researchers and graduate students working in all areas of Group Theory will find many examples of how Computational Group Theory helps at various stages of the research process, from developing conjectures through the verification stage. These examples will suggest to the mathematician ways to incorporate Computational Group Theory into their own research endeavors.