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## Fifth Week Update from the Math & Stats Department

Happy fifth week from the Math & Stats Department! While students have been busy with midterms and dreaming of warmer weather, lots has happened within the department. Helen Wong has been invited to The Institute for Advanced Study, SDAs for next year have been chosen, and a weekly Math & Stats tea has been organized. Keep reading to learn more about these exciting developments and for job, internship, and scholarship opportunities!

## Will you meet Einstein?

Helen Wong has been invited to spend next year at The Institute for Advanced Study in Princeton, NJ. This is, basically, paradise for mathematicians (and a great honor to be invited). We caught up with Helen to ask her about her plans.

GG: What is the Institute for Advanced Study?

The IAS is an institute whose founding director wrote an essay, "The Usefulness of Useless Knowledge," which sums up the philosophy of the place. I love the name of that essay. That, and the "institute" part of the name. Everything is taken care of, so you can just devote yourself to your work. They've got the best research facilities, and housing, lunch, childcare, and all that stuff are provided on campus. The professor who invited me said that the place was designed so that I could start working within 15 minutes of arrival. I was a bit intimidated by that, actually, as it takes me at least 15 minutes just to figure out where my shoes and keys are in the morning!

GG: Is it just for math? Isn't that where Einstein worked?

The institute also has other schools besides math, for historical studies, natural sciences, and social science. Noah Solomon from Religious Studies was there a few years ago, and he told me it was "paradise." I'm super excited to go. And yes, it was the academic home of Einstein and many others who fled Europe in the 1930s.

GG: Why are you going there next year? What will you do there?

I'm going there for all of next year, on a von Neumann fellowship. First off, I'm planning on catching up on a whole lot of research things that's been left on the back burner. For example, I'll finish up papers that have come out of my comps projects in recent years. Primarily, I'm hoping to get back on track with my research in quantum topology. I felt like I've spent a lot of energy on my kids since they were born, and now that they're old enough, this is my big chance to catch up with all the latest developments and meet up with collaborators to move our projects forward again.

## Meet Your New SDAs!

Congratulations to Logan Crowl and Qimeng Yu who will be our new SDAs next year! SDAs are a resource for all current students (especially people who are new to or interested in the math or stats major) who'd like to talk to an experienced upper-level student about courses, registration, what the major is like, and all things

related to mathematics and statistics!

# Announcing the Weekly Math and Stats Tea

Starting next week, the Math & Stats Department will host a weekly tea on (most) Tuesday afternoons. It will be a casual gathering for snacks, drinks and conversation. Everyone is welcome! The first tea will be Tuesday May 2 at 4pm in CMC 206.

# Job & Internship Opportunities

**Work in the Mathematics and Statistics Department Next Year!**

Are you looking for a job to fill your work-study hours next year? The Mathematics and Statistics Department is looking for course graders, lab assistants, someone to edit the Gazette, and an office assistant. Applications are due by April 28 and can be found at:

https://apps.carleton.edu/curricular/math/resources/student_worker_application/

**Neuro-Statistics: the interface between Neuroscience and Statistics workshop**

The University of Minnesota School of Statistics via its Institute for Research on Statistics and its Applications will be hosting this workshop on the use of statistics and data science methods towards understanding neuroscience data and scientific objectives, and on the challenges and scope of this inter-disciplinary research.

When: May 5th and 6th 2017
Where: Walter Library on the University of Minnesota Campus
For more information and to register, visit: http://irsa.stat.umn.edu/session/neuro-statistics-interface-between-neuroscience-and-statistics

**Cloud Applications Consultant**

Location: Denver, CO
Organization: Oracle Cloud Applications Consulting - Center Of Excellence

As a COE consultant, you will work as a member of a cloud center of excellence (COE) consulting team to solve business and technical problems for prospective clients and customers. As a member of a project team, you will follow standard practices and procedures to analyze situations/data and provide quality work products to deliver functional and technical solutions on cloud solutions. You will uncover and understand customer goals and challenges and align Oracle's cloud portfolio to enable optimal solutions. You'll develop and deliver high quality presentations and demonstrations, present and articulate product features and benefits, and configure and test overall Oracle solutions that delight the customer.

You will participate in a development program focused on building your foundation consulting skills and mastering those skills. Your initial training program consists of a multi-week, comprehensive program in Denver, CO where new hires begin to learn consultative skills and deep-dive into Oracle solutions. This will be followed by on the job training on actual customer engagements. This serves as the base of your new hire learning and provides you with the tools to make an instant impact as part of a highly collaborative consulting delivery team.

For more information and to apply:
https://carleton-csm.symplicity.com/students/index.php?s=jobs&ss=jobs&mode=form&
id=614a2105de5b954f595ee9928e1ba36f&PHPSESSID=74ca34cb2108bc022aeaa996fd37fab&
signin_tab=0

**Americorps Urban Education Fellowship**

The Phoenix Academy Network currently operates three high schools in Massachusetts - one in Chelsea, one in Lawrence and one in Springfield - with plans to open additional schools in the coming years. The Phoenix Network is at the forefront of education, particularly alternative education, in Massachusetts.

