

# Tangents

Fall 2002

News from the Department of Mathematical Sciences  
University of Massachusetts Lowell

## We've Moved!

**A**t the end of August, the Mathematical Sciences Department moved lock, stock and barrel across Riverside Street to the fourth floor of the Olney building. The faculty offices are now located in Olney 428, in the space that used to be used for seminars and meetings, plus some additional space on either side. Each faculty member now has his or her own office although they are considerably smaller than our previous offices. On the plus side, those of us with windows

can actually open them and breathe fresh air, something that was in short supply in Olsen Hall at times. In addition, we have the Mathematics Tutoring Center, which is very popular with the students who have managed to find us in spite of the move. The beginning of classes was a bit more hectic than usual, but everyone seems to have settled into the routine of the new space, with most classes still across the street in the Olsen building. If and when you are on campus, be sure to come and visit us in our new digs.



Al Doerr showed the way when we moved to Olney Hall this August.

## Alumni Profile: David McDevitt

*Prospective students and their parents often ask us about job prospects for students who major in math. A significant number of our graduates find themselves in "non-math" positions after they graduate. Here is Dave McDevitt's story of how a math position evolved into a seemingly non-math position.*

When I graduated from ULowell in 1985 with my M.S. in mathematics, I wasn't quite sure where I was going, but I had interviewed with

Arthur D. Little and went to work for them as consultant on a program called the Advanced AFSATCOM Monitoring System. I soon found out that the software we were developing made use of Keplerian Vector Analysis. Johannes Kepler's 1609 proposition stated that planetary motion could be described as ellipses. He showed that any planet (or satellite) must orbit in an ellipse with its primary at one



Dave McDevitt

focus. His laws of motion further described the change of orbital velocity required throughout a stable elliptical orbit, and explained the interrelationship between the size of the

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## New Hire: Kostya Rybnikov

We are very pleased to welcome Konstantin Rybnikov to the faculty of the Department of Mathematical Sciences.

Prof. Rybnikov was born and raised in Moscow, Russia. He received his bachelor's degree from the Faculty of Mechanics and Mathematics at Moscow State University, where he remained to pursue his Ph.D. studies with Sergei Ryshkov of the Steklov Institute. In 1995 he moved to Canada, where he completed his

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# Kiwi's Korner

I am writing this column in Olney Hall, the new home of the Department of Mathematical Sciences. Because of an expanding Bioinformatics Program here at the University, the Biology and Computer Science Departments required more space for faculty and laboratories in Olsen Hall so we were relocated.

The move happened the week before fall semester classes began so you can imagine the turmoil. However, things have gone as well as can be expected and we are settling into the usual routine now. Please feel free to drop by, say Hi, and view the new department—we are on the fourth floor.

We had a successful search for new faculty last year, resulting in the hiring of two outstanding new permanent faculty members. Kostya Rybnikov comes here from Cornell University with an excellent record in research and working with students—there is a more information about Kostya elsewhere in the newsletter. Sasha Kheifets, a complex and harmonic analyst, is currently completing his tenure at the College of William and Mary and will join us next year.



James Graham-Eagle

Of course we are still adjusting to the loss of six faculty and our secretary to early retirement. This resulted in a substantial increase in our need for part-time teachers. Fortunately three of the retirees agreed to return to help, and we have a few outstanding teachers who have stuck with us from previous years and we added several more excellent people who have settled quickly into the department. We could not continue to offer the courses we do without their help and we are very grateful for the work they do here.

Kiwi

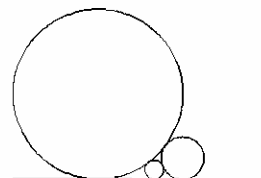
## The Math Sciences Web Page

Have you seen the updated Mathematical Sciences Web page at <http://www.uml.edu/dept/math/>? Ferney Lopez in the UML Web office did a great job redesigning it for us. A recent change is a link on the main page to a collection of *WebMathematica* pages developed by Ken Levasseur. You can review and explore a variety of math topics ranging from Abstract Algebra to “Fun with Numbers” on these pages.

