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: MAA Holiday Movie Festival
Speakers: Donald Duck and Paul Erdos (or Srinivasa Ramanujan)
Time: Tuesday, December 10th, 1:30 pm
Place: SC **282** (aka Mathemagic Land)

This Week's Colloquium

How is geometry manifest in everyday life? Why do the laws of mathematics make a difference to cartoon characters? How is Donald Duck so irascible and yet so cute at the same time? These are a few of the questions which will be answered during Tuesday's Holiday Movie Festival, brought to you by the St. Olaf Student Chapter MAA. Thanks to the MAA's large supply of bread crumbs, Donald Duck was persuaded to make his n^{th} visit to St. Olaf and will be prepared to share his mathemagical wisdom. After Donald finishes his lecture, the colloquium audience will vote on whether they would like to hear from Paul Erdos or Srinivasa Ramanujan. Both mathematical visionaries are eager to share their accomplishments with you.

Donald doesn't lecture without snacks. So rest assured that plenty of popcorn and other goodies will be available. Don't miss your chance to have a mathemagical holiday season!

Math Dept Christmas Dinner

Come have a holly, jolly, mathematical Christmas with the Hamiltons! Dr. Doreen and Steve Hamilton are hosting the math department's annual Christmas dinner on Saturday, December 14th, at 5pm. Along with a sizeable helping of mathematical cheer, the Hamiltons will be serving turkey, dressing, mashed potatoes, cranberries, and of course Christmas cookies. Vegetarian options will be available as well.

Rides will be leaving from Buntrock beginning at 4:30pm and about every 30 minutes after that. However, if you are heading out on your own, get in the Christmas Spirit! Stop by Buntrock and pick up someone else to ride along! The Hamiltons will make sure he or she gets back to Olaf.

Feel free to drop in whenever you like, and leave when you've had your fill of turkey, Christmas cheer, and mathematical joy. Email hamiltod@stolaf.edu if you need directions.

Santa Claus Calculations

How can Santa Claus possibly visit all children at midnight on the same night? Keith Devlin, known as "The Math Guy" on NPR, ran the numbers and concluded that Santa's lead reindeer would explode. According to his calculations, Santa has to visit 108,000,000 homes in 24 hours, which works out to about 1250 homes/sec. In other words, for each house with at least one good child, Santa has 1/1250th of a second to park his sleigh, dismount, slide down the chimney, fill the stockings, distribute the remaining presents under the tree, consume the cookies and milk that have been left out for him, climb back up the chimney, get back onto the sleigh, and move on to the next house. Santa may have a pot belly, but he's quite the speedy guy! For some entertaining holiday reading, check out the original article at http://www.maa.org/devlin/devlin_12_00.html

More Pi, Anyone?

In recognition of the increased demand for pi during the holiday season, Professor Yasumasa Kanada and his colleagues at the Information Technology Center at Tokyo University have calculated over one trillion digits of p. Their calculation produced over six times the number of digits of the previous record, set in 1999. So, go ahead and have seconds! See more at http://www.boston.com/dailynews/340/world/Researchers_calculate_pi_to_mo%3A.shtml

Last Week's Problem

Using the Law of Cosines, one can see that the 3-5-7 triangle has an angle of arccos(-1/2), or 120 degrees. Prove that there is an integer-sided triangle with angle arccos(-1/n) for any positive integer n, or find as many of these as possible.

Solution: Adam McDougall '05 sent solutions for n=3 through n=10. **Geoff Bolen** '98 sent solutions for each n up to 115. I did not check all of these, because **Bob Hanson** from Chemistry sent a formula which works for every n! Let $a=n^2-4$, $b=2n$, and $c=n^2$. Then $c^2=a^2+b^2+2ab/n$, which is what is required by the law of cosines when cos(C)=-1/n. Turns out Bob is a big fan of the Law of Cosines, which as you might expect comes up a lot in 3D molecular geometry. A natural follow-up question is, are there, in fact, *infinitely many* solutions for each n when cos(C)=-1/n, as there are when cos(C)=0?

Problem of the Week

If you've seen Donald Duck in Mathmagic Land before, you remember the infamous billiards scene. One part of that that was edited out was when Donald makes the following interesting discovery. Donald is playing billiards on a square table with sides of length 1, and pockets in the corners. He shoots a ball from one corner of the table and measures the total distance the ball travels before it reaches a pocket. So, for example, if he aims the ball at the midpoint of an opposite side, it will travel a distance of v5. He calls such numbers Gauss numbers. Prove that the product of any two Gauss numbers is also a Gauss number. If you need a further challenge over interim, try the same problem on an equilateral triangle.

** Please submit all solutions to David Molnar (molnar@stolaf.edu) by 2003.

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.