



Goodsell Gazette

Carleton College

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Northfield, MN 55057

The newsletter for the Carleton mathematics and statistics community

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8th Week Update from the Math & Stats Department

It is nearing the end of Winter Term -- time certainly passes quickly when you're caught up in the excitement of life in the Carleton Math & Stats Department! So far this term, several independent comps students and five comps groups have presented their research findings, and many students have participated in mathematics- and statistics-related conferences and competitions.

The news this week is that there isn't too much news: read on for information about an upcoming speaker, to learn about a summer research opportunity at Carleton, to get updates on jobs and internships you're likely to be interested in, and to try this issue's Problem of the Fortnight.



Math Across the Cannon Speaker Series: Ken Ono

Every year, the Carleton Department of Math and Stats and St Olaf Department of Math, Stats, and CS 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 Ken Ono, who is Asa Griggs Candler Professor of Mathematics at Emory University. He is one of the world's leading experts in the theory of integer partitions and modular forms. He has won the Guggenheim, Packard, and Sloan Fellowships, a Presidential Early Career Award for Science and Engineering, received the Presidential Career Award from Bill Clinton in 2000 and was named a Distinguished Teaching Scholar by the National Science Foundation. He will give two talks:

Thursday, March 2nd, 2017

3:30-4:30 pm / Olin 141

Talk #1: Can't you just feel the Moonshine?

Time and Location: 3:30-4:30 p.m. in Olin 141 at Carleton College

Talk #2: Gems of Ramanujan and their Lasting Impact on Mathematics

Time and Location: 7:00-8:00 p.m. St. Olaf's Viking Theater (Buntrock Commons 012)

In addition, there will be opportunity to visit with Ken Ono the morning of Friday March 3. If you're interested, please contact our local organizer at hwong@carleton.edu.

Summer Math Research at Carleton

Interested in doing research in mathematics this summer? Rob Thompson is looking to recruit a team of students to work on research problems in applied math and geometry. The program will be 10 weeks of full time work, starting right after Spring term. Last summer's projects involved automated jigsaw puzzle assembly, classifying special curves on surfaces, and an industrial problem on 3d scanning. Come talk to Rob to apply and to learn about new (and continuing) projects for this summer!

Job & Internship Opportunities

REU: Dartmouth College

The Department of Mathematics at Dartmouth College invites undergraduate student applications to participate in a summer research experience program for mathematical modeling in science and engineering. Students will receive room and board on the Dartmouth campus along with a small stipend and travel allowance. The program starts on June 22 and participants must commit to being on campus for at least six weeks, and may stay through August 17. As part of the program, students will participate in a course team-taught by Professors Feng Fu and Anne Gelb which will introduce fundamental concepts and cutting-edge methods in mathematical modeling. Students will learn valuable tools in scientific computing and integrating data and models. Topics will include, but are not limited to, image reconstruction algorithms for ultrasound, MRI, and radar, and game theory with applications to real-world cooperation problems. This instruction will be combined with individual hands-on research experiences and projects, and will include on-site visits to various campus research facilities. All work will be in a collaborative environment with fellow participants, graduate students, and postdocs. Students will undertake research projects and present their findings at the end of the program. Previous course work in linear algebra, probability, and ordinary differential equations is highly recommended, and course work in at least one of these topics is required. Some experience in a programming language such as MATLAB is also highly beneficial. Applicants should submit by email to Tracy Moloney: tmoloney@math.dartmouth.edu the following: 1. Letter describing interest in program such as your own mathematical background and interests, career goals, and a research idea you are interested in. 2. Unofficial transcripts or degree audit showing courses taken and grades. 3. At least one letter of recommendation from either an instructor of a mathematics course or research supervisor of a math related project. 4. Deadline to apply is March 8, 2017. 5. Decisions will be made by March 22, 2017. Questions may be directed to Anne Gelb via email at annegelb@math.dartmouth.edu.

