

# Goodσελλ Gazette

Carleton College  
Northfield MN 55057

The newsletter for the Carleton mathematics and statistics community

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## *Colloquium Talk*

Jennifer Galovich, St. John's University/College of St. Benedict  
Thursday, October 22, 4:00 pm, in CMC 206

**Combinatorics and RNA Secondary Structure.** Various combinatorial objects have been used to model RNA secondary structures. This talk will describe some of the known models and introduce a new one which uses permutations. We give a complete characterization of those permutations which correspond to RNA secondary structures, describe some statistics on the RNA secondary structures and their relationship to well-known permutation statistics, and suggest some ways in which these statistics could be used by biologists to distinguish functionally different types of RNA. No previous knowledge of combinatorics will be assumed.

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## *Travel Funds for Students Presenting at Regional or National Meetings*

Are you interested in presenting a paper or poster at a math conference this year? It's a great way to meet other mathematicians and hear great math talks, in addition gaining practice talking about mathematics. Our department has some funds available to help support math majors to go to a regional or national math conference while they are at Carleton so that they can present a poster or paper. Upcoming conferences include the Joint Mathematics Meetings in San Francisco January 13-16, the Nebraska Conference for Women in Lincoln January 29-31, and the MAA North Central Section Spring Meeting April 24-25 at the University of St. Thomas, among others. Talk to Steve Kennedy if you're interested in travel support.

## *Math and Art Night*

Come join the fun as faculty and students attempt to construct some interesting mathematical shapes out of paper plates, paper, staples, and glue. No advanced training is necessary. All lovers of mathematics are welcome, and pizza will be served. We'll meet Wednesday,

October 21, 8 pm in CMC 328. Hope we see you there.

## *IMO Math Competition on PBS*

*Hard Problems* is a feature documentary about the extraordinarily gifted students who represented the United States in 2006 at the world's toughest math competition—the International Mathematical Olympiad (IMO). It is the story of six American high school students who competed with 500 others from 90 countries in Ljubljana, Slovenia. The film shows the dedication and perseverance of these remarkably talented students, and will be aired on PBS stations. Visit [www.hardproblemsmovie.com](http://www.hardproblemsmovie.com) for more information and show times.

## *The Evolving Face of Social Networks*

What can evolutionary graph theory teach us about the spread of ideas on social networks such as Facebook and Twitter? Harvard graduate student Erez Lieberman's evolutionary graph theory is encouraging people to think about social networks in a different way: as an evolving population. Lieberman developed his

foundation through the observation that while most of evolutionary theory deals with populations that have either simple shapes or no structure at all, the world around us is full of evolving systems with all kinds of internal structure – whether it’s the networks of cells present in the human body or the social networks that occur in cyberspace. Learn more about the evolving face of social networks at [www.guardian.co.uk/technology/2009/oct/07/fac-ebook-social-networks-evolutionary-graph-theory](http://www.guardian.co.uk/technology/2009/oct/07/fac-ebook-social-networks-evolutionary-graph-theory)

### *AAAS Mass Media Fellowship*

The American Association for the Advancement of Science (AAAS) Mass Media Science & Engineering Fellowship places senior undergraduate science, engineering and mathematics students at media sites nationwide to work as science reporters for ten weeks. Past sites include the *Chicago Tribune*, NPR and *Scientific American*. By exposing reporters and editors to the expertise of student scientists, while also training those same students in the nuances of journalism, the program can improve the quality of information that is disseminated. AAAS selects 15-20 Fellows each summer. There is a \$4500 stipend plus travel expenses. Applications are now available online at [www.aaas.org/programs/education/MassMedia/](http://www.aaas.org/programs/education/MassMedia/) Application deadline is January 15, 2010.

### *Nebraska Conference for Undergraduate Women in Mathematics*

The registration deadline for the Twelfth Annual Nebraska Conference for Undergraduate Women in Mathematics (NCUWM) is quickly approaching! Register before December 4<sup>th</sup> (first come, first serve) to participate in the conference held on January 29-31. Students have the opportunity to present their research as either a talk or a poster, or to sit in on panel discussions of graduate programs in mathematics. Contact [ncuwm@math.unl.edu](mailto:ncuwm@math.unl.edu) with any questions.

### *PROBLEMS OF THE WEEK*

1. One of the problems posed on September 25<sup>th</sup> involved polyominoes. This first problem also involves polyominoes. As defined in that earlier problem, a monomino is a 1 by 1 square tile, while a straight tromino consists of three 1 by 1 squares glued together in a straight line. The only other way one can glue together three 1 by 1 squares is known as an *L-shaped tromino*. It is easy to tile a 2 by 2 chessboard with 1 monomino and 1 *L-shaped tromino*. Find, with justification, all positive integers  $n$  for which it is possible to tile a  $2^n$  by  $2^n$  chessboard with 1 monomino and the appropriate number of *L-shaped trominoes*.

2. Suppose the sequence  $\{a_n\}$  is defined by  $a_1 = \alpha$ ,  $a_2 = \beta$ , and  $a_{n+1} = a_n + a_{n-1}$  for  $n \geq 2$ . (Note that if  $\alpha = 1$  and  $\beta = 1$ , this is the familiar Fibonacci sequence  $\{F_n\}$ .) Prove or give a counterexample: For every pair of real numbers  $\alpha, \beta$ , there are constants  $A$  and  $B$  so that  $a_n = A F_n + B F_{n-1}$  for  $n \geq 2$ .

Henry Luo solved the first of last week’s problems, but with the use of a calculator. Shunji Li also provided a correct solution; his solution does not use technology. Rebecca Cordes, Shunji Li, and “Snow Lover” all submitted correct solutions to the second problem. Henry Luo mostly solved that problem. The lottery winner this week is Rebecca Cordes. She should stop by CMC 217 to collect a prize from the B.B.O.P. To earn a chance to visit the B.B.O.P. you must submit a correct solution to one or both of the above problems by Tuesday night.

Gail Nelson

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