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Indiana University Department of

Mathematics Alumni Newsletter

College of Arts & Sciences Alumni Association

Vol. 4/Fall 1994

From the chair

Growing department keeps in touch with majors

We are now in our second year in Rawles Hall, the department's newly renovated home. The change, from a worn and tired Swain Hall, has been good for everybody.

More than our building has changed during the past year. Reform in mathematics education has spread across the country, and Indiana, like many departments, has used the opportunity to review every part of our curriculum. The requirements for a mathematics major will change next year (more hours, but also more flexibility). We are expanding our offerings at the senior level to add a greater variety of one-semester courses. We no longer give graduation credit for College Algebra (to encourage students to complete high school algebra). And we are using computers more in many parts of the curriculum. (Isn't everyone?)

Several faculty have experimented with ways to use advanced undergraduate students to lead study groups for students in entry level courses. Other faculty have tried teaching with fewer lectures, working with students on group projects during the class. Still others have incorporated lengthy writing assignments in mathematics courses, surprising some students who view mathematics and writing as disjoint activities.

Our faculty have changed as well. This year, Professor Billy Rhoades retires after 27 years at IU. Next January, Professor Jan Jaworowski will join him in retirement. We have appointed a young assistant professor, Shouhong Wang, whose specialty is the mathematics of meteorology and long-term weather prediction. We also hired an eminent, senior Russian mathematician, Sergey Pinchuk, whose research concerns several complex variables (which is related, in part, to those pretty pictures of fractals you may have seen).

We are now a department of nearly 60 faculty, representing 20 different countries. (The countries of birth are Argentina, Czechoslovakia, China, Colombia, Denmark, England, France, Germany, Hungary, India, Israel, Japan, Poland, Romania, Russia, Serbia, South Korea, Switzerland, United States, and Vietnam.) We have nearly 100 mathematics graduate students. We teach more than 13,000 undergraduates in more than 200 mathematics courses each year. We duplicate more than 1.2 million sheets of paper each year, mainly containing tests and quizzes.

We're big. The number of mathematics majors remains relatively small, however, with fewer than 200 certified at any time. That gives us an opportunity to maintain contact with our majors in spite of our size. We are always happy to have alumni visit, just to stop by and chat. We also welcome letters that tell us what you are doing or how you now view past experiences at IU. Please keep in touch.

— John Ewing

Math Instructor Mentoring Program

This past year, we began a training program in which three math graduate students taught advanced freshman/sophomore courses while being supervised by Dean **Mort Lowengrub** and professors **Grahame Bennett** and **Peter Sternberg**. Our plan, which grew out of conversations between Chair **John Ewing**, and Lowengrub, is to maintain a high standard of instruction in these courses while allowing our most senior and experienced graduate instructors to prepare for their first assignment as postgraduate teachers.

The first stage began last fall: **Phillip Gloor**, **Andrew Dabrowski**, and **Swatee Naik** were selected to assist instructors Lowengrub, Bennett, and Sternberg in faculty-taught sections of M120 Brief Survey of Calculus II, M311 Calculus III, and M216 Calculus II. Stage two began in spring, after these students had become familiar with course procedures as teaching assistants. They instructed course sections of M120, M311, and M215 while being advised by their faculty mentors on issues such as grading, preparation of lectures, and testing procedures. Both the students and faculty were pleased with the results.

Naik will begin an appointment as an assistant professor this fall at the University of Nevada, Reno; Gloor is finishing his PhD work this year; and Dabrowski is seeking a teaching position.

We intend to continue pairing other advanced graduate instructors and faculty members this year. A careful reader may have noted a slight twist in our plans that occurred this spring: The intended section of M216 for Naik was canceled due to fewer M216 students than expected. Fortunately, she handled the alternate assignment, M215, comfortably since she had also assisted in this course several times.

Faculty profile Billy Rhoades: Teacher, researcher, traveler

Billy Rhoades was born in Lima, Ohio. He graduated from Lima Central High School in 1946 and served for two years as a bandsman in the Army. He played the saxophone, but never had presidential aspirations. From 1948 until 1951, he attended Ohio Northern University, graduating with distinction, majoring in mathematics with a minor in physics.

