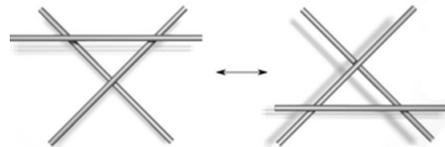● ●   ●

Upcoming Talks!

Unital Shelves

Alissa Crans
Professor of Mathematics

Loyola Marymount University
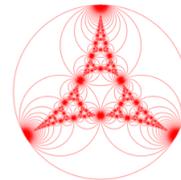
Thursday, October 20 at 4:00 p.m. in CMC 206

What does it mean to be random? A "shelf is a set equipped with a single binary operation whose single axiom of self-distributivity, $(x*y)*z = (x*z)*(y*z)$ algebraically encodes the third Reidmeister move from classical knot theory. A "unital shelf" has the additional structure of an element "1" that satisfies $x*1 = x$ and $1*x = x$. Surprisingly, it turns out that the shelf operation for unital shelves is associative! We will explore properties of unital shelves in preliminary work with Mukherjee and Przytycki.

Take What You Have Gathered from Coincidence: Understanding and Using Randomness

Matthew Richey
Professor of Mathematics

St. Olaf College

Friday, November 4 at 3:45 - 4:45 p.m. in Weitz Cinema

What does it mean to be random? We all encounter randomness every day -- it is part of how we talk about the weather, sports, and even love. Despite being so familiar, randomness has proven to be an elusive idea to pin down. Even mathematicians have struggled to define randomness, leading to competing and sometimes conflicting definitions. Whatever it is, randomness is a driving force behind many modern computational algorithms. These algorithms -- the Metropolis Algorithm, Markov chain Monte Carlo Methods, and others -- use randomness as the secret ingredient that makes it possible to tackle famously difficult problems such as the Traveling Salesperson Problem and image reconstruction. Using many pictures (and even a few Bob Dylan references), this lecture will reveal the historical quest to define randomness and illustrate how randomness allows us to solve many of today's most challenging applied mathematics problems.

What can you do with a math or math/stats major?

Are you curious about what happens after life at Carleton? Click on the link below to view math and math/stats alumni profiles. You can discover different career paths or find out details of a typical day in the life of a mathematician or statistician and much more.

https://apps.carleton.edu/curricular/math/alumni/profiles/

Applied Mathematics Consulting this Winter!

Are you interested in applying math to solve a real (yes, really real) world problem? Talk to Rob Thompson about Applied Mathematics Consulting THIS WINTER TERM! This will be a special course offered during Winter Term, Math 291, not listed in the course catalog. In this course we will work in teams on problems proposed by local business and government clients. Possible projects include developing mathematical techniques for measuring wood quality for a violin maker, testing feasibility of passenger rail options in southern Minnesota for the city of Northfield, developing investment models for a wealth management firm, or even designing algorithms for merging and smoothing 3D-scan data for a local computer vision company. These are all real applied math problems that real people need solved, and you can help! As part of this course you will also have the opportunity to attend MAA Mathfest in Chicago this summer to present your work. Email rthompson or stop by my office if you're interested!

Math Subject GRE Practice

Interested in going to math grad school? You'll probably need to take the Math Subject GRE exam (yikes!). I'm here to help and to organize preparation. I have training materials, test-taking tips, practice exams, videos, and other resources to help you prepare. The subject test is given on 10/29. Get in touch with Rob Thompson (rthompson) if you plan to take the exam!.

Job, Internship, and Graduate Opportunities

Predictive Science: Data Science Apprentice
Predictive Science is looking for ambitious and interested students who want to learn more about data science or pursue a career in data science. Predictive Science is offering an entry-level part-time position for those who want to start getting real data science experience. As part of the position you will be working on real projects with leading brands such as Verizon, NFL, Dell, Neiman Marcus, VMware and many more. You will learn data science concepts that can help you get a better job as you graduate. Additionally, you will receive training from data scientists through our events to help you develop your data science skills. Students will start out working on different projects and will be paid for the work you perform as freelance data scientist. Students are welcome to work from any place at any time and hold multiple jobs. In many ways this is like starting a venture as a freelance data scientist. All that is required to get started is a computer, internet connection, and a desire to become a data analyst. Having additional data entry job experience, being a fast and accurate typist, and familiarity with MS Office and other data programs is a great plus. Based on performance and dedication you will be assigned different responsibilities that meet your skill levels. More advanced data analysis and manipulation will come with more experience. The deadline to apply is November 4th. To find out more and apply, visit the Tunnel.

