Some Comments about Teaching Mathematics
From Jan Mycielski

Math. and Sci. at the university level should be taught like history or geography. Courses should describe things, structures, and show them from many points of view so that they become interesting and familiar. Thus courses should provide knowledge, and not focus on know-how, not on the performance of algorithms. The knowledge of concepts and structures yields the know-how, not vice versa. Old artisanry was very difficult since it was know-how without knowledge, it took years to become a good artisan. Unfortunately like in old artisanry, today in the teaching of math and sciences the focus upon the know-how prevails. In consequence we have bad teaching, bad books and bad exams. The effect is devastating. A vast majority of people hate math. and sciences, and in a rich country like America they try and they can avoid scientific education. The country keeps importing its scientists from poor countries where the pressure to study science is much higher than here. But my point is that mathematics is not like a sport and not like the ability to play a musical instrument or to sing.

Most people are surprised that there is any research in mathematics. They think that math. is an ability to apply some fixed fornulas or algorithms (the job of computers). Bad teachers and bad books misleed students; they ask only "how to do it?" (in fact "how get rid of it?"), and not "what are we talking about?" or "what are the properties of this object?".

And when a textbook in math. or science has more than 10 times the no. of years of the students for whom it is writen it is a totally inacceptable book. Such books repell the students since it appears impossible to them grasp its content and hence it appears depressing to read it! The books are full of gimmics irrelevant pictures, repetitive exercises; they are not books to read they are training manuals for the teacher. Thus they not help at all! Worse, these books hide from the students the simplicity and efficiency of mathematical desriptions (but they fill the pockets of the fraudulent textbook industry.)

Since one has to check the knowledge by means of exams, let me deplore the kind of exams that do not check the knowledge of concepts and focus on performance. These are exams involving overly complicated calculations (as a rule algorithms have very simple cases and these should suffice) and exams involving too many problems with similar calculations. They test menial abilities or speed rather than knowledge, they test diligence and they ignore intelligence, are made for robots and not human beings. If not under too much stess the brain of every person thinks quite fast but it is not made for long calculations, it makes mistakes. This cannot be eradicated. Imagination is more important than precision! Imagination makes outstanding mathematicians, and some of them are not precise. When it becomes important, they achieve precision by rechecking things.