MSCS Mess

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

February 21, 2005
Volume 33, No. 13

This Week's Colloquium

Title: How We Spent Our January Interim: the 2005 Mathematics Practicum
Speakers: The Metris Group and the Spinnaker Group
Time: Tuesday, February 22th, 1:30 pm
(treats at 1:15)
Place: SC182

How is mathematics really used, in the real world, by real people, to solve real problems? In the Mathematics Practicum, offered each Interim, students find out. They work in teams for the full month on open-ended, sometimes ill-posed, real-world problems. In this week's colloquium, two of these teams will present on their project.

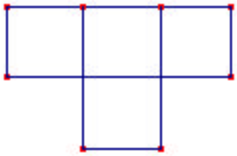
The Metris Group (Bjorn Berg, Stephanie Dalager, Mark Holland, Brendan Mrosak, and Kylie Stitt):
Have you ever wondered why credit card companies choose you to solicit to? The primary goal of our project was to create a model that would predict the probability that a consumer would respond to a Hispanic credit card offer. We aimed to improve upon Metris Companies' existing model used to predict who will respond to a credit card offer in the general population. The second goal of our project was to create a model that would accurately predict the propensity of a consumer to speak Spanish. Using both of our models, Metris can better target consumers who will be most likely to respond to a credit card offer in Spanish. In our data analysis for both goals, we used logistic regression techniques as well as decision tree model building. In the presentation, we'll further explain the methods we used and our exciting results.

The Spinnaker Group (Joel Couenhoven, Kirsten Eilertson, Steve Engle, Alison Newgard, Eli Townsend):
The processing power of computers has been growing at an astonishing rate since the 80's. With this increase in power it has become cheaper and faster to use computers to develop mathematical models of processors instead of creating actual prototypes for testing. This January, our group helped Spinnaker, a Twin Cities company, to model the electric fields involved in a new chip they were building. A chip they claim will make computers up to 100 times faster! Come hear how simple calculus and linear algebra were used to search for a stable model and what the final results were with the methods the practicum group employed.

Problem of the Week

In honor of the 13th annual Konhauser contest, we give you a vintage question. Here is a bit of trivia for you as well. I did one question by myself the year I did the Konhauser. This is it.

From a 7x7 chessboard I remove the middle squares from one edge. Is it possible to tile the remaining board with twelve T-tetrominoes? (a T-tetromino consists of four squares in the shape of a T).



Bonus: Which Konhauser (annual, not year) is this question from and where did we go to take it?

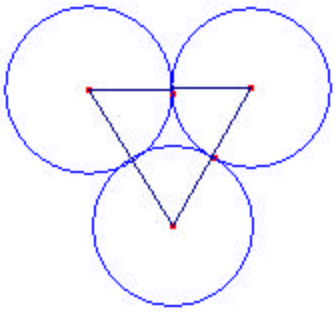
*** Please submit all solutions by Wednesday at noon to Amelia Taylor by e-mail (ataylor@stolaf.edu) or by placing them in her box at OMH 201.

Last Week's Problem

A Quaker once, we understand
For his three sons laid off his land.
And made three equal circles meet
So as to bound an acre neat.
Now in the center of the acre
Was found the dwelling of the Quaker.
In centers of the circles round
A dwelling for each son was found.
Now can you tell by skill or art
How many rods they live apart?

Solution to Last Week's Problem:

Unfortunately, no solutions were submitted this week. This problem takes some careful reading. One clue is that the dwelling of the quaker is in the center of the acre bounded by the circles. So the picture (below) is three circles that are mutually tangent and the region in the middle is where the Quaker lives. This region is an acre.



The sons live 2r apart, where r is the radius of the circles (they are equal so all have radius r). In the picture above, 2r is the length of the line segments. The acre is then the area of the equilateral triangle minus the three sectors that each have area $\frac{1}{6} \cdot \pi r^2$ (the angles of the sectors are 60 degrees, so the sector is 60/360 = 1/6 of the area of the circle). There are 160 square rods in an acre so

$$160 = \sqrt{3}\cdot r^2 - 3\left(\frac{1}{6}\cdot \pi r^2\right) = \left(\sqrt{3} - \frac{\pi}{2}\right) r^2 .$$

Thus $r = \dfrac{4\sqrt{10}}{\sqrt{\sqrt{3} - \frac{\pi}{2}}}$ rods and the answer to the question is then $\dfrac{8\sqrt{10}}{\sqrt{\sqrt{3} - \frac{\pi}{2}}}$ rods.

Global Health & Biostatistics at the World Health Organization: An Exercise in Flexibility

By Steff Halberstadt and Stacey Wood

Thanks to the meticulous planning and careful research of Professor Julie Legler, a new statistics interim was born this year. In January a group of 16 students traveled to Geneva, Switzerland to study biostatistics and global health. In addition to classroom activities, students also had a chance to participate in two different projects at the World Health Organization. For the first project, students analyzed tobacco use data from the World Health Survey (WHS). The WHS aimed to collect first time comparable data on health risk factors and demographics from many developing countries. The group examined trends in tobacco use with respect to age, sex, education, and occupation. For the second project, students investigated data on vaccine coverage in developing countries. The group formulated several regression models to determine the coverage of the third dose of DTP vaccine using the first dose figures. Aside from the projects, students heard over 20 speakers from many leading international organizations such as: Doctors Without Borders, International Agency for Research on Cancer, and various groups from the WHO like Polio Eradication. These speakers emphasized the great need for statistics and statisticians in the realm of global public health. Additional activities included tours of the United Nations, the World Health Organization, the International Red Cross Museum, and two excursions into France to visit the International Agency for Research on Cancer in Lyon and the center of Euromedicine in Montpellier. The trip provided students with an excellent background in the inner-workings of global public health and opportunities for future experiences. Overall it was a statistically significant success!

Konhauser Contest Approaching

The main annual problem solving contest in the spring is the Konhauser. This team contest is shared between St. Olaf, Carleton, Macalester, Gustavus, St. Thomas, St. Catherine and Augsburg. This year the contest is on February 26, 9am - noon at Carleton. If you are interested in participating and have not already contacted Amelia Taylor (ataylor@stolaf.edu, OMH 205) you need to do so as soon as possible.

Webmaster Wanted

Wanted: Webmaster to maintain and update the mathematics department web page. Must have experience with Macromedia Dreamweaver. Total time required is around 2-4 hours per week for the remainder of the semester (this is negotiable). If interested, contact Matt Richey.

***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.

Editor-in-Chief: Paul Roback

Associate Editor: Thomas Noah Loome

MM Czar: Donna Brakke

Problems Editor: Amelia Taylor