Know Your Wisconsin Mathematician

Where did you grow up?

I grew up in Duluth, Minnesota. I lived in the same house until I graduated with my BA in Mathematics at age 21. Then I moved to Madison to attend graduate school, and after getting married, I moved into the second house I have ever lived in where I live today.

Was there a time in your life when you discovered that mathematics was what you wanted to do?

All through elementary school I struggled due to my being mildly dyslexic (although I was in graduate school when it was diagnosed). In seventh grade I hit my first course titled "Mathematics" and was suddenly exposed to a subject that came easily to me, and I began spending an enormously amount of my time studying as much mathematics as I could get my hands on. I had a teacher who noted this and fed my interest. He did as much as anyone to set my direction and convince me to pursue mathematics.

As late as age 15 I remember considering other occupations such as physics, engineering, and computer programming, but I think that soon after it became very obvious that if there were an option to work in mathematics, I would take it. Several professors at the university encouraged my interest and training. I do remember leaving for graduate school thinking that I wanted to get a Ph.D. in mathematics because I loved to do mathematics, but at the time I did not have a good idea what I would do with the degree after I earned it.

Where did you go to undergraduate school?

My BA is from the University of Minnesota, Duluth. I already felt at home there since, as a high school student, I was taking college mathematics courses, and I had a job working on a research project in the Physics Department. It was also convenient for my family having me stay at home as an undergraduate, so I actually applied to only one school for college.

And what about graduate school?

Ok, so I actually applied to several graduate programs. I chose UW-Madison because of their strength in Analysis and because I was greeted by very friendly people during a visit I made to campus.

What was the influence of your family on your education?

My family always promoted the importance of education. I have two older sisters who excelled in academics, although both majored in English. It always clear to me that my family expected me to get a college degree, and my parents always took an interest in my education.

Are there any teachers who had influenced you to become a mathematician?

I already mentioned my seventh-grade mathematics teacher. I am still in touch with him today and often stop in to see him when I am visiting in Duluth. In high school I had science teachers who encouraged us to enter projects in the school science fair. Being interested in mathematics, I instead wrote mathematics papers. Each year I put a great deal of effort into producing a paper that would make its way to the state science fair in Minnesota. It was a wonderful stimulus for learning. As a senior in high school in order to understand the limits of straight-edge and compass constructions, I read much of Herstein's *Topics in Algebra* book. It all stemmed from the encouragement of these teachers.

How did you end up at Whitewater?

I graduated with my Ph.D. in 1980 in the same semester that I got married to Janet Mertz who was already on the faculty in the Oncology Department at UW-Madison. Although I applied for jobs throughout the country and went on a good half-dozen job interviews, the advantages of being able to live with my wife during the first year of our marriage began to become clear. The job at UW-Whitewater had the advantage that there would be plenty of opportunity for me both to

learn and to teach computer science as well as mathematics and statistics courses. Commuting to Whitewater from Madison proved reasonably convenient since a large number of others do the same.

You have a very mathematical family. Tell us about the accomplishments of your wife and your sons.

I am very proud of my entire family. My wife, Janet, has a Ph.D. in biochemistry from Stanford. Her thesis advisor, Paul Berg, won the Nobel Prize in 1980 for work on genetic engineering, work on which Janet made major contributions. She went to Stanford from MIT where she double majored in Biology and Engineering, and nearly completed a third major in Mathematics. She has always been interested in mathematics. I refer to her as a math groupie. She has recently gotten very interested in the girls-in-mathematics issue, and we have worked together on several papers on the subject.

My older son, Daniel, is just special. My wife and I discovered early on that he was gifted in mathematics, like the time when, at age six, as part of the dinner conversation he gave us a complete general proof that the sum of two odd numbers was always an even number. Although we tried to nurture his interest, after a few years we could no longer take credit for all that he accomplished which included earning two IMO gold metals, being a four-time Putnam Fellow, wining the Morgan Prize, and publishing over 40 research papers in mathematics and computer science. He will get his Ph.D. in Mathematics from Harvard this spring.

My younger son, Jeremy, might have become a mathematician, too, but understandably, living in the shadow of his older brother made that difficult. Jeremy has a masters rating in chess and really enjoys tutoring children in chess. He will graduate this spring from the University of Chicago with a degree in Political Science and Public Policy.

What courses do you like to teach?

