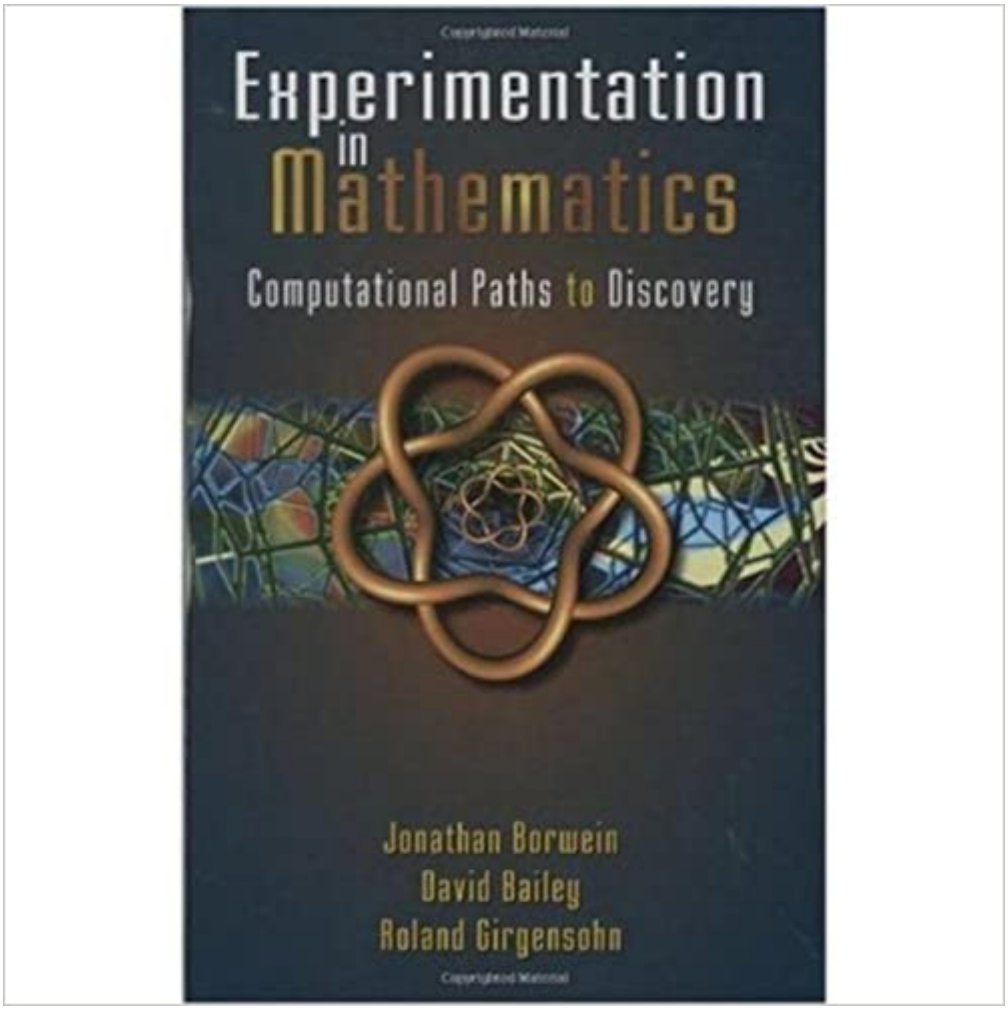
Experimentation In Mathematics: Computational Paths To Discovery



Synopsis

New mathematical insights and rigorous results are often gained through extensive experimentation using numerical examples or graphical images and analyzing them. Today computer experiments are an integral part of doing mathematics. This allows for a more systematic approach to conducting and replicating experiments. The authors address the role of experimental research in the statement of new hypotheses and the discovery of new results that chart the road to future developments. Following the lead of Mathematics by Experiment: Plausible Reasoning in the 21st Century this book gives numerous additional case studies of experimental mathematics in action, ranging from sequences, series, products, integrals, Fourier series, zeta functions, partitions, primes and polynomials. Some advanced numerical techniques are also presented. To get a taste of the material presented in both books view the condensed version.