After two years at Rutgers, where he earned a master's in mathematics in 1953, he began teaching full time at Lafayette College and simultaneously working for his PhD from Lehigh University. After receiving his doctoral degree in 1958 under the direction of A. Wilansky, he remained at Lafayette College on the faculty until 1965.

During this period, Rhoades became increasing involved in mathematics education, an interest that has continued throughout his career. From 1963 to 1965, he was granted a leave of absence from Lafayette College to serve as associate director (and subsequently, as director) of the Committee on the Undergraduate Program in Mathematics (CUPM), which was a powerful force in mathematics education reform for many years and profoundly influenced the high school curriculum for hundreds of thousands of students, including many of us in the department. At the end of his term as director, Rhoades joined the faculty at Indiana University.

While at Indiana, Rhoades associated himself closely with all aspects of pedagogy and mathematics education. While assistant chair for undergraduate affairs, he took charge of T.A.s (now called A.I.s) for some time. He coordinated the dialogue between the mathematics department and the School of Education. He supervised the master of arts in teaching program during his entire career at Indiana. At the same time, Rhoades remained active outside the university on committees and panels, speaking widely on mathematics education to sectional meetings of the Mathematical Association of America and the National Council of Teachers. He was director of the Academic Year Institutes Program, sponsored by the National Science Foundation, and served as director of the Institute for Negro College Teachers from 1969 to 1970. Rhoades was recently awarded the Distinguished Service Award of the Indiana section of the MAA for his many years of outstanding service to the Association.

Teaching was only part of his professional life. Rhoades has remained active as a research mathematician, and he has recently traveled as a Fulbright Fellow to Hungary and Nigeria. He has published more than 150 papers, mainly in his fields of summability and fixed point theory. He has a remarkably meticulous filing system stored on 3x5 cards. Every Wednesday afternoon, Rhoades can be seen in the Swain Hall Library poring over journals, updating the cards, cross-referencing the information. He is generous in sharing that information with others, and he is especially keen to encourage younger colleagues at institutions that lack the fine library facilities that we enjoy at Indiana.

Rhoades is a master of classical summability theory. Some years ago, when Paul Halmos was giving a talk called "Matrices I Have Met," he raised the question: Does the Cesaro matrix have a square root? It was a typical Halmos puzzle — simple to state, but irritatingly hard to answer. Rhoades, using his extensive knowledge of summability theory, easily showed the answer was Yes, and was able to describe explicitly the square root.

Rhoades and his wife, Mary Lou, have made Bloomington their home for nearly 30 years. He maintains close ties both to Bloomington and to IU, and he has touched the lives of thousands of students during his years here. We are certain that he will continue to touch people's lives in the future. We congratulate Rhoades for the past and wish him well in the future.

Student news

Awards Day April 25, 1994

Undergraduate award winners

• Outstanding Sophomores:

Joseph James Breedlove — Marie S. Wilcox Scholarship

Michael John Suralik — Marie S. Wilcox Scholarship

• Outstanding Juniors:

Mark Andrew Bishop — Marie S. Wilcox Scholarship

Amanda Sharon Coatney — Cora B. Hennel Scholarship

Christopher Daniel Stephens — Cora B. Hennel Scholarship and Rainard Benton Robbins Prize

• Outstanding Seniors:

Rebecca Jessie Lowe Crum — Marie S. Wilcox Scholarship

Karin Saskia Dorman — Cora B. Hennel Scholarship

Samuel Johnson — Marie S. Wilcox Scholarship

Mark Andrew Schaaf — Cora B. Hennel Scholarship and Addison-Wesley/Benjamin Cummings Book Award

• Outstanding Student:

Zachary Jayson Ziliak — Ruth E. Gilliatt Memorial Scholarship

Graduate Award Winners

• Robert E. Weber Award — **Wenfang Cheng**

• James P. Williams Award — **Theodore Sean Elicker**

• Rothrock Summer Fellowship Awards — **Harishree Achuthan** and **Kathleen McWilliams**

• Rothrock Teaching Awards for Associate Instructors — **Jeff Johannes, Eric Olson, Andrea Rafael**, and **Jacqueline Roberts**

• COAS Graduate Student Fellowships — **Theodore Sean Elicker, Pamela Deering**, and **Noah Stern**

• Eberhard E. Hopf Fellowship in Applied Mathematics — **Xiaoming Wang**

• The Fourth Annual Rothrock Faculty Teaching Award was presented to **Bruce Solomon**.

