St. Olaf Mathematics Department

Math Mess

Department of Mathematics
St. Olaf College
Northfield, MN 55057

March 21, 2002
Volume 30, No. 17

This Week's Mathematics Colloquia

#1: David Carlton—“Geometry, Topology, and Number Theory”
Time and Place: Tuesday, March 19th, 2 p.m., SC 182
#2: Edward Burger—“How to Always Win at Limbo”
Time and Place: Thursday, March 21th, 2 p.m., SC 182

This Week’s Colloquia

Our first speaker this week, on Tuesday, is David Carlton from Stanford University. David is a candidate for a position in our department. In his talk, “Geometry, Topology, and Number Theory”, you will see why $x^2+y^2=2z^2$ has lots of solutions but $x^2+y^2=3z^2$ does not. The main tool for showing this is the set of p-adic numbers, which have infinitely many places to the *left* of the decimal place.

On Thursday, Professor Edward Burger from Williams College in Williamstown, MA will be giving a colloquium talk entitled “How to Always Win at Limbo”.

Have you ever gone out with someone for a while and asked yourself: "How close are we?" This presentation will answer that question by answering: What does it mean for two things to be close to one another? We'll take a strange look at infinite series, and dare to mention a calculus student's fantasy. In fact, we'll even attempt to build some very unusual and exotic series that can be used if you ever have to flee the country in a hurry: we'll either succeed or fail... you'll have to come to the talk to find out which. Will you be at the edge of your seats? Perhaps; but if not, then you'll probably fall asleep and either way, after the talk, you'll feel refreshed and great. No matter what, you'll learn a sneaky way to always win at Limbo.

Prerequisites: All fans of mathematics are invited, although it would be helpful if audience members have heard of the phrases "absolute value" and "infinite series".

Mathematics and Nothing Else

Famous author Martin Gardner tells a story about a time in school when he had finished an exam, and started to pass the time by figuring out if the second player could always force a draw in Tic-Tac-Toe. His teacher told him "Mr.
Gardner, in this class we do mathematics and nothing else!" At St. Olaf, we insist that games *are* mathematics. Come down to SC182 Wednesday night from 7-9 and learn about some games that look like doodles - Hex, Sprouts, Dominono, and Chomp. There will be milk and cookies. After break, there will be a contest featuring these games. Look for the sign-up sheet for teams on Molnar's door.

Career Column

Career of the Week: Operations Researcher

Operations researchers help organizations plan and operate in the most efficient and effective manner. They use mathematics to forecast the implications of various choices and decide on the best alternatives. Types of models they use include simulation, linear programming, networks, and game theory. (Take Math 266 to find out more about the mathematics they use.) Examples of problems an operations researcher would investigate are: How can a dress manufacturer lay out its patterns to minimize wasted material? How many elevators should be installed in a new office building to cut waiting time? How could fire stations be relocated to reduce response time?

Many large companies such as Northwest Airlines, AT&T, and Merrill Lynch have an in-house staff of operations researchers. Other operations researchers are employed by consulting firms. The largest employer of operations researchers is the federal government.

For more information on careers in operations research, visit the website of the Institute for Operations Research and the Management Sciences (INFORMS), where you can find a Career Booklet, profiles of operations researchers, and information on educational programs in operations research.

Last Week's Solution

Last week's problem: Find formulas for the areas of each of these polygons in terms of the number of sides n, and show that in each case the limit as n goes to infinity is in fact π.

Solution: We had solutions from **Nick Maryns** and **Adam McDougall**. The area of the inscribed polygon of n sides works out to be $n \sin(\pi/n) \cos(\pi/n)$, and the area of the circumscribed polygon is $n \tan(\pi/n)$. In each case, proper application of L'Hôpital's rule yields the limit of π as n goes to ∞.

There is a curious relation between these formulas which is shown on the 2nd floor OMH blackboard.

Another Slice of Pi

Prove the freaky Fibonacci formula $\pi/2 = \arctan(1/1) + \arctan(1/2) + \arctan(1/5) + \arctan(1/13) + \arctan(1/34) + \ldots$, where the numbers in the denominators are alternate entries from the Fibonacci sequence.
[Hint: start with $\arctan(1) = \arctan(1/2) + \arctan(1/3)$, and use the identity for $\tan(\alpha+\beta)$.]

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

Editor-in-Chief: Bruce Hanson

Associate Editor: Beth Speich

MM Czar: Donna Brakke

Problem Guy: David Molnar

mathmess@stolaf.edu