Math Matters

The Cornell Mathematics Department Newsletter

VOLUME 3, NUMBER 1   June 1995

The Putnam Competition

Cornell University achieved second place in the 55th annual William Lowell Putnam Mathematics Competition. The Putnam Competition is a bi-national contest involving teams and individuals from colleges and universities throughout the United States and Canada. According to Professor Bob Connelly, the faculty advisor for the team, this is the best performance by a Cornell team in at least 25 years.

This year's team was composed of **Jeremy Bem**, **Bobby Kleinberg**, and **Mark Krosky.** Bem placed among the top five nationally (the top five are not ranked among themselves) with a score somewhere between 87 and 102 out of 120. "A truly outstanding achievement," Connelly notes. Kleinberg placed fifteenth. Other Cornell students who participated were: **Xun Wilson Huang, Daisuke Shimizu, Mark Pilloff** and **Jie Li**. Department Chair Peter Kahn extended his congratulations to Connelly as well, who "spent many Friday afternoons preparing [the students] for the test."

The Putnam Competition, established in 1938, promotes a healthful rivalry in mathematics between academic institutions across the United States and Canada. The Mathematical Association of America currently regulates the competition. The exam itself consists of twelve challenging mathematical questions that the participants attempt to solve during the course of two three-hour sessions. The event this year was held on December 3, 1994 and included 2,314 participants and teams from 409 institutions.

REU Program to be Held Again This Summer
by Robert Strichartz

This summer, the Cornell Mathematics Department will conduct its second Research Experiences for Undergraduates (REU) program, sponsored by the National

REU Program, con't.

Science Foundation. Ten students, including four from Cornell: **David de la Nuez, David Glickenstein, Alexander Tsow** and **Kevin Walsh**, will participate in Cornell's eight-week program, which coincides with the eight-week summer session. The students will work on research problems under the direction of faculty members **Karoly Bezdek, Robert Connelly** and **Robert Strichartz**, assisted by graduate student **David Kennerud.** They will be joined by two students from the Supercomputing Program for Undergraduate Research (SPUR), including Cornell undergraduate **Mark Krosky**.

The research problems to be studied will be chosen from the following areas: geometric convexity theory, circle packings, tensegrities, fractals, and harmonic analysis. Some of the work will involve running computer experiments to investigate mathematical problems. When the program finishes the first week of August, the students will give public lectures on their work. There will also be a series of public lectures by faculty members, called the Smorgasbord Seminar, in conjunction with the program. These talks are designed to give students a small taste of what research in the different areas of mathematics can be like.

Professor Strichartz is a professor of mathematics and coordinator of the REU program at Cornell.

Alumni Panel

The Mathematics Department will be providing a forum for current math majors. Alumni interested in discussing their career decisions are urged to contact **Professor Graeme Bailey** via e-mail at bailey@math.cornell.edu or 129 White Hall, Cornell University, Ithaca, NY 14853, (607) 255-4013.

Hudson River Undergraduate Conference

The second Hudson River Undergraduate Mathematics Conference was held *Saturday, April 8, 1995* at Siena College in Loudonville, New York. Keynote speaker was Jean Taylor of Rutgers University. Students and faculty presented featured expository talks and original research to an audience comprised of their peers.

Cornell University was represented by three undergraduate mathematics majors. **Justin Collins** spoke on a topic from differential geometry; **Max Huffman** discussed why Euclid chose to work in geometry; and **Julie Oldakowski** lectured on the emigration of mathematicians from Europe to the United States in the 1940's. **Tom Rishel**, senior lecturer and director of undergraduate teaching, accompanied the students as the Cornell coordinator of these talks.

Director of Math Majors Returns

Professor **Lars Wahlbin** returns from his sabbatic leave to Göthenburg, Sweden where he worked with Vidar Thomeé. He resumes his duties as director of math majors this fall.

Many thanks to **Graeme Bailey** for so ably handling Professor Wahlbin's duties in his absence.

