



ΓΟΟΔΣΕΛΛ ΓΑΖΕΤΤΕ

Carleton College

Northfield, MN 55057

The newsletter for the Carleton mathematics and statistics community

February 8, 2019

Vol. 37, No. 9



Gather your team for the Konhauser Problemfest

On Saturday, February 23, the 27th annual Konhauser Memorial Problemfest will take place at St. Olaf. The contest, which is named after the late Macalester professor and legendary problem poser Joe Konhauser, is a premier local problem-solving event. Teams of up to three students get three hours (9 a.m. to noon) to work together on a set of ten challenging and intriguing math problems. The participants then have lunch together while the solutions are graded, and the results are announced right after lunch. The winning team gets to take the famous granite "pizza trophy" home to their college for the year. It's been in residence at Macalester this past year, and it would be great to bring it to Carleton for a year. To sign up for the Konhauser, contact Rafe (rfjones@carleton.edu). Three people can sign up as a team, but individuals are also welcome to express interest -- it should be possible to find you some teammates. The deadline is Friday, February 15.

If you want to see what Konhauser problems are like, and get some practice solving them, drop by the problem-solving group, which meets on Wednesdays 4:30-5:30 pm in CMC 328.

Prospective Major and Minor Information Meeting

The Mathematics and Statistics Department is hosting an information session for prospective majors and minors on Thursday, February 14 from 4-5 pm in CMC 206. Come meet with current mathematics and statistics students and professors and enjoy some food!

SWiMS Event

To kick-off midterm break, SWiMs will be holding a joint pizza making event with WiPs+ and Whims today at 5pm at CANOE house. This is a great opportunity to meet other women and non-binary in STEM, share experiences, and talk about careers and interests. It will be yummy and fun and they would love for more people to join! Email canilangs@carleton.edu if you plan on attending.

Employment Information Session

Join Carleton alum Melissa Bain '18 (Economics & Mathematics) and Sam Bacon '17 (Mathematics/Statistics) to learn more about UnitedHealth Group's Data Science Program - Research & Development opportunity. Melissa and Sam will be presenting work they've done to give students a sense of the various opportunities that exist in the industry. They will touch briefly on the jobs available and take Q&A. The information session will take place on Tuesday, February 19, 12-1pm in CMC 206. RSVP via the Tunnel.

Upcoming Events

Week 6, Tuesday, February 12
Colloquium Talk

Week 6, Thursday, February 14
Prospective Major and Minor Information Meeting

Week 7, Tuesday, February 19
Individual Comps Presentations

Week 7, Thursday, February 21
Group Comps Presentations

Job & Internship Opportunities

Johns Hopkins University Center for Talented Youth, Summer Teaching Assistant

The Johns Hopkins University Center for Talented Youth (CTY) offers challenging academic programs for highly talented elementary, middle, and high school students from across the country and around the world. (CTY) Summer programs are looking for undergraduate students who may be interested in summer employment as a mathematics teaching assistant or instructor. Information regarding the summer programs can be found at: cty.jhu.edu/jobs/summer.

Stanford University, Predoctoral Research Fellowship

The Stanford Institute for Economic Policy Research (SIEPR) and Stanford Economics are pleased to open applications for our Predoctoral Research Fellowship Program. The SIEPR/Economics Predoctoral Research Fellowship program is a full-time, post baccalaureate program designed to prepare individuals wishing to gain valuable training and experience toward a career in academic research in economics or public policy. Fellows will be expected to fully engage in the intellectual life at Stanford University. They dedicate a significant portion of their time to an empirical research project and can take graduate-level courses at Stanford University for credit (up to one course per quarter). The fellowship offers tuition, health insurance, and a living stipend. They are seeking individuals to join their program for a period of at least one year. International applicants are welcome to apply. Full program and application information is available on their website at: <https://siepr.stanford.edu/about/student-opportunities/predoctoral-fellowship>. Applications received on or before March 31, 2018, will be reviewed on a rolling basis.

Northfield Schools Data Fellow

This position is part of the Carleton Center for Community and Civic Engagement's (CCCE) Community-Engaged Fellowship program, available during summer and winter breaks. Selected students will join not only the community partner hosting the position, but also a cohort of other CCCE Fellowship recipients and Carleton-funded internship participants engaging in professional development programming facilitated by the Career Center. This position will support the Director of Assessment Services for Northfield Public Schools. The position involves working on data projects to support the school district and will include data preparation, analysis and creation of data visualizations for school district staff. This position is open to Freshmen, Sophomores, and Juniors. The priority deadline is February 18. For more information, visit: https://apps.carleton.edu/ccce/fellowships/community_engaged_fellowships/2019-fellowships/.

Careers in Advertising

Alex Lekikh '95 will be on-campus on the February 26th. He will be talking about Careers in Advertising and job & internships at MullenLowe Group. He is also sponsoring one summer internship from the class of '19 or '20. Last year they had applicants from IR, English, Psych., CS, Math, Russian, CAMS, and Statistics. As students will need to produce a video as part of their application, the Career Center will be hosting a workshop titled "Producing Videos for a Job or Internship?" on February 15 at 4pm. Alex will also be hosting information sessions on February 26. For more information, visit: The Tunnel.

Problems of the Fortnight

To be acknowledged in the next *Gazette*, solutions to these problems should reach me by noon on Tuesday, February 19.

1. If it bothers you that the absolute value function (given by $f(x) = |x|$) is not differentiable at $x = 0$, you might consider extending the definition of “differentiable” as follows: A function f is “differentiable” at x if its left and right derivatives,

$$\lim_{h \rightarrow 0^-} \frac{f(x+h) - f(x)}{h} = f'_l(x) \quad \text{and} \quad \lim_{h \rightarrow 0^+} \frac{f(x+h) - f(x)}{h} = f'_r(x)$$

both exist there, and we then define the “derivatish” at such a point by

$$f'_i(x) = \frac{1}{2}(f'_l(x) + f'_r(x)).$$

For instance, at $x = 0$ the absolute value function now has “derivatish” $\frac{1}{2}(-1 + 1) = 0$, which is surely the “right” value, if only for reasons of symmetry. Note that if a function was already differentiable at x , we have $f'_i(x) = f'_l(x) = f'_r(x) = f'(x)$, so extending the definition doesn’t change any derivatives we had already. You might wonder about the differentiation rules, though. In particular, using the extended definition, do we still have

- a) the Product Rule and
- b) the Chain Rule?

2. Let C_1 and C_2 be two circles in the plane (with arbitrary centers) so that C_1 lies completely inside C_2 . Consider the curve C consisting of all points P for which the distance from P to C_1 equals the distance from P to C_2 . (The distance from P to a curve is, by definition, the minimal distance from P to any point on the curve.)

- a) Show that C has at least two axes of symmetry (lines such that reflecting across them maps C onto itself).
- b) Find (and prove) a necessary and sufficient condition on the circles C_1 and C_2 for the “midway curve” C to be a circle also.

Correct solutions to the first problem posed January 11 came in from “Auplume” and from John Snyder in Oconomowoc; John also solved the second problem. Alas, although at least one student has made some headway on the second problem, no student solutions have come in yet. (Any student solutions that come in for either problem from January 11 will still be considered for B.B.O.P. recognition.) Enjoy midterm break, and good luck on the new problems!

- Mark Krusemeyer



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