

UofL Math Gazette

2007-2008

The Newsletter of the
Department of Mathematics
College of Arts & Sciences
University of Louisville



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Chair's Corner



Dr. Thomas Riedel

The Department has completed another successful year with many noteworthy accomplishments by our students and faculty. The number of publications in high quality journals as well as presentations at national and international meetings is ever increasing and more faculty and students are involved in grants. Several of our graduate and some undergraduate students have made presentations at national research conferences and have had papers accepted for publication in research journals. More of our Ph.D. students have graduated this past year, Dr. Chakib Battioui, Dr. Michal Czajkowski, Dr. Fariba Nowrouzi-Kashan, Dr. Mussie Tesfamichael, Dr. Jeremy White, and Dr. Susan White. At the same time we have added many new talented students at the undergraduate and graduate level. An increasing number of our undergraduate students are participating in research experiences for undergraduates at UofL as well as at other universities.

Let me thank the many of you who have contributed to the success of the Department. The success

is due to the dedication and hard work of our faculty, staff and students who are the main source of our accomplishments. But in this time of looming draconian budget cuts, the numerous financial contributions made by you, our alumni and friends are essential for our continued success. Over the years several large donations have helped establish undergraduate scholarships and graduate fellowships, which truly help our students in these days of ever increasing tuition and they help fund a lecture series, while smaller ones have helped us to provide a better experience for our students through MathClub activities and upkeep of the Mathematics Commons Room. This room is very popular with our students; it provides a place for students and faculty to gather, discuss mathematics and do home work as well as relax. I encourage you to stop by the department and see this first hand.

The departmental colloquium series hosted several prominent mathematicians, including Professor Carlos Castillo-Chavez from Arizona State University. His talk entitled "*Mathematics and Epidemics: Local versus global perspectives*", drew a large audience of faculty and students from mathematics as well as physics and biology. This talk was the catalyst for a seminar in Mathematical Biology organized jointly by faculty from mathematics and biology.

Some changes have occurred in the past year; Dr. Davitt's phased in retirement officially ended, but he ensured us that he will be back in the fall semester to teach for our department as well as the honors program and work with international programs in a new capacity; we look forward to his

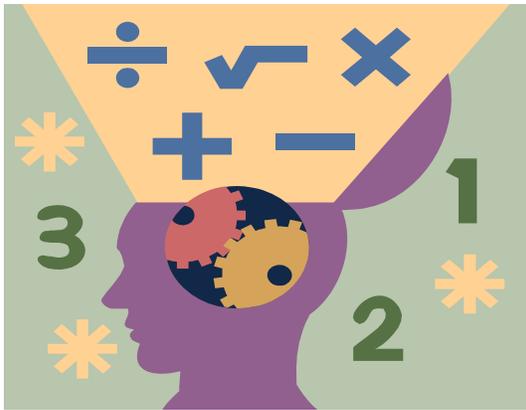
continued contributions. Dr. Grzegorz Rempala has resigned from the Department effective June 30, 2008 to take on a position in the Department of Biostatistics at the Medical College of Georgia; we thank him for his years of service and wish him well.

We were fortunate to hire three new tenure-track assistant Professors: Dr. Changbing Hu, who is working in the field of partial differential equations; he obtained his Ph.D. from Indiana University and comes to us after a post-doc at Texas A&M and 2 years at Missouri State University. Dr. Jiayu Li, with a Ph.D. from Arizona State University, joins us after some experience in industry, in a position funded by the Executive Vice President for Research's office. Dr. Li's work is in the area of mathematical modeling in particular modeling of diabetes and he joins the university's effort in Bioinformatics. Dr. D. Jacob Wildstrom comes to us from the University of California, San Diego, where he just completed his Ph.D. under the direction of Professor Ron Graham. Dr. Wildstrom's expertise is in Combinatorics/Graph Theory which he uses in applications to logistics. His position is funded by the Executive Vice President for Research's office in support of LoDI (the Logistics and Distribution Institute). Jake is also a Project NExT fellow of the Mathematical Association of America. In addition, Dr. Susan White joins us as Dual Credit coordinator after receiving her Ph.D. under Professor Udayan Darji from our Department. She heads the department's effort to provide dual credit courses. Taught at local high schools, these courses provide high school and college credit and

thus give students a chance to earn college credit before entering the university. This is made possible with support from the A&S Dean's office as well as from Dr. Dave Howarth in the Provost's office. We welcome them to the department and look forward to their many contributions.

