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Review of: The Art of Mathematics: Coffee Time in Memphis by Béla Bollobás

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The Art of Mathematics: Coffee Time in Memphis by Béla Bollobás
Review by: Robert A. Beezer
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However, version 6.0.1 contains help menu information on all of the obsolete packages and functions.

Some brief comments on other new additions are as follows.

- *Mathematica* 6 notebooks can be saved as pdf files.
- The commands `Import` and `Export` have been enhanced to handle a wider range of file types.
- Text is color coded.
- Unlike previous versions, output from `Plot` commands can be suppressed by using a semicolon.

Some quibbles:

- All notebooks created with previous versions of *Mathematica* must be “scanned for possible compatibility issues.” This is a pain, but pays off once all necessary changes (if there are any) are made.
- The cursor gets stuck when using the down arrow to move through large notebooks.
- A single equals sign should not act as an assigning operator inside a `DSolve` command.
- There is no print preview.

Summary. *Mathematica* 6 is a major upgrade from previous versions. Its added graphical abilities and dynamic interactivity combined with new features not discussed here make upgrading very worthwhile.

The suggested retail price for *Mathematica* 6 is \$2,495. The academic and student versions list for \$1,095 and \$140, respectively. Both of these versions have the same functionality as the professional version. *Mathematica* 6 can be purchased directly from www.wolfram.com.

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The Art of Mathematics: Coffee Time in Memphis. By Béla Bollobás. Cambridge University Press, New York, 2006. \$34.99. xvi+359 pp., softcover. ISBN 978-0-521-69395-0.

A common technique of reviewers writing for *Mathematical Reviews* is to simply quote the abstract of the research article being reviewed. A similar shortcut, where this reviewer might simply quote the preface of

this book, could suffice as a concise and accurate review of the book. Instead, the curious may connect to Amazon.com and employ the “Search Inside This Book” feature with “preface” as the search term and read the three pages of the full preface there.

The preface describes this book as a collection of problems the author thinks Paul Erdős or J. E. Littlewood would have found enticing. As the title suggests, its genesis is an informal problem-solving group that

met at the University of Memphis. There are 157 problems in the first section (the first 28 can be seen at Amazon.com in the “Excerpt”), mostly stated in an informal fashion. A short section of hints follows, and then the final 315 pages contain full solutions written as proofs, often of reformulations of the problems in more formal terms. The serious nature of the mathematics is counterbalanced by lighthearted artwork by the author’s wife.

It would be pointless to try to entirely classify the nature of the problems. Perhaps a majority have roots in discrete mathematics, but many are related to geometry, topology, or analysis. The author hopes that the problems could be used to “inspire undergraduates,” and there are problems that are appropriate for strong, but not exceptional, undergraduates. However, many of the problems require a lot of machinery that even a strong undergraduate will not have seen before. There is no indicated gradation to the problems in difficulty or organization by the mathematics brought to bear. The author makes no apology for this, saying the collection is “haphazard” and is meant to be sampled rather than read from front cover to back cover. The first and penultimate problems illustrate the range.

Problem 1 is due to Rado and popularized by Littlewood:

A lion and a Christian in a closed circular arena have equal maximum speeds. What tactics should the lion employ to be sure of his meal? In other words, can the lion catch the Christian in finite time?

The solution contains a journal reference and discusses generalizations such as n lions in an n -dimensional ball, and two lions in a bounded area with rectifiable lakes.

While the first problem is easy to state and understand, Problem 156 has a more technical statement:

Let $x_1, x_2, x_3, \dots, x_n$ be vectors of norm at most 1 in a d -dimensional normed space such that $x_1 + x_2 + x_3 + \dots + x_n = 0$. Show that there is a permutation $\pi \in S_n$ such that

$$\|x_{\pi(1)} + x_{\pi(2)} + x_{\pi(3)} + \dots + x_{\pi(k)}\| \leq d$$

for every k .

The hint includes a reformulation as a more general problem, and the proof in the solutions is followed by 17 references, including several from the 1980s and 1990s and one from 2000.

While both of these problems have proofs that might escape an undergraduate student, there are some problems appropriate for students, such as Problem 40, which requires an edifying application of induction:

Cut out a square of a 2^n by 2^n chess board. Show that the remaining $2^{2^n} - 1$ squares can be tiled with L -tiles, where an L -tile is a union of three squares sharing a vertex.

Besides the memory of Erdős and Littlewood, the author’s main criteria for selecting problems is that they should be “mathematics with fun.” In this, the author has succeeded, and every mathematician should find something fun, novel, and unexpected, alongside some old friends. This book is a must-have for the problem solver, and would be a valuable addition to any personal library. Those who lead problem-solving seminars (such as preparation for the Putnam Mathematical Competition) will find additional material here. Finally, for an academic library this book provides a bridge between purely recreational mathematics and pure mathematics.

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Fuzzy Modeling and Fuzzy Control. By *Huaguang Zhang and Derong Liu*. Birkhäuser, Boston, 2006. \$89.95. xvi+416, hardcover. ISBN 978-0-8176-4491-8.

The present book is devoted to the foundations of fuzzy control. Fuzzy control is the best-known and most successful branch of fuzzy logic. Fuzzy controllers are based on so-called fuzzy rules (or if-then rules), which are linguistic rules such as “if temperature is high and change of temperature is about zero, then set the fan to high (rpm)” or variants of such rules. A collection of such rules, which is supposed to be obtained from a domain expert, describes a control strategy. To run such a control strategy, one needs, in addition to a set of rules, a