Augarithms

AUGSBURG COLLEGE

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Colloquium Series Dates for Spring 2004

Colloquia are held on Wednesdays from 3:40 to 4:40 p.m. in Science 108. Except for the names of some of the speakers, here is the schedule of dates for the 2003-2004 academic year:

Mar.	31	Su Dorée, Augsburg College*
Apr.	14	Augsburg Students

Puzzle & Problem...

A belated acknowledgment to **Gregory McKusky**, who submitted a solution to the first part of the broken stick problem of vol. 17, no. 10. **Elizabeth Ringer** submitted a very nice solution to the nine-square puzzle of vol. 17, no. 11. She showed that the area of the entire rectangle was 4209 in^2. **Chrissy Piram** had an answer that was close--4208 in^2. Here is this week's puzzle: Can the edges of a cube be labeled from 1 to 12 so that the sums of the four numbers around each face are each the same? If so, how?

There were no correct solutions (or answers) to the dice rolling problem of the last volume, so it remains open. Here is this week's problem: In any given hour, the number of cars, *N*, entering Fisk's gas station has a Poisson distribution with a mean of 10. That is,

$$P\{N = n\} = 10^n e^{-10}/n!,$$

where $n = 0, 1, 2, \ldots$ What is the *exact* probability that in a particular hour, the number of cars entering is even?

Send your solutions (not just answers, please) to the editor at kaminsky@augsburg.edu, or drop them inside the math suite, Science Hall 137.

*This week's Colloquium

Euler's Extraordinary Evaluation of $\sum_{n=1}^{\infty} \frac{1}{n^2}$

by Su Dorée, Augsburg College

"The legacy of Leonhard Euler is unsurpassed in the long history of mathematics. In both quantity and quality, his achievements are overwhelming. Euler's collected works fill over 70 large volumes . . ." and includes significant work on number theory, logarithms, infinite series, complex variables, abstract algebra, geometry, and combinatorics. (From p. .207 William Dunham's *Journey Through Genius: The Great Theorems of Mathematics*, Wiley, 1990.)

How do we make sense of adding infinitely many positive numbers? Even if we know the sum is finite, how do we find it? Consider the title series, for example. The sum of the first ten terms is ≈ 1.54977, the first hundred terms add up to ≈ 1.63498, and the first thousand terms to ≈ 1.64393. Do they approach a finite limit? What is it? In this talk, we'll take a look at just one of Euler's results, an example of his extraordinary efforts with infinite sums and products that resulted in the evaluation of this series. We'll also learn a little more about the life and works of the genius himself.

The talk be preceded by the usual 5 minute cookie break and will be followed by a brief, but blatant, advertisement for fall mathematics courses.

Special Feature: Euclid's Proof of the Infinitude of Primes (c. 300 B.C.)

Theorem: There are infinitely many primes.

Proof: Suppose that $p_1=2 < p_2 = 3 < \ldots < p_r$ are *all* of the primes, let $P = p_1p_2\ldots p_r+1$, and let p be a prime dividing P. Then p can not be any of $p_1, p_2, \ldots, p_r$ otherwise p would divide the difference $P - p_1p_2\ldots p_r=1$, which is impossible. So this prime p is still another prime, and $p_1, p_2, \ldots, p_r$ would not be all of the primes.

Source: http://www.utm.edu/research/primes/notes/proofs/infinite/euclids.html

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

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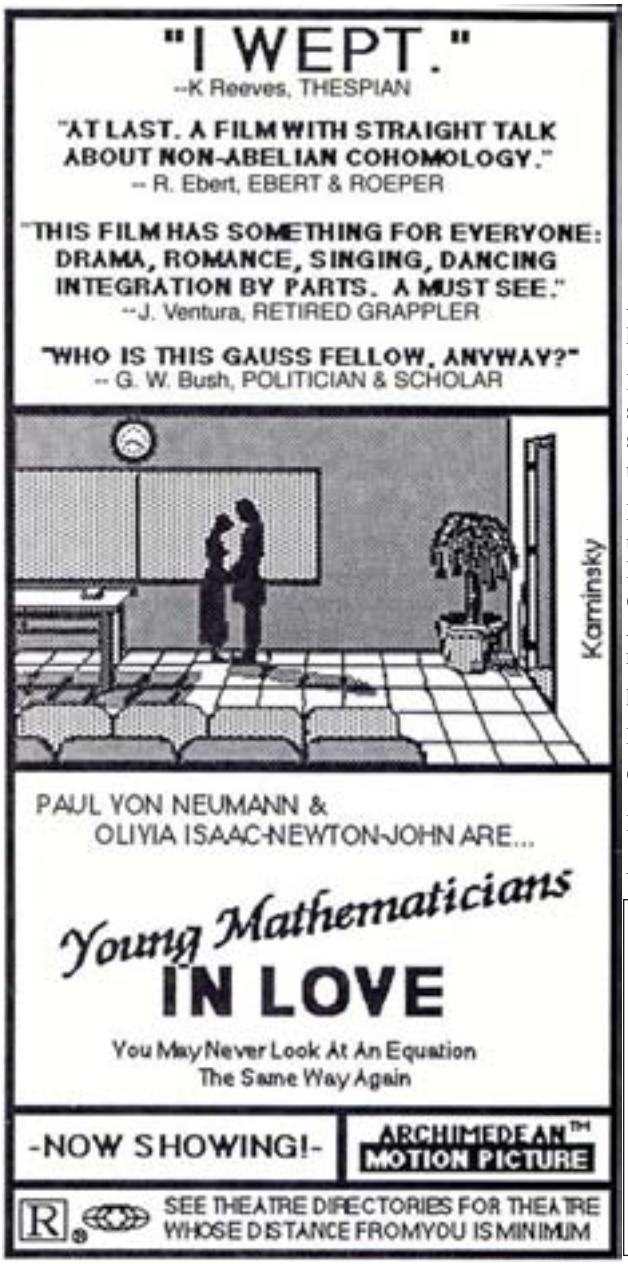
Cartoon Corner



Born on this day...

Diederik Korteweg

Diederik Korteweg was born on March 31, 1848, in 'sHertogenbosch, Netherlands. He studied at the Polytechnical School at Delft. Originally intending to become an engineer, he turned to mathematics, becoming a secondary school teacher. He taught in schools at Tilberg and Breda.

He then entered the University of Amsterdam, receiving a doctorate in 1878. He remained at Amsterdam becoming professor there in 1881, holding this post until he retired in 1918.

Korteweg's main work was in applied mathematics. His doctoral dissertation was on the velocity of wave propagation in elastic tubes. His subsequent work included work on electricity, statistical mechanics, thermodynamics and further work on wave propagation.

He established a criterion for the stability of orbits of particles moving under a central force. He also studied a stationary wave in a rectangular canal. He is remembered in particular for the Korteweg-de Vries equation on solitary waves. In 1894 de Vries wrote a dissertation *Bijdrage tot de kennis der lange golven* supervised by Korteweg. The results of this thesis were written up for publication in a joint paper published in 1905.

His books studying Huygens contributed greatly to the history of mathematics. He was also the editor of Huygens complete works.

Korteweg died on May 10, 1941 in Amsterdam.

Article by: J J O'Connor and E F Robertson

Atiyah and Singer Awarded Abel Prize

The Norwegian Academy of Science and Letters has award the 2004 Abel Prize jointly to **Sir Michael Francis Atiyah**, University of Edinburgh, and **Isadore