Augarithms

Volume 16, Number 7 Visit us at augsburg.edu/math/ January 29, 2003

Colloquium Series Dates for Spring, 2003

Colloquia are held on Wednesdays from 3:40 to 4:40 p.m. in Science 108. Here is the tentative schedule for 2002-2003:

Wed.	Jan.	29	Steve Morics, University of Redlands
Wed.	Feb.	12	David Molnar, St. Olaf College
Wed.	Feb.	26	Tracy Bibelnieks, Augsburg College
Wed.	Mar.	12	Laura Chihara, Carleton College
Wed.	Mar.	26	Nick Coult, Matt Haines, & Ken Kaminsky, Augsburg College
Wed.	Apr.	9	Augsburg Students
Wed.	Apr.	16	Augsburg Students

This week's talk: Mathematics Education Done Right, or, How I Learned What a Genetic Decomposition Is

by Steven Morics, University of Redlands

Steve Morics as an undergraduate at St. Olaf College in 1987

Other than knowing I wanted to teach college-level mathematics, I had no knowledge or interest in research into mathematics education as I left graduate school and began my career. However, I became aware of a group of like-minded individuals who were frustrated with the state of affairs in undergraduate mathematics education, and by the lack of communication between education researchers and classroom instructors. They were using a framework which integrated instructional design with education research, and I found myself attracted to their efforts to the point where I became a member. My talk will describe the framework under which the group operates, list some of the projects it has undertaken and successes it has achieved, and use a current project in Linear Algebra, with which two Augsburg students are assisting, as a case study. Anyone interested in teaching or learning mathematics at the undergraduate level is invited to attend.

Augarithms is available on-line at augsburg.edu/math/augarithms/. Click on the date you want to see.

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Puzzle & Problem of the week

PUZZLE SECTION:
Last issue's puzzle, in which we asked you to rearrange some toothpicks (that looked oddly like matches) around, was solved by students **Andrew Held**, **Jon Fix**, and **Alex Kranz** IT's **Scott Krajewski** , Registrar **Wayne Kallestad**, and alumnus **Brent Lofgren** ('88).

In the equation below, each letter represents a digit. Determine the value for each letter.

ONE + TWO + FOUR = SEVEN

(If ambiguity exists, let later letters , i.e. "W", be greater than earlier letters, i.e. "U".)

PROBLEM SECTION:
Last issues problem, in which Niko and Pulver are to meet between noon and 1 p.m. for lunch, was solved by student **David Wallace**, mystery faculty member **Tom S. Fast**, and alumnus **Brent Lofgren** ('88).

In the very entertaining book *Penn & Teller's How to Play with your Food*, by Penn Jillette and Teller, Villard Books (1992), the authors describe a game they play called the "Creamer Game," in which players A and B alternate in hurling coffee creamers at each other, with the contestant on the receiving end holding a suitably adjusted, outwardly pointing fork. The game continues until one player "gets creamed" (that is, the hurled creamer is pierced by the other's fork). Here is your problem. Suppose both players have 1 chance in 6 of succeeding on any given toss. What is the probability that A wins if he/she hurls the first creamer? Generalize this if you can.

Send puzzle and/or problem solutions to the editor at kaminsky@augsburg.edu, or drop them in the P & P box just inside the math suite (Science Hall 137).

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The Bi-weekly Newsletter of the Department of Mathematics at Augsburg College

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Profs say ancient Greeks used concept of infinity

By Ali Alemozafar
Contributing Writer
Wednesday, November 13, 2002
www.stanforddaily.com

Pages from the Archimedes Palimpsest examined by Stanford Classics Prof. Reviel Netz and Ken Saito of Osaka Prefecture University. Netz and Saito revealed that the ancient Greeks understood the concept of infinity.

A casual visit to the Walters Art Museum in Baltimore by Stanford Classics Prof. Reviel Netz and colleague Ken Saito of Osaka Prefecture University has proven to be more fruitful than either imagined. A scrupulous examination of a section from the Archimedes Palimpsest has contradicted widely held views of the history of mathematics by showing that the ancient Greeks understood the concept of infinity.

