Letters to the Editor

Andrew Gleason

Many readers of the *Notices* are, I am sure, grateful for the fine articles about the late Andrew Gleason and his accomplishments, in the November 2009 issue. I myself was particularly interested in Paul Chernoff's article, for I once spent much effort to completely master Gleason's profound theorem characterizing abstractly defined "states" in quantum mechanics, and I even hoped to be able to shorten the proof, something in which, however, I failed. Because Gleason is probably most widely known for his path-breaking contribution to solving Hilbert's Fifth Problem, I thought that a personal experience of mine may be of interest.

Gleason once visited Indiana University in Bloomington, and I met him at a post-lecture party. I mentioned to him my admiration for "Gleason's Theorem". "Which one?" he asked. Upon my replying that I meant the one about states in quantum theory, his face darkened, he thought for a few moments, and then said "You know, that was the most difficult thing I ever did in my life."

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As a former physics major, now physician and neuroscientist, and one of Professor Gleason's "last students" in a couple of different ways, I would just like to add to the recent recountings in the *Notices*.

I was the only nonmathematician taking Gleason's graduate real analysis class. Gleason passed out a set of notes from a prior time he had taught the class and requested that we bring any errors to his attention—there were less than a handful. I mentioned that he must be pleased that when he taught the class again, the notes would be error free! He responded that he would never teach the class again, but he continued to collect errors with interest and concern. The final for the class was half true/false questions, scored +1 for a correct answer, -3 for a wrong answer, zero for no answer. One question was so tricky that no one among the crew of past, present, and future deep-thinking and Putnam Prize-winning students dared answer! The professor still knew best!

Later I wanted to enter a team in the COMAP Mathematical Contest in Modeling. Knowing that Gleason was a three-year Putnam champion and literally wrote the book on this pure math contest, I approached him about being our faculty advisor with some trepidation, but he immediately agreed.

We solved the discrete problem for the specific given set of conditions, and also showed that with general conditions the problem was NP-complete. On Monday morning after Gleason mailed our sealed write-up, we proudly told him our results. He listened with a knowing look. He too had found the same, but didn't look nearly as tired as we were! We were awarded an Outstanding Paper. Gleason's legacy is that Harvard now regularly competes in this applied math contest.

I have done some work on J. J. Thomson's century-old problem of the minimum energy configuration of charges on the surface of a sphere. I discussed with Gleason one paper in which we were studying the difference in energies of configurations for certain numbers of charges that we had found admitted more than one nice lattice configuration. He asked why we hadn't given the general formula for such N—his legendary ability to generalize your results on the spot! My co-author Richard Stong was then able to produce the formula. I have never seen reviewers so impressed! I continued to have the pleasure and good fortune of discussing work on other problems in physics and neuroscience with Andrew Gleason.

From his lectures and comments, it seems to me that Andrew Gleason was never fully comfortable with the notion of completeness of the real numbers. When last we talked Gleason mentioned to me that he was studying Hilbert's axioms of geometry, in particular the axioms on order.

Our teacher and friend is gone. But the example he set for us lives on for us to follow.

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Submitting Letters to the Editor

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