One of the things I like the most about teaching in Whitewater is the opportunity it has given me to teach a wide variety of courses. My thesis was in Complex Analysis, so I really enjoy teaching Calculus, Complex Variables, Discrete Mathematics, and our Introduction to Analysis course which is our course to teach students how to write proofs. While in graduate school, I got a masters degree in statistics, so I like teaching our Probability and Mathematical Statistics courses. Whitewater supported my study of Computer Science, and in 1983 I completed my masters in that area. I teach about half-time in Computer Science and especially enjoy teaching programming, data structures, algorithms, and theory of computation. In 1995 I completed the exams for an Associateship in the Society of Actuaries and have enjoyed teaching our actuarial courses.

Over the years, did you find that teaching of mathematics changed?

The mathematics that I teach changes very slowly, but the students that I teach change faster. Students coming out of high school today have almost no understanding of mathematical proofs as compared to those of 30 years ago who received at least some background in proofs in their geometry courses. On the other hand, students today are much more comfortable with technology both for calculating and for finding reference material. The best mathematics students of today have many more opportunities to train than their predecessors, so if they are talented and ambitious, they will advance far beyond what was possible before.

Where do you think mathematics is going, and then closely allied to that, where do you think it should go?

Mathematics has always had an unusual relationship with the rest of the culture because it is hard to figure out exactly why they hire us to do what we do. Certainly, we need well trained mathematicians to teach application courses so that we can have engineers, statisticians, scientists, financial experts, and other researchers who can use mathematics. But why do they pay us to study and research areas of mathematics that entertains us but provides little application to the rest of society? Apparently, mathematicians have a good track record of showing that as long as enough of us are allowed to continue thinking about mathematics, when an important new problem arises, our community will find the expertise needed to solve the problem. So, mathematics will certainly grow in the application areas that the society currently deems financially beneficial (look for a lot of growth in the study of risk, investments, and

information theory), but it will also expand into new areas that just meet the current fancy of mathematicians.

What do you think is the best part of being a mathematician?

I love to play games, and doing mathematics is like continually playing games. It is hard to believe that they pay me to do this.

What was the worst part of teaching mathematics?

Ok, there is always drudgery in any job. Grading homework can sometimes be tedious, but if I keep reminding myself how important it is, and I keep thinking about how I would appreciate getting useful feed-back on my own work, then I find the strength to make it through.

How would you describe what you did when you were talking to somebody outside of mathematics?

I once mentioned to my friend's mother that I studied mathematics because of the beauty of the subject; that to me it was more a humanities than a science. She challenged me to give her a glimpse of that beauty. So I sat down with her for about an hour and explained about the cardinality of sets. It was a subject that did not depend on how much mathematics she might have remembered. I was able to get through the argument that the set of rational numbers was the same size as the set of integers, but that the set of real numbers was bigger. She was amazed and had to agree that the arguments were beautiful. Unfortunately, most people do not have the patience to listen as intently as my friend's mother.

What of your work do you like the best? What are you most proud of?

The part of teaching I like the best is working one-on-one with a student. When a student comes to me for help, I love the challenge of finding out what it is that they need to complete their understanding of a concept.

I am a mathematician because I like working problems. In the last ten years I have gotten very involved with writing mathematics problems for contests. This has been a real joy, and with practice, I have become much better at doing it. I write most of the problems for our on-line Purple Comet! Math Meet (http://purplecomet.org), and I am now co-chair of the committee that produces the American Invitational Mathematics Exam (AIME). I also enjoy working with Math Circles and Mathematics Summer Camps because I meet students eager to soak up as much knowledge and insight as they can get.

What is your advice to college students and new teachers?

To college students I would say that once you have found your passion, do not let anything get in your way of understanding. Keep asking questions and finding help so that you can know that you are mastering the area where you want to be an expert.

To faculty members I would quote one of my mentors, Joe Gallian, who recommends "Always say yes" to any request for help. That is, get involved in every conceivable project, especially those that interest you. It is amazing how much you can get done when you have too much to do.

As outgoing governor of the MAA, do you have any advice for the membership?

The MAA offers many more services and opportunities than most members are aware of. I have gotten a great deal out of my service on various MAA committees, and I always enjoy attending the organization's meetings. If a member has a particular interest within mathematics, there is like a facet of the MAA that can address and enhance that interest. By getting involved in the organization, one can find many rewards while serving the community. I look forward to staying active in both the national organization and the Wisconsin Section long after my term as governor ends.

Do you have any other comments?

Besides mathematics, I like chess, bridge, running, biking, hiking, swimming, reading science fiction and mysteries, photography, listening to classical and rock & roll music, and playing the bass in the Madison Community Orchestra. I have been selling the shareware computer gradebook program, GRADE GUIDE, since 1985 (http://gradeguide.com) and the shareware Sudoku Studio program since 2006 (http://sudokustudio.com).