The palimpsest — text written over text — contains a compendium of mathematical treatises, including the only copy of “Method of Mechanical Theorems,” in which Archimedes explains how he drew upon mechanical means to elucidate his mathematical theorems.

Overlayed by the Euchologion, a 13th-century Greek prayer book, the treatise remained hidden until its discovery in 1906 by the Danish philologist Johan Ludvig Heiberg in a volume collection in Istanbul. Equipped with a magnifying glass, Heiberg would set out to examine the text.

“Back then, the text was in much better condition,” Netz explained.

Despite his efforts, Heiberg was unable to fully decipher the treatise, skipping over a significant section of Archimedes’ work.

The palimpsest went missing and remained hidden from the scholarly community for nearly a century. In 1998, Christie’s Auction House sold it to a private collector, who supports its conservation at the Walters Art Museum.

Want to read the entire article? Go to: http://daily.stanford.edu/tempo?page=content&id=9500&repository=0001_article. Reprinted with permission.

From *Dictionary of Theories**

PERFECT NUMBER: A natural number which is equal to the sum of its divisors other than itself.

For example, 6 is a perfect number since $6 = 1 + 2 + 3$. It can be shown that an even number is perfect if and only if it has the form

$$2^{p-1}(2^p - 1)$$

where both p and $2^p - 1$ are primes. Thus

$$28 = 2^2(2^3 - 1)$$

It is a notorious unsolved problem whether there are infinitely many perfect numbers or any odd perfect numbers.

Reference: A. Baker, *A Concise Introduction to the Theory of Numbers* (Cambridge, 1984)

Michael Bean

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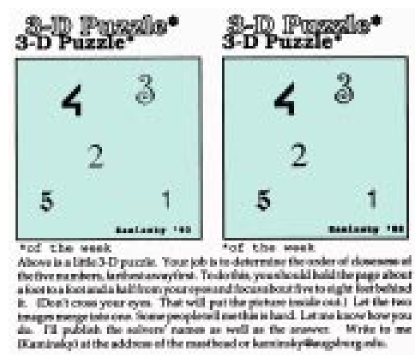
Return of the 3-D Puzzle



Is Voting Really Fair? by Allyn Jackson*

Voting---whether for a presidential election or for which kind of cake is the favorite of a kindergarten class---is considered by most people to be the fairest way to come to decisions. But when analyzed mathematically, voting can look a bit shady.

According to mathematician Donald Saari, who recently proved an important result in the mathematics of voting theory, it is possible to create through voting any misrepresentation one likes. Once one has some notion of what the voters think, it is possible to set up packages where a majority of the the voters keep approving of one package over the other until you have them agreeing on the desired outcome. The key here is that who is in the "majority" can shift each stage.

Here is a simple example. Suppose there are 30 voters, and suppose that the A, B, and C are the choices one has to vote on. To say that a voter has A > B, means that voter prefers choice A to choice B. Now let's suppose we have this configuration:

10 have A > B > C, 10 have B > C > A, 10 have C > A > B.

Now, we could have an election comparing two candidates and then having the winner against the remaining candidate. Who do you like? Whoever it is, an election can be arranged to ensure she wins. For instance, if you like C, have the first election between A and B. (Here A wins.) Then, have the winner run against C; C wins.

If you prefer A, have the first election between B and C where B wins. We already know that A beats B, so A is the winner. For B, the same idea: just have the first election between A and C where C wins. Then B beats C.

Notice, in each election, the winner wins with over 66% of the vote. "What a landslide!" says Saari. "Nobody would or should question the outcome, and that is the delight of the scam. It gets much worse; with more candidates I can invent scenarios where *everyone* prefers A to B, yet B is the overall winner."

Saari's work appeared in the article, "A Chaotic Exploration of Aggregation Paradoxes," in the March 1995 issue of SIAM Review, published by the Society for Industrial and Applied Mathematics.

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