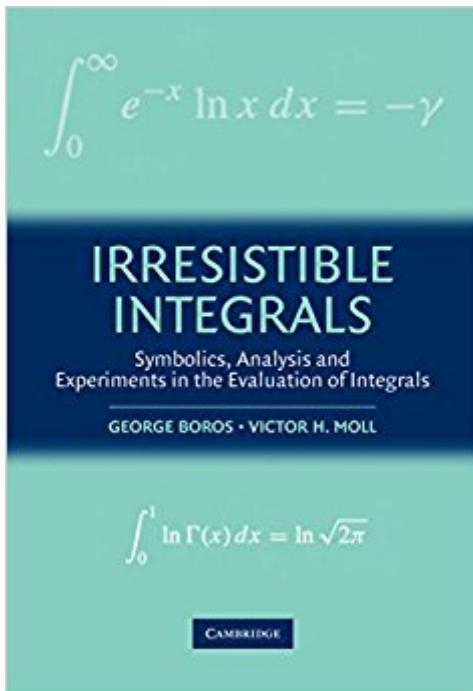


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Irresistible Integrals: Symbolics, Analysis And Experiments In The Evaluation Of Integrals



Synopsis

The problem of evaluating integrals is well known to every student who has had a year of calculus. It was an especially important subject in 19th century analysis and it has now been revived with the appearance of symbolic languages. In this book, the authors use the problem of exact evaluation of definite integrals as a starting point for exploring many areas of mathematics. The questions discussed in this book, first published in 2004, are as old as calculus itself. In presenting the combination of methods required for the evaluation of most integrals, the authors take the most interesting, rather than the shortest, path to the results. Along the way, they illuminate connections with many subjects, including analysis, number theory, algebra and combinatorics. This will be a guided tour of exciting discovery for undergraduates and their teachers in mathematics, computer science, physics, and engineering.

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Customer Reviews

Everyone who has touched calculus and analysis during the very first university years knows how

much time must be 'lost' in the justification of quite clear facts (almost obvious to our intuition). At the same time, one becomes familiar with several tricky counterexamples to those clear facts if a condition (looking rather inessential!) is missed. Arriving then at the subject of definite and indefinite integration, one usually starts to think of calculus as a boring but unavoidable part of mathematics, and it is only on a higher level of university study when one may taste the real beauty of analysis by seeing so many wonderful applications of those boring statements. It is astonishing to see in the book "Irresistible integrals" that even the first steps in calculus may be full of an irresistible grace and that many contemporary beautiful results may become available so early. It is the task of the authors to introduce the reader to the subject of analysis by means of methods of definite integration and their applications to mathematical functions. The methods involved are not only classical (purely analytic) but also modern, like symbolic evaluation in computer algebra systems. An important novelty of the book is demonstrating the role of experiment in mathematics. This is really something that may help the beginner to understand the basic ideas of proofs and evaluations before doing the proofs rigorously and the evaluations formally. The book contains a lot of exercises, examples and computer algebra programs. Complex analysis is completely avoided to make the book as elementary as possible. Among the applications, the reader will find many results on special mathematical functions and mathematical constants.

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