St. Olaf Mathematics Department

Math Mess

Department of Mathematics
St. Olaf College
Northfield, MN 55057

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This Week's Mathematics Colloquium

Title: What Does That Padlock On Netscape Mean?
Speaker: Steve McKelvey, St. Olaf College
Time: Tuesday, November 18th, 1:30 pm - treats at 1:15
Place: SC 182

This Week's Colloquium

Online vendors constantly assure nervous consumers that it is safe to transmit credit card numbers and other sensitive personal information over the Internet, even as consumers slowly realize that system administrators everywhere along the way can read every byte of every message that passes through their machines. So ... How secure is secure, and how is security achieved?

The talk will discuss the techniques and mathematics of Public Key Cryptography, a brilliant idea---taken from basic research in number theory---that allows two strangers who have never met to securely create a unique encryption system that is extremely difficult for anyone else to crack. Public Key Cryptography, the basis for almost all Internet browser security systems, is good but not perfect. If time permits we will discuss some of its weaknesses.

Steve McKelvey is an associate dean of students as well as a faculty member in the Mathematics Department. A Phi Beta Kappa graduate of Grinnell College, he completed his Ph.D. at Brown University in operations research, concentrating on large-scale network equilibria. Steve is also involved with the mathematical modeling of biological systems, including population levels of endangered species. Steve's present or former employers, along with St.Olaf, include NASA, the Internal
Revenue Service, the Illinois Bureau of the Budget, and the College of Forest Resources at North Carolina State University. Steve's leisure time is spent canoeing, hiking, skiing, folk dancing, and supporting progressive politics.

Bowling with the Profs!

Dust off your spiffy bowling shoes and start polishing your old three-holer, because the Math Department's annual bowling extravaganza is here! Math profs and students alike will come from near and far to show off their mediocre bowling skills this *Thursday, November 20th, at 7:30pm* at Jesse James Lanes. Rides to the bowling alley will be leaving from OMH at 7:15, so you have no excuse not to come! It's bound to be a great time, so mark it in your calendar and we'll see you there.

Pre-Service Teacher Program

If you are preparing to teach K-12 math or science, then this full-time summer internship might be for you! The program is run through the US Dept. of Energy, and places students in paid internships in Science, Math, and Technology at any of several different locations around the country. Students work with scientists or engineers on projects related to the laboratories' research programs. They also have the mentorship of a Master Teacher who is currently working in K-12 education as a teacher and is familiar with the research environment of a specific National Laboratory. The different laboratories each offer different research opportunities. Applications are due in February, and more info can be found at http://www.scied.science.doe.gov/scied/PST/about.htm.

Last Week's Problem

There are six sparrows sitting on six trees, one sparrow on each tree to begin with. The trees stand in a row, with 10 meters between any two neighboring trees. If a sparrow flies from one tree to another, then at the same time some other sparrow flies from some tree to another the same distance away, but in the opposite direction. Is it possible for all the sparrows to gather on one tree? What if there are seven sparrows and seven trees?

The answer is no for six sparrows, and yes for seven. The problem was solved by the usual suspects: **Adam McDougall '05**, **Matthias Hunt '07**, **Robert Orme '05**, **Heather Wood '07**, **Will Mitchell '06**, and **Senator Zorn**. For seven sparrows (or any odd number), just do it. To prove that it is impossible for six sparrows, an idea is necessary. All solutions involved some form of this idea. Consider the sum of each sparrow's distance from the left-most tree. To start with, this is 0+10+20+30+40+50=150. And, it must stay at 150! This quantity is called an invariant. If all the birds were to end up on the same tree, this tree would have to be 150/6=25 feet from the left-most one. But there is no tree there. This result generalizes in a straightforward way.

Problem of the Week

Ostebee and Zorn just got a section of whatever book they're currently working on back from the publishers. It has some obvious mistakes, like those in the previous sentence, so they both need to proofread it. There are 18 pages in the section, and they have ten days in which to do the proofreading (independently). On the first day, Zorn fixes the first two pages, while Ostebee only gets one page done. Thereafter, each does at least one page per day, with Zorn never falling behind Ostebee, and both finishing on the tenth day. Prove that there must be some span of days (not including the first day) over which both fixes the same number of pages.

*** Please submit all solutions by Wednesday at 5 o'clock to David Molnar by e-mail (molnar@stolaf.edu) or by placing them in his box at OMH 201.

If you would like to receive a copy of the Math Mess in your P.O. Box weekly, please e-mail Donna Brakke at brakke@stolaf.edu.

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