



# Goodsell Gazette

Carleton College

January 10, 2020

Northfield, MN 55057

The newsletter for the Carleton mathematics and statistics community

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## Welcome Back!

We hope everyone had a wonderful break and a great first week as Winter Term begins at Carleton! From classes to competitions to conferences, the next nine weeks in the Math & Stats Department promise excitement and adventure. Stay tuned via the Goodsell Gazette (published biweekly!) for the current goings-on in the CMC.

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## Welcome-to-Winter Snowflake Cutting Party

**When:** Friday, January 10, 4:30-5:30

**Where:** CMC 328

Welcome back to campus! To celebrate the start of winter term, come cut paper snowflakes with us from 4:30 to 5:30pm in CMC 328 on Friday, January 10. We'll provide paper, light snacks, and about 10 pairs of scissors---just bring yourself! (Though extra scissors wouldn't hurt.)

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## Summer Activities Panel

**When:** Tuesday, January 14, 12:00-1:00pm

**Where:** CMC 206

Are you wondering how you might spend next summer? Do you get hungry at lunchtime? Come to CMC 206 on Tuesday, January 14 at noon for pizza and a student panel on summer activities! Math and Stats students will discuss their research and internship experiences and answer your questions.

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## Budapest Semesters in Mathematics Info Session

**When:** Friday, January 24, 4:45-5:30pm

**Where:** CMC 206

Are you interested in studying abroad in beautiful, historic Budapest with either the Budapest Semesters in Mathematics or the Budapest Semesters in Mathematics Education program? If so, you are invited to

an information session about the programs themselves as well as the application process. We hope to have the directors of BSM and BSME there to answer questions. This meeting will be held Friday, January 24, 4:45-5:30 in CMC 206.

More information and the department application (due February 2) is available online at <https://www.carleton.edu/math/off-campus/>. Contact Gail (gnelson@carleton.edu) with questions.

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## **Math GRE Training**

**When:** Mondays, 2:00-3:00pm

**Where:** Leighton 202

Are you interested in taking the GRE Math Subject Test, often required by math graduate schools? Now is a good time to start practicing! We'll be offering training sessions this term on Mondays from 2pm to 3pm in Leighton 202; the first meeting will be Monday January 13 and will cover topics from Calculus II. To sign up for future GRE training announcements, if you're not already receiving them, email Alex (abarrios) or Owen (obiesel).

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## **Problem-Solving Group**

**When:** Wednesdays, 4:30-5:30pm

**Where:** CMC 328

If you have always really enjoyed the problem-solving aspect to your classes, then the problem-solving group is just for you. Come join us in CMC 328 from 4:30-5:30 on Wednesdays, where we will work on solving some fun and challenging math problems together. All are welcome. This term we will focus on working problems from past editions of the Konhauser problemfest, a semi-legendary local team competition that features fun and challenging problems of a variety of difficulty levels, and occurs each February. Watch the Gazette for information later this term on how to sign up.

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

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## **MinneMUDAC Bonus Round Winners!**

In December, a team of Carls won the MinneMUDAC bonus round, raking in a cash prize! The team had the most accurate predictions in the commodity closing price of soybeans. Please congratulate the team: Varit Bhanikasem, Chiraag Gohel, Jaylin Lowe, Tanvi Mehta, and Elliot Pickens.

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## **Carleton Teams Capture High Placings in NCS Contest**

Late last fall six teams of Carleton students were among the 55 teams from 21 colleges and universities in the region who competed in the annual North Central Section problem-solving contest. The results of the

contest came in after the last Gazette of the fall, but all the Carleton teams acquitted themselves admirably, finishing in the top half of all teams. Leading the charge was the team of Soren DeHaan, Ethan Rojek, and Carl Tankersley, who placed 4th. The team of Duc Nguyen, Noah Pinkney, and Juanito Zhang Yang took home 10th place, and the team of Jessie Baskauf, Aaron Li, and Brody Lynch was right behind them in 11th place. The teams of Ryan Basava Reddi, Victor Huang, and Edward Lee (18th place) and Ben Hafner, Dasha Palenova, and Jack Uchitel (19th place) also finished side by side, and the team of Victor Chekhovoi, Adele Dujsikova, and Christian Peerzada took home 22nd place. Congratulations to everyone who participated!

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## **Upcoming Events**

### **Week 1**

Friday, Jan 10, 4:30-5:30pm  
Snowflake Cutting Party - CMC 328

### **Week 2**

Tuesday, Jan 14, 12:00-1:00pm  
Summer Activities Panel - CMC 206

### **Week 3**

Friday, Jan 24, 4:45-5:30pm  
Budapest OCS Info Session - CMC 206

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## **Job, Internship, & Other Opportunities**

### **Institute for Advanced Study - Undergraduate Summer School**

This is an opportunity to learn about p-adic number theory this July at the Institute for Advanced Study's Park City Math Institute, located in Park City, Utah. The prerequisites are: linear algebra, a proof-based course, and either real analysis or abstract algebra. (A course in number theory would be helpful, but is not required.) This is open to all undergraduates, even those of you graduating in May. The deadline is January 31. Find more information at <https://www.ias.edu/pcmi/uss2020>.

### **The Data Incubator Fellowship Program**

The Data Incubator is an intensive 8 week fellowship that prepares masters students, PhDs, and postdocs in STEM and social science fields seeking industry careers as data scientists. The program is free for Fellows and supported by sponsorships from hundreds of employers across multiple industries. In response to the overwhelming interest in their earlier sessions, they will be holding another fellowship. Early applications are due January 30. Details at <https://www.thedataincubator.com/fellowship/apply.html>.