Book Information

Hardcover: 368 pages

Publisher: A K Peters/CRC Press; 1 edition (April 12, 2004)

Language: English

ISBN-10: 1568811365

ISBN-13: 978-1568811369

Product Dimensions: 6.1 x 1.1 x 9.3 inches

Shipping Weight: 1.4 pounds (View shipping rates and policies)

Average Customer Review: 4.7 out of 5 stars 3 customer reviews

Best Sellers Rank: #2,123,719 in Books (See Top 100 in Books) #98 inÂ Books > Science & Math > Mathematics > Research #330 inÂ Books > Science & Math > Mathematics > Number Systems #18276 inÂ Books > Textbooks > Science & Mathematics > Mathematics

Customer Reviews

" ""The authors . . . explain experimental mathematics in a lively, surprisingly accessible fashion. ""-N/ A, L'Enseignement Mathematique , December 2004 How large a role will computer computations play in the mathematics of tomorrow? The books under review are about many things, but it is clear that the authors are focused on this question. Their answer: very large. Their attitude: we should embrace this change. -David P. Roberts, MAA Online Read This!, January 2005 These are such fun books to read! Actually, calling them books does not do them justice. They have the liveliness and feel of great Web sites, with their bite-size fascinating factoids and their many human- and math-interest stories and other gems. But do not be fooled by the lighthearted, immensely

entertaining style. You are going to learn more math (experimental or otherwise) than you ever did from any two single volumes. Not only that, you will learn by osmosis how to become an experimental mathematician. -Doron Zeilberger, American Scientist, March 2005 It is impossible to describe the content of the whole work in detail in just a few lines. -Ivan Netuka, EMS, September 2004 ""Much of the material in the book has arisen from the experiences of the authors while working on a computer based approach to different topics in mathematics. The variety obtained in this way is impressive, the authors have really touched and produced a treasure trove of lovely mathematical gems."" -Fritz Beukers, AMS MathSciNet , May 2005 ""MathÃ©matiques expÃ©rimentales Certains mathÃ©maticiens dÃ©fendent l'idÃ©e que les mathÃ©matiques sont une science expÃ©rimentale: l'ordinateur, dont la puissance de calcul engendre des conjectures, est pour eux une source dâ ™inspiration."" -Jean-Paul Delahaye, Pour la Science--Logic et Calcul, April 2005 ""Still, experimental mathematics is here to stay. The reader who wants to get an introduction to this exciting approach to doing mathematics can do no better than these books."" -Jeffrey Shallit, Notices of the AMS, September 2005 I do not think that I have had the good fortune to read two more entertaining and informative mathematics texts. -Andrew Rechnitzer, Australian Mathematical Society , August 2005 ""The two books are written in an inviting,conversational, unprepossessing style. They are fascinating as a vast collection of interesting facts, anecdotes, and examples about numbers, primes, polynomials, special functions, definite integrals, series summations, and especially PI."" -Ruben Hersh, SIAM Reviews, January 2006 ""The two books are written in an inviting, conversational, unprepossessing style. They are fascinating as a vast collection of interesting facts, anecdotes, and examples about numbers, primes, polynomials, special functions, definite integrals, series summations, and especially PI."" -Ruben Hersh, SIAM Reviews, January 2006 ""Much of the material in the book has arisen from the experiences of the authors while working on a computer based approach to different topics in mathematics. The variety obtained in this way is impressive, the authors have really touched and produced a treasure trove of lovely mathematical gems."" -F. Beukers, Mathematiacl Reviews, April 2005"

Great book. Prompt delivery.

The book is an advanced text in computational maths. It requires a solid undergraduate background in real analysis. Typically, you'd have this if you are a maths major. Or possibly a theoretical physics major. The level of rigour is unlike most undergrad texts on numerical analyis. The authors strive to demonstrate that even in pure maths, it can be fruitful to have a computer perform computations.

The chapters show that often when there are what appear to be pure maths derivations, a context might appear where you can, or perhaps need to, crunch some numbers.There are many problems; some quite challenging. Not all the computations are numerical. Several involve symbolic algebra. The text leaves it to you to use whatever maths packages you prefer.

The collaboration of Jonathan Borwein, David Bailey, and Roland Girgensohn, Experimentation In Mathematics: Computational Paths To Discovery is a scholarly, college and graduate-studies text discussing the role of computer-based experimental research in the formulation of new hypotheses. Extensive equations, advanced numerical techniques, and mathematical experiments explained in meticulous, step-by-step detail reveal the "new paradigm" in mathematic research, in this solid text especially for expert students and field professionals in cutting-edge mathematical studies.

and Experiment Design (3rd Edition)