



Goodsell Gazette

Carleton College

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Northfield, MN 55057

The newsletter for the Carleton mathematics and statistics community

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Welcome Back

Welcome to The Goodsell Gazette! Now that school has started, we hope all of the students in the Mathematics and Statistics departments are as excited as we are! Even with the current state of the world, there's a lot to look forward to this year including new professors AND challenging, rewarding, and entertaining classes offered every term. Published every other week during the term, this newsletter will keep you informed of social and scholarly activities, visiting speakers, comings and goings in the department, your colleagues' comps talks, and job and research opportunities. To subscribe, send an e-mail to sjandro.

Meet Your New Professors!



MurphyKate Montee

MurphyKate is originally from Door County, Wisconsin. She majored in math and music at Notre Dame, then went to England to get a masters in math (Part III) at Cambridge. She then came back to the US to get a masters and PhD in math from the University of Chicago. Her research is in Geometric Group Theory, which use the tools of geometry to study algebraic groups. Currently she is investigating the actions of random groups on $CAT(0)$ cube complexes. In her spare time, MurphyKate loves to sing, bake pastries, and swim. Last year, she completed a 14km swim down the Thames River. MurphyKate is especially excited to be a Carleton, because of the rural environment (perfect for weekend bike trips!) and the department's focus on excellent and innovative teaching. She is excited to broaden students' definitions of math, incorporating interdisciplinary work into her teaching. MurphyKate is teaching Calculus 2 in the Fall and Winter, Structures in the Winter, and Abstract Algebra in the Spring, as well as leading a comps group.



Steve Scheirer

Steve grew up in Nazareth, PA, earned his undergraduate degree (BS in math) at Moravian College and his graduate degrees (MS and PhD in math) at Lehigh University. Both schools are in Bethlehem, PA. His research interests are in algebraic topology/topological robotics. He worked at Ashland University for two years, where he taught calc 1/2, elementary statistics, modern geometry, complex analysis,

and combinatorics. This fall, he is teaching two sections of Calculus 2. Outside of math, his hobbies include cycling, hiking, cooking, and baking sourdough bread. [Ed. note: since his arrival in Northfield in mid-August, Steve has biked over 1250 miles in the area!]

Math/Stats Colloquium Series

The Math/Stats Colloquium Series will be held virtually Tuesday, September 22 from 4:00 pm - 5:00 pm, with an informal "tea" held before the talk at 3:30 pm where you can drop by and connect with others in the Math/Stats Department. We are pleased to welcome Edna Jones, a graduate student in number theory at Rutgers University, as our first speaker.



Title: Apollonian Circle Packings, Integers, and Higher-Dimensional Sphere Packings

Abstract: An Apollonian circle packing is a certain circle packing in which the circles do not intersect but may be tangent to each other. What do Apollonian circle packings have to do with integers? Under certain conditions, each circle in an Apollonian circle packing has a bend ($1/\text{radius}$) that is an integer! When all the bends are integral, which integers appear as bends? It turns out that this is a hard question to answer. However, it is easier to answer a similar question for analogous higher-dimensional sphere packings.

How to Connect: The Zoom link for each talk will be sent to the mast-interest mailing list, so be sure to sign up if you are not already on the list!

Problem Solving Group

If you have always really enjoyed the problem-solving aspect to your classes, then the problem-solving group is just for you. Come join from 4:30-5:30 on Wednesdays, where we will work on solving some fun and challenging math problems together, and learn some strategies for solving them. Students at all stages of their Carleton careers are welcome.

Rafe Jones will be hosting the session. You can contact him for more information at (rfjones@carleton.edu).

Graduate Programs Expo

As part of the Graduate Programs Expo, The Department of Mathematics at Texas State University is holding a Rapid Fire Research competition. It will be virtually via Zoom on Friday November 6, 2020. During the competition undergraduates make short presentations (approximately 4 mins) of their original research in mathematics or mathematics education. This is a great opportunity for students to get practice talking about their work. The presentations will be judged, and the judges will provide feedback as well as awards. Students who are interested in participating should submit an abstract of up to 256 words by October 5, 2020. Submission is online via the website <https://www.math.txstate.edu/research-conferences/graduate-expo.html>

The Grad Expo will also include virtual faculty presentations, student panels and more. See the website above for more details.

