Now Open: The Mathematics of Origami Exhibit in the Gould Library

This past Winter Term, Joe Slote, Thomas Bertshinger, Sam Vinitsky, and Claire Spencer completed their two-term comprehensive exercise in mathematics, in which they studied the mathematics of paper-folding. They presented their work, which introduced listeners to the mathematical study of paper-folding, at the comps Gala on February 23. The group also included some of their newly-proven results about determining whether a given crease pattern (laid out in a grid) was flat-foldable. However, they weren't done yet!

Joe and Thomas have completed the installation of an interactive exhibit based on their comps project that is currently open in the Gould Memorial Library. It illustrates some of the principles of origami, highlights interesting results in the field and contrasts results in traditional Euclidean geometry and mathematical origami. The exhibit also includes interactive foldings so that you can see some of their results in action! Be sure to visit; the exhibit will remain open in the library until August 31.

Students Present at MAA North Central Section Meeting

During the weekend of April 15-16, just after the previous Gazette went to press, math majors Joe Slote and Michelle Mastrianni gave a presentation called "How Many Ways Can You Slice a Doughnut?" at the Spring Meeting of the North Central Section for the MAA. They were presenting the findings of research they've conducted in the field of topological graph theory. Topological graph theory is itself a branch of graph theory, and aims to study embeddings and immersions of graphs in surfaces as well as to study graphs as topological surfaces.

Their presentation was very well-received at the conference, and they both received books from the MAA as thanks for their presentation.
Math in Post-Carleton Life: How Do You Divide the Rent?

For those of you looking to move into a shared apartment for next year or the upcoming summer: how do you fairly divide the rent? Many apartments agree to simply divide the rent evenly among residents. Some use each bedroom's square footage as a starting place, and still others use residents' incomes as the deciding factor. As it turns out, none of these methods is completely satisfactory--they could produce outcomes in which one or more inhabitants would like to inhabit a different room under the same price-division scheme.

The problem here is that individuals evaluate a room differently based on their preferences. That's why in the study of fair division, there is Sperner's Lemma, which was discovered in 1928 by the German mathematician Emanuel Sperner. Dr. Francis Su, a math professor at Harvey Mudd College, designed an algorithm using this lemma that produces a fair outcome when all participants act in their own self-interest. It guarantees an "envy-free" solution, in which no one will want to swap his/her room and price for someone else's. This procedure has been used not only to divide rent, but also to divide such things as Germany after WWII, deep-sea mining rights, and property after a divorce or death. Interested in the specifics? You can read the New York Times' original article here: [http://www.nytimes.com/2014/04/29/science/to-divide-the-rent-start-with-a-triangle.html](http://www.nytimes.com/2014/04/29/science/to-divide-the-rent-start-with-a-triangle.html).

(The New York Times also has a calculator that can carry this process out for you if you (and your roommates) are so interested: follow this link to try it out! [http://www.nytimes.com/interactive/2014/science/rent-division-calculator.html#.](http://www.nytimes.com/interactive/2014/science/rent-division-calculator.html#).)

At the Career Center: Mock Technical Interviews

On Wednesday, May 4, Sam Tucker '11 will be hosting 30-minute, one-on-one mock technical interviews. Tucker is currently a Software Development Engineer at Amazon.com, and he brings several years of industry experience with him to this event. If you are interested in acquiring a job or an internship in software engineering, this is the perfect opportunity to become better prepared to answer technical interview questions and make yourself stand out as an applicant.

Sign up for your spot on the Tunnel today--and hurry! Spaces are limited.

Job & Internship Opportunities

Professional Data Analysts: Statistician Intern
Professional Data Analysts, Inc. (PDA) is an independent evaluation and statistical consulting firm specializing in the fields of public health and the behavioral and medical sciences. In the summer of 2016, they are offering a 10-week paid internship for 20 hours per week in their Statistics Division. As a statistician intern, you will apply your academic knowledge to real-world datasets and contribute to on-going projects while working closely with experienced statisticians and analysts. PDA is located on the Mississippi River across from downtown Minneapolis in the Northeast neighborhood.
This is a Carleton Edge Internship. A Carleton alum is the Senior Analyst for Professional Data Analysts, Inc., and this internship is being offered specifically for Carleton students. Visit the Tunnel to apply!

City Internships: Global Internship Program
City Internships has extended an invitation to Carleton students to apply for its Global Internship Program. They offer placements in London, in New York City, and in Los Angeles. Programs are available to suit a variety of interests as well: technology & engineering, consulting & professional services, and banking & financial services are just a few areas in which students may work. Programs are eight weeks long and participants will have access to career seminars, skills workshops, and networking events.

The internships require an enrollment fee and students must finance their own housing; however, accommodation packages are available through City Internships. Visit http://city-internships.com/apply/ to apply.

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Problems of the Fortnight

Solutions to these problems are due by Tuesday, May 10 at noon.

1. Recall that for a series \( \sum_{n=1}^{\infty} a_n \) to converge, the partial sums, which are given by \( s_n = a_1 + a_2 + \cdots + a_n \), must have a limit \( s \) (the sum of the series). If this happens, then \( \lim_{n \to \infty} (s - s_n) = 0 \), and so it is possible, but not certain, that the series \( \sum_{n=1}^{\infty} (s - s_n) \) will converge as well. Let’s define the series \( \sum_{n=1}^{\infty} a_n \) to be superconvergent if it converges with sum \( s \) and \( \sum_{n=1}^{\infty} (s - s_n) \) converges also. It’s not too hard to see that if a geometric series converges, then that series is actually superconvergent. How about for \( p \)-series? That is, for which values of \( p \) is \( \sum_{n=1}^{\infty} \frac{1}{n^p} \) superconvergent?

2. a) Show that every polynomial (with real coefficients, in one real variable \( x \)) can be written as the sum of three cubes (third powers) of polynomials.

b) Show that not every polynomial can be written as the sum of two cubes of polynomials.

For the first problem posed April 15, essentially correct solutions arrived from “Auplume”, from Marshall Ma, and from John Snyder in Oconomowoc. Marshall should stop by CMC 217 to pick up a B.B.O.P. item. Alas, so far nothing has come in on the other problems. Have a great break, whether or not it includes problem solving . . .

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

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