Finally, I would like to draw your attention to our 2008 William Marshall Bullitt Lecture, which will be given by Dr. Philip Protter, Professor of Operations Research and Information Engineering, Cornell University. Dr. Protter is internationally known for his research in probability theory, with specialties in mathematical finance, stochastic calculus, stochastic numerical analysis, weak convergence, and statistics of stochastic processes. He is the author of several popular books, numerous research articles, recipient of teaching awards and research grants from the NSF, the Navy, and the NSA, and most recently he became a Distinguished Chair in the Fulbright program. He serves on the editorial boards of many of the top journals in his area. The title of this year's Bullitt Lecture is "**Mathematics meets Wall Street: How high finance became safer and more dangerous at the same time**" and it will be held on Thursday April 3, 2008 from 6:00 pm to 7:00 pm in the Middleton Auditorium (back to the original location); **please note the earlier lecture time.**

Hopefully you will find something of interest in this issue and I encourage you to contact us and let us know your thoughts. We appreciate your comments and support; if you are in the area please stop by for a visit or just check us out at our website:
<http://www.math.louisville.edu>



The Annual William Marshall Bullitt Lecture

The Mathematics Department's Bullitt Lecture is a free, public lecture that has brought to Louisville each year, beginning in 1993, a distinguished mathematician to speak to 200-500 audience members about important and cutting-edge mathematics. Ronald Graham, former Chief Scientist at AT&T, and Indiana University College Professor of Cognitive Science and Computer Science, author and computer scientist Douglas R. Hofstadter (author of *Gödel, Escher, and Bach*) are former Bullitt Lecturers. The emphasis has been drawing people from outside academia. Talented high school students, area professionals, and other parties interested in the impact and excitement that mathematics has generated, especially in the last decade, have attended the Bullitt Lecture in surprisingly large numbers.

The Lecture is endowed through a grant from the family of William Marshall Bullitt, the Solicitor General of the United States under President William Howard Taft.

More information about the Bullitt Lectures and the celebrated William Bullitt Collection of Rare Mathematics

and Astronomy Books can be found at the website.

<http://www.math.louisville.edu/Bullitt/>.

2008 Bullitt Lecture

The Mathematics Department's 2008 Bullitt Lecture, a free lecture aimed at the general public, will take place Thursday, April 3, 2008 from 6:00 to 7:00 p.m. in Middleton Auditorium, Strickler Hall 101. This year's speaker will be Dr. Philip Protter, Professor of Operations Research and Information Engineering at Cornell University.

Philip Protter is the former Director of the Financial Engineering Program at Cornell University. He joined the Cornell faculty in 2000, after holding faculty positions at Duke and Purdue universities. He received his B.A. from Yale and his Ph.D. from the University of California at San Diego in 1975. He is one of the top researchers in his field, and the U of L Mathematics Department is delighted that he accepted our invitation. More information about Dr. Protter and his research is available at <http://legacy.orie.cornell.edu/~protter/>

Here are the title and abstract of Professor Protter's talk:

*Mathematics Meets Wall Street:
How high finance became safer
and more dangerous at the same
time*

Over the last 35 years, probability theory combined with economics has led to a new industry: the transfer of, and protection against, risk in the financial world. Just as one can buy car insurance, one can also now buy insurance against

financial losses. This has led to huge advances in commerce, a new trillion dollar industry involved in the transfer of financial risk, and in general increased prosperity. But it comes with a potential for abuse if used incorrectly, as it often is. We will explain some of the fundamental ideas, and explain how they are used, and how they have been misused to create spectacular multi billion dollar losses. These losses have ranged from the collapse of entire banks, to the bankruptcy of county governments, to the collapse of an entire nation's economy.

College and high school students, teachers, and many others from the community interested in the impact and excitement that mathematics has generated have attended recent Bullitt Lecture in large numbers. Everyone is welcome!

For more information about the Bullitt Lectures, please visit <http://www.math.louisville.edu/Bullitt/>.

Faculty Highlights and Notes

Dr. Patricia Cerrito published a book: *An Introduction to Data Mining with Enterprise Miner*, SAS Press and signed a contract for a second book on *Data Mining Clinical and Healthcare Databases*. She also received a grant from the Association for Institutional Research to investigate University Expectations of Work. In addition, she has now developed 4 online graduate courses in applied statistics for the Data Mining Certificate Program.

