Letters to the Editor

On the Harvard Consortium Calculus

The Harvard Consortium Calculus (HCC below) again appears in an article (May 1997, pages 559–563) by David Mumford. He again mentions the purported definition of a continuous function f given in HCC: "the closer x gets to a, the closer $f(x)$ gets to $f(a)$." I had once objected because this definition does not take into account the well-known counterexample $f(x) = x \sin(1/x)$ with $f(0) = 0$. Mumford proposes a clarifying footnote to say that "$f(x)$ need not go straight to $f(a)$." Perhaps Professor Mumford was not at the San Diego meeting, where I proposed another counterexample: for x real, with $f(x) = |x| + 1$ when $x \neq 0$ and $f(0) = 0$. Here the trouble is that $f(x)$ does indeed get closer and closer—but not real close! An added footnote to cover this might be risky; who knows what other examples could arise?

The solution is simple. This purported definition is not one; it serves only to mislead and confuse. Texts subsidized by the taxpayers' money need not mislead. That "definition" should be forthwith dropped. Nothing but nonsense is thereby lost; the text on the very next page gives a correct definition in terms of the previously defined notion of limit.

Professor Mumford goes on to argue against epsilon and delta (why not use e and d?), when some form of that real definition should be there in every calculus text for the possible instruction of those occasional eager students.

David Mumford, after triumphs in algebra geometry, has gone on to exciting work in applied mathematics, where simulation is used. I admire his initiative, but not his examples. He cites Ed Lorenz, who "simulated his three-dimensional dynamical systems, without anyone being able to rigorously analyze [it]." It so happens that Lorenz, as an undergraduate student at Harvard, had indeed learned rigor in my (and others') courses. Mumford then argues against teaching full rigor; he labels it "logic", so recovering the ancient prejudice against "logic".

Rigor is not just logic. It is precision. Mathematics involves the understanding of precision in thinking. Precision is essential in policy work, as I know at first hand (National Academy of Sciences), and precision is needed in many of the applications of mathematics—in my own experiences in Hamiltonian mechanics, in geometrical optics, in analysis of electric circuits, and with many uses of elementary differential equations (which were vital in my experiences in war research). The HCC has great merit in covering DE (marred only by a sneak preview of *Romeo and Juliet*). To make it an effective reform text, it is essential that HCC in public renounce and omit all nonsense.

Saunders Mac Lane
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(Received April 29, 1997)

About the Cover

Arbitrary Substitution Tiling: All these squares are congruent. Yes, it is true, by definition, since the space of congruences has been appropriately defined. This is a substitution tiling, using these weird congruences. Amazingly, there are matching rules on these tiles, in this strange space, so that ANY tiling with these tiles satisfying the basic rules looks basically like this. Image created by Chaim Goodman-Strauss. Copyright 1995 by the Regents of the University of Minnesota for the Geometry Center (`http://www.geom.umn.edu`). Used with permission.

Library at Indian Institute of Technology

A new Indian Institute of Technology (IIT) has been established by the government of India in Guwahati which is located in the State of Assam in the northeast of India. The Institute started functioning in 1995. This IIT will be along the lines of the other IITs in Bombay, Delhi, Kanpur, Kharagpur and Madras and is an institute of national importance.

We are trying to build a very good library. I write this letter to the *Notices* to seek help from fellow mathematicians of the world to help us augmenting our collections by:

1. Sending us their preprints and reprints,
2. Including our name in their mailing lists,
3. Sending us research reports,
4. Sending us back volumes of different journals from their personal collections which they might wish to dispose of. We shall pay the shipping costs.

At present our mathematics faculty consists of a small but very promising group of seven people. We hope to grow to a strength of about twenty-five faculty members in the next few years. We are planning to develop research groups in mathematics analysis, algebra, CFD, and OR.

We welcome mathematicians from other countries to visit our institute.

Thanking you with kind regards.

