## This Week's Mathematics Colloquium

Title:  Instant Insanity and Scramble Squares
Speaker:  Kay Smith, St. Olaf College
Time:   Tuesday, October 28th, 1:30 pm - treats at 1:15
Place:   SC 182

## This Week's Colloquium

Instant Insanity is a puzzle consisting of four cubes. Each face of a cube is colored with one of four colors.  The object is to arrange the four cubes in a stack so that all four colors appear on each side of the stack.  In the 1960's T. H. O'Beirne published a clever way to solve the puzzle which we will present in the first part of the talk.  In the second part, we will consider another puzzle called Scramble Squares.  As we discuss attempts to solve this puzzle, we will illustrate the mathematical research process.

Kay Smith joined the mathematics faculty at Saint Olaf in 1980.   She received her B.S. from Bucknell University and Ph.D. from Yale. When not on campus, she enjoys conducting math enrichment activities for elementary school children.  Her non-mathematical interests include chocolate desserts.

## Great Summer Opportunity

The Institute for Pure and Applied Mathematics at UCLA is excited to announce the fourth year of an innovative summer program for undergraduates. The program is called *Research in Industrial Projects for Students* (RIPS), and it puts together teams of 3-5 undergraduates paired with faculty mentors and industry liaisons whose goal is to solve real-world industrial problems.   Sponsors have included companies such as Pixar and national laboratories such as Los Alamos.

Last summer RIPS completed it's 3rd summer program, and as in the previous two years, it was very successful and the undergraduates who participated were enthusiastic about their experience.  Want to know more?  Additional information, including comments from students and information on prior projects, can be found on the RIPS website at http://www.ipam.ucla.edu/programs/rips2004/

and questions can be addressed to rips2004@ipam.ucla.edu.

## Math Practicum

Want to tackle a "real" math problem? One that's challenging and open-ended, yet of great importance to a local business or organization? One that requires creativity and teamwork? One that asks you to apply mathematical, statistical, or programming knowledge you possess while potentially exploring new territory? Then the Math Practicum is for you!

Past projects have been conducted for organizations from Target Corportation to Northwest Airlines to Medtronic to the Minnesota Department of Human Services. The mathematical and statistical methods applied have ranged from survival analysis to transportation models to multiple regression to stochastic modeling. Most clients who have participated in the practicum have been extremely impressed by the professional and creative quality of the students' work, and most students who have participated have cited the practicum as among their most memorable undergraduate experiences.

Fifteen slots are available for the Math Practicum this coming January; priority will be given to seniors, although there may be a few spaces available for interested juniors. Sign-up sheets for interested students will be posted outside the doors of Ted Vessey (OMH101) and Paul Roback (OMH206), then interviews for the available slots will begin around October 27th. Come sign up! If you have any questions, please contact Professors Vessey or Roback.

## Actuarial Enlightenment

Cecil Bykerk, Chief Actuary of Mutual of Omaha, will give a presentation regarding the actuarial profession on the afternoon of October 30 at 2:00 pm in SC 188. He will discuss several current issues that illustrate the work of actuaries including his recent involvement in the passage of a Genetic Discrimination Protections bill in the US Senate. He will also ask Tilman Achberger to discuss the project that Tilman completed while working as a summer student at Mutual of Omaha this past summer. In addition, Cecil will discuss the educational process that actuaries must complete and how it is changing. Finally, he will give an overview of the Mutual of Omaha Summer Program. Cecil has worked for Mutual of Omaha for nearly twenty-five years. Before that he was professor of Actuarial Science at the University of Nebraska-Lincoln. He currently serves as Chair of the Education Comittee of the International Actuarial Association. His daugther, Andie, graduated from St. Olaf in May 2002 and currently works as actuarial student at Mercer Consulting in Minneapolis.

## New Faculty Spotlight:
## Paul Roback

Paul is an applied statistician, having attacked problems ranging from clinical trials in panic disorder to population models for bowhead whales to indicators of welfare recidivism to the effects of forest fragmentation on birds. He returns to The Hill after a long hiatus; after graduating from St. Olaf in 1989 with majors in mathematics and economics, Paul recevied an M.S. in statistics from Iowa State, worked as a clinical statistician for Eli Lilly, received a Ph.D. in statistics from Colorado State, and taught for several years at both Bucknell and Connecticut College.

In addition to applied statistical consulting, Paul's research interests include Bayesian statistics, nonparametric methods, and statistical education. Paul and his wife Karen have three young children – Samantha, Timothy, and Sophie – who keep his office decorated with fine artwork. Outside of his office, Paul can often be found on some athletic

court or field, playing basketball, tennis, soccer, and maybe even broomball. Or, he can be found putting his statistical knowledge to good use – attempting to win the coveted Joe Boe Trophy in the Boe Fantasy Football League.

