Book Reviews bring interesting mathematical sciences and education publications drawn from across the entire spectrum of mathematics to the attention of the CMS readership. Comments, suggestions, and submissions are welcome.

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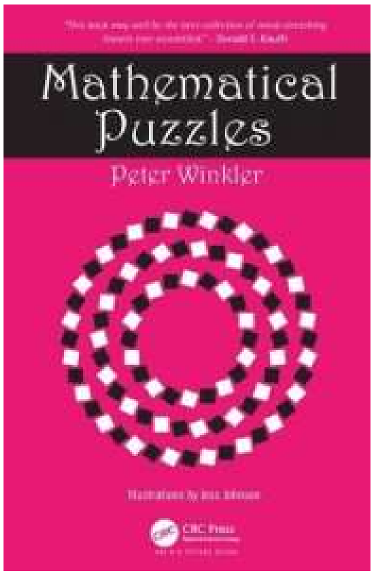

Mathematical Puzzles
by Peter Winkler
A K Peters/CRC Press, 2021
ISBN: 978-0367206925
Reviewed by David Wolfe, Verisk Analytics

I wished I'd refused the assignment to review Peter Winkler's Mathematical Puzzles. As a reviewer, I felt compelled to read the puzzles and the solutions, but I was too addicted to the puzzles to *want* to see the solution to a tantalizing puzzle I had yet to solve. This is the greatest collection of puzzles I've encountered, and is excellent reading for all ages of mathematically minded individuals from teenagers through experienced researchers. Whoever you are, do not expect to solve them all!

Peter Winkler's excellent taste in puzzles comes through in both his selection and his presentation. Many puzzles are framed in a mini-story with captivating language or characters; and there are a few non-mathematical teasers thrown in. They include old classics like, "Brothers and sisters I have none, but that man's brother is my father's son," and "How can you get a 50-50 decision by flipping a bent coin?" But the real attraction for me was the number of puzzles from the last decade or two which are sure-to-be classics.

Like many of Peter Winkler's own creations, this pair of puzzles spread through the mathematical community like wildfire:

- Alice and Bob each have $100 and a biased coin that comes up heads with probability 51%. At a signal, each begins flipping his or her coin once a minute and bets $1 (at even odds) on each outcome, against a bank with unlimited funds. Alice bets on heads, Bob on tails. Suppose both eventually go broke. Who is more likely to have gone broke first?"
- Suppose now that Alice and Bob are flipping the same coin, so that when one goes broke, the second one's stack will be $200 [but will keep playing]. Same question: Given that they both go broke, who is more likely to have gone broke first?"

Of course, since Winkler poses both questions, you can correctly infer that the answers differ!

Winkler's choice of organization is a bit unusual. The puzzles are enumerated 4 times. The first lists the puzzles in an order that doesn't divulge the technique of solution. The second section of the book gives hints. The third, and largest, section of the book provides solutions to all the puzzles grouped by technique used; each of these sections ends with a well-chosen *bonus* theorem related to the technique. In the closing portion of the book, Peter Winkler describes what he knows of each puzzle's source or history.

Most who pick up the book will no doubt want to work the puzzles as initially presented in the lead section. The first puzzles are easiest, but are plenty interesting and fun. Otherwise, they are well-mixed in both style and mathematical methods required. If, on the other hand, you are a person who prefers to use the book to study techniques, you may choose to jump straight into the third presentation of the puzzles. Each puzzle is repeated verbatim from the first section, so the solutions stand on their own. And the puzzles are sorted by difficulty, so the reader can build confidence in using the technique and stop when the waters get too deep. Each technique-specific chapter ends with a bonus theorem, one which is just the sort of theorem I might not have seen before but which I sure wish I knew years ago.

Thank you, Peter, for assembling this magnificent potpourri!

David Wolfe is co-author of several books on combinatorial game theory, most recently of the second edition of « Lessons in Play: An Introduction to Combinatorial Game Theory » (with Michael H. Albert and Richard J. Nowakowski), A K Peters/CRC Press, 2019.