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Fourth Week Update from the Math & Stats Department

Happy fourth week from the Math & Stats Department! While students have been busy with midterms and dreaming of warmer weather, lots has happened in the department. We look forward to a new major welcome and comps announcement over the next couple weeks. Keep reading to learn more about fun events, as well as conference, job, and internship opportunities!

Math Across the Cannon Speaker Series: Jessica Utts

Every year, the Carleton Department of Mathematics and Statistics and St Olaf Department of Mathematics, Statistics, and Computer Science jointly host the Math Across the Cannon speaker series. Our goal is for the faculty and students on the two sides of the river to get together and to get to know one another better. This year, the speaker is Jessica Utts, who is Professor of Statistics at University of California - Irvine and is a former president of the American Statistical Association. Jessica is a leader in the statistics community and has made important contributions to applied statistics and statistics education. She will give two talks:

Math and Stats Student Lecture: "Understanding p-Values and the Controversy Surrounding Them"
Time: Tuesday, April 24, 3:30 - 4:30 pm
Location: St Olaf, RNS 410 (Reception 3:00 - 3:30)

Abstract: Most researchers and journals rely heavily on p-values for determining whether results of a study are statistically significant, and if the study is worthy of publication. But recently p-values have come under attack, and one social science journal has gone as far as banning their use for papers submitted to the journal. These developments led the American Statistical Association (ASA) to release a statement in 2016 titled "Statement on Statistical Significance and P-values,"Â with six principles underlying the proper use and interpretation of p-values and statistical significance. What's wrong with p-values? Should their use be abandoned? This talk explores what p-values really mean, some common misunderstandings about them, what the ASA's statement said about them, and what steps statisticians and researchers can take to make sure p-values are not misused.

Public Lecture: "How Basic Statistical Literacy Can Save You Money, and Maybe Even Save Your Life!"
Time: Tuesday, April 24, 7:00-8:00 pm
Location: Weitz Cinema (Reception to follow)

Abstract: A headline proclaims that coffee lovers live longer. Should you start drinking coffee? You test positive for a disease. How likely is it that you actually have the disease? Are there ways to increase your chance of winning the lottery? Should you buy an extended warranty? Should you pay the advance purchase, non-refundable cost for a hotel room, or wait and pay more when you arrive? All of these are questions that can be answered with a little understanding of statistics and probability. This talk will discuss these and other examples of how statistics and probability permeate our lives, and how a little knowledge can help us make better decisions.

Math and Stats Majors Welcome and Comps Announcement

Newly-declared Math or Stats majors are invited to a reception in CMC 206 from 3:30 to 4:00 pm on Tuesday, May 1. It's a chance to meet fellow majors, both old and new, as well as to get to know professors you might not have met yet. There will be cake! For current juniors (if the promise of cake and company wasn't enough), right afterwards from 4:00 to 5:00 pm, the department will be announcing comps projects for the coming year!

Congrats Kiran!

Congratulations to Kiran Tomlinson, a junior CS/Math major, who has been awarded an Honorable Mention in the Goldwater Scholarship Program! The Goldwater Scholarship Program, one of the oldest and most prestigious national scholarships in the natural sciences, engineering and mathematics in the United States, seeks to identify and support college sophomores and juniors who show exceptional promise of becoming this nation's next generation of research leaders in these fields. Way to go, Kiran!

Upcoming Events

Week 5, Tuesday, April 24, 3:30pm
Math Across the Cannon Speaker Series, Student Lecture - RNS 410, St. Olaf

Week 5, Tuesday, April 24, 7:00pm
Math Across the Cannon Speaker Series, Jessica Utts- Weitz Cinema

Week 6, Tuesday, May 1, 3:30pm
Math & Stats Majors Welcome - CMC 206

Week 6, Tuesday, May 1, 4:00pm
Comps Announcement Meeting - CMC 206

Job & Internship Opportunities

GROW (Graduate Research Opportunities for Women)

Graduate Research Opportunities for Women (GROW) is a conference for women-identified students interested in graduate school in the mathematical sciences. Typically, there are break-out sessions on graduate school experience with grad students, and Q&A on graduate school applications. The panel for the latter usually includes faculty members who are on admission committees. The conference will be held October 26-28, 2018 at the University of Michigan, Ann Arbor. The application opens on June 1, 2018 and can be found through http://www.mathprograms.org/db. Funding is available for all participants.