Rhodes Scholar

Math major **Zachary Ziliak** is one of two Indiana residents who were awarded prestigious Rhodes Scholarships, which are named for British statesman and financier Cecil John Rhodes. Offered to students from several former British colonies, including the United States, plus Germany, thirty-two scholarships go to American students each year.

Zachary, also a Wells Scholar and a Goldwater Scholar, had five undergraduate majors during his four years at IU. He spent his sophomore year in the IU Overseas Program in Hamburg, Germany. He graduated in May with three degrees, a BS I in mathematics, a BS in physics, and a BA in linguistics. He will complete his fourth degree, a double BA in German and Japanese in August, and plans to study mathematics at Oxford University in England this fall.

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Conferees gather in Bloomington, pay homage to Ziemer

A mathematics conference was held on May 21 in honor of the 60th birthday of Professor William Ziemer.

The conference was attended by approximately 65 mathematicians whose research is related to the fields of real analysis and partial differential equations, those in which Ziemer has worked. Many of the participants were also close friends of Ziemer. Speaking at the conference were world-class researchers from Brown University, Princeton University, Rice University, Stanford University, University of Kentucky, University of Minnesota, and University of Wisconsin.

The first talk of the conference was given by Wendell Fleming, of Brown University, who was Ziemer's thesis advisor at Brown. Appropriately, the last talk was by Ed Stredulinsky of the University of Wisconsin–Richland Center, who is a recent PhD student of Ziemer at Indiana University.

Professor Ziemer came to Bloomington in 1961. He has twice been chair of the mathematics department, 1971–74, and 1983–86. From 1979 to 1981, he was associate dean of the Graduate School. Ziemer has taught a wide variety of courses at all levels, from freshman to advanced graduate. He has directed the theses of nine PhD students. He has written 54 research articles and is completing his second graduate textbook. Ziemer was a driving force behind the computerization of the mathematics department during the 1980s.

Outside of mathematics, Bill Ziemer's interests include competitive sailing, racquetball, tennis, and singing. He has one son and two daughters. One daughter is a lawyer, the other an aeronautical engineer. Bill's son, a mathematician on the faculty of Long Beach State University in California, attended the conference.

At a special banquet during the conference, Ziemer was given a framed picture of the Admiral's Cup Sailboat Race, held off the coast of Australia at Fremantle, Western Australia, prior to the America's Cup Race in 1987. Entertainment at the banquet was provided by a string quartet from the Indiana University School of Music.

Student news

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Reception for graduates

The math department hosted a spring reception in honor of our May and August graduates. Faculty and staff were joined by students and their friends and family members. The reception was held in Rawles Hall on Saturday, May 7, before the afternoon commencement ceremony.

Phi Beta Kappa

Eleven mathematics majors were elected to Phi Beta Kappa during the 1993–94 academic year. November's initiates were **Rebecca Crum, Karin Dorman, Masaru Hashimoto, Julie Hudson, Samuel Johnson, Brian Kern, Andy Schaaf,** and **Paul Stemn**. Inductees in April were **Charity McCoy, Hannah Sarnow,** and **Deborah Shilling**.

Wells Scholar

Kiera Cope, one of our outstanding undergraduate majors, was awarded a Wells Scholarship last summer. Wells Scholarships are named for Herman B. Wells, who spent 50 years as president of IU, and is now chancellor of the university. Kiera spent the spring semester in an overseas studies program at Australian National University in Canberra. She will return to Bloomington to begin her senior year this fall.

