MSCS Mess

Department of Mathematics, Statistics and Computer Science
St. Olaf College
Northfield, MN 55057

April 24, 2006
Volume 34, No. 17

This Week's Colloquium

Title: The Mathematics of Shopping? Why Not!
Speaker: Tracy Bibelnieks '85
Augsburg College
Time: 1:30 PM on Tuesday, April 25
(treats at 1:15 PM)
Place: SC182

In today's consumer-driven marketplace, it is clear that winning business strategies for consumer-centric industries are those tailored to fit individual characteristics of consumers. Statistics and mathematical optimization, including linear and nonlinear programming, combine to form powerful approaches and solution strategies as businesses seek to leverage the breadth and depth of historical and predicted consumer information and behavior. So, let's go shopping and explore how businesses use the mathematical information that can be found in consumer shopping carts!

After graduating from Olaf, Tracy finished her Masters and Ph.D. in Mathematical Sciences at Clemson University in South Carolina. Since grad school she's held positions at the U of MN and as a Mathematical Consultant for IBM and Decision Intelligence Inc. Her current mathematical interests are two-fold. As an applied mathematician Tracy is working on applications of operations research in the retail business sector as well as using Fourier Analysis to analyze boundary and domain transformations of lipids. As a mathematics educator, she is involved with curriculum review and revision for pre-service K-6 teachers and in-service professional development for K-6 teachers. Outside of acadmia, Tracy enjoys time with her husband, kids (human and goats), and everything outdoors at her farm in Wisconsin. Well, maybe not the mosquitos.

Return of the PIG ROAST

Yes, yes, the rumors are true. The annual pig roast is back by popular demand, and will take place on Sunday, May 14 at 1:00 p.m. Tickets are now on sale for $5 (in the math hallway or from Donna Brakke). Come for food, come for fun, come to gawk at the pig, or come to put off studying for finals. And most importantly, come to beat the faculty at softball!

Problem of the Week (POW)

A two part question this week—but contact Amelia Taylor if you get either part.

a) Is it possible to place the numbers -1, 0, 1 on the squares of a 4 X 4 grid so that the eight row and column sums will all be different?

b) What if we also want one of the two diagonal sums to be different from the previous sums? Is that possible?

*** Please submit all solutions by Wednesday at noon to Amelia Taylor by e-mail (ataylor@stolaf.edu) or by placing them in her box at OMH 201.

Last Week's Problem

Are there any three digit numbers A such that $A = a! + b! + c!$ where a, b, and c are the digits?

Congratulations to a set of solvers that spans all four graduating years! Carrie Manke '06, Brendan Bailey '07, Michael Soma '07, Jeremy Gustafson '08, and Thomas McConville '09 all submitted correct solutions to this week's problem. The answer is outlined below.

First, $n!$ for $n \geq 7$ is a 4-digit number, so a, b, c must be less than or equal to 6. Also, 6! is 720, so the first digit is too large for 6 to be a, b, or c. Therefore, $a, b, c \in \{0, 1, 2, 3, 4, 5\}$. Sums of any of the first 5 digits in that list will not give a 3 digit number, so 5 must be one of the numbers. Using a similar argument, the first digit of the number has to be 1 at this point, so 1 must be one of the numbers. A quick check of 2, 3, and 4 shows that the solution is $145 = 1! + 4! + 5!$.

Last Week's POW: The Sequel

Paul Zorn did a little extra investigation for last week's POW and submitted the following observations:

If n is a number, let's call fac(n) the sum of the decimal digit factorials of n. A number with n=fac(n) is called a *factorion*. A little fooling around reveals that 1, 2, and 145 are the first three factorions.

Are there any more?

Well, if n has k digits, then fac(n) cannot exceed k times 9!, so a factorion n must satisfy the inequality $n < 9!*k = 362880*k$, and a bit of fiddling (with logs, if you like) shows that this forces n to be less than about 2.5 million.

These n can be searched mechanically without much fuss. I wrote a crude Maple program to do just this, and it took about 2 minutes to check the first 2.6 million cases. The only factorions found were 1, 2, 145, and 40585, and so that's all there are.

Student Work Published!

An article written by Steff Halberstadt '06 and Stacey Wood '06 has been published in the latest issue of CHANCE, a magazine of the American Statistical Association. Halberstadt and Wood's article, "Global Public Health: The New Frontier of Statistics," reflects on their experience studying biostatistics at the World Health Organization in Geneva during Interim 2005.

Computer Science 284: Client-Server Applications

As you look through the MSCS course offerings for next fall, don't forget to look under separate links for the statistics and computer science courses. One exciting computer science that is being offered is CS 284, Client-Server Applications.

A web browser and web server together make an example of a client-server application: your browser is the "client" that provides access to web servers that may be thousands of miles away. In CS 284, students will explore the essential components of such systems, including graphics user interfaces (GUIs) of a client, network programming, server design, and database systems for storing and retrieving information. Students will explore most of these concepts using the powerful and widely used Java programming language, introduced in the course; they will also be introduced to SQL for database operations and programming with XML to represent and transmit information. These concepts and skills will be tied together in a semester-long team project with real clients, created using the emerging "agile programming" methods. The only prerequisite is CS 125 or CS 251; more advanced students can move into the project more quickly.

Note: CS 284 will be offered MWF 2:00-3:25 instead of the usual 2:00-2:55, allowing more time for labs and team programming.

Questions? See Dick Brown (rab@stolaf.edu).

Editor-in-Chief:	Paul Roback
Associate Editor:	Meredith Johnson
MM Czar:	Donna Brakke

Problems Editor: Amelia Taylor