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Review Of "The Future Of College Mathematics" Edited By A. Ralston And G. S. Young

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Review
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obtain the number M_{151}, displayed in all 69 digits and its three prime factors from the abstracted article. WGC

Sophia Kovalevskaia and the Mathematical Community, A. H. Koblitz. The Mathematical Intelligencer 6:1 (1984) 20-29.

A seriously revisionist essay on the life of the first woman to receive a doctorate in mathematics (under the direction of Karl Weierstrass at Göttingen). Kovalevskaia's short life (1850-1891), as represented in the standard sources, including E. T. Bell's Men of Mathematics, was high in nonmathematical interest but relatively low in mathematical importance. In fact, an error in one of her papers has been used to support, as it turns out, an entirely erroneous posthumous view that her work was perhaps even marginal. Using her extensive correspondence with the mathematical luminaries of her day, Koblitz illustrates the contradictory forces at work in nineteenth century academic life. On one hand, her talent was widely acknowledged by her contemporaries (with a couple of dissenting views - from Kronecker, who had his own well-known ax to grind with her mentor, and from Markov, who was later censured by the Moscow Mathematical Society for his criticisms because they were unsubstantiated and without foundation). On the other hand, her sex, politics, and what we now call "lifestyle," led to considerable difficulty in gaining formal credentials and then employment. Koblitz's work shows in very specific terms the tight weave among the threads of sexism, ideology and academic politics - an object lesson in itself. But even more importantly, Koblitz establishes the continuity of that constraining weave through history to the present day via the reactions to recent attempts to memorialize Kovalevskaia's key role in the early days of Acta Mathematica. JJK

Media Correspondents

GLA Gerald L. Alexanderson; **JWB** John W. Berry; **DWB** Donald W. Bushaw; **WGC** William G. Chinn; **CVJ** Charles V. Jones; **JJK** James J. Kaput; **DMcC** Donald McCarthy; **CGM** Charles G. Moore; **VNM** Vedula N. Murty; **AHS** Alan H. Schoenfeld.

The Future of College Mathematics, Anthony Ralston and Gail S. Young, eds., Springer-Verlag, New York, 1983, ix + 278 pp.

Proposition. The first two years of the mainstream college mathematics program should be completely overhauled so that discrete mathematics plays as important a role in it as does calculus.

This proposition, unheard of until a few years ago, is getting considerable attention today. This book—the proceedings of a June, 1982, conference at Williams College, organized by Ralston and Young, and funded by the Alfred P. Sloan Foundation—is a major addition to the literature on the subject. It will get

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you thinking. It deserves to be widely read—it sold out at its first public appearance (the January '83 MAA meeting).

Any call for major change provokes a host of objections. Here are a few for this Proposition:

(1) Who needs this discrete mathematics? Isn't it just for computer science students? Aren't they being well enough served by the Discrete Structures courses which have been designed for them? As for other students who want discrete math, aren't they well enough served by either the precalculus Finite Math course or an upperclass combinatorics course?

(2) If discrete math is to be fitted into the first two years, some calculus and linear algebra will have to be postponed or dropped. Efforts have been made to condense the calculus sequence before—unsuccessfully.

(3) Many departments in other disciplines (including social sciences) require a year of calculus as a prerequisite for their majors. If calculus is that important in all these fields, how can one think of demoting it? Engineers and physicists, in particular, need lots of calculus and need it early.

(4) Any attempt to change the college curriculum will wreak havoc on the interface with high schools. A Calculus Advanced Placement course is the capstone of secondary mathematics.

(5) Finite math courses have been around since Kemeny, Snell and Thompson's book was developed in the late '50s. It never caught on as a mainstream course. Why should it now?

(6) If the amount of calculus in the first two years of the curriculum is reduced, will students develop the same degree of mathematical maturity?

(7) Even if all of the above objections are invalid, is not the traditional calculus sequence entrenched? How could one possibly bring about a major overhaul of the mathematics curriculum?

The great value of this book is that it wrestles with all these objections and more. Although the conferees were all sympathetic to the Proposition, they were not blindly sympathetic. Through the selection of conferees and topics for papers, the organizers saw to it that a wide range of concerns was discussed.

Several papers concern the mathematical needs of students in specific majors: engineering, social science, computer science, business management, statistics—even pure mathematics. One paper describes how symbolic manipulation software (MACSYMA, Mu-Math) may allow the time devoted to calculus to be shortened. There are papers discussing the effects a new curriculum would have on two-year colleges, advanced placement students, and teacher training. Other papers discuss subject matter for new courses. At the end of the conference, workshops made a first stab at writing more detailed syllabi. One workshop outlined two separate 1-year courses; another an integrated 2-year program. There is a paper on mathematical maturity and how it seems to develop. Another paper deals with the increased role problem-solving and modeling might play in the revamped curriculum. And there is a paper by Kemeny himself on "Finite Mathematics—Then and Now." Some papers contain suggestions on how to address institutional obstacles. Finally (actually first), there is an overview article by Ralston summarizing the arguments pro and con for a new curriculum.

Each paper is followed by a summary of the discussion about it which took place at the conference. Additionally, many authors made revisions after the conference.

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Clearly a lot of thought went into the volume. Even the cover design is thoughtful—a sigma superimposed on an integral sign; or is the integral sign on top?

All right, so what are the answers to all the objections? I won't tell you! Read the book! No one involved would claim that it contains all the answers, but one comes away feeling that the proposition has a strong case—strong enough that the Sloan Foundation went ahead and funded a number of proposals for pilot curriculum programs.

Stephen B. Maurer
Swarthmore College and the Alfred P. Sloan Foundation

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