Senior Achievement Awards

Mathematics majors **Esther Brooks** and **Masaru Hashimoto** were given Senior Achievement Awards by the Honors Division during the 1993–94 academic year. During her five years at IU, Esther was a middle distance runner and member of both the track and cross- country teams. She graduated in May with two degrees, a BS II in mathematics and a BA in computer science. She plans to enter a PhD program in exercise physiology at Penn State this fall. Masaru, who was born in Japan, will complete his BS II in Mathematics in August. He plans to begin graduate studies in mathematics at IU Bloomington this fall.

Alumni profile Gretchen Mueller: Researcher, consultant

It's not your father's Oldsmobile. The heartbeat of America. These slogans are not just the result of successful brainstorming, they represent a great deal of time and research. Car manufacturers spend millions of dollars each year to create powerful, effective advertising strategies for their products.

Gretchen Mueller had no idea that she would be deeply involved in this industry when she was a math student at Indiana University in the late 1980s. In fact, when she entered college she had no intention of majoring in mathematics. Yet after taking a beginning course and discovering the logic of math, Mueller decided to major in the field. She graduated in 1990.

A friend of a friend told her about a potential job with a company called Motoresearch, Inc. in Detroit. Motoresearch is a small company that provides consulting to General Motors, Ford, and other auto manufacturers regarding the appeal and effectiveness of their advertising. In her position, Mueller travels throughout the country, organizing focus groups to view potential television ads and measuring audience response. She has given workshops in many cities, including San Francisco, Atlanta, Chicago, Mexico City, Montreal, and Saõ Paulo.

Mueller's training in mathematics has proved useful in organizing the thousands of responses and reactions that may be generated by a single commercial. She tabulates, collates, and analyzes the results using statistics and computers and then makes recommendations to the manufacturer.

Although Mueller's job can be stressful when she is expected to compose a report in as little as 24 hours, she loves her job and her career. She is confident that her decision to major in mathematics was the best decision of her life.

(This profile appeared on the poster "Mathematics, Calculate the Possibilities," developed by the College Division of McGraw-Hill Publishing Co., and is reprinted with permission from David Carter, McGraw-Hill.)

Departmental news

Research Experiences Program

The National Science Foundation program of Research Experiences for Undergraduates (REU) continued in mathematics at IU during summer 1994. Once again directed by professors **Darrell Haile** and **Daniel Maki**, the program ran from June 19 to Aug. 12. Undergraduates came from the University of Chicago, Texas A&M, Harvard University, the University of Pennsylvania, IU, Brandeis University, Iowa State University, and Stanford University.

REU's goal is to provide students with a research environment that is as close as possible to that of a working mathematician. Library and computer resources are made available to the students, and the students meet two or three times a week with their faculty advisors. Faculty advisors give short talks on research areas to start the summer program, and students give talks on their work at the end of the summer. Topics for summer 1994 included finite-dimensional algebras and graph theory, hidden Markov models, neural networks, stratified population models, Mersenne primes, speech recognition, and dynamical systems.

Math Awareness Week

IU undergraduates and area high school students, including many students from Franklin Central in Indianapolis (led by their teacher IU graduate Christine Bolte), participated in a variety of mathematical activities in Rawles Hall. These included a lecture and video presentation called "Fermat's Last Theorem — A Theorem at Last?" (see page 6 in this newsletter) by Professor **Darrell Haile**, a demonstration and a brief explanation of the related mathematics of a planimeter by Professor **Vinay Deodhar**, and a variety of computer demonstrations and exhibits. In addition, three faculty members gave lectures at the Bloomington high schools.

New this year was the "Math 500 Time Trial" contest, which was loosely modeled after qualification time trials at the Indianapolis Motor Speedway. The program, written by graduate student **Lawrence Smith**, simulated a contestant's program module that controls a car running around an oval track.

The department also sold T-shirts featuring a beautiful color rendition of the Mandelbrot set which describes the behavior of a certain family of functions of complex variable. The computer demonstration of this set and other fractals were prepared by Professor **John Ewing**.

Both IU undergraduates and IU graduates participated in the time trial contest and a chalk talk contest. Senior **Rebecca Crum** won the time trial contest and junior **Ashish Kumar** won the chalk talk contest.

