

Foreword

Mathematics has traditionally been a theoretical subject. Unlike other disciplines in sciences, there were no experiments in mathematics. Typically the plausibility of a result is checked by trying it on a few examples that can be computed by hand. If the conjectured result passes such tests, a proof was then sought.

The advent of computers changed this old picture. Now experiments are becoming an increasingly important part of mathematics. Even though such experiments do not replace the role of the proof, they do significantly increase the landscape of opportunities for mathematics and they provide another dimension for visual mathematical objects and results. At Princeton University, we now have a lab where undergraduate students can use and experiment with mathematical problems.

This brings a new problem: If we are going to teach undergraduate students about experiments in mathematics, we need some textbooks. Since the subject is very new, such texts are essentially unavailable.

The book by Li Shangzhi et al. provides a nice solution to this problem. Covering many aspects of mathematics, this book gives a list of very interesting mathematical problems that can be tested on a computer. Starting from the fundamentals of calculus, with such questions as the value of π , to continuous fractions, and sequences and limits, the book continues with problems in number theory, probability theory, dynamical systems, geometric transformations, fractals, coding, etc. The problems selected are representative, elementary yet deep. The topics are very well chosen and the discussions are thorough but not lengthy.

This book is not only useful to mathematics students. For students in all areas of sciences who are interested in learning some of the mathematical tools, this book provides a hands-on approach to the most fundamental issues in mathematics. I expect that this kind of approach will revolutionize the teaching of mathematics. In summary, I think this is a very nicely written text in a very promising new direction of mathematics education.

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