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This Week's Colloquium

Title:	Integrating Genome Exploration and Visualization Tools
Speaker:	Libby Shoop Macalester College
Time:	1:30 pm Tuesday, November 13th
Place:	SC 182

Abstract: The field of genome research has produced large amounts of diverse data about the genomes of many species of organisms in biology's 'tree of life'. The different types of data are best suited to be viewed and explored with many different types of data exploration tools, ranging from tools that make querying data easier, to tools that display data in graphical tree format, to tools that visualize the relative amounts of expression, or abundance of genes, in certain conditions in an organism. In this talk I will discuss the development of and demonstrate a system that enables researchers to use a set of these types of tools more effectively together by enabling them to pass information gathered from one tool to another tool for further exploration. We have designed the system to enable other tools to be added fairly easily- I will discuss how this is done and some of the challenges we face in making such a system work well with the variety of data that genome researchers have generated.

Bio: Professor Shoop is a computer science teacher at Macalester College. Her research interests include bioinformatics and data exploration tools, and she has directed numerous undergraduate research students as they have explored these areas and built data exploration tools of their own. Libby, a Northfield native, has been at Macalester College since 2001, and prior to that worked as a research associate at the University of Minnesota's Center for Computational Biology and Genomics.

Mathematics and War

The branch of mathematics called operations research (OR) was originally developed to deal with military problems. In the late 1930's the British introduced radar as a means of locating enemy aircraft. Recognizing that its effective use involved operational as well as technical issues, the Royal Air Force organized a group of mathematicians, scientists, and engineers to analyze the physical equipment, communication networks, and behavior of personnel involved in using the radar. The idea of OR groups spread to the other British military branches, and during World War II these groups analyzed military operations and suggested ways to optimize the use of existing military equipment. Organized operations research activity began in the United States in 1942 to study the use of mines. Subsequently it was used to study both amphibious and ground operations. Following the war the use of operations research spread to industry.

To learn about operations research today see http://www.informs.org/index.php?c=74&kat=-+Career+Booklet&p=194%7C202%7C

or take Mathematics 266 next semester.

Reference:http://www.britannica.com/eb/article-68171/operations-research

2007 Pi Mu Epsilon Conference

Last Friday afternoon, six Oles, David Swanson ’08, Thomas McConville ’09, Bjorn Paulson ’10, Rachel Darling ’11, Sarah Sprague ’11 and Paul Humke ‘XX left St. Olaf to attend the twenty-Second Annual Pi Mu Epsilon Undergraduate research conference at St. Norbert College in De Pere, Wisconsin.

The Friday evening session began with two parallel sessions of ten undergraduate research talks concluding with “How We Roll: The Theory and Construction of the Square Wheel Bicycle” by Alica Brinkman of St. Norbert. Keith Devlin, Stanford University gave the plenary evening lecture entitled “The Numbers Behind NUMB3RS: The Real Mathematical Story that Inspired the Hit Television Series.” Keith was the first mathematician consultant for the series. Above is a picture of the Ole group with Professor Devlin. After Devlin’s talk there was a math game show Face Off!” played by six of the college teams present followed by a pizza party.

On Saturday morning Rachel led off the Ole talks with “Balancing Massachusetts” at 9:40 followed by Sarah, speaking on “Music of the spheres.” David spoke at 10:30 on “Comparing the density and f-density topologies” and was followed by Thomas speaking on “A derivative that is not Riemann integrable.” These were all wonderful talks and professionally presented. At 11:00 Professor Devlin gave his second talk of the conference entitled “Math 20-20 vision.” The entire conference ended at 12:30, we snagged a quick Subway and headed back to Northfield, returning to campus about 6:30.

Problem of the Week (POW)

Oct 26 Solution

An arrow is placed on each square of a tic-tac-toe board, pointing vertically or horizontally to one of its neighbors with equal probability. That is, the arrow in the upper-left square has a 50% probability of pointing right and a 50% probability of pointing down. The arrow in the middle square of the top row has a 1/3 probability of pointing left, right or down. The arrow in the central square has a 25% probability of pointing left, right, up or down. A marker is placed on the central square and moves according to the arrows. What is the probability that the marker will return to the central square?

Further Problems: What is the probability if the board is 5x5? (2n+1)x(2n+1)? infinite?

Solution presented verbally by **Prof. Zorn**:
"I solved it in a very unclever way and got an answer a little under 1/2."

Prof. Weimerskirch’s way: By the symmetry of the problem, WLOG, assume that from the middle square you move up. There is a 1/3 probability of returning immediately. With 2/3 probability, you move either left or right. Again, WLOG, assume you move left, then with 1/2 probability you move down (if you don't, you can't get back). You then have a 1/3 probability of returning the center, a 1/3 probability of getting stuck in the upper left corner, and 1/3 probability of moving counter-clockwise around the square. The total probability is
(1/3) + (2/3)(1/2)(1/3) + (2/3)(1/2)^2(1/3)^2 + (2/3)(1/2)^3(1/3)^3 = 151/324.
There is still no clever answer to the infinite board question…

Joke of the Week?

This week I have receive several comments on how we all miss Joke of the Week. If anyone wants to revive the old tradition- please feel free to email me (<tummers>) by the Wednesday before the mess goes out.

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