## Assorted Course Offerings

Below are some of the Math/CS course offerings for this Interim and Spring Semester. Keep your eyes open for more course descriptions in the next few weeks.

### Interim:

*CS 378: Bioinformatics* (Allen/Trilling/Rutherford)
When biologists ask questions that require computer scientists to answer, the result is Bioinformatics. For example, now that the patterns of DNA (genomes) have been determined for various organisms, retrieving that data in useful ways, and analyzing it (e.g., comparing two genomes, or detecting individual genes within a genome) calls for some interesting Computer Science. Furthermore, the inspiration goes both ways: the results of CS techniques make it possible to ask further questions and pursue new lines of Biology investigation. Furthermore, biological results produced by this fruitful collaboration have great relevance in society, e.g., helping to determine genetic causes of cancer or factors in the spread of organism-borne diseases such as tuberculosis.

We will offer a first course in this exciting new interdisciplinary field during January Interim 2004. Biology, CS, math, and stats students are encouraged to take this course, which has prerequisites Intro to CS and either Software Design *or* Biology 125, or permission of instructor; students with biology background will be given extra help in CS, and students with CS background will be given extra help in Biology. The course counts for no less than three majors –

Biology, CS, or Mathematics (satisfies the "applied" requirement) - and two concentrations – CS and Molecular Biology. For questions about the course, you can check with Rich Allen.

*Math 356: Geometry* (Cederberg)
We will explore principles of finite axiom systems, Euclidean, non-Euclidean and fractal geometries using hands-on exploration and dynamic geometry computer labs. Students will work in groups of three on assignments that include writing proofs and a formal class presentation. Course prerequisites include Math 220 and 244 or 252. Class will meet M-F from 8:30 to 10:00 and from 1:00 to 2:30. Note: The course concludes with the study of fractal geometry, not projective geometry as listed in the interim catalog.

*Math 224: Investigative Mathematics* (Dietz)
This course is designed for students thinking about (but maybe not yet committed to) being math majors, who have not taken courses beyond linear algebra (Calc II is the only prerequisite). The course is inquiry based: students will investigate various mathematical topics (number theory, graph theory, some calculus topics, a bit of algebra), conjecture theorems, and even prove theorems. This will be an excellent bridge to the more serious theory courses of ERA and Abstract Algebra. See or write to Prof. Dietz for more information.

### Spring Semester:

*Math 252B: Abstract Algebra* (Corzatt)
Abstract Algebra will be taught with special emphasis on the axiomatic method, problem solving and proof writing. The course content will be similar to the usual offering but we will not be using a text. Instead we will work from classroom notes and problem sets which the instructor has developed. If you have any questions contact Professor Corzatt

## Actuarial Jobs

Watson Wyatt Worldwide is one of the world's leading human resources consulting firms providing services to multinational corporations, public employers, FORTUNE 500 companies, and nonprofit institutions.

They are hiring for actuarial analysts, interns and group and health care analysts. Some of the deadlines are past, but if you are interested, you can e-mail Amelia Taylor at ataylor@stolaf.edu or stop by OMH 205, or e-mail Eileen Shimota in the office of experiential learning at shimota@stolaf.edu.

## Last Week's Problem

If you tape together eight standard dice into a 2x2x2 cube, is it possible for the four numbers on each side to have the same sum? If so, what sums are possible? Remember that on a standard die, opposite faces add to 7.

**Heather Wood** and **Paul Tveite** submitted solutions, with Paul promising a proof that his answers of 8, 12, 14, 16, and 20 were the only sums possible. I knew why Paul's proof hadn't come in when **Chris Ebert** stopped by my office with a solution with a sum of 13. Chris eventually came up with solutions for all numbers from 8 to 20. And I think it was **Adam McDougall** who proved that these are the only possibilities - the three numbers at each corner of the 2x2x2 block must add up to at least 6 and at most 15. So the total of all the numbers visible must be between 48 and 120 inclusive, and for each face to have the same sum, this sum must be no less than 8 and no more than 20.

## Problem of the Week

The following problem appeared on the Carlson: Clicker the robot is back, and once again occupying the lower-left square. Clicker intends to travel through every room in an n-by-n grid. There are three possible moves that Clicker can make: one square to the right, one square up, or one square diagonally down and to the left (East, North, and Southwest, if you will). For which values of n is it possible for Clicker to travel by some sequence of such moves through every square in the grid exactly once, ending up in the square just to the right of the initial square?

Many people missed the last restriction. With this condition, the answer is "none" (this is still interesting to prove if you have not done so already). But, taking off the restriction on the final square, we still have an interesting problem. For which values of n is it possible to make a trip through the entire grid?

If you want to get the Mess problems ahead of time, they will be sent out on Thursdays on Molnar's math-probsolv email alias. Let him know if you would like to be added to the alias.

\*\*\* 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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