P. Bhattacharyya
Indian Institute of Technology
Guwahat
(Received May 14, 1997)

On the COSEPUP Report

The May 1997 issue of *Notices* carries a letter by Moss Sweedler concerning the implications of the 1993 report *Science, Technology and the Federal Government: National Goals for a New*

Era,[1] on science priorities for the future funding of U.S. mathematics. The report was written by COSEPUP, a joint committee of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. It proposes that the U.S. have a policy of attaining a position of world leadership in all major fields of research.

Dr. Sweedler expresses concern that the case for the funding of mathematics research is undercut by a statement by John Hopcroft suggesting that K–12 math instruction may be more important to the overall health of U.S. science than Ph.D.-level preparation in math.

COSEPUP's report is aimed at helping set national priorities for research funding, not for the broader task of setting the funding levels for mathematics education or other important components of the nation's infrastructure for research. Thus, Hopcroft's observation is extraneous to the COSEPUP criteria, which center on the contributions of a field's research finding to progress in other fields of research.

Lawrence E. McCray
National Academy of Sciences
(Received May 27, 1997)

Funding Not the Problem

In the May 1997 *Notices* Judy Roitman cites funding restrictions as the obstacle to substantive reform in mathematics education: "While many of us might devoutly wish that better professional education development had preceded curriculum reform, the way in which professional development is funded is the real problem here."

But money is not the real problem. Fresh funding isn't needed to support future teachers as they take appropriate mathematics courses as undergraduates.

A perverse order of priorities is the problem: we habitually view mathematics education as suddenly being in a "crisis" which requires a rapid fix before another generation of students is lost. The usual fix is "quick, a new curriculum"—either more basics or more concepts, more applications or more theory, more emphasis on history or on esthetics. Or it may be a new way to organize the class.

If we put first things first and make sure that future teachers are mathematically well prepared *before* they enter a professional program, then we can finally improve matters.

On the other hand, if we continue the present course of focusing on curriculum or teaching strategies, I expect that the Standards reform movement will suffer the same fate as the New Math of the 1960s: [it will] gradually fizzle and vanish.

Sherman Stein
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(Received May 29, 1997)

The Future of Math Departments

The communication on the uncertain future of mathematics departments makes interesting and familiar reading. Professor Conway (*Notices*, April 1997, pages 439–443) has quite succinctly identified teaching of algorithms as a problem. Fifteen years ago, in 1982, I wrote [1]:

> In the laboratory or in industry, the mathematics used in most cases is actually an algorithm for turning a set of data to another set of data and in the coming years such tasks will be increasingly done by magnetic tapes, floppy discs, and plastic cards with the help of silicon chips.

For understanding various problems considered in that communication, the following further facts may also be of interest to your readers and to those who are concerned. At this college I used to belong to a small but distinguished mathematics department; in its entire long history it had only six full professors: P. Diens, A. C. Offord, C. H. Dowker, R. Penrose, R. W. Tiffen, and me. Most of your readers will have heard of all these names, with the sole exception of mine. Among many distinguished mathematicians trained in the department was A. Robinson, who discovered nonstandard analysis and was a professor at Princeton. The department was closed down some years ago without a murmur of protest from anybody; my own connection with the department had ceased some years earlier when I became the founding member of this unit. In England, after a probationary period of three years (fewer in exceptional cases) all university teachers—lecturers, readers, and professors—used to have tenure. As English law does not recognize retrospective changes in contracts those who had tenure still have it, but all newly appointed or promoted university teachers, including professors, no longer have tenure.

I have written an essay [2] on the subject which was published as an editorial in the *Journal of Natural Geometry*, and I hope those who have access to the journal will find some food for thought there.

References

[1] C. S. Sharma, *The role of mathematics in physics*, British J. Philos. Sci. **33** (1982), 275–286.
[2] ____, *Mathematics in the market-place*, J. Natur. Geom. **8** (1995), 157–162.

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[1] *Science, Technology and the Federal Government: National Goals for a New Era*, by the Committee on Science, Engineering and Public Policy (COSEPUP), chaired by Phillip Griffiths, National Academy Press, Washington, DC. 1993.