Graduate Student Mentorship Initiative

Are you a student from a group underrepresented in STEM? Are you interested in applying to grad school someday? If so, check out the Graduate Student Mentorship Initiative (GSMI) run by Científico Latino. The program is aimed at students from underrepresented groups who are applying to STEM graduate programs; students are paired with scientists who are enrolled in or have completed PhD programs in the sciences, who support them in preparing their applications for graduate school. For more information about the program, check out their website here: <https://www.cientificolatino.com/gsmi>

Electronic Undergraduate Statistics Research Conference

Are you interested in statistics? Have you conducted research that you want to present? Do you want to learn about graduate programs in statistics? Do you want to learn about statistics/data science careers in industry and government?

If you answered yes to any of the above questions, then you should consider registering for the Electronic Undergraduate Statistics Research Conference! The conference is free, and it will take place on Friday, November 6th. The conference is open to all students and faculty to attend.

The keynote speaker is Gabriela de Queiroz, founder of AI Inclusive and R-Ladies. There will be sessions on statistics careers and graduate school. Winners of the Undergraduate Statistics Project Competition will give plenary talks. You can also submit an abstract to give a video presentation on your research.

Here's the conference URL: <https://www.causeweb.org/usproc/eusrc/2020>

Excited About Sports Analytics?

If you're interested in sports analytics, the 2020 UConn Sports Analytics Symposium could be the thing for you!

Saturday, October 10, 2020

The UConn Sports Analytics Symposium (UCSAS) focuses specifically on students (graduate, undergraduate, and high school) who are interested in sports analytics. Organized by the UConn Statistical Data Science Lab of the Department of Statistics, UCSAS aims to: 1) showcase sports analytics to students at an accessible level; 2) train students in data analytics with application to sports data; and 3) foster collaboration between academic programs and the sports industry.

For more information, visit their website at <http://uconnsportsanalytics.org/>

Career Prep Week

Monday, September 21 - Friday, September 25

The early fall recruiting season is heavy on computer science, consulting, finance, and technology opportunities, particularly with the inaugural Minnesota Private Colleges Fall Recruiting Job and Internship Fair on Friday, September 25. There are many events happening next week that can help students to learn about different fields and build valuable professional relationships. One particularly useful set of events may be the recruiter resume review opportunities on Tuesday, September 22 and Wednesday, September 23 that feature 32 recruiters from a wide variety of industries and organizations.

For more information, please visit the Career Center website.

Job & Internship Opportunities

Research Analyst, Federal Reserve Bank of New York

Research Analysts at the Federal Reserve Bank of New York play an integral role in both the policy and research functions of the Research and Statistics Group. Research Analysts work closely with economists, whose specialties include banking and payment systems, capital markets, international economics, macroeconomics, and microeconomics. Upon leaving the Fed, Research Analysts who choose to apply to graduate school are consistently accepted by top programs; others pursue a wide variety of public- and private-sector opportunities. Research Analysts usually have a strong background in economics, policy, mathematics, or computer science, though a major in one of these fields is not a necessity. Successful candidates often have previous research experience, and many are considering careers in economic research, public policy, or related fields. In addition, we seek candidates from a wide range of backgrounds, particularly those that are typically underrepresented in economics. It is important to us that we succeed in recruiting a diverse cohort of research analysts each year. Thus we encourage many students with varying experiences and backgrounds to apply. Applications are being accepted now, on a rolling basis, at https://www.newyorkfed.org/research/careers/research_analysts/index.html. It is recommended that candidates apply by October 15.

Accenture, Summer Analyst

As a Consulting Summer Analyst, you'll be helping our clients address the biggest challenges in today's digital age. Your summer analyst journey starts with a preview into the Consulting Development Program (CDP), where you will gain cross-industry experience while building a diverse set of core consulting skills, such as business analysis, process improvement and technical expertise. The program focuses on your personal and professional growth, challenging you to stretch your boundaries and achieve your greatest potential at a rate unparalleled in other entry-level roles. Through collaboration with Accenture leaders and our bright analyst community, you will deliver unique and impactful results to our clients every day. The application deadline is today! More details can be found on the Tunnel.

