L'Augarithms

vol. 23.08 We're even prettier in color. Visit us at <augsburg.edu/math/> February 10, 2010

Mathematics Colloquium Spring Lineup

Colloquia are held Wednesdays 3:40—4:40 in Oren 113. Refreshments will be served.

Jan.	27	Pat Van Fleet, University of St. Thomas
Feb. →	10	The Proof, BBC production about Andrew Wiles's solving of Fermat's Last Theorem.[1]
	24	Pudipto Banerjee, Div. of Biostatistics, U. of Minn.
Mar.	3	TBA
	24	Vittorio Addona, Macalester College
Apr.	21	Catherine Sampson, General Mills

[1]This week's colloquium — The Proof

NOVA: For over 350 years, some of the greatest minds of science struggled to prove what was known as Fermat's Last Theorem—the idea that a certain simple equation had no solutions. Now hear from the man who spent seven years of his life cracking the problem, read the intriguing story of an 18th century woman mathematician who hid her identity in order to work on Fermat's Last Theorem, and demonstrate that a related equation, the Pythagorean Theorem, is true.

Highly recommended reading:

Fermat's Enigma, by Simon Singh, Anchor Books, New York, 1997. Published in Great Britain under the title

Fermat's Last Theorem, by Simon Singh, Fourth Estate, *London*, 1997

Fermat

Wiles

The other puzzles from the last issue

The pick-a-number puzzle and the birthday puzzle, both from volume 23.07, were solved by Euler.

Mr. or Ms. Euler points out that repeating is the same as multiplying by 1,001 = 7*11*13, so you multiply by 1,001, then divide by 1,001.

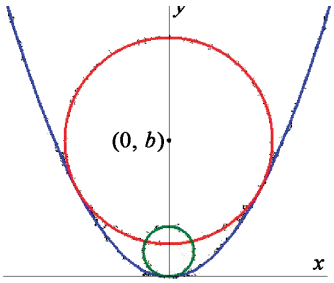
For the birthday puzzle, Euler points out that Sven was born on December 31, and it is now January 1. No one solved the 3D puzzle involving the blockbuster *AVATAR*. The secret message was

"AVATAR is best seen in 3D."

Problem of the week...

Sometimes our readers solve the POTW and don't officially tell us. We give credit this week to **Michael Janas**, who did just that on the *dip* problem from the last issue. There were 9 dips; 14 more allowing 1's. Now, here's a new one:

The graph of $y = x^2$ is shown in blue below. When a circle is dropped into this parabola, it will be tangent to the graph at two points if its radius is large enough, as the red circle, or at one point otherwise, as the green circle. Find the radius, b, of the largest circle which is tangent to the parabola at only one point.



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Puzzle of the week...

Solvers of the most recent puzzle include **Susan Hecker**, **Charles Green**, **David Nestrud**, and **L. Euler**. Here is a new puzzle:

Find a 10-digit number made up of the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, such that the number formed by the first n digits is divisible by n for each value of n between 1 and 10.

Answer next week.

Submit puzzle & problem solutions to kaminsky @augsburg.edu., or under Ken Kaminsky's door at SCI 137E, or in the puzzles and problems box just outside of Su's office.

L'Augarithms
The approximately bi-weekly newsletter of the Department of Mathematics at Augsburg College
Editor.....Kenneth Kaminsky
<kaminsky@augsburg.edu>

Augsburg Math Professors Publish Research

Professors **Jody Sorensen** (←)and **John Zobitz** (→)recently published articles in mathematics and science journals. Professor Sorensen co-authored "Waiting to Turn Left?" in the January 2010 issue of the *College Mathematics Journal* (http://www.maa.org/pubs/cmj.html), which describes how traffic engineers decide to install a left turn arrow by applying the Second Fundamental Theorem of Calculus. Professor John Zobitz authored "Quantifying the Atmospheric Impact and Carbon Footprint of an Urban Biomass Incinerator" in the Winter 2009 issue of *Science Education and Civic Engagement: An International Journal*, describing how differential equations were used to quantify the carbon footprint and offsets for a biomass incinerator (http://www.seceij.net/). Congratulations Professors Sorensen and Zobitz!