Knots and Donuts, Part II

by Debra Boutin

On April 27th a group of women from Cornell's Mathematics Department presented the workshop "Knots, Donuts, Surfaces and Teacups" at the Lansing Residential Center For Girls. Ten girls from the Lansing Residential Center attended last fall's "Expanding Your Horizons" workshops. They enjoyed the workshops so much that the staff at LRC wanted to offer a similar experience to the rest of their girls. The result was "Women in Math and Science Day."

Volunteers from colleges and industries in the local area volunteered their time to present hands-on workshops in math and science to the 102 students at the center. The representatives from Cornell consisted of **Debra Boutin**, her daughter **Holly Boutin, Jennifer Davoren, Karin Johnsgard, Min Kang, Lisa Orlandi** and **Lilly Pineda**. The group presented six sessions of the workshop "Knots, Donuts, Surfaces and Teacups." This workshop, based on a paper by Professor **Robert Strichartz**, has been successful at the last two "Expanding Your Horizons" workshops; the reception of the presentation demonstrates that this success continues. The girls used clay to explore the similarity between a donut and a teacup; they made ordinary and Mobius bands to explore their differences; and using knot theory, the girls proved that a sphere and a torus are different. Of course, a real donut has to be used to represent the torus, and once the donut is properly wrapped in string the only way to find out whether the resulting loop is simple or knotted is to actually eat the donut!

This was a wonderful experience not only for the students at Lansing Residential Center, but for the volunteers also. Anyone feeling cynical or burned-out by teaching needs only to spend a day at Lansing Residential Center to feel revived — the enthusiasm is contagious! The biggest problem was trying to limit the students' questions and comments so that the material could be covered within the allotted time. Eating lunch together gave the participants the opportunity to get to know the girls better; it was evident that they have so many hopes, so many dreams. Anyone considering volunteering their time to a worthy cause should consider volunteering at Lansing Residential Center; it's well worth the time and effort!

Debra Boutin is a fourth-year graduate student in the Mathematics Department.

Presentation

Jim Coykendall and **Lisa Orlandi** are "clearly among the very best teaching assistants in the College," according to Lynne S. Abel, associate dean of the College of Arts and Sciences. On March 31, 1995, Coykendall and Orlandi were presented with the Russell and Clark awards, respectively, and cash prizes at a College of Arts and Sciences convocation honoring them, as well as other distinguished faculty and students.

Russell Award

James Coykendall was awarded the Russell Award for distinguished teaching. Jim has been a teaching assistant in the Mathematics Department since the fall of 1991. In the fall of 1994, Coykendall was awarded a Hutchinson Fellowship for his many years of outstanding work as a T.A.

Coykendall has been teaching Mathematics 111 and Mathematics 112 (first- and second-semester calculus) since he entered the graduate program. Because of his excellence, he was selected as lecturer for both the past and current summer. His students' evaluations have been consistently high. The calculus coordinator describes Jim as "...an enthusiastic teacher who just loves to lecture."; his students call him an "...excellent math teacher." Of the 27 sections of calculus, Jim's class usually scored the best on the prelims.

Because of this excellence, Jim was also chosen to help train new teaching assistants during the summer T.A. Training Program.

Clark Award

Lisa Orlandi was awarded the Clark Award for distinguished teaching in the Mathematics Department. Orlandi taught first- and second-semester Engineering Mathematics in her first year as a graduate student, where she received excellent evaluations. Because of this excellence, Lisa was selected to teach Mathematics 111 and 112, where again she excelled. In addition, she was also chosen to be the head coordinator of our summer training sessions for new teaching assistants.

Lisa was fundamental in getting the department the Professors for the Future grant from the Pew Foundation. This grant has allowed a number of mathematics students to give talks at Ithaca and Wells Colleges, and to attend regional mathematics association meetings. She is an important member of the team of graduate students who developed the plans for the project-

Clark Award, con't.

based sections of Math 112. The faculty leader of the team describes Lisa as "one of the most effective and respected teachers."