Dr. Udayan Darji, currently on sabbatical, taught a short course (20 hours) to PhD

students in Napoli in Italian, after spending time at a language institute in Perugia. He also spent time at St. Andrews University in Scotland, the University of Florida, the Fields Institute and is currently at the University of Amsterdam.

Dr. Greg Rempala received the degree of 'doctor habilitatus' at the Warsaw Technical University in Warsaw, Poland. In March 2007, he organized jointly with Dr Darren Wilkinson from Univ of Newcastle in UK a three day workshop on 'Biosystems Modeling' at the Statistical and Applied Mathematical Sciences Institute (SAMSI). Also, in June 2007, he was invited to deliver a series of lectures on bioinformatics at the European Union Center for Advanced Studies, Research and Development, located at the island of Sardinia in Italy.

Dr. Steve Xu has been elected to and been serving on the Board of International Society of Analysis, its Applications and Computations (ISAAC), 2007-2009. He also has been serving as the Associate Managing Editor of *Mathematical Methods in Applied Sciences*, as well serving as the Editor in Chief for *Applicable Analysis* and on the Editorial Board for *Complex Variables and Elliptic Equations*.

Welcome New Faculty

Dr. Changbing Hu earned his PhD in Indiana University at Bloomington in 2002. He spent three years in Texas A&M University as a visiting assistant professor. Dr. Hu joined the mathematics department at Missouri State University in 2005 as an assistant professor. Dr. Hu joined the Department of

Mathematics at the University of Louisville in 2007 as an Assistant Professor; his research interests include Partial Differential Equations, their applications to the atmosphere and ocean, fluid mechanics and image processing. During his spare time, Dr. Hu enjoys playing badminton.

Dr. Jiayu Li is originally from China and joined us after graduating from Arizona State University. His research interests include Ordinary Differential Equations, Delay Differential Equations, Dynamical Systems and Mathematical Biology. This current semester, he is teaching calculus and precalculus. Outside of his teaching, research and service activities, he loves sports, music and reading.

Dr. Susan White is the Dual Credit Coordinator for the department. She is currently teaching precalculus, as well as overseeing the dual credit precalculus courses taught in select area high schools. She grew up in Lake Charles, LA, and received her BS in secondary mathematics education in 1992 from McNeese State University. She moved to Louisville with her family in 1997, and after taking a few years off to be a stay-at-home mom, she began graduate school at UofL. She completed her MA in math in 2003 and her PhD in 2007, both at UofL. Her research interests are measure theory (in particular, the study of Haar null subsets of various Polish groups) and topology, and she loves to teach mathematics. She and her husband have three daughters, the oldest of whom is a sophomore music major here at UofL.

Dr. Jake Wildstrom is a new assistant professor in

Logistics, with particular interest in facility-location problems on graphs. He received his PhD last summer from the University of California at San Diego. His work at present involves exploration of service provider relocation in response to realtime events. He is additionally interested in other problems in combinatorics and graph theory. This semester he is teaching Calculus I and Discrete Mathematics. In his spare time he crochets, plays board games, and writes interactive fiction.

Student Highlights and Notes

Dr. Chakib Battioui graduated in Spring 2007 after completing his PhD dissertation "Cost models with prominent outliers".

Dr. Michal Czajkowski graduated in Spring 2007 after completing his PhD dissertation "Generalized broken-line logistic regression with application to anomaly detection".

Grant Johnson (undergraduate), **Ryan Glassford**, and **Hamed Zahedi** won scholarships to present their work at SESUG at Hilton Head in October 2007.

Dr. Fariba Nowrouzi-Kashan graduated in Fall 2007 after completing her PhD dissertation "Cost shifting of the drug-eluting stent".

Christiana Petrou won an award to present her work at the M2007 data mining conference and at SAS Global Forum in March 2008. **Guoxin Tang** also won an award to present at Global Forum.

Christiana Petrou, **Guoxin Tang**, **Ryan Glassford** (undergraduate), and **Hamed Zahedi** won awards to

present at the F2007 Forecasting Conference.

Dr. Mussie Tesfamicael graduated in Summer 2007 after completing his PhD dissertation "Forecasting prescription of medications and cost analysis using time series".

Dr. Jeremy White graduated in Spring 2007 after completing his PhD dissertation "Finite upper semimodular lattices and the cl -median property".

Dr. Susan White graduated in Spring 2007 after completing her PhD dissertation "Properties of generic and almost every mappings in various nonlogically compact Polish abelian groups".