Kepler Group: Optimization and Innovation Internship

At Kepler Group, interns will be front and center in the data-driven, digital marketing revolution. The Kepler Group has grown to service over 15 of the world's leading brands as they harness data and technology to create truly breakthrough and dynamic marketing programs that scientifically evaluate, target, and optimize every consumer touchpoint. The Optimization & Innovation Intern will have the opportunity to learn how to use data-driven insights, innovative best practices, and creativity to help manage campaigns from the ground up. This exciting opportunity, based in NYC, requires strong analytic and problem-solving skills, an innate hunger for finding the truth behind data, and an inherent curiosity for learning how things work. The Kepler Group is looking for rising seniors and recent graduates for both this internship and their Technology and Data Services Internship, which can be found on the Tunnel. The application deadline for this internship is April 30. Apply via the Tunnel.

Problems of the Fortnight

To be acknowledged in the next *Gazette*, solutions to the problems below should reach me by noon on Tuesday, May 1.

1. Consider the "lattice points", that is, the points (m, n) with integer coordinates, in the plane. Let r be a number with $0 < r < 1$; for each lattice point, draw a circle of radius r with that lattice point at the center. It is not hard to see that after all these circles are drawn, every point in the plane that is not on one of the circles will be inside $0, 1, 2, 3$, or 4 of the circles; for instance, if $r = 0.8$, the point $(1/2, 1/2)$ will be inside the four circles centered at $(0, 0), (1, 0), (0, 1)$, and $(1, 1)$ (and not inside any of the other circles). Now color the points in the plane red that are inside an odd number (1 or 3) of the circles, while leaving the points that are inside an even number of the circles uncolored. As a function of r, what fraction of the plane will be colored red? (You will have to consider several cases, depending on the size of r. If it worries you, as well it might, that the area of the entire plane is infinite, you can rigorously define "fraction of the plane" by taking large finite subsets of the plane, say square regions with $-N \leq x \leq N, -N \leq y \leq N$, seeing what fraction of such a subset is red, and then taking the limit as $N \to \infty$. But because the whole pattern of circles is periodic, "taking the limit" doesn't really amount to much here.)

2. It is fairly well known that there exist arbitrarily large intervals of positive integers that don't contain any primes; in other words, given a positive integer N, it is possible to find a "run" of N consecutive integers that are all composite. Is it also possible to find arbitrarily large intervals of positive integers that don't contain any *powers of* primes? (Primes themselves count as [first] powers of primes. For instance, the complete list of powers of primes that are at most 50 is:

$$2, 3, 4, 5, 7, 8, 9, 11, 13, 16, 17, 19, 23, 25, 27, 29, 31, 32, 37, 41, 43, 47, 49.$$

Thus there are several cases of five consecutive composite integers ≤ 50, specifically 24 through 28 and 32 through 36, but the longest "run" of consecutive integers ≤ 50 that are not powers of primes consists of only four integers, 33 through 36.) If it is possible for every N to find N consecutive positive integers that are not prime powers, show why; if it is not possible for every N, find the largest N for which it is possible.

In a noticeable reversal, so far no solutions from off campus have arrived for the problems posed April 6 (unless I somehow overlooked an e-mail), but I did get solutions to the first problem from Charlie Kapsiak, Fabio da Silva Soares, and Noah Scott Goldman. Fabio should stop by CMC 217 some time to pick up an item from the B(ig) B(ox) O' P(rizes), that is, the B.B.O.P. Meanwhile, solutions to the second problem posed April 6, as well as to the new problems, are still very welcome, and will be considered for possible prizes.

- Mark Krusemeyer

Having trouble seeing the problem of the fortnight? Try enabling images for the message.

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