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: To Be or Not to Be?
Speaker: Matt Richey
Time: Tuesday, November 5th, 5:00 pm (4:30 for food)
Place: SC 182

This Week's Colloquium

Remember, the annual **"**To Be or Not To Be**"** extravaganza is this Tuesday. Come at 4:30 for the subs and pizza! Members of the mathematics department faculty will discuss classes for next semester, the math major, statistics and computer science concentrations, summer opportunities and all sorts of other math related stuff. Festivities commence at 5pm in SC 282 and root beer floats will cap off the evening. Don't miss it!

Special Classes

The Mess brings you brief descriptions of the core courses and seminars for interim and next semester. Some of these are offered quite rarely, so take them while you can!

Interim Courses

Math 210: Principles (Molnar)—This course focusses on mathematical games, specifically two-player "games of perfect information" (no dice or concealed strategies). This week's problem is an example. There are no prerequisites and the class does not count toward the major.

Math 356: Geometry (Wallace)—Explore principles of non-Euclidean and fractal geometries through hands-on and dynamic geometry computer labs. You will do much of your work in small groups and will write and critique proofs of statements that arise from your explorations.

Math 390: Practicum (Legler and Vessey)—A total of 15 students will be enrolled and will form 3 teams to work on problems submitted by corporations, governmental agencies, and non-profits. Interviews are coming soon!

Spring Semester Courses

Math 282: Problem Solving (Molnar)—This seminar meets once a week to work on problems like those presented in various contests in which St. Olaf students participate. This is a .5-credit course, and open only by permission of instructor. Linear Algebra is a prerequisite.

Math 352: Abstract Algebra II (Bloss)—After reviewing group theory and linear algebra, the class begins an exploration into the representation theory of groups. This beautiful topic can be thought of as a marriage between abstract and linear algebra.

Math 370 Mathematical Logic (Allen)—This course introduces students to first order logic, the role it has played in mathematics in the twentieth century, and its role as a representational tool. A special emphasis in the second half of the course will be on resolution as an inferencing mechanism.

Math 384: Advanced Statistics Seminar (Legler)—This course addresses latent variable modeling. This topic covers a broad range of methods and applications, including item response theory, random effects and multilevel modeling, and Gibbs sampling. Students will have an opportunity to purchase a student-version of a stand alone statistical computing package (Stata) that will be useful long after the course is completed.

MAA Contests and Winners

The MAA North Central Section holds its annual team competition this year on Saturday, November 16. We take the contest here, and there is no limit to the number of teams who can participate. If you are interested, contact David Molnar, with names of teammates, if appropriate. A practice session will take place Thursday, Nov. 7, 7-9pm in SC130.

Another MAA contest, a pumpkin carving contest, was held this past week in OMH. *Steve Engle* won Best Pumpkin, *Amanda Febey* carved the Mathiest Pumpkin, and *Steve Hamilton* slashed his way to a Worst Pumpkin award.

Last Week's Problem

Let f(x) be a polynomial of degree 2 and g(x) a polynomial of degree 3 such that f(x)=g(x) at some three distinct equally spaced points, a, (a+b)/2, and b. Prove that $\int_a^b f(x)dx = \int_a^b g(x)dx$.

There were two solutions, from Jason Saccomano '05 and Adam McDougall '05. Your strategy here is to note that while there are very few theorems concerning two functions, there are a lot about one function. Thus, consider h(x)=g(x)-f(x). h(x)=0 at x=a, x=(a+b)/2, and x=b. Even better, if j(x)=h(x+(a+b)/2), then j is a cubic function with zeroes at -r, 0, and r, where r=(b-a)/2. Hence j(x) is a constant times x(x-r)(x+r), making it an odd function, so $\int_{-r}^{r} j(x)dx = 0$. Aha! Now it follows that $\int_a^b h(x)dx = 0$ and that $\int_a^b f(x)dx = \int_a^b g(x)dx$.

Problem of the Week

Two plates of donuts sit on a table in front of you, one with 8 donuts, and the other with 27. On the other side of the table . . . Molnar! You take turns eating donuts from one of the two plates according to the following rule: you may take from the plate with the larger number of donuts *any multiple* of the number of donuts on the other plate. (So the first player may take, from the plate of 27, either 8, 16, or 24.) Whoever is forced to finish off the donuts on either of the two plates looks greedy and therefore *loses*. Do you want to go first or second, and what strategy will you follow?

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

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