Math Modeling Institute

Once again this summer, the IU Mathematics Department is hosting a National Science Foundation High School Teacher Institute on Mathematical Modeling. Twenty-five teachers were selected to work with IU faculty members and guest lecturers. The four-week program involves both an introduction to mathematical modeling and practical hands-on experience in working with real modeling problems. Teachers are introduced to several computer tools for modeling. The institute emphasizes small group problem solving and development of appropriate curriculum units for the high school classroom. The institute, directed by Professor **Daniel Maki**, was first offered in summer 1993, and is expected to be repeated in summer 1995.

Math Contest in Modeling

A team composed of senior math majors **Joe Cailles**, **Sam Johnson**, and **Craig Miller** received honorable mention in the Mathematical Contest in Modeling (MCM) in February. The MCM, sponsored by the Consortium for Mathematics and Its Applications (COMAP), is the only international contest in which teams of students work together to find a solution. The 1994 MCM had 315 teams from 198 schools in 10 countries.

Alumni news

Before 1960

Alberta Peterson Bogan, BA'25, is retired as a teacher for Bloomfield Schools. She lives at Lyons Convalescent Center, Lyons, Ind.

Audra Snyder Bailey, BA'30, retired in 1979 after teaching high school math in both public and private schools for more than 47 years. Bailey earned her master's degree at Butler University, where she was inducted into Phi Kappa Phi. She writes us: "Your 'Mathematical Reflections' (on programming by computers) are beyond my comprehension;

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Mathematical Reflections

Fermat's Last Theorem — A theorem at last!

On June 23 of last year, a rare event occurred — a mathematician made headlines. Andrew Wiles, of Princeton University, announced a solution to one of the oldest and most famous open problems in mathematics. Part of its fame derives from its simple statement: If n is an integer greater than or equal to 3, there are no positive integers a,b,c such that $a^n + b^n = c^n$. (When n is 2 there are lots of solutions, for example $3^2 + 4^2 = 5^2$ and $5^2 + 12^2 = 13^2$. In fact, triples $[a,b,c]$ of positive integers, for which $a^2 + b^2 = c^2$, are called Pythagorean triples because they represent the possible integral lengths for the sides of a right triangle. There is a formula for all possible solutions.) Another reason for its fame is its longevity. The statement has resisted all efforts at resolution for more than 350 years. The origins of the statement and the attempts to resolve it make a great story. It begins with Pierre Fermat.

Pierre Fermat, reprinted with permission.

Pierre Fermat was born in 1601 near Toulouse, France. His father was a wealthy merchant and lawyer and his mother came from a prominent family. Fermat received a law degree from Orleans in 1631. He married a distant cousin soon after and began his law career. He never traveled far from Toulouse. He never met any of the other important mathematicians of his time. (Near the end of his life, he almost met Pascal, one of his regular correspondents, but his poor health and that of Pascal prevented it.) He died while pursuing his law duties in 1665.

Fermat did not publish any of his work on mathematics. Almost all we know of his work is from his correspondence, which was voluminous. It was his habit, having solved a problem, to propose it to various correspondents as a challenge.

Fermat did important work on analytic geometry, calculus (especially the theory of maxima and minima), and probability theory, but it is for his work in number theory that he is best known today. His interest in number theory was spurred by Claude-Gaspar Bachet's publication of a new edition in Latin and Greek of the works of Diophantus of Alexandria, who is thought to have lived during the first century A.D. Much of what we know of Fermat's results in number theory appeared as marginal notes in his copy of Bachet's edition of the six books of the Arithmetica by Diophantus.

Here are two examples of well known theorems in number theory credited to Fermat:

(1) If p is a prime number and a is any integer, then p divides $a^p - a$. (For example, $2^5 - 2 = 30$ is divisible by 5.)

(2) If p is a prime, then p can be written as a sum of two squares if and only if 4 divides $p - 1$. (For example, 4 divides 13 - 1 and $13 = 2^2 + 3^2$. On the other hand 4 does not divide 7 - 1 and it is not hard to see that 7 cannot be written as the sum of $a^2 + b^2$ for any integers a and b.)

