Logic As Algebra, by Paul Halmos and Steven Givant, The Mathematical Association of America, Washington, D. C., 1998. 152 pp., $27.00(paper). ISBN 0-88385327-2.

It can be strongly argued that logic is the most ancient of all the mathematical sub-disciplines. When mathematics as we know it was being created so many years ago, it was necessary for the concepts of rigid analytical reasoning to be developed. Of the three earliest areas, geometry was born out of the necessity of accurately measuring land plots and large buildings and number theory was required for sophisticated counting techniques. Logic, the third area, had no "practical" godfather, other than being the foundation for rigorous reasoning in the other two. In the intervening years, so many additional areas of mathematics have been developed, with logic and logical reasoning continuing to be the fundamental building block of them all. Therefore, every mathematician should have some exposure to logic, with the simple history lesson automatically being included. This short, but excellent book fills that niche.

The title accurately sets the theme for the entire book. Algebra is nothing more than a precise notation in combination with a rigorous set of rules of behavior. When logic is approached in that way, it becomes much easier to understand and apply. This is especially necessary in the modern world where computing is so ubiquitous. Many areas of mathematics are incorporated into the computer science major, but none is more widely used than logic. Written at a level that can be comprehended by anyone in either a computer science or mathematics major, it can be used as a textbook in any course targeted at these audiences.

The topics covered are standard although the algebraic approach makes it unique. One simple chapter subheading, 'Language As An Algebra', succinctly describes the theme. Propositional calculus, Boolean algebra, lattices and predicate calculus are the main areas examined. While the treatment is short, it is thorough, providing all necessary details for a sound foundation in the subject. While the word "readable" is sometimes overused in describing books, it can be used here without hesitation.

Sometimes neglected as an area of study in their curricula, logic is an essential part of all mathematics and computer training, whether formal or informal. The authors use a relatively small number of pages to present an extensive amount of knowledge in an easily understandable way. I strongly recommend this book.

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In Polya's Footsteps: Miscellaneous Problems and Essays, by Ross Honsberger, The Mathematical Association of America, Washington, D. C., 1997. 328 pp., $28.95(paper). ISBN 0-88385-326-4.

The greatest scientist of all time was quoted as saying that the reason that he saw further than others was that he stood on the shoulders of giants. As the title of this book suggests, there is another route, namely walking the same path as others. Given our individual differences and how we vary from day to day, even the most beaten of paths can present differing appearances. When walking through a forest, some days you may see the moss, other days the ground cover and then on others we pay particular attention to the leaves. In this collection of problems, Ross

Honsberger proves once again that he is the best at picking the high quality, sturdy building material from the large, stable, yet uninspiring stack of wood.

This is a collection of problems to build on. Many of the them were taken from those proposed and rejected from mathematics competitions, both national and international. Given the quality of these problems, those that were accepted in favor of them must have indeed been gems. It is fortunate that **Crux Mathematicorum**, a journal of the Canadian Mathematical Society, publishes problems of this type so that the rest of us may enjoy them. The range of topics is extensive, with very detailed proofs of all problems. The most striking aspect of many of them is that the approach used in the proof is "non-obvious." Which is the mathematical term for ,"now, how did they ever think of that?" Which is what makes them so charming and emphasizes how exciting mathematics is. There used to be a television game show where contestants competed by claiming that they could name a song in the fewest notes. If there was a similar contest concerning the elegance and directness of proofs, some of those in this book would provide stiff competition.

Classic works of art or music always provide enjoyment, even after many repetitions. High quality, elegant proofs of mathematical problems do the same thing to those willing to experience them. This is one book that will allow you to do that.

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Computer Analisis of Number Sequences, by Henry Ibstedt, American Research Press, Lupton, Az., 1998. 87 pp., $9.95 (paper), ISBN 1-879585-59-6.

Playing with numbers is one activity that all mathematicians enjoy. It is considered a pleasurable occupational hazard. Finding "new" properties of numbers is a joy that cannot be accurately described, only experienced. In this book, the author presents and to some extent explores a set of problems in recreational mathematics. Nearly all of the problems originated in the mind of Florentin Smarandache, the creator of innumerable problems in many areas of mathematics. While many are somewhat contrived, they are all fun to read and think through.

For exemple, there are the three sequences of numbers formed by the repeated concatenation of the elements of a set of integers

Smarandache Odd Sequence (SOS):
1, 13, 135, 1357, 13579, 1357911, 135791113, ...

Smarandache Even Sequence (SES):
2, 24, 246, 2468, 246810, 24681012, ...

Smarandache Prime Sequence (SPS):
23, 235, 2357, 235711, 23571113, ...

where questions like the following are presented.

How many primes are there in the SOS and SPS sequences?
How many perfect powers are there in the SES sequence?

Like the large Marsenne primes, the current largest Known prime in either of these sequences is an accurate barometer of the state of current factoring capability. As no less a mathemetician as Pal Erdos has noted, it will probably never be known if there is an infinite number of primes in either the SOS or SPS sequences.
Howewer, if someone ever resolves the issue, it will no doubt be headline news in the mathematics community. Any technique powerfull enough to resolve this issue will certainly be one that can be used elsewhere.
It is just an interesting collection of problems in recreational mathematics that can be worked on just for the joy of exploration. That alone makes it well worth reading.

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CRC Concise Encyclopedia of Mathematics, by Eric W. Weisstein, CRC Press, Boca Raton, FL, USA, 1998, 1969 pp., $79.95 (alk. paper), ISBN 0-8493-9640-9.

The best ever published encyclopedia of mathematics. Also very accessible and well organized, with many cross-references.

From

http://www.amazon.com/exec/obidos/ISBN=0849396409/ericstreasuretroA/,

"The CRC Concise Encyclopedia of Mathematics is a compendium of mathematical definitions, formulas, figures, tabulations, and references. Its informal style makes it accessible to a broad spectrum of readers with a diverse range of mathematical backgrounds and interests. This fascinating, useful book draws connections to other areas of mathematics and science as well as demonstrates its actual implementation providing a highly readable, distinctive text diverging from the all-too-frequent specialized jargon and dry formal exposition.

Through its thousands of explicit examples, formulas, and derivations, The CRC Concise Encyclopedia of Mathematics gives the reader a flavor of the subject without getting lost in minutiae, stimulating his or her thirst for additional information and exploration.

This book serves as handbook, dictionary, and encyclopedia extensively cross-linked and cross-referenced, not only to other related entries, but also to web sites on the Internet. Standard mathematical references, combined with a few popular ones, are also given at the end of most entries, providing a resource for more reading and exploration. In The CRC Concise Encyclopedia of Mathematics, the most useful and interesting aspects of the topic are thoroughly discussed, enhancing technical definitions."