The mission of all Phoenix schools is to challenge teenagers with an academically rigorous and individually tailored

curriculum. Talented students who have not succeeded in other schools will have the support, resources and training needed at Phoenix to succeed academically in high school and college, and become economically secure in their future. Phoenix is named after a mythological figure of strength, healing and renewal. We believe in the capacity of our students to regain control of their academic future and recast themselves as strong, independent and self-sufficient adults.

We are seeking talented individuals who are interested in making a difference in the lives of students who have previously struggled in school through daily tutoring. The right individual for this year of service will have a fierce commitment to confronting the educational inequality that exists in inner city education today. Because our students are often suffering from years of educational neglect or apathy, our staff must be driven with a sense of urgency and energy.

The 2017-2018 Phoenix AmeriCorps Fellowship will include up to 36 full-time AmeriCorps members, each working closely with high school students and tutoring them in Math, English, and Biology.

Phoenix AmeriCorps members are engaging in a year of service. All members are provided with dormitory style housing (living in a single or double and sharing a bathroom with 2-3 other members), a living stipend (up to $10,500 for the year), healthcare coverage, and are eligible for an educational financial award at the end of their year of service.

For more information and to apply:

https://carleton-csm.symplicity.com/students/index.php?s=jobs&ss=jobs&mode=form&
id=d39cdc097bce62d4ec8ad37179c1daa8

**Marketing Intern**

BW Incorporated (BW Inc.) started in 1990 has two websites FamilyPoolFun.com and FamilyGoKarts.com. They are looking for a qualified intern to join their business team. Their company helps families have fun and is seeking an intern who wants real hands on experience with business growth.

Your job will be to seek out new technological, social, and business frontiers. We need a student who is passionate and will be strategic in working with and reaching out to our customers all the while moving at our blistering pace. You will help BW Inc. continue to push the boundaries of what we can do for our customers.
You should be prepared to work in a fast-paced environment, and you will finish the internship having gained broad experience in various aspects of business operation and growth.

For more information and to apply:

https://carleton-csm.symplicity.com/students/index.php?s=jobs&ss=jobs&mode=form&
id=80f522b06792e53a6a52c2651958b328

**Horton Global Scholars Program**

Please considering applying to the Horton Global Scholars Program! Economics and STEM students can apply for a $3000 scholarship for their off-campus studies program. Applications for 2017-18 programs are due at 11:59pm on May 15.

In November 2015, Horton, Inc. donated money to the Minnesota Private College Fund for a scholarship supporting students studying business or in science, technology engineering, and math (STEM) fields. Each MPCC school, including Carleton, will award one $3000 scholarship annually for three years (2016-17, 2017-18, 2018-19).

Eligibility:

- Students majoring or intending to major in economics, cs, physics, chemistry, biology, geology, math or math/stats.
- Students may attend a semester, term, or academic-year program.
- First-years, sophomores, and juniors can apply.
- Students must have demonstrated, unmet financial need, and have already accepted all of their need-based aid from Carleton.
- All applicants must be in good academic standing.
- Students must agree to write an exit essay about their experience and a thank-you to

Horton, Inc.

Applications can be found on the Off-Campus Studies Website at:
https://apps.carleton.edu/curricular/ocs/money_matters/carletonscholarships/horton.
Contact lkarels or nziegler with any questions.

# Problems of the Fortnight

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

## PROBLEMS OF THE FORTNIGHT

To be acknowledged in the next *Gazette*, solutions to the problems below should reach me by noon on Tuesday, May 9.

1. How many times does the function

$$f(t) = \prod_{k=1}^{2017} [k \cos^4 t - (k^2 + 1) \sin^2 t \cos^2 t + k \sin^4 t]$$

change sign on the interval $[0, 2\pi]$?
(The symbol $\prod$ stands for "product", just as $\sum$ stands for "sum".)

2. It is fairly well known that any conic section that is not a circle can be defined as the set of points in the plane for which the ratio of the distance from some fixed point to the distance from some fixed line is a constant (called the eccentricity $e$ of the conic section; the conic section is an ellipse if $e < 1$, a parabola if $e = 1$, and a hyperbola if $e > 1$. To get circles, you have to allow the fixed line to be at infinity, let $e = 0$, and do a bit more "fudging".)

Suppose we look, instead, at the set of all points in the plane for which the *difference* between the distance from some fixed point and the distance from some fixed line is a constant. What kinds of sets are obtained in this way? Specifically, describe and sketch the sets you get this way if the fixed point is $(0, 1)$ and the fixed line is the $x$-axis, for various values of the constant.

At the risk of sounding like a broken record (what percentage of the readership actually remembers what this metaphor refers to, I wonder? Inquiries welcome ... ), I've heard very little about the problems posed April 14, although John Snyder in Oconomowoc (assisted by *Mathematica*) did solve the first one. Solution(s) to problems whose answers have not been posted remain(s) eligible for a B.B.O.P. prize or prizes. Enjoy midterm break - a good opportunity to solve a problem or two?

- Mark Krusemeyer