Math ⬡ Mess

> # This Week's Mathematics Colloquium
> Title: Solving Puzzles and Composing Music with Commutators
> Speakers: *John Kiltinen*, Northern Michigan University (Mathematics)
> *Peter Hamlin*, St. Olaf College (Music)
> Time: Tuesday, March 2nd, 1:30 pm - treats at 2:30
> Place: Talk in SC 182; music in SC Lobby

This Week's Colloquium

A commutator is, at its most abstract, a group element of the form $ABA^{-1}B^{-1}$. Less formally, you start by doing a first thing and then a second thing, and follow this by reversing the first thing and then reversing the second thing.   John Kiltinen will begin by describing how commutators are fundamental to solving permutation puzzles. He will demonstrate his puzzle software and show how adding musical sounds to the puzzles as a feedback device leads to the idea of commutators in music. Peter Hamlin will then discuss using commutators as a new device for composing music, and demonstrate his Commutator Music Machine software.

The presentation will end – unusually for a mathematics talk---with the Minnesota premiere performance by the string quartet *Mathemusica* of an original composition by Peter Hamlin.   The work is built on a commutator motif from one of Kiltinen's puzzles.

John Kiltinen has taught mathematics at Northern Michigan University for over thirty years. He is a long-time active member of the Michigan Section of the Mathematical Association of America, having served in many capacities including a 3-year stint as Governor.   His book, *Oval Track and Other Permutation Puzzles*, which comes with a CD-ROM of puzzle programs, was published by the MAA in 2003.   (John's son, Eric, is an Ole, class of '93.)

Peter Hamlin has taught composition, music theory, and electronic music at St. Olaf since 1992. He received his doctorate from the Eastman School of Music, where he studied with Joseph Schwantner and Samuel Adler. He has a long-time interest in computers, electronics, and mathematical applications in musical composition.

A Sampling of Summer Opportunities

Every summer there are a plethora of opportunities for undergraduate students in mathematics, statistics, and computer science. These opportunities run the range from internships in the private or public sector, to Research Experiences for Undergraduates, to research programs right here on campus. Below I list a few opportunities that have just recently come across my desk, but this is just a small sampling of all that is out there. Note that deadlines are quickly approaching. For information about more opportunities, talk to your favorite math prof.

Summer Institutes for Training in Biostatistics is sponsored by the National Heart, Lung, and Blood Institute. This program is offered at three sites: **Boston University**, **North Carolina State University**, and the **University of Wisconsin-Madison**. The aim of this program is to introduce undergraduate students to the exciting profession of Biostatistics through course work in the principles and applications of statistical methods in biomedical research. Students will gain hands-on experience working with real data collected in major clinical studies. Each of these three programs has its own unique features, but what they share in common is a well conceived and balanced agenda and an ensemble of outstanding and dedicated investigators who will carry out a highly successful training program. For more information please see the program web sites:

> http://www.bumc.bu.edu/biostats/sibs
> http://www.stat.ncsu.edu/sibs
> http://www.biostat.wisc.edu/training/sibs

Target Technology Services Ann Bailey, the better half of Master Teacher Randy Bailey, is a Manager in the Project Office at Target Corporation. She is looking for a current student (graduating in 2005 or later) who is interested in Information Technology/software design or development or project management as a career and would like a summer job at Target. Salary is roughly $15/hour. If the IT person had a great stats background, that'd be a bonus! Any interested student should contact Randy as soon as possible.

Mercer Government Human Resource Consulting Andie Christopherson '01 writes "A non-exam-taking analyst position is open here at Mercer. As a fellow Ole, I can assure you this job is rewarding; you help set rates and do other projects for state Medicaid programs. Anyone interested should go out to our website (www.mercerhr.com) and send their resume online for the "Analyst-Government Sector Consulting" in Minneapolis. The official go-to person for the opening is Justyn Rutter, but I would be happy to talk to you about any questions you have too. Thanks for your time and consideration!"

Mercer Government Human Services Consulting (GHSC) within the Health & Group Practice works with state governments to assist in purchasing health and welfare benefits. The GHSC is the largest Medicaid consulting practice in the country, currently serving over 30 states. With a hub in Phoenix, Arizona, GHSC currently employs more than 100 people in the practice, 20 of whom are located in Minneapolis. The GHSC is a growing specialty practice with a variety of opportunities for growth.

The GHSC is searching for a Health Care and Group Benefits Analyst to provide actuarial support on a variety of projects. Key responsibilities in this position include, but are not limited to:
- ?? Collect, analyze and interpret benefit plan experience data.
- ?? Analyze experience, estimate future plan costs and calculate plan prices.
- ?? Assist in the development of customized pricing and valuation models.
- ?? Develop awareness of benefit plan designs, cost factors and renewal processes.
- ?? Develop data manuals for health plans and client use.

?? Health plan financial auditing.

Contact Justyn Rutter at (612) 642-8938 or justyn.rutter@mercer.com.

Summer Research Experience at Iowa State University This program, Vertical Integration of Research and Education (VIGRE), aims to increase the level of interaction among students, postdoctoral fellows, and faculty in an effort to better prepare students for the broad range of career opportunities available in the statistical sciences. At the heart of the program at Iowa State is a collection of **work groups**, composed of a number of faculty, postdocs, graduate students, and undergraduate students. The work group structure will enable undergraduate students to become involved in coordinated research efforts at an earlier stage in their program of study than is the current norm. Work groups have been formed in the areas of Bioinformatics and Genetic Statistics, Statistics for Engineering Applications, Environmental Statistics, Probability and Stochastic Processes, Statistics in the Social Sciences, and Statistical Sampling Methodology. Future groups may be formed in other areas on the basis of student and faculty interest.

The Department invites applications from highly qualified and motivated undergraduate students for participation in an Undergraduate Summer Experience in Research (USER), organized under one of the work groups. Room and board plus an additional stipend will be provided for an 8 week program. Applications are invited from students majoring in any scientific field who wish to gain exposure to the process of data collection and analysis from a statistical perspective. More information can be found at http://www.stat.iastate.edu/update/vigreunders.html. *Note that the deadline just passed, but the director of the program reports that there are still openings, so students are encouraged to submit applications ASAP.*

Last Week's Problem

What is the smallest number of 2s required to make the number 2004? For example, we have $2004 = 2222 - 222 + 2 + 2$. So at most nine. What about 3s? 4s? ... up to 9s.

The best answers received were seven 2s, from **Adam McDougall**, $(2^{22/2} - 22 \cdot 2)$, seven 3s, from **Heather Wood,** $(333(3+3)+3+3)$, and six 4s, also from Adam, $(4^4(4+4)-44)$. Adam also had a solution using 5s that was too disgusting to print. I'm still interested in other results, or improvements on these.

Problem of the Week

A Martian word is any string consisting only of the letters X, Y, and Z. Prove that for any n, there is always one more Martian word of length n with an even number of Xs than with an odd number of Xs.

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 Thursday at noon 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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