Augarithms

AUGSBURG COLLEGE

vol 19.7 Visit us on the web at Augsburg.edu/math/ January 25, 2006

The new fall line of colloquia is revealed...

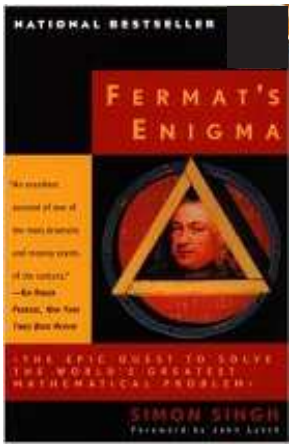
Mathematics Colloquium Series

Unless otherwise indicated, colloquia are held Wednesdays from 3:40 - 4:40 in Science Hall 108. Refreshments are provided.

Jan. →	25	Fermat's Last Theorem, The NOVA special†
Feb.	8	Terrance Hurley, University of Minnesota
Mar.	15	Cindy Kaus, Metro State University
	29	TBA
Apr.	5	TBA
	26	TBA

kaminda@earlham.ed

This week's colloquium...†



(From the liner notes of Simon Singh's book *Fermat's Enigma*, recounting the lifelong passion of mathematician Andrew Wiles to prove the theorem which had eluded proof for more than 350 years.)

"I HAVE DISCOVERED A TRULY MARVELLOUS PROOF, WHICH THIS MARGIN IS TOO NARROW TO CONTAIN..." With these tantalising words the seventeenth-century French mathematician Pierre de Fermat threw down the gauntlet to future generations. Fermat's last theorem looked simple enough for a child to solve, yet the finest mathematical minds would be baffled by the search for the proof."

Everyone should read Singh's book, but failing that, come to this week's colloquium (Wednesday, 3:40-4:40 in SCI 108) and view the NOVA special (directed by Singh) retelling Wiles's successful quest.

In the meanwhile, to whet your appetite, you can read an interview with Wiles at *www.pbs.org/wgbh/nova/proof/wiles.html*.

Problem of the week...

We have not received any solutions to the POTW of volume 19.6. Here is a new problem:*

Let $f(x)$ be a smooth (twice differentiable is good enough) function which is concave downward on the closed interval $[a,b]$. At which point(s) in the interval is the area between the function and the tangent line the smallest?

Send solutions to the editor at kaminsky@augsburg.edu, or slip them under his door at Science Hall 137E.

*reproduced with permission from Bradley University's 'potw' page <bradley.bradlye.edu/~delgado/>

Puzzle of the week...

We received correct and complete solutions to the puzzles of volume 19.6 from **Dr. Bahr**, **Jonathan Pierpont**, and **Erik Sevre**. A near complete solution was received from **Kirsten Cole**.

Here is a new puzzle:

One of the most prominent citizens of Chicago once offered highly prized football tickets to forty people whom he despised. Can you explain his unusual generosity?

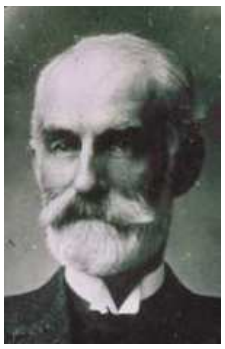
Send solutions to the editor at kaminsky@augsburg.edu, put them in the Puzzles & Problems box near the department printer, or slip them under his door at Science Hall 137E.

Augarithms

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

Editor.....Ken Kaminsky
<kaminsky@augsburg.edu>

Born on this day...



William Shanks

William Shanks was born January 25, 1812 in Corsenside, Northumberland, England. He kept a boarding school at Houghton-le-Spring in a coal mining area near Durham, England.

Shanks is famed for his calculation of π to 707 places in 1873, which unfortunately was only correct for the first 527 places. He used the formula

$$\pi/4 = 4\tan^{-1}(1/5) - \tan^{-1}(1/239).$$

Shanks also calculated *e* and Euler's constant to a great many decimal places. He published a table of primes up to 60,000, found the natural logarithms of 2, 3, 5 and 10 to 137 places and the values of 2^{12m+1} for $m = 1, 2, 3, ..., 60$.

In 1944 Ferguson calculated using the formula

$$\pi/4 = 3\tan^{-1}(1/4) + \tan^{-1}(1/20) + \tan^{-1}(1/1985).$$

He found that his value disagreed with that of Shanks in the 528th place. Ferguson discovered that Shanks had omitted two terms which caused his error.

Shanks died in Houghton-le-Spring, Durham, England in 1882.

Article by: *J J O'Connor* and *E F Robertson*—reprinted with permission.

From the *Dictionary of Theories**

Baker's Theorem (1966) Named after the British mathematician Alan Baker (1939—), this is the result in number theory whereby if $\alpha_1, ..., \alpha_n$ are algebraic numbers (none 0 or 1) such that $\log\alpha_1, ..., \log\alpha_n$ are linearly independent over the rationals, then $1, \log\alpha_1, ..., \log\alpha_n$ are linearly independent over the field of algebraic numbers. This result, which generalizes the *Gelfond-Schneider Theorem*, furnishes the transcendence of

$$\beta_1\log\alpha_1 + ... + \beta_n\log\alpha_n$$

in which the α's and β's are non-zero algebraic numbers. Quantitative versions of this theorem have also played a crucial role in the effective solution of a wide variety of diophantine equations. For his significant contributions, Baker was awarded a Fields Medal.

A. Baker, *Transcendental Number Theory* (Cambridge, 1979)

*Article by Michael Bean. Reprinted with permission from the *Dictionary of Theories*, by Jennifer Bothamley.

What is the largest known prime?

According to Chris Caldwell (http://primes.utm.edu/notes/by_year.html), the largest known prime as of today is the Mersenne prime $2^{30,402,457} - 1$, discovered just last month. This number is 9,152,052 digits long.

Using a simple linear regression model, Caldwell predicts that the first 10,000,000 digit prime with one billion digits, will be found by May 2006; the first 100,000,000 digit prime by early 2015; and the first 1,000,000,000 digit prime by 2024.

Film Revival (from 1987)