Mathematician born on this day: Aida Yasuaki

Yasuaki

Born February 10, *1747* in Yamagata, Japan, **Aida Yasuaki** studied under the mathematician Yasuyuki Okazaki in Yamagata from the age of 15 years. The city of Yamagata in which Aida was born and brought up was (and still is) situated in northern Honshu, Japan nearly 300 km north of present day Tokyo. In 1769, Aida went to Edo, which has been renamed Tokyo. There Aida worked for the shogunate of Tokugawa Ieharu. The shogunate was the government of the shogun, or hereditary military dictator, of Japan and this type of rule lasted from 1192 to 1867. The third shogunate in Japan was established in 1603 ruling from Edo. The shogunate was extremely powerful, controlling the emperor, controlling the religious establishments, administering the lands and forming foreign policy. Aida was employed by the shogunate as a civil engineer working on river control and irrigation systems around Edo. However, this was not the job that Aida aimed for since ever since he was young his aim had been to become the best mathematician in Japan.

Also working for the same shogunate at this time was Teirei Kamiya, a mathematician who had been a pupil of Sadasuke Fujita. Aida would have liked to become a pupil of Fujita, for he was one of the leading mathematicians in Japan. Aida saw his friendship with Kamiya as means to be accepted by Fujita and asked Kamiya to arrange for him to be introduced to Fujita. Indeed Kamiya organized the necessary introductions but Aida was not accepted by Fujita.

It appears that relations between Fujita and Aida may have been poor even before Kamiya arranged the introduction, although if that were the case it is unclear quite why Aida worked so hard to obtain the introduction. It was the custom of the time for mathematicians to donate tablets inscribed with mathematical problems to religious temples. These tablets represented offerings of scholarship to the gods. Aida had donated some tablets which contained errors and these had been spotted by Fujita. Perhaps Aida was unaware of these errors at the time he sought to become Fujita's pupil.

Fujita had published a mathematical work *Seiyo sampo* in 1781 and in part his high reputation rested on this highly regarded text. Aida now decided to write a work based on the *Seiyo sampo* yet one which would criticize this work. It is not surprising that relations between Aida and Fujita would deteriorate further when Aida published Kaisei sampo, his critical revision of the *Seiyo sampo*. The private feud extended to include other mathematicians when Kamiya, who had lost face by arranging the failed introductions, attacked Aida's *Kaisei sampo*.

The argument eventually turned into a public feud between the Seki school of mathematics and the Sijyo school. Ajima was a friend of Fujita, their friendship arising from the fact that both were pupils of the same teacher Nushizumi Yamaji. Naturally Ajima joined the argument on the side of Fujita and since Yamaji was a recognized master of the leading Seki school of mathematics, the argument soon involved the whole school.

The shogun Tokugawa Ieharu died in 1786 and Tokugawa Ienari became his successor in the following year. Aida lost his post with the arrival of the new shogun and he decided that he would concentrate all his efforts on mathematics:

... he would live on his savings and devote himself to the perfection of his studies. He also took pupils, including many from the northeastern provinces; these returned to teach in their native regions, where Aida is still revered as a master of mathematics.

Aida compiled *Sampo tensi shinan* which appeared in 1788. It is a book of geometry problems, developing formulae for ellipses, spheres, circles etc. Aida explained the use of algebraic expressions and the construction of equations. He also worked on number theory and simplified continued fraction methods due to Seki.

The remarkable productivity of Aida is summed up as follows:

Aida was hard-working and strong-willed and produced as many as fifty to sixty works a year. Nearly 2000 works survived him, including many on non-mathematical subjects. He was a distinguished teacher of traditional mathematics and a successful popularizer of that discipline. Yasuaki died October 26, 1817 in Edo (now Tokyo).

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