Students compliment Lisa on her enthusiasm and her sense of humor. One student described Lisa as "one of the few productive investments Cornell makes..." Another described Lisa as by far the best T.A. she had encountered. Finally, one student describes her love and enthusiasm for mathematics as "unparalleled."

Distinguished Teaching Award

Thomas Rishel, senior lecturer and director of undergraduate teaching staff in Cornell University's Department of Mathematics, has received the 1995 Distinguished Teaching Award from the MAA Seaway Section. According to the chair of the selection committee, the award was based on strong evidence of Rishel's excellence in teaching, and his active participation in teaching-related activities. Dr. Rishel will also be the official section candidate for national awards.

Dr. Rishel earned his Ph.D. from the University of Pittsburgh where he studied topology under Professor Jun-Iti Nagata. While at Pittsburgh, Rishel taught at both the Greensburg and main campus of the university. He then took a post-doctoral fellowship at Dalhousie University and was later awarded a fellowship at Tokyo University of Education and a Canadian Mathematical Conference Summer Research Fellowship. Since coming to Cornell in 1973, Rishel has taught a variety of courses including large lectures in engineering mathematics and has designed his own courses in geometry and topology. Student evaluations consistently rate Rishel as excellent and he received the Clark Award for Distinguished Teaching in 1982. The Clark Award is a prestigious honor given to a very few Cornell faculty each year. He has since been recommended again for the Clark award, but it is only awarded one time to any one person.

Rishel has also been active in the training of graduate teaching assistants. He is currently the director of a project entitled "Preparing Future Faculty" that is designed to get Cornell graduate students to interact with faculty at some of the smaller colleges and universities.

Dr. Rishel was honored at the Spring Seaway Section meeting in April, held at Hobart and William Smith Colleges.

"Preparing Future Faculty" Program A Success

by Tom Rishel

Recent talks by graduate students in the Cornell Mathematics Department have been greeted with enthusiastic responses. Four Cornell students, led by **Tom Rishel**, senior lecturer and director of undergraduate teaching, traveled to Wells College in February. Wells College, a liberal arts college for women located in Aurora, New York, hosted the first half of a home-and-home meeting between Cornell graduate students and Wells faculty and undergraduates.

Cathy Stenson, a first year graduate student, spoke on "DNA and Topology." The talk was very well received, having attracted an audience of 60. Following Stenson's talk, **Debra Boutin** and **Lisa Orlandi** hosted a luncheon, discussing the opportunities available in mathematics, science and education. Wells faculty then had the chance to describe their duties to the graduates. The Wells program was so well received that Karl David, the chair, requested abstracts from all potential speakers. According to David, he would like an even more extensive program in the future.

In March, **Nikil Shah**, a second-year graduate student in statistics, gave the second of a series of four talks at Ithaca College. Shah spoke to thirty students and faculty on the job search problem, called "How to Choose a Date." The talk was immensely popular with both students and faculty; John Rosenthal, Ithaca College mathematics professor and the incoming chair, said "that was better than any recent job candidate talk — no, I take that back; it wasn't better than any *recent* job talk, it was better than *any* job talk I've ever heard!"

In April and May, five more talks were given at Ithaca and Hobart Colleges. Cornell students also traveled to Hobart in April for the second trip to a Mathematical Association of America regional meeting. This follows a November trip to Rochester by the students, organized by graduate student **Ed Bueler**. Bueler spoke at that meeting while other PFF committee chairs solidified this year's program with department members at other regional colleges.

Future activities being considered include a talk at the Math and Education Reform meeting regarding the new calculus initiative in effect by Orlandi and **Harel Barzilai**. In November of 1995, Orlandi, **Rachel Hastings** and Rishel expect to attend a conference in Denver, at which they will lecture regarding their models to TA trainers from various disciplines and schools across the country.