## The Problem

A real tangent problem! Two circles with radii  $r$  and  $s$  are externally tangent to one another and are tangent to a line. What is the radius of the circle that lies between the circles and line and is tangent to each of them?

Think you know the answer? Send your solution to [mathematics@uml.edu](mailto:mathematics@uml.edu) by March 1, 2003. A prize will go to a randomly selected entry from among the correct responses.



### Solutions to previous problems

**Fall 2001.** Starting at the bottom left of a chessboard, a combination of seven moves up and seven moves right will bring a king to the top right corner. Let  $M$  be the number of these different paths that a king can take.

- What is  $M$ ?
- Suppose that the white king selects one of the  $M$  paths at random and the black king takes the reverse of some random path, from top right to bottom left. What is the probability that they will share the same space at the same time if they take steps simultaneously?

Composite of solutions from David Bloss and Tom Walsh

- There are 14 steps that need to be taken and 7 of them need to be “up” and the other 7 “right.” The number of possible paths is the binomial coefficient “14 choose 7” = 3432
- There are  $M^2$  different pairs of paths that the two kings can take. Of those pairs, there are 3395016 that meet on a square in the diagonal from top left to bottom right. Therefore, the probability is  $3395016/M^2$ , which is approximately 0.288.

**Spring 2002.** On an LCD display, some positive integers, when viewed upside-down, are images of other positive integers. What is the millionth positive integer that is meaningful upside-down?

Solution by Debbie Cassidy, Class of 1979: The millionth positive integer that is meaningful upside-down is 11555511. The decimal “upside-down” digits are: 0, 1, 2, 5, 6, 8 and 9. They form a base 7 number system and 1000000 base 10 = 11333311 base 7 = 11555511 base “upside-down.”

## What Are You Up To?

Want to keep your classmates up to date on what you're doing and where you are. Take a few moments to tell us where you are, and whatever else you might like to share. We'll add it to the UML Math Alumni page on the web: <http://www.uml.edu/dept/math/alumni.htm>

We can be contacted by mail at Department of Mathematical Sciences, North Campus,

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You might also wish to contact our Office of Alumni Relations, Wannalancit Mills Complex, 600 Suffolk St. Lowell, MA 01854-3629. Toll free telephone: (877) UML-ALUM. e-mail: [Alumni\\_Office@uml.edu](mailto:Alumni_Office@uml.edu)

## Faculty Update: Virginia Taylor

**I**t was exciting to see Dr. Virginia (Ginny) Taylor using her talents and exceptional gift for teaching

in a statistics course this semester. This writer experienced her excellence in teaching within the context of a calculus course in which she exhibited her reputation for creating an atmosphere of enjoyment for learning through her ever pleasant personality, boundless energy and always-helpful disposition toward her students.

Ginny retired from UMass Lowell six years ago after having been a professor for more than 32 years. During her tenure she

became an internationally renowned expert on individualized self-paced instruction, especially for the teaching of calculus.

Her research and publications have been presented in a variety of academic venues. Even today, she continues to attend mathematics conferences with her son Edward and his wife who are both professors at Wesleyan University. Her other son Robert is a managing director on Wall Street.

In her spare time, Ginny and her husband Edward, who has his own consulting company, enjoy working on their beautiful farm in Bolton. She has always been an avid gardener and has

two horses that she has owned for more than 35 years. In addition, Ginny has two adopted dogs and a host of barn cats.

Frequently, on weekends, she and her husband spend time visiting their grandchildren in Connecticut.

A visit to the Taylor's would find Ginny preparing gourmet dishes and desserts from recipes that many of us have solicited from her.

Within the last month, this writer and his wife have prepared hermits and lemon pie bars made from the

recipe cards that have been distributed by Ginny, upon request, to numerous faculty and staff.

