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: Practicum Projects
Speakers: Thirteen really cool math students
Time: Thursday, Feb 21st, 2 pm
Place: SC 182

This Week's Colloquium

Jeff Boerner, Megan Daymont, Evan Froderman, Peder Hanson, and Jonathan Von Stroh will be presenting their project entitled "A study of boarding procedures for NWA". This is the first such analysis of security and boarding procedures by NWA since September 11th changed air travel in the U.S. This talk presents a multi-faceted synthesis of analytical techniques that will wow and inform you about current boarding procedures at MSP airport. The group not only collected their own extensive set of data at MSP, but they also performed regression analyses, flow models and process analyses that are sure to be of use to NWA for many years to come.

Nathan Hubbell, Jon Larson, Jerad Parish, and Heather Tollerud will be presenting their project entitled "Warranty & Peace". When these students weren't walking through massive freezers reminiscent of Minnesota winters of the past, they were consulting with a Northfield company that designs, fabricates and custom installs huge freezers. Their aim was to improve the already high customer satisfaction and reduce warranty costs. They have used some really unique and innovative methods to display and analyze a complex and enormous dataset of installation and warranty information from nearly 200 jobs.

Lynne Peeples, Satyam Panday, Erin Peterson, and Eric Weinhandl will be presenting their project entitled "Prediction of Time-to-Mold". This group got a hold of some real experimental data produced in the microbiology labs at General Mills and they creatively combined two different survival analysis methods (Accelerated Failure Time modeling and Cox Proportional Hazards modeling) with a standard industry response surface model to produce estimates of time to mold for various combinations of experimental factors.

MAA T-shirts

The MAA is holding its annual t-shirt design contest, with submissions due on or before **March 4** in the Math Department office, OMH 202. So, if you think you have what it takes to create the next math t-shirt design, we want to see it!

Konhauser Problemfest

This is the last call for this year's Konhauser Problemfest, to be held this Saturday at St. Thomas. If you are interested in participating, you must let us (molnar) know, so we can make sure we can you get there! We have to leave at 7:30am, but there will be breakfast and lunch provided. There will be another "practice session" for the curious, Wednesday 7-9pm in SC182.

Last Week's Solution

Last week's problem: 24 senior math majors still need to take their core course. Currently 7 are signed up for Humke's Real Analysis, 8 are signed up for Molnar's Combinatorics, and 9 are signed up for Zorn's Wavelets. None are taking more than one of these courses, or has any intention to do so. Whenever two of these students meet who are signed up for different core courses, they both decide to drop the course they are in and add the third. Is it possible that in this way all 24 will end up in the same course?

Solution: The final problem from last semester was a typographical error. We ignore it in order to say more about the problem of 2/14.

It is not possible for all 24 students to end up in the same class. As noted by **Brian Peters**, **Rob Hilliard**, and **Adam McDougall**, the differences between the class sizes can only change by three at a time. Thus, as the class sizes do not begin differing by a multiple of three, they cannot end up differing by a multiple of three. This idea is formalized by the concept of an *invariant*, which is a very common technique for proving the impossibility of certain outcomes of an indeterminate sequence of `moves'.

A formal proof: Let a, c, and w be the number of students in analysis, combinatorics, and wavelets respectively. Consider the sum 0a+1c+2w, which is initially 26. When two students switch into wavelets, the sum increases by three. When two students switch into combinatorics, the sum is unchanged. When two students switch into analysis, the sum decreases by three. So the *remainder* of the sum upon division by three is an *invariant* (namely, 2). Were all of the students to end up in the same class, the sum would be 0, 24, or 48, none of which has a remainder of 2 when divided by three. So the result in question is impossible.

Problem of the Week

Here is a classic problem from Diophantime equations—equations which require positive integers as solutions, as discussed in last week's number theory colloquium. The triangular numbers: 1, 3, 6, 10, are those which can be depicted by a triangular array of dots, each row having one more dot than the row above it. The question is, which triangular numbers are also perfect squares? Are there infinitely many?

*** Please submit all solutions to David Molnar (molnar@stolaf.edu) by noon on Sunday.

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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