Tom Rishel is senior lecturer and director of undergraduate teaching in the Mathematics Department.

The Math Club

by Graeme Bailey

Excitement. Fun. Amazement. Camaraderie. Challenge. Controversy. If EFACCC doesn't describe your immediate reaction to the thought of spending a convivial hour or so on a Wednesday afternoon being mathematical, then you don't know what you have been missing! Every second Wednesday this past year, the Math Club met at 4:30 p.m. for snacks in the lounge of White Hall. Then, from 5:05 to 5:55 p.m. lectures were given concerning new and old advances or applications of mathematics. Occasionally, the time was spent involved in puzzles, games or arguments.

This past semester, **Francis Yein Chei Fung** described rationals, irrationals and transcendentals and how they can be distinguished when approximated by rationals in his talk entitled "What's in a Number?". **Robert Strichartz, Robert Connelly** and **Karoly Bezdek** enticed students into undergraduate research by discussing this summer's REU program on fractals, harmonic analysis, circle packings, convexity and tensegrities, and the money and kudos that support undergraduate research. The club undertook a film trip to Willard Straight for "The Neapolitan Mathematician." At another meeting, **Marshall Cohen** amused and intrigued with "The Search for a Sphere of Imaginary Radius," describing some of the bizarre, yet bizarrely useful, properties of hyperbolic geometry: triangles without "enough" degrees, apparently curved straight lines, etc. **Leonard Gross** allowed his dry humor to enliven a discussion on how to measure the length of a rod in "Special Relativity and a Theorem of Albert Einstein"; while **Clifford Earle** showed how interesting a nine-point circle could be, enriching Euler with some nineteenth century ideas in his discussion called "Properties of Euler's Nine-Point Circle."

As should be evident, the Math Club this semester was highly EFACCCtive!

Graeme Bailey is adjunct professor in the mathematics department and faculty advisor to the Math Club.

Activities of the Mathematics Instructional Computer Lab

Activity in the Math Department's new instructional computer lab, which opened just a year ago, has been high this spring. The statistics group in the department has been using DataDesk software in the introductory Math 171 course taught by Professors **Gene Hwang, Olcay Akman** and **Richard Liu**; students now use the "professional version" with greatly improved graphics and other capabilities. Weekly section meetings are also held regularly in the lab.

Another class which meets in the computer facility regularly is Math 408: Mathematics in Perspective, taught by Professor **Avery Solomon.** A range of software from graphing programs to Geometer's Sketchpad to fractal display programs are used in the course. Class meetings in Stimson 206 are not usually dedicated hour-long computer labs; instead, they are often lecture discussions where student experiments become launching and solidifying points for issues the course always wanted to cover.

During the 1994-95 school year, Math 106, taught by **Karoly Bezdek** and Math 111, led by Math czar **Shankar Sen** (serving 600+ introductory calculus students) visited the lab and used the Analyzer* program. Some of the TA's for these courses also hold regular office hours in the lab so that computer use can be blended in with regular discussion of the course.

Math 213, a broad topic sophomore level course primarily for life science majors led by Senior Lecturer **Beverly West**, is a steady user of the lab. Students are asked to select from a range of models and software, and then experiment in groups. West instructs the students to keep records of what surprises they find, as well as answering "guiding" questions in order to focus on core issues. One of the most popular projects among the groups has been working with the "Planets" program of MacMath, which was developed under the supervision of West and Professor **John Hubbard**, and is now sold by Springer Verlag; students look at stability, sensitivity, and step size issues, as an example.

Geometer's Sketchpad has been available much of the semester. Among other things, its capability for bringing to life theorems in perspective geometry made for some very enjoyable classes and lectures. In addition to finding, maintaining, and installing hardware and software (including software upgrades), the director and associate director work with faculty who are trying to introduce computer use into their courses. Director **Allen Back** and faculty member **Birgit Speh** prepared a collection of Maple worksheets for Math 222: Multivariable Calculus Concepts. The lab has the best kind of support in equipment, teaching staff and facilities.