Now, back to our story. Question number eight of Book II of Diophantus concerns the equation $x^2 + y^2 = z^2$ which we discussed above (and which Diophantus knew how to solve). In his copy, Fermat wrote next to this problem (in Latin) what is perhaps the most famous marginalia ever.

Here is a translation:

On the other hand it is impossible for a cube to be written as a sum of two cubes or a fourth power to be written as a sum of two fourth powers or, in general, for any number which is a power greater than the second to be written as a sum of two like powers. I have a truly marvelous demonstration of this proposition which this margin is too narrow to contain.

Fermat later gave the details of the case where n is 4. In fact, this is the only complete proof of his in number theory that we have. In particular, he never explained what was too big to fit in the margin.

Soon after Fermat's death one of his sons, Samuel, arranged for a new edition of Bachet. In this version, Fermat's marginal comments are incorporated into the text. (I encourage you to visit the Lilly Rare Book Library on your next visit to Bloomington. Among its many interesting acquisitions is an original of this volume in white vellum. Although the book is more than 300 years old it is in excellent condition.)

It was left to future generations to provide the proofs for Fermat's assertions. Much of this was done by the Swiss mathematician Leonhard Euler (1707–1783). By 1800, the only one not settled was his marginal comment on the equation $x^n + y^n = z^n$, and it is thought that this is why this statement came to be known as Fermat's LAST Theorem (FLT) — it was certainly *not* his last assertion.

In 1816, the French Academy announced a prize for the

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Fermat's Last Theorem

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solution to FLT. In the next several years, special cases were settled (n=5,7 — it is not difficult to see that the general case can be reduced to the special case where the exponent n is an odd prime number). The most striking progress on the theorem at this time was achieved by the German mathematician Ersnt Kummer (1810–1893).

Here is a brief description of what Kummer did: It had been realized that one could prove FLT for a given prime exponent p if a certain collection of complex numbers associated to p had the "unique factorization" property; that is, if in that collection one could factor every number uniquely into primes as one can in the integers (for example, $12 = 2^2$ and there is no way to write 12 as a product of other primes). However it had also been shown that for some primes the associated collection of complex numbers definitely did not have the unique factorization property. In fact, it had been shown that if p is bigger than 23 then unique factorization failed. Kummer's important contribution was to replace the unique factorization property by a property that was weaker but still enough to give FLT. With this tool, he was able to prove FLT for all primes less than 100. (More important, the ideas he introduced turned out to be fundamental for the study of many problems in number theory.)

In 1850, the French Academy offered a second prize for a solution to FLT. In 1856, the Academy withdrew the prize and awarded a medal to Kummer for his work on the problem.

One can characterize the methods used on the problem to this point in our story in the following way: Up to the beginning of the 19th century, the methods were "elementary," and often very ingenious. In the 19th century, methods from abstract algebra, which was being developed at the time were applied. In the 20th century, geometric methods have proved most successful. More precisely, the 20th century, has seen the development of a part of mathematics that is now called arithmetic algebraic geometry, and Wiles's methods come from this very sophisticated subject.

Here is a brief and very sketchy description of what has happened: In 1982, the German mathematician Gerhard Frey discovered a connection between FLT and a conjecture in the arithmetic theory of what are called elliptic curves. This conjecture was first made by the Japanese mathematician Y. Taniyama in 1955 and later refined by G. Shimura and A. Weil. It is therefore referred to as the Shimura-Taniyama-Weil conjecture (STW). The conjecture says that all elliptic curves over the rational numbers are "modular" — whatever that means. Now, if for a given prime p, we have positive integers a,b,c such that $a^p + b^p = c^p$, that is, if FLT is false for the exponent p, then it turns out that the equation $y^2 = x(x - a^p)(x + b^p)$ describes an elliptic curve, which Frey claimed to have proved could not be modular. So if the STW conjecture were true, FLT would follow. His proof was incomplete, but French mathematician J.-P. Serre identified the difficulty and a American mathematician K. Ribet gave a complete proof in 1989. So now it was known that STW implies FLT. In fact, it was known that one needed STW only for a special class of elliptic curves, the "semistable" ones.