Math Club

This year has been an exciting one for the University of Louisville Mathematics Club. Our current officers are Katie Davis (President), Joseph Moore (Vice President), and Samantha Colvin (Treasurer). The fall semester included a showing of the movie "Pi," and an outing to Huber's Farm and Winery to pick pumpkins for Halloween. We also applied for MAA student chapter status. So far this spring semester, we've been even busier. The club hosted a fundraiser at the Fazoli's on Breckinridge Lane and were selling long-sleeved shirts with a unique and very 'punny' mathematics design. We also had two student talks: the first given by Blakesley Burkhart entitled, "Statistical Studies of Magnetohydrodynamical Turbulence of the Interstellar Medium," and the second by Kim Meyer entitled "Biological Applications Using Complex Analysis." Our meetings are generally every other Friday in the Math Commons room. Look for

the fliers around Natural Sciences! There is always snack food and good company where everyone is welcome.

Scholarship Endowments and Gifts

As always, we appreciate the kindness and generosity of alumni and other friends of mathematics. In many cases contributions were received in response to the department newsletter, the U of L Math Gazette. The department is thankful to alumni, friends and family who support the department endowments. Without their generosity, we would be unable to provide many of the offerings that make our department unique.

* The **Mary Brookover Award** was awarded to **Kelly Houston**.

* The **C. Coleman Petty Scholarships** were awarded to **Benjamin Creech** and **Joseph Moore**.

* The **Robert J. Bickel Scholarships** were awarded to **James Frank** and **James Osborne**.

* The **Lois Pedigo Scholarship** was awarded to **Nathan Olds**.

* The **William Marshall Bullitt Scholarship** was awarded to **Katherine Davis**.

* The **Ken F. & Sandra S. Hohman Graduate Fellowships in Mathematics** were awarded to **John Cochran, Maxfield Leidner, Harrison Simrall, and Lesley Wiglesworth**.

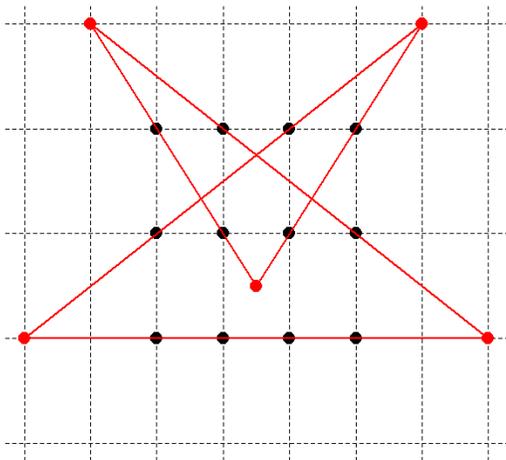


Puzzle

Last year's puzzle -

Suppose that we wish to connect the twelve points on the grid below by drawing straight line segments with a pencil so that we never lift the pencil off the paper and the last line segment ends where the first started. What is the minimum number of line segments needed to accomplish this task?

Solution: Assuming line segments in the sense of Euclidean geometry, the minimum number of line segments is five, as shown below.



Thanks to **Richard Farris**, **Max Leidner**, and **Robert White** for their contributions to last year's puzzle.

This year's puzzle - Suppose that a king designs a game to decide which of his C children will inherit all of his wealth. The king places N rocks in a covered box; one of these rocks is gold and all the others are not. Suppose that the king lets each child draw a rock from the box one-at-a-time, starting with the oldest. If the oldest child draws a gold rock, then this child inherits the fortune. Otherwise the rock that was drawn is returned to the box, the box is mixed, and the second oldest child draws from the box. If this child draws the gold rock, then he/she inherits the fortune, otherwise the next child draws. The process continues until someone draws the gold rock. (If the youngest child draws a rock which is not gold, then the oldest child gets the next opportunity.) Assume that other than the color, all of the rocks are the same and that the box is well-mixed so that on any particular draw, each rock has the same chance to be chosen. What is the probability that the i th oldest child will win the fortune?

Please mail or e-mail your solution to: Dr. Ryan Gill
rsgill01@louisville.edu - Math Dept, Louisville, KY 40292.

Mathematics Department Donation Card

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All gifts are tax deductible and will be acknowledged. Please make checks to The University of Louisville Foundation and indicate for "Mathematics Department" on your check.

Thanks for your generosity!