The Mathematics Instructional Computer Lab is located in 206 Stimson Hall.
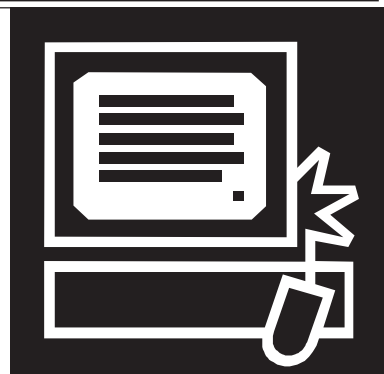
1995 Commencement

Commencement Day 1995 celebrated the graduation of fifty-seven undergraduate mathematics majors and three doctoral recipients. Special awards were presented by **Chair Peter Kahn** to **Daniel Rabinovitch** for the Kieval Prize and **Marcelo Aguiar** for the York Prize, along with seven undergraduates who were presented with honors in mathematics. **Graeme Bailey,** acting director of math majors, presented diplomas.

☞ # CONTRIBUTE!

Math Matters is always looking for interesting articles for future editions. If you have puzzles, stories, information, or questions relevant to the Cornell mathematics community, we want to hear from you!

Direct submissions to Karen L. Finch, Editor, 129 White Hall, Cornell University, Ithaca, NY 14853 (e-mail karen@math.cornell.edu).

Retaining Cornell Women in Math

Although a recent Cornell study demonstrated that women are now taking as much math and science as men in high school, a problem still exists. Michele Fish, director of Women's Programs in Engineering, works towards counteracting this, concentrating on recruitment and retention at the college level. Fish's office was created in July 1991.

Fish states that getting women to enroll in technical majors has been a challenge. In large part, she notes, this stems from the lack of information available to graduating high school women in the process of making college decisions.

At Cornell, female students in the Mathematics Department have taken their own initiative to support and recruit women. "On our own, we sent out letters to the six women who have been accepted to Cornell for graduate study next year," said **Debra Boutin**, a fourth-year graduate student in the Math Department.

"Cornell is known to be a good place for women to go among the better schools. The department is friendly and the faculty are very supportive and we want prospective women to know that," she added.

The women graduate students also have set up an informal mentoring program for female undergraduate math majors. For three semesters they have hosted bimonthly dinners in the Risley dining hall. Any math student is welcome to come, but they are looking to target women, Boutin commented.

"We have noticed that many women who like math and do well often don't perceive themselves as doing well. There is a confidence difference between male and female students, and I don't know where that comes from. If I had a magic wand I would give the women confidence, and maybe even a touch of arrogance," she said.

Information taken from "Progress made in retaining Cornell women in the sciences" in the Cornell Chronicle of March 30, 1995, originally written by Nancy Rosen.

New Associate Chair Named

On July 1, **Professor Michael Morley** will retire from his position of associate chair of the Mathematics Department. Mike became associate chair in 1982, the fifth to hold that position since it was created in 1967. During his long tenure, he served under three department chairs: **Professors Anil Nerode, R. Keith Dennis** and the current chair, **Peter Kahn.**

Associate Chair, con't.

Mike's successor as associate chair is **Professor Stephen U. Chase**. Steve received his Ph.D. in 1960 at the University of Chicago and joined the Mathematics Department in 1962. While at Cornell, Steve has been professionally active in several areas of algebra and algebraic number theory and has had ten doctoral students.

The associate chair has primary responsiblity for supervision of the mathematics department's program in undergraduate education, especially insofar as it affects students in their first two years, and others not majoring in mathematics. A very important feature of this supervision is the advising of undergraduates, and in this task Steve will be assisted by an advising committee consisting of Professors Morley and **Marshall Cohen.**

The Mathematics Department extends its deepest thanks to Mike Morley for his twelve years of exemplary service as associate chair and welcomes Steve Chase to his new responsibilities.