UMN Graduate Program in Biostatistics: Fight Zika with Math
Interested in learning about biostatistics, an exciting field that blends biology, medicine, and math? The University of Minnesota offers MPH, MS, and PhD programs in biostatistics, and is hosting an open house for students to learn about their program at the School of Public Health on the Twin Cities Campus on Friday, October 28. Students will have a chance to meet Biostatistics faculty, alumni, and current graduate students and to explore the different types of work biostatisticians do and many career possibilities. To learn more visit http://www.sph.umn.edu /academics/divisions/biostatistics/ or www.biostat.umn.edu. Students should RSVP at http://z.umn.edu /2016openhouse by Frday October, 21 for the open house.

Consumer Financial Protection Bureau - Summer Internship
The Pathways Internship Program is a Summer 2017 internship for current (students are eligible if they are enrolled as students before, during, and after Summer 2017) undergraduate and graduate students. Interns work directly with a seasoned member of the Office of Research on policy and research projects and are assigned to one project which they are expected to complete during the twelve-week program. Interns will be expected to work independently but will be provided necessary on-the-job training and mentorship to support them in their work. Strong intern candidates may be considered for possible future Research Assistant opportunities within the Office of Research. The Office of Research will post their formal internship announcement on October 20, 2016. To receive a direct link to the announcement or request more information, please email pathways@cfpb.gov. All applicants must apply to the formal announcement to be considered. To learn more, visit http://www.consumerfinance.gov/about-us/careers/students-and-graduates/.

Consumer Financial Protection Bureau - OR Research Assistant Program

The OR Research Assistant is a fellowship program that was developed for graduating undergraduates (recent December 2016 and May/June 2017 graduates may apply) who are interested in spending 2-3 years in the Office of Research working alongside Ph.D. researchers (which include economists, research psychologists, and research scientists) on substantial and rigorous data oriented policy projects. Ideally, the candidatesÃ¢â¬â„¢ time with our office would prepare them for future graduate programs such as Ph.D. programs in economics and finance, Masters of Public Policy, and other graduate fields. Successful candidates will have a proven track record of academic excellence in one or more of the following areas: economics, mathematics, statistics, or computer science. Experience in R, SAS, or Stata programming is also key. Strong written and verbal communication skills are a must, as is the demonstrated ability to work in a fast-paced multidisciplinary environment. To learn more, visit http://www.consumerfinance.gov/jobs/location/

Problems of the Week

To be acknowledged in the next *Gazette*, solutions to the problems below should reach me by noon on Tuesday, October 25.

1. Let a and b be nonzero real numbers. Consider a triangular "Pascal-like" array of numbers with a along the left diagonal edge, b along the right diagonal edge, a b as the first row, and each interior entry equal to the sum of the two entries diagonally above it:

$$
\begin{array}{ccccccccc}
 & & & & a & & b & & \\
 & & & a & & a+b & & b & \\
 & & a & & 2a+b & & a+2b & & b \\
 & a & & 3a+b & & 3a+3b & & a+3b & & b \\
\end{array}
$$
$$\text{(etc.)}$$

Suppose that somewhere in this infinite array, an entry is zero. Does it follow that infinitely many of the entries are zero? Why, or why not?

2. Does there exist a differentiable function f, defined on the positive real numbers and with positive real values, which is one-to-one (and thus has an inverse function) and which is such that the inverse function of f equals the derivative of f? If so, give an example of such a function; if not, show why no such function exists.

For the first problem (about the frog) posed September 30, several solutions have come in, including one student solution. However, there were a few inaccuracies (including a slight misreading of the problem); I'll be communicating with the solvers, and am holding off on acknowledgements for the moment. Also, as yet there have been no solutions to the second problem. So I'll still be taking solutions for both problems for now, and will report in the next *Gazette*. Meanwhile, my own solutions to the problems posed September 16 have been posted in the hallway outside CMC 217. Have a good midterm break, whether or not it includes solving problems!

\- Mark Krusemeyer

If you're having trouble seeing the Problem of the Week, try enabling images for the message.

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