Augarithms

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Mathematics Colloquium Spring Lineup

Colloquia are typically held Wednesdays from 3:40—4:40 in Science Hall 108. Refreshments are always provided.

Jan.	24	Aaron Luttman, Bethany Lutheran College
Mar.	7	William Cooper, University of Minnesota
Mar. →	28	Adam Roesch, ('00), Ing Group[1]
Apr.	4	Corey Nathe, Lava K. C., Augsburg College
Apr.	18	Daniel Kaplan, Macalester University

[1]This week's speaker...Adam Roesch

Adam Roesch

"The first actuarial problems that students encounter in textbooks involve life continigencies and the theory of interest. For actuaries who do not work in life insurance or pensions, these problems rarely if ever come up.

In this talk, I will discuss three common problems that I have encountered as an actuary working in group health reinsurance:

i) *leveraged trend*,

ii) *completion triangles*, and

iii) *economic capital*.

I will also be open to questions about the actuarial career.

Adam is a 2000 graduate of Augsburg College majoring in mathematics.

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The bi-weekly newsletter of the Department of Mathematics at Augsburg College

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Problem of the week...[2]

Michael Janas, and **Jerry Eddy** solved the 'ferry crossing' problem of vol. 20.8, finding that the river was 1700 feet wide. Here is this week's problem:

My three nieces were visiting for Thanksgiving. My neighbor came over and wanted to know their ages. I told her that the product of their ages is 72.

"That's not enough information for me to figure out how old they are," she complained. I offered that the sum of their ages is my street address.

"But that's still not enough information." After a moment's thought, I added that my eldest niece loves pumpkin pie.

"Now I know how old the girls are." my neighbor said. How old are my nieces?

[2]Reprinted with permission from Bradley U's 'potw' page <bradley.bradley.edu/~delgado/>

Puzzle of the week...

The names of **John Ronnei** and **Diane Glorvigen**, solvers of the puzzle of volume 20.7, were inadvertantly omitted from the last issue.

Solvers of the 'counting cubes' problem of volume 20.8 were **Michael Janas**, **Phil Adamo**, **Antonio Spargo**, **Eric Dietz** (who included a generalization to $n \times n \times n$ cubes, **Deb Redmond**, **Eric Bentley**, and **Jerry Eddy**. Here is this week's puzzle:

The numbers below form a sequence. Figure out the logic of the sequence. Begin at the point marked 'START' and trace a path from box to box. The boxes may be conndected horizontally, vertically, or diagonally. Double and triple digit numbers may be made by grouping the numbers this way. You can go through the box only once. End at the 'FINISH sign in the bottom right corner.

START →	**2**	**1**	**6**	**4**	**2**	**4**
	8	**4**	**3**	**2**	**0**	**8**
	6	**2**	**6**	**1**	**0**	**4**
	1	**4**	**5**	**5**	**2**	**0**
	2	**8**	**2**	**1**	**9**	**6** ← **FINISH**

Submit solutions to kaminsky@augsburg.edu, or under Kaminsky's door at SCI137E, or in the puzzles and problems box just outside of Su's office.

Senior Spotlight-Antonio Spargo

by Becky Taute, Alumni-Parent Relations

Antonio Spargo

It was one of the main reasons for Antonio's decision to come to Augsburg. He wanted to play football. Yes, his mom, Carolyn, is an alumna and that certainly weighed in, but when Jack Osberg, Augsburg's retired football coach, gave this home schooled young man the opportunity to play ball, other schools were no longer in the running.

Antonio says he is more persistent, confident and determined since coming to Augsburg. He says he has learned that hard work pays off, and he has worked very hard, especially considering that he is a commuter student. He and his sister, Annika, a third year student, commute from Chaska every day of the week and sometimes on the weekend.

Antonio has been involved in Campus Ministry, Philosophy Club, Math Club, Lilly Mentorship, Lilly Internship, Phonathon, Fellowship of Christian Athletes (FCA), and Campus Kitchen. He has also served as a New Orleans mission trip leader, is the recipient of a Lilly Scholarship, and was awarded a summer research grant by Undergraduate Research and Graduate Opportunities (URGO). In addition to all of this, he has worked for Athletics and Institutional Advancement, as a math and economics tutor, and as an S.I. (supplemental instructor).

If all of that wasn't enough, he played football for the very first time in his life under Coach Osberg, who says, "Antonio has taken advantage of all that Augsburg has to offer in a way that few students do."