Spotlight on Maria Korolov

Maria Korolov '91, a graduate of the mathematics department, recently spoke with **Professor Michael Morley,** associate chair and director of undergraduate studies. Maria went to work for *The Chicago Tribune* after graduation. Rather than follow the "traditional"--and long--route to becoming a foreign correspondent, however, Korolov gave notice after a year and left for Moscow.

In Moscow only three days, she landed a job at *The Express-Chronicle*, a human-rights weekly published in both Russian and English, There, she interviewed the president of Chechnya, Jokhar Dudayev; traveled with mercenaries to Abkhazia; and interviewed Abkhazians about their reasons for participating in the conflict with Georgia. She also insisted upon going to Tajikistan, despite UPI's refusal to send her.

Maria returned to Moscow and eventually worked her way up to national editor of *The Moscow Tribune.* She then went to work for Reuters in Georgia, where she wrote news and feature stories about the civil war and ethnic tensions in the Caucasus and Central Asia, before returning to the States. Maria is currently applying to graduate schools.

Yes, I would like to help support the Mathematics Department endowments with my donation of $_____ for:

Δ *The Mathematics Faculty Book Fund*
Provides the Cornell Community with immediate access to one of the world's finest assortments of mathematics books and publications by enriching the collection of the Mathematics Library.

Δ *The Mathematics Colloquium Endowment Fund*
Instituted to invite distinguished scientists to speak at Cornell. Major contributions come from faculty who teach extra courses and donate their earnings to the fund.

Δ *The Eleanor Norton York Award in Astronomy and Mathematics*
Established in honor of Eleanor Norton York, a valued Astronomy Department employee who worked closely with graduate students. Recognizes outstanding graduate students in Astronomy and Mathematics with an annual prize.

Δ *The Israel Berstein Memorial Fund*
Honors the memory of a former Mathematics Department professor with an initial donation from his sister, Gita Fonarov. Funds annual awards for deserving graduate students in the fields of topology and/or geometry.

Δ *The Logic Endowment*
Recently established by a donation from a former Cornell undergraduate. Seeks to actively support promising logic students in the areas of institutional memberships and travel expenses, for Association for Symbolic Logic meetings and events, and other activities in the field of logic.

Make checks payable to the Cornell University Mathematics Department; a receipt may be sent to you for tax purposes if you wish. Please send to The Mathematics Department Endowments, 133 White Hall, Cornell University, Ithaca, NY 14853-7901.

Comments:_____

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The Annual Report

The Department will be sending out it's *1994-95 Annual Report* in late
summer. We will no longer be sending it unrequested to alumni,
so if you are interested in continuing to receive copies,
please fill out the following:

Name:_____

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129 White Hall, Cornell University, Ithaca, NY 14853
or e-mail math@math.cornell.edu

San Francisco Reception

A gathering of former faculty and students joined current faculty, students and staff at the 1995 Joint Mathematics Meetings held in San Francisco in January. Chair **Peter Kahn** hosted the event together with graduate students, faculty, and department manager, **Diane Downing**. Department memorabilia, including a scrapbook of department activities from the past six years and a photo album dating back several years, were on display. We were pleased to see several former Dana/Pew Visiting Faculty Participants, former graduate students, soon-to-be faculty members, and colleagues from Yale, Princeton and UCLA.

Debra Boutin, James Coykendall and **Jeff Baggett** were graduate student hosts. The department, together with the College of Arts and Sciences, sponsored the attendance of **Erik Sandquist,** a Cornell Senior pursuing a BA in mathematics. Erik was invited to give a Special Session talk at the AMS/MAA meeting in San Francisco; he is one of six highly talented undergraduates who were selected to be part of the Research Experiences for Undergraduates program, entitled "Probabilistic Methods in Graph Theory, Combinatorics and Number Theory," conducted at Michigan Technological University during the summer of 1994.