

The Almagest

The bi-weekly newsletter of the Department of Mathematics and Computer Science. Your trusted source for news.

Volume 3, No. 9

February 16, 2011

Alma College
Alma, MI 48801

Topics of Senior Presentations

Mathematics Majors

Brooke Bergeron: *The Four Squares Theorem*

Zach Cresswell: *The Bernoulli-Euler Problem of the Misaddressed Letters*

Brian Hassevoort: *The Königsberg Bridges Problem*

Ian Kurth: *Heron's Formula for the Area of Triangle*

Heath Laugal: *The Monty Hall Problem*

Matt Mansell: *Runge-Kutta and Higher-Order Runge-Kutta Methods*

Ryan Spittler: *Phase Transitions & Critical Phenomena of Random Walks*

Jamie Young: *Cryptological Mathematics & the Advanced Encryption Standard*

Computer Science Majors

Jacob Dayringer: *Auto Tuning (Phase Decoder)*

Bobby Fryling: *Data Compression of Media Files with Major Focus on GIF Images*

Danny Hearit: *Computational Performance with Varying Hardware with Emphasis on Multi-Core Multi-Threaded Programming*

Dan Krauss: *Advanced Computer Graphics **

Jonathan Morley: *Slowloris: A New Denial of Service Attack*

Mathematics & Computer Science Double Major

Chris Przybylski: *Ant Colony Optimization and its Applications to the Traveling Salesman Problem*

* Senior Thesis

REU at MSU: Underclassmen Welcome

Lyman Briggs College at Michigan State University will be hosting a summer research institute in *experimental mathematics* from **June 6th to July 30th**. The topics to be studied are: generalized Fibonacci polynomials, inverse modeling dynamical systems, and patterns in permutations. Each student will receive a \$3,200 stipend along with free room and board. Candidates must be U.S. citizens or permanent residents who will be undergraduates in the fall of 2011. To be considered for the program an applicant should have completed a first course in calculus by May 2011. Women and minorities are particularly encouraged to apply. Last summer, **Ryan Spittler** and **Garrett Rodriguez** participated in this program; I'm sure they'd be happy to tell you about their experiences.

Applications are due by **April 1st**. For more info visit the website:

www.lymanbriggs.msu.edu/SURIEM

Math Teacher Scholarship

The Miriam B. Schaefer Scholarship of \$1000 is awarded to students who are enrolled in a teacher education program and have mathematics as a specialty. To be eligible you must: be a *secondary education math major* or an *elementary education math minor*; have junior or senior status in the Fall of 2011; and have a G.P.A. of at least 3.0. Applications are due by **May 15, 2011**. Applications and Scholarship Guidelines are available on the MCTM website www.mictm.org or in the Education Department bay. Contact Ruth Farrier (SAC 237) for more information. farrier@alma.edu

Important Dates for Seniors

Seniors: please mark the following dates on your calendars.

March 11: Your paper is due.

March 15: Presentations begin!
Senior Dinner @ 5:30

A Class on Rubik's Cube

Have you ever wondered what it takes to solve a Rubik's Cube? Well, there now exists a math class at Washington and Jefferson College (in Pennsylvania) that teaches you how to do it. The professor, Michael Woltermann, said that in order to find a solution to the cube, one must understand permutations (arrangements), and that's at the heart of what's called abstract algebra (MTH 421 at Alma). Students in Woltermann's class learn about the basics of groups and permutations. Since permutations are simply ways to arrange things in a particular order, Woltermann shows how they can be used to understand how to solve the cube in 20 moves or less. His current class of 19 students is also learning the mathematics behind card tricks and other puzzles such as Sudoku. S^2

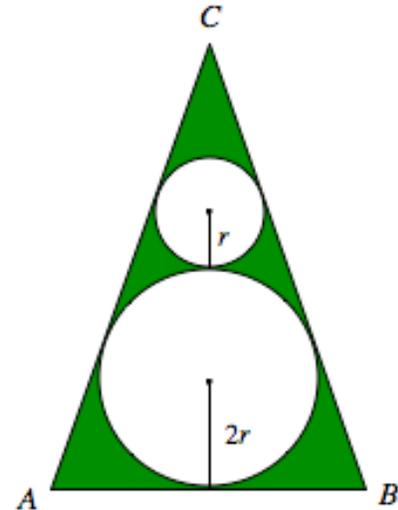
Solution to Previous Puzzle

Three lunch boxes are labeled HH , HC , and CC . One of them contains two ham sandwiches, another one ham sandwich and one cheese sandwich, and the last one two cheese sandwiches. Unfortunately, the labels are **all wrong**: the HH box does not contain the two ham sandwiches, etc. You must straighten out the labels; that is, you must correctly identify the contents of each lunch box, but you must do it by opening the **fewest** number of lunch boxes as possible. Explain how you can do this.

Solution by **Bill McHenry**: You only need to open the HC box and check one sandwich. For example, if you choose the HC box, it must be HH or CC since all of the labels are wrong. Suppose you find out it is CC . You then know the HH box is really HC because it cannot be HH based on the stipulations, and you found out CC is in the HC box. Therefore, by process of elimination, CC must contain HH .

Problem of the Bi-Week

Triangle ABC is an isosceles triangle with two inscribed circles. The larger circle has radius $2r$, and the smaller circle with radius r is tangent to the larger circle and the two equal sides. What is the **area** of triangle ABC ?



A small prize will be awarded to the FIRST student who provides a correct solution. See Prof. Sipka.

Student assistants:	Matt Mansell = M^2
	Stephen Sorensen = S^2
Distribution:	Deb Smith
Faculty advisor:	Tim Sipka

If you would like to submit an announcement or a short article, please send it via e-mail to Matt Mansell (11mgmans) or Tim Sipka (sipka).