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