How fortunate the students and we are to have Ginny Taylor willing to teach at least one course a semester at our university. I know this sentiment is shared by her present and past students as well as by her colleagues.



Emeritus Professors Bernie Sharpiro, Virginia Taylor, Tom Kudzma, Joyce Williams, and Brendan Fleming returned to campus last spring.

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## New Hire: Kostya Rybnikov

Ph.D. under the supervision of Robert Erdahl at Queen's University in Kingston, Ontario. During that time he also spent a year at the Fields Institute and the University of Toronto, where he studied complexity lower bounds and applications of probability and statistics to finance.

Before joining UMass Lowell, Prof. Rybnikov

received a NSERC post-doctoral position at Cornell University, where he was later appointed an assistant professor.

Prof. Rybnikov has diverse research interests in areas of both pure and applied mathematics, including discrete and computational geometry, the geometry of numbers, algebraic topology, graph theory, and stochastic geometry. Recently he has been exploring applications of graph rigidity to computational molecular biology, as well as verifying global properties of PL-manifolds via the checking of corresponding local properties and related algorithms.

In his spare time Prof. Rybnikov enjoys classical music concerts, bicycling, swimming, and hiking.



Prof. Kostya Ribnikov

## Math Haiku

Danielle Tarnow's Explorations in Math class at UML composed some haiku this fall. Here is a sampling of their work.

*Snowflakes* by Jessica Pappathan

No two are alike  
But mathematicians ask  
Is there a pattern?

*Untitled* by Lance Piantaggini

Pretty Blue Shot Glass  
Bends Reflections of my Pen  
Alters What is Real

This one appeared in the *American Mathematical Monthly* a few years ago.

*Untitled* by Katherine O'Brien

Fire and Ice  
Strange anomaly:  
the flame of intuition  
frozen in rigor.

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## Alumni Profile: David McDevitt

ellipse and the orbital period. We used these laws to calculate an astronomical ephemeris for our satellite system to improve our tracking performance.

I went on to positions at several firms on a variety of projects including

- Senior Engineer at Computer Technology Associates doing SW/radar analysis for the USAF Peace Shield
- Program Manager for Science Applications International Corporation where my day-to-day math focused on reviewing the work of my engineering team.
- Director of Proposal Operations for Itek Optical Systems, working on proposals for programs like the ultra-lightweight

**You can do math without engineering but you can't do engineering without math**

mirrors for large optical space systems, and on the Advanced Reconnaissance System. Our efforts included developing software for adaptive optical systems.

With this diverse experience, I moved on to Steven Myers & Associates (<http://www.smawins.com>), where I've been for more than 12 years and am currently a vice president. I've been privileged to work on many programs and still put math to good use in design and application reviews of programs like the U.S. Coast Guard's National Distress and Response System Modernization and Lockheed Martin's Program for the USCG Integrated Deepwater System. I don't get to apply my math skills every day but, as I tell my engineers... You can do math without engineering but you can't do engineering without math.

*Dave can be reached at [Dave.McDevitt@smawins.com](mailto:Dave.McDevitt@smawins.com)*

## Graduate Program Update

**T**he graduate program at UML is alive and well. At the moment we have about 60 students working on master's degrees in the areas of applied mathematics, scientific computation, statistics and optimization and secondary mathematics teaching. Our new graduate certificate programs in applied statistics and mathematics for teachers

are proving attractive as well; several students who have received their certificates upon completion of four courses have chosen to continue for the master's degree. One student had so much fun she returned for a certificate after getting her master's. We also find a growing number of graduate students from other departments taking our courses.

## Thanks for the Contributions!

Our profound thanks to all who have contributed to the Department of Mathematical Sciences over the past few years. Your generosity has enabled us to make purchases, award scholarships, and engage in activities that would otherwise have been impossible.

Many of you have responded generously to

UML phonathon and other fundraising contacts. These requests can benefit the Department of Mathematical Sciences directly if you specify that you wish to have your gift directed to Mathematics. Otherwise it will provide valuable assistance to the University at the college level.

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