SUMS: Brown University

The Brown University Symposium for Undergraduates in the Mathematical Sciences (SUMS) has been held annually since 2002. The symposium's goal is to foster greater undergraduate interest and scholarship in mathematics by demonstrating the ubiquity of mathematics throughout the sciences. The conference also provides an environment in which motivated undergraduates can come together to share their own work and learn from distinguished faculty and researchers from around the country. This year's symposium will be held on March 18th, 2017 and will feature the topic of Serendipity. The deadline for registration is March 11. For more information, please visit: <https://sites.google.com/a/brown.edu/sums-2016/>.

Tencent: Summer Intern (Law, Policy, Technology)

This internship position is with Tencent's legal department and is an excellent opportunity for undergraduate students who are interested in law and policy, internet and technology, and China. The student will be expected to stay for 1-2 weeks at Tencent's Silicon Valley office for an orientation and introduction to Tencent, and then spend the remainder of the internship at Tencent's headquarters in Shenzhen, China. This internship is intended for juniors and is 10 weeks long. Applications will be accepted until March 12th. For more information and to apply visit The Tunnel.

NSDAQ

A 2012 Carleton Econ/Psych graduate working at NASDAQ is encouraging Carleton students to consider internships or full employment opportunities at NASDAQ. In Rockville, Maryland there are available internships in Modeling, Forecasting, and Economic Analysis; Client Services, Corporate Systems; and Global Technology Project Management. There are also internships available in San Francisco, Boston, Philadelphia, New York, and Los Angeles in a variety of fields, and full-time opportunities are available worldwide. The positions are focused on financial technology, but the jobs run the gamut of what a global company needs. Carleton students are encouraged to apply as this could be an interesting and helpful career opportunity. For more information check out: <https://careersus-nasdaq.icims.com/jobs/dashboard>.

City of Eagan: Finance Intern

This internship position includes assisting the finance director and budget team members with various tasks like reviewing, assimilating, and preparing the city's annual budget. Participants must have completed at least two years of undergraduate study prior to the internship. Applications will be accepted until March 12. For more information and to apply visit 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, March 7.

1. As motivation for this problem, here's a standard result from geometry: A convex quadrilateral (four-sided figure) $ABCD$ can be inscribed in a circle (that is, all four vertices lie on the same circle) if and only if the sum of the (opposite) angles at A and at C is 180° . Now for the problem: Let $ABCDEF$ be a convex hexagon, with the vertices A, B, C, \dots in counterclockwise order.

- a) Suppose $ABCDEF$ can be inscribed in a circle. Does it follow that the sum of the three angles at A , at C , and at E is 360° ? Why, or why not?
- b) Suppose the sum of the three angles at A , at C , and at E is 360° . Does it follow that $ABCDEF$ can be inscribed in a circle? Why, or why not?

2. Let A_n be the $(n+1) \times (n+1)$ matrix such that all entries in any northeast-southwest diagonal of A_n are equal to each other and such that the "values" of these diagonals, in order, are $0, 1, \dots, n-1, n, n-1, \dots, 1, 0$. For example,

$$A_3 = \begin{pmatrix} 0 & 1 & 2 & 3 \\ 1 & 2 & 3 & 2 \\ 2 & 3 & 2 & 1 \\ 3 & 2 & 1 & 0 \end{pmatrix}.$$

Find $\det(A_n)$ as a function of n .

For the first problem posed February 10, no complete solution has arrived yet; there was one serious student attempt that may lead to a solution, and John Snyder in Oconomowoc located the answer in OEIS (the invaluable resource *On-Line Encyclopedia of Integer Sequences*) and made expert use of *Mathematica* to extract a formula that fit the data for $n \leq 73$. The second problem was solved by John Snyder and by "Auplume", but there are no student solutions so far. Good luck to all you problem solvers, especially if you are participating in the Konhauser this Saturday!

- Mark Krusemeyer

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



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