Maple and Mathematica: A Problem Solving Approach

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The book under review compares the two computer algebra systems (CAS) Maple and Mathematica. The purpose of this book is not to establish that either Maple or Mathematica is "better" than the other, but is to simply present and describe a wide variety of sample Maple and Mathematica codes side-by-side. All comparative judgments are left to the reader. Before continuing with the review, I add that although I am well-versed in Mathematica and use it regularly, I only have a passing knowledge of Maple.

The primary audience for this book will be researchers and graduate students who are interested in solving problems that require the use of computer algebra systems. The book does not provide a good introduction to either Maple or Mathematica for first-time CAS users. However, it does provide an excellent introduction to Maple for Mathematica users and vice versa. Further, experienced CAS users will learn more advanced commands and topics by reading through the examples. Finally, this book is ideal for scientists who want to corroborate their Maple or Mathematica work with the independent verification provided by another CAS.

The first section of the book, "Foundations of Maple and Mathematica," contains a brief history of each of the CAS under consideration. The remainder of the section includes an introduction to the basics and language structures of both Maple and Mathematica. This section is well written and is easy to follow for those who have experience using any computer algebra system. The general structure of the book is as follows: A mathematical task or problem is stated and then, the code necessary to accomplish the task or to solve the problem is presented. The parallel construction of the book (i.e. the fact that both Maple and Mathematica codes are provided for every problem) allows the reader to easily compare, contrast, and learn the languages of the two systems.

The second section, “Mathematics,” is the heart of the book. It begins with (simple) problems relating to polynomials and ends with (difficult) problems relating to integral equations. Just as in the first section, Maple and Mathematica codes are presented side-by-side. After a problem is introduced, many mathematically-related Maple and Mathematica commands are listed. A brief, but sufficient, description of each command is included. Each chapter in the section contains a number of problems related to a specific mathematical area. Chapters include: graphics, algebra, geometry, calculus, complex functions, special functions, transforms, and mathematical equations. The chapters build upon one another in a logical manner and reference material included earlier in the book.

For example, the subchapter on ordinary differential equations (Chapter 10.2) begins with a thorough list of Maple and Mathematica commands related to initial-value and boundary-value problems. After briefly describing each of these commands, the subchapter continues with sample Maple and Mathematica codes for a representative sample of ODE problems. Example codes for solving problems analytically and numerically are given. Samples of codes for creating phase portraits, vector fields or solution graphs are also included.

Although I would recommend this book to anyone who uses Maple or Mathematica regularly, I have one noteworthy criticism. The majority of the Mathematica code included in the book is written for version 5. This is especially surprising considering that the authors themselves note that version 6 was released in May 2007. All of the code will work in version 6, but it does not take advantage of any of the enhancements and new packages version 6 has to offer. Among others, specific examples include the ZeroMatrix command, the Manipulate command, the VectorFieldPlot command, and the ImplicitPlot command.

In summary, this book is well written and straight to the point. Although it is not suited for first-time computer algebra system users, the book is a valuable asset for anyone interested in solving mathematical problems using Maple and/or Mathematica.