It was apparently at this point that Wiles started working on the problem in earnest. Then last summer, he asked to give a series of three lectures at a number theory conference at Cambridge. He gave his lectures the unrevealing title "Modular Forms, Elliptic Curves, and Galois Representations." By the third lecture, though, the audience knew where he was headed. Wiles showed that, based on the results of his first two lectures, he could prove STW for semistable curves and so obtain Fermat's Last Theorem. Cameras flashed and the audience cheered. Soon after, the headlines began. Although the resolution of FLT is a great achievement, proving the Shimura-Taniyama-Weil conjecture is seen by mathematicians as being of much greater importance because the conjecture is very general and hence applies to many problems having nothing to do with the Fermat equation.

So our story ends. Or does it? After Wiles's manuscript was circulated, a gap was found in his argument. Wiles believes that no new ideas are needed to fill in the gap and that he will soon have a complete proof. But for now perhaps we should alter our title to FERMAT'S LAST THEOREM — A THEOREM AT LAST?

Alumni news

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I'm not computerized!"

Helen Rasler Umbach Roth, BA'34, is retired from I&ME Employees Federal Credit Union in Fort Wayne. She lives in Fort Wayne.

Paul D. Oyer, BS'48, MA'49, has retired from the U.S. Department of the Treasury and is now conducting speakers' bureaus nationwide. The president of his own company, Oyer led international conferences on Smart Cards during the 1980s.

In August 1993, **Robert L. Ledger**, BS'52, MAT'57, was honored as the Warren Township Schools 1993 Teacher of the Year. Ledger retired in 1993 as chair of the mathematics department at Warren Central High School, Indianapolis. He taught math in the Warren schools for 34 years and has also taught in Battle Creek, Mich. He lives in Indianapolis.

Wilbur J. Hildebrand, MAT'53, has been chair of the mathematics department at Montgomery College, Germantown, Md., since 1992. He earned his doctorate in education from Penn State in 1969. He lives in Arnold, Md.

Patrick Shanahan, PhD'57, took early retirement at the end of the 1992–93 academic year and is now using his free time to complete a book on physics, geometry, and gauge theory. Shanahan is professor emeritus at the College of Holy Cross, Worcester, Mass., and lives in North Grafton, Mass.

1960–69

In August 1993, **Queen F. Randall**, MA'61, was appointed chancellor of the Los Rios Community College District in Sacramento, Calif. She had served as president of the district's American River College since 1984. From 1978 to 1980, she was president of Pioneer Community College in Kansas City, Mo., and from 1981 to 1984, she was president of El Centro College in Dallas, Texas. She was honored by the California Cultural Assembly as the Outstanding African-American Woman of 1990 and has received the YWCA Outstanding Woman in Education Award and the Soroptimist International Woman of Distinction Award. She has served on the board of

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the Commission on Women in Higher Education.

W. Dennis Pepe, BA'62, MA'63, PhD'66, owns an actuarial and insurance consulting business and is a consultant to the executive staff of Penn Treaty Life Insurance Co. and Network America Life Insurance Co., subsidiaries of Penn Treaty American Corp. (PTAC). Pepe is on the board of directors of PTAC's three companies. A former senior vice president of Cologne Life Reinsurance Co. and a past vice president of reinsurance for Phoenix Mutual Life Insurance Co., he also taught mathematics at the University of Kentucky and at Ohio State University. He lives in Glastonbury, Conn.

John S. Lancaster, BA'66, MA'68, PhD'72, professor of mathematics at Marshall University, Huntington, W.Va., was the 1993 recipient of the university's Marshall and Shirley Reynolds Outstanding Teacher Award. Before coming to Marshall in 1972, Lancaster taught courses at IU and Shawnee State University and was on the faculty of the University of Hawaii–Hilo. A past recipient of three faculty research awards and a faculty improvement grant from the National Science Foundation, his research involves applications of the computer in mathematics. He has also been a consultant to various publishers and educational institutions. A 28-year member of the Mathematical Association of America, he was a 1992 nominee for its Ohio Section Award for Distinguished University Teaching of Mathematics.