### **Paglia Post-Baccalaureate Research Fellowship**

Through the generosity of Carleton Trustee Cathy James Paglia '74 and her husband Lou Paglia, we

have a new post-baccalaureate fellowship available for STEM students to pursue research at an R-1 institution for one to two years after graduation from Carleton. This would be a great opportunity for students who are thinking about graduate school but not ready to make a commitment, or who could benefit from additional research experience to be a more competitive applicant for graduate school. We are piloting the program for the class of '20 and can offer up to three fellowships to students from this class. You can find more information at [https://apps.carleton.edu/fellowships/carleton\\_fellowships/research/paglia/](https://apps.carleton.edu/fellowships/carleton_fellowships/research/paglia/). The application deadline is February 28.

### **Big Data Summer Institute**

The Big Data Summer Institute in Biostatistics (SIBS) is a six-week interdisciplinary training and research program that introduces undergraduate students to the intersection of big data and human health – a rapidly growing field that uses quantitative analysis to help solve scientific problems and improve people's lives. Find more information and apply by March 1 at <https://sph.umich.edu/bdsi/>.

### **Teaching Experiences for Undergraduates**

The Teaching Experiences for Undergraduates (TEU) program is a six-week immersive summer experience in secondary mathematics education at Brown University in Providence, RI, funded by the National Science Foundation. TEU participants earn a generous stipend, take a 60-hour course in mathematics pedagogy, and apply what they're learning to teaching urban high school students under the supervision of a master teacher-mentor. If you are committed to a career in secondary education or seriously interested in exploring the possibility of such a career, apply by February 29. More information and application at <https://teu.vassar.edu/>.

### **Causeway Postbaccalaureate Program**

Causeway is a 12-month program designed to prepare students for graduate school through coursework, research experiences, seminars on the profession, mentorship and community building. It is tuition-free and provides a living stipend (about \$34,000) to students. The mission of Causeway is to increase the number of graduate students in the mathematical sciences from historically under-represented groups. Applications are now open for the 2020-21 session, and due by April 1. More details can be found at <https://sites.northwestern.edu/causeway/>.

### **University of Chicago - Research Assistant**

Professor Gunter J. Hitsch at the University of Chicago is hiring a full-time research assistant to start around July 1, 2020, and looking for graduating seniors or recent graduates. This full-time RA will be working on projects at the boundary between Business Analytics/Quantitative Marketing and Industrial Organization. A job description with information on how to apply can be found at <http://bit.ly/Hitsch2019>.

### **Epsilon Camp - Math Camp Counselor**

We are a unique, high-level math camp for 7-11 year-olds, and we are in the process of recruiting our counselors for the summer of 2020. We require that all of our counselors be math majors who have taken at least some upper-division math courses and who also love children. Our campers study topics such as methods of proof, number theory, projective geometry, sets and functions, and group theory in classes

taught by university professors. Many of our counselors find it to be such a rewarding experience that they choose to return several years in a row. Application deadline: March 1. Find more information and apply at <https://epsiloncamp.org/jobs>.

### **Ross Mathematics Program - Camp Counselor**

We are looking for math graduate students or upper division undergraduates who have taken a college course in Abstract Algebra and are familiar with some elementary number theory. Counselors also need strong social skills to enable them to take leading roles in supervising and guiding teenagers. The 2020 Program will have two sites, one for 6 weeks in Columbus, Ohio, the other for 5 weeks in Changzhou, Jiangsu Province, China. (All classes are held in English.) Visit <https://rossprogram.org/counselors/to-apply/> for application information for either program.

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## **Problems of the Fortnight**

To be acknowledged in the next *Gazette*, solutions to the problems below should reach me by noon on Tuesday, January 21.

1. Note that the sequence of numbers

1, 4, 2, 5, 7, 10, 13, 16, 14, 17, 15, 12, 9, 11, 8, 6, 3, 1

has the following properties:

- i) it starts and ends with 1;
- ii) the (absolute value of the) difference between two successive numbers in the sequence is always either 2 or 3;
- iii) not counting the 1's at the beginning and the end, the numbers in the sequence are exactly the integers between 2 and 17 inclusive, and those occur once each.

Here's the problem: For which values of the integer  $n > 1$  does a sequence with these properties exist, where in property iii) the number 17 is replaced by  $n$ ?

2. Let  $\mathbf{a}, \mathbf{b}, \mathbf{c}$  be vectors in  $\mathbb{R}^3$  with the property that for all  $\mathbf{v}$  in  $\mathbb{R}^3$ ,

$$\mathbf{a} \times (\mathbf{v} \times \mathbf{a}) + \mathbf{b} \times (\mathbf{v} \times \mathbf{b}) + \mathbf{c} \times (\mathbf{v} \times \mathbf{c}) = \mathbf{v}.$$

Show that the vectors  $\mathbf{a}, \mathbf{b}, \mathbf{c}$  form an orthogonal set (that is, they're all at right angles to each other) and find all possibilities for the lengths (magnitudes) of  $\mathbf{a}, \mathbf{b}, \mathbf{c}$ .

It may seem like ancient history, but it is still a pleasure to report that Aaron Li and John Snyder both solved the first problem posed November 8; for the second problem, there was a partial solution, and Aaron provided a full solution (which even featured nice symmetry). Clearly, Aaron should pick up a B.B.O.P. item at his convenience. By the time you read this, my own solutions to all the problems posed last term will be posted outside CMC 217 (although for that last problem, I'll likely use Aaron's solution instead). Sorry that took so long, and good luck on the new problems!

- Mark Krusemeyer

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