BOOK REVIEW

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From Calculus to Computers:
Using the Last 200 Years of Mathematics History in the Classroom
By Amy Shell-Gellasch & Dick Jardine (Eds.), published by the Mathematical Association of America, 2005 (MAA Notes #68).
ISBN 0-88385-178-4, paperbound, 255+xii pages, US$48.95.
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A modified title, "Using the Last 200 Years of Mathematics History in the Classroom: From Calculus to Computers", would better reflect the emphasis of this book. The collection of twenty-two articles focuses attention on 19^{th} and 20^{th} century mathematics. The majority of articles stem from a contributed papers' session at the 2001 MAA MathFest in Madison, Wisconsin, and a follow-up session a year later in Burlington, Vermont. The articles, most ranging from six to twelve pages in length, are divided into four broad sections (number of articles in brackets): I. Algebra, Number Theory, Calculus, and Dynamical Systems (5); II. Geometry (3); III. Discrete Mathematics, Computer Science, Numerical Methods, Logic, and Statistics (7); and, IV. History of Mathematics and Pedagogy (7).

The articles generally shed insight into the historical development relevant to a particular topic in mathematics, such as elliptic curves, predator-prey models (an example of mathematical modeling), or logic via Turing machines. Ideas for classroom projects, extensive references, and personal experiences with undergraduate teaching of the topics appear as the sub-text throughout the collection. The volume as a whole offers a rich blend of mathematics, history, and classroom teaching ideas in a manner that will be of interest to mathematicians of many stripes. Whether your interest is Galois theory, cryptography, computer programming, or modern geometry, there is an article of specific interest to you. More importantly, any mathematician will be drawn to several articles in the book while likely finding others to be relatively uninteresting in contrast. This book would make an excellent addition to a departmental reading room or a library collection.

Mindful that this is being prepared for a problem-solving journal, the reviewer will devote the remainder of the review to aspects that may be particularly pertinent to ***CRUX with MAYHEM*** readers. The book does not appear like a problem-solving book and is clearly not intended as such. However, descriptions of courses and projects combine with the discussions of historical contexts scattered throughout the book to provide fertile ground for posing interesting problems and for revisiting problems that were historically significant. A little browsing reveals problems nestled into the structure of the articles. The most vivid example may be "Euler on Cevians"

by Eisso J. Atzema and Homer White. The authors introduce the article as "a historical examination of a little-known contribution of Euler to classical Euclidean geometry, combined with a free-floating elaboration on some of Euler's results". The proofs and discussions of results offer one evident source of problems. The authors then conclude the article with an appendix consisting of various challenging mathematical "exercises" intended to deepen students' mathematical understanding of these topics. Indeed, these are problems!

The final chapter of the book is entitled "Teaching History of Mathematics Through Problems". The author, John R. Prather, presents students with a list of problems that are historically motivated as a means of engaging students in the learning of mathematical history. For example, a set of construction problems using a straightedge and compass is presented with no indication of the relative level of difficulty associated with the constructions. Indeed the trisection of a given angle will prove to be quite a challenge. Consider it to be an open problem with solutions welcomed at any time. Prather adds that it is the number theory and discrete math problems that actually seem to work best in class as they lend themselves to building conjectures, examples, and results. Readers are invited to contact the author at prather@ohiou.edu if they wish to receive a current copy of the complete problem set. Prior to placing this information here, I requested and received a copy of the problem set, as well as assurance that correspondence from readers of this review would be welcome.

In summary, this publication is not one that problem solvers will necessarily wish to add to their collections. However, it offers a wealth of ideas that can contribute to various facets of mathematical teaching and learning, particularly at the undergraduate level. Those with an interest in the history of mathematics and/or the teaching of undergraduate mathematics will enjoy the book and will possibly find the problems contained within to be a bonus. The exchange of problems and communication with John Prather has offered such a benefit to my own experience as a reviewer of the book. Likewise, I am confident that those who obtain the book for their department, institution, or personal library will find some component of it to be particularly pleasing, while gaining an appreciation for the entire collection as a worthy contribution to mathematics (education). The Mathematical Association of America should be applauded for its commitment to publish this collection.