Leroy A. Franklin, BA'67, MA'74, PhD'77, professor of decision science at Indiana State University in Terre Haute, received a Caleb Mills Distinguished Teaching Award at the May 1993 commencement ceremonies. He teaches statistical methods and quality and productivity, and was instrumental in developing the decision sciences minor and a new course in quality control. He received the ISU business school's Teacher of the Year Award in 1990 and its Researcher of the Year Award in 1992. Also in 1992, the university recognized him with its annual research award for his work in statistical computing, sampling, nonparametric statistics, statistical graphics, and Bayesian statistics.

1970–79

Marc T. Simon, BA'77, accounting manager for Hudson General Corp., Great Neck, N.Y., became a certified public accountant in 1985 and took his current position in 1989. For the past five years, he has also been active in community theater. He lives in Elmont, N.Y.

As a senior software engineer for Boeringer Mannheim, **J. David Lehman**, BA'79, is involved in the development of biomedical instruments. The Martinsville resident writes that he is "also making a comeback in running, after a 12-year layoff. Watch out, Spivey!"

Bloomington attorney **David E. Schalk**, BS'79, MA'79, was a candidate for Monroe County prosecutor in the recent Democratic primary. A former Bloomington city chemist, Schalk continues his law practice in Bloomington.

1980–89

Jeffrey K. Olin, BA'80, is currently a software development manager for Galileo International, the largest airline reservation system in the world. In spring 1993, Olin, his wife, Jodi, and their daughter, Miriam, moved to Denver, Colo., where their second daughter, Elizabeth, was born in June.

Antonia (Toni) Wilson Bluher, BS'83, is an assistant professor at Stanford whose research interests involve automorphic forms and theta functions. She and her husband, Grigory, have three children and live in Newark, Calif.

In summer 1993, **Alius J. Meilus**, BS'85, conducted a management training seminar in the newly independent Lithuania. Meilus presented a monograph on management information systems at the seminar, which was organized through the Purdue University–Calumet School of Professional Studies. Meilus' wife, Ginta, led a seminar on strategic planning through the same program. Meilus is an operations research analyst for Analytical Services Inc., Arlington, Va. He earned a master's degree from George Washington University in Washington, D.C., and is now working toward a doctorate in operations research there. He and his wife live in Annandale, Va., with their daughter, Viltis.

As the official buyer of men's shoes for all Bloomingdale's Department Stores, **Leslie A. Jones**, BS'86, finds that "my math background helps me to analyze the business in all 15 stores." Jones travels to Italy twice a year to develop major private-label shoe programs. She lives in New York City with her husband, Leon V. Shivamber, MBA'86, who is a partner with the firm New York Consulting Partners.

Thomas S. Botsko, BA'87, is an actuarial assistant for Nationwide Insurance Co., Columbus, Ohio, where he has been working since 1989, after graduating from Ball State University with an MA in actuarial science. He is married to Terri Taylor–Botsko, BA'87, a staff attorney for Consolidated Stores Inc. The couple lives in Hilliard, Ohio.

Terri Nation, BA'88, has been the mathematics undergraduate advisor at IU since November 1991. In addition to talking with students, she writes a monthly newsletter that is distributed to undergraduates enrolled in math classes. Nation spends part of the summer advising new freshmen and transfer students at FOCUS (Freshman Orientation, Communication, Understanding, and Support). She also serves as the news editor for this annual alumni newsletter.

Melanie A. Ebdon, BA'89, of Columbus, Ohio, is finishing work toward a master's degree in biomedical engineering at Ohio State University. Ebdon also teaches Fortran, DI3000 Graphics, and Maple on HP workstations in OSU's engineering graphics department. After graduation, she hopes to work with orthopedic biomaterials.

In his doctoral work at Michigan State University, **Panagiotis Papadopoulos**, MA'89, concentrates on the classification of finite groups using amalgamation methods. He lives in East Lansing, Mich.

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