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Ancient and Modern Mathematics: The Partial Permutations

Dat Phung To
Trafford (Aug 27, 2012)
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In *Ancient and Modern Mathematics*, Dat Phung To offers a refreshing postulation that mathematics can be appreciated on a more fundamental level than how it is often presented in these modern times of advanced-function calculators and whizbang computers. Dat Phung To is, in his own words, “the man who loves mathematics.” And while he surely is not the only one, he does prove true to his self-description throughout the pages of this gem of a book.

Ancient and Modern Mathematics is divided into two sections, “Arithmetic and Geometric Problems” and “The Partial Permutations,” two of no doubt many areas of mathematics of which the author has made a study for his own enjoyment.

The arithmetic problems include classic challenges such as “The Sum of Rice in Sixty-four Squares of Chessboard,” in which a man in the Middle Ages invents the game of chess and shows the king how to play it. To reward the man, the king grants him a wish. Having always lived in poverty, the man asks for an amount of rice to be derived from placing one grain on the first square on the chessboard, two on the second, and so forth, each time doubling the number of grains of rice over the sixty-four squares. The king’s mathematician makes the calculation—without the advantage of logarithmic tables or an electronic calculator, of course. Not only is the final sum arrived at as astounding as the reader might expect, but Dat Phung To’s explanation of the most efficient calculation the king’s mathematician might have used is presented precisely and cleary.

The geometric problems presented are also classics. The first is whether a triangle having two angles bisected by line segments of equal length must be an isosceles triangle. The discussion then moves on to the euclidean theory that a straight line and a circle intersect at two points. The latter may seem intuitively obvious, and readers are told that Euclid considered it so. But the author is not satisfied until he can prove the case, and he does. His hand-drawn diagrams add authenticity to his work and again demonstrate the simple beauty of pure, diligent mathematical work.

The second section of the book begins with a look at partial permutations. The author clearly lays out the main rules and then goes on to develop his own corollary to a conventional permutations theorem, which he then applies to further expansions. More handwritten charts appear, meticulously written and very readable.

There are a few typos in the text and a couple of other flaws, such as an occasional missing word, none of which alters the book’s readability. Another round of editing would eliminate these errors for a second edition. And, the reader should be warned that the word “nominator” is used in place of “numerator,” a rare but not actually incorrect usage. The author might consider altering the subtitle to include a reference to the first section of the book as well as the second. Finally, an overall table of contents, rather than one just for each section, would be helpful.

This is without doubt the work of an inspired man. Any math teacher, especially of algebra (heavily relied on in the first several problems), geometry, or discrete mathematics should have this thought-provoking book in his or her personal library and can recommend its reading to students as preparation for some interesting class discussion. Additionally, instructors of computer science might challenge their students to convert Dat Phung To’s work into ditigal algorithms,

just for the fun of it.

PATRICIA MORROW (January 14, 2013)

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