Antonio will be looking for a summer internship to complete his math major. He will student teach in the fall as a part of his secondary education licensure. Perhaps it is his minors in philosophy and religion that have paved the road for his career, however, as he plans to attend seminary in the fall of 2008.

When asked why he involved himself in so many activities, Antonio quickly responded, "I wanted to be an Auggie." His football teammates voted him to receive the Jeroy Carlson Auggie Award at the end of last season. This award recognizes a contribution to the team beyond the playing field.

Antonio, we are proud to call you an Auggie!

Group Effort: Mathematicians Map E_8

After a four-year effort, 18 mathematicians and computer scientists from the U. S. and Europe have mapped E_8, one of the largest and most complex structures in mathematics.

David Vogan of Massachusetts Institute of Technology announced the mathematical breakthrough on Monday, March 19, at MIT. Institutions involved in the massive computation include MIT, Cornell University, the University of Michigan, the University of Utah, and the University of Maryland.

E_8 is an example of a Lie group. Nineteenth-century Norwegian mathematician Sophus Lie (1842–1899) was one of the first mathematicians to emphasize the importance of the notion of groups in geometry. He applied what are now known as Lie groups to characterize transformations and study symmetries. Underlying any symmetrical object, such as a sphere, is a Lie group. Balls, cylinders, and cones are examples of symmetrical, three-dimensional objects. Mathematicians can study symmetries in even higher dimensions. E_8 applies to a 57-dimensional mathematical structure, and its Lie algebra is 248-dimensional. A visualization of the E_8 root system reveals an intricately connected pattern.

E_8, which was discovered in 1887, seemed unsolvable, said Jeffrey Adams, project leader and mathematician at the University of Maryland. Hence, he noted, "this groundbreaking achievement is significant both as an advance in basic knowledge, as well as a major advance in the use of large scale computing to solve complicated mathematical problems."

"This is an exciting breakthrough," agreed mathematician Peter Sarnak of Princeton University. "Understanding and classifying the representations of E_8 and Lie groups has been critical to understanding phenomena in many different areas of mathematics and science, including algebra, geometry, number theory, physics, and chemistry." At present, however, the full significance of the mapping of E_8 remains unclear.

The magnitude and nature of the E_8 calculation invites comparison with the Human Genome Project. The human genome, which contains all the genetic information of a cell, is less than a gigabyte in size. The E_8 data, which contain all the information about E_8 and its representations, are 60 times larger.

The E_8 computation called for new mathematical techniques and computing power available only recently. "This is an impressive achievement," said physicist Hermann Nicolai, director of the Albert Einstein Institute in Potsdam, Germany. "While mathematicians have known for a long time about the beauty and the uniqueness of E_8, we physicists have come to appreciate its exceptional role only more recently. Understanding the inner workings of E_8 is not only a great advance for pure mathematics, but may also help physicists in their quest for a unified theory."

The Atlas of Lie Groups Project

The E_8 calculation is part of an ambitious project sponsored by the American Institute of Mathematics and the National Science Foundation and known as the Atlas of Lie Groups and Representations. The goal of the Atlas project is to determine the unitary representations of all the Lie groups—:E_8 being the largest of the exceptional Lie groups.—*H. Waldman*

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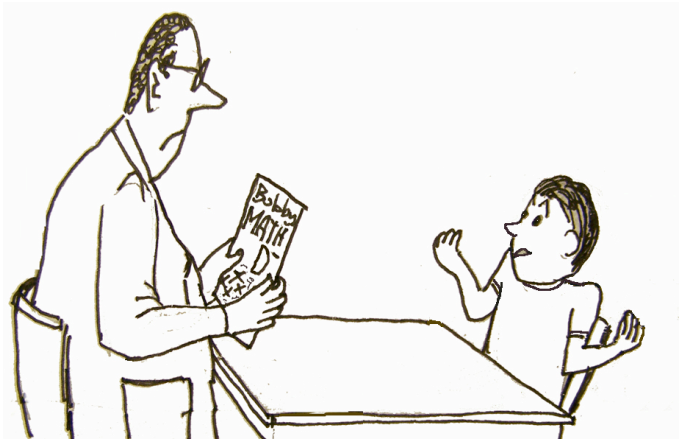
Cartoon Corner



Kaminsky '07

Mistakes were made.