BOOK REVIEWS

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Excursions in Classical Analysis: Pathways to Advanced Problem Solving and Undergraduate Research by Hongwei Chen
The Mathematical Association of America (Classroom Resource Materials), 2010
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There is a common perception among some mathematicians who do not read ***Crux*** (and maybe even a few who do) that contest-style problem solving, while all very well as an alternative to crosswords or a way to keep the undergraduates off the streets, hasn't got a great deal to do with real mathematics. (I suspect that this opinion varies with subject area; I have used my old "Putnam skills" often in my research on discrete geometry, but rarely while working on category theory.)

This book goes a long way to closing the gap. It explores a large number of fascinating topics in classical analysis (rather loosely interpreted, as some sections might better be classified as algebra or even combinatorics). These are illustrated with problems from the Putnam, from the *Monthly*, and other sources; and these problems, in turn, motivate much of the theory. A small selection from the topics covered is listed here: inequalities (including a powerful and little–known elementary proof technique); trig identities via complex numbers; advanced trig identities; telescoping sums (including Gosper's algorithm); powers of Fibonacci numbers; series involving binomial coefficients; and parametric differentiation and integration.

Who are the readers for this book? It is probably inaccessible to most "recreational math" amateurs without some university training in mathematics. A very few high school students — those who are training for the IMO, and have a very advanced background — might benefit from it; but I suspect that much of the most relevant material is already known to their trainers, and passed on when appropriate.

Strong undergraduates training for the Putnam may be able to use this book independently. However, it should be noted that most of what is in here is not necessary to solve Putnam problems, which can usually be solved with comparatively simple tools. The book's real strength is in exhibiting common themes and "power tools" at a rather high level. Probably the natural readership for the book is among advanced undergraduate students, graduate students, and career mathematicians wanting to enhance their skills. These readers will find a rich and rewarding set of techniques, amply illustrated with challenging problems.

The book has solutions to all problems except those taken from the *Monthly* or the Putnam, for which the reader is referred to the usual sources.