Blackstone Real Estate, Summer Analyst

The Summer Analyst position is open to Juniors and will work directly with the BREDS Liquids Business, which is responsible for sourcing, analyzing and executing all liquid, real estate-related debt investments on behalf of Blackstone Real Estate. As a summer analyst you will have the opportunity to participate in the investment process for a wide range of US and European real estate debt transactions, with a primary focus on CMBS and RMBS. Apply via the Tunnel by October 15. On-campus interviews will be held on Friday, October 19.

Intuitive Surgical Inc., Financial Analyst Rotational Program

Intuitive Surgical has a really exciting medical device / robotics product and a fulfilling mission to change surgery. Joining Intuitive Surgical means joining a team dedicated to using technology to benefit patients by improving surgical efficacy and decreasing surgical invasiveness, with patient safety as the highest priority. They are looking to hire interns that would want to be part of a 2 year, 4 position rotation program after college, which is an exciting investment in any young professional where four jobs within Finance are guaranteed in two years. For example, a Carleton grad that received an offer out of this intern program could work in FP&A, Corporate Accounting, Treasury, and Data Science all within four years and then 'graduate' and likely place as a senior analyst in several departments. More information and to apply, visit the Tunnel.

Problems of the Fortnight

PROBLEMS OF THE FORTNIGHT

Welcome to Carleton, or welcome back for a new academic year! As we all try to deal with a variety of unusual and stressful challenges and circumstances this fall, this section of the *Gazette* may seem less relevant to you - or it may provide a welcome break from more weighty issues with more at stake. In any case, the plan is to offer, as in the past, two problems in each “regular” issue of the *Gazette*. Correct solutions are eligible for prizes from the B.B.O.P. (not a musical genre, but the Big Box O’ Prizes). Although this box still exists physically and resides in the CMC, due to social distancing requirements we are working out a new protocol for people to choose and claim their prizes; details should be ironed out soon. Similarly, unlike in the past, for this term solutions should be submitted by e-mail only, to me at mkruseme@carleton.edu . (In fact, I may well be out of town for some time, as I am not teaching this term.) You can either write the solution in the body of an e-mail to me, or attach a pdf (no other attachments, please) to such an e-mail (which allows you to handwrite the solution and/or to include formulas, graphs, etc., easily). In either case, please include “Problems of the Fortnight Solution” or something similar in the subject line, so your e-mail doesn’t get lost in a flood of unrelated ones. Solutions are “due” by noon on Tuesday of the next *Gazette* week - in this case, by noon on Tuesday, September 29. (Solutions that come in later will still be considered, but I probably won’t be able to acknowledge them in that Friday’s *Gazette*.) People submitting incorrect solutions will not be identified in public (but should receive supportive comments in private), so don’t hesitate to submit something even if you’re not sure whether it’s right. (On the other hand, to be eligible for a prize, a solution should show reasoning, not just an answer.) By the way, the problems are not necessarily in order of difficulty for you - for one thing, their difficulty may depend on what you happen to have seen!

Here are the first two problems of the term:

1. Consider the following two-player game. Starting with the number 0, the players take turns adding to the current sum; whenever it’s your turn, you can choose whether to add 4 or to add 7. For instance, the first eight turns might result in the numbers:

4, 11, 15, 19, 23, 30, 37, 41.

If on your turn you can make the new sum end in two zeros (in other words, if your turn leaves a multiple of 100), you win.

Assuming best play by both sides, is there a winning strategy for either player, or should the game go on indefinitely? If there is a winning strategy, should you move first or second to win, and what will be your strategy?

2. Let f , g , and h be functions defined on the positive real numbers such that for all $x > 0$,

$$f'(x) = \frac{g(x)}{x}, \quad g'(x) = \frac{h(x)}{x}, \quad h'(x) = \frac{f(x)}{x},$$

and such that we also have $f(1) = 0$, $g(1) = 1$, $h(1) = 2$. Find an explicit formula for $f(x)$.

Both “summer problems” posed May 29 were solved rather promptly by Sebastian Vander Ploeg Fallon, who should consult with Sue Jandro about getting another prize from the B.B.O.P., as well as by “Auplume”; the second problem was also solved by John Snyder in Oconomowoc. Looking forward to getting solutions from both new and veteran problem solvers to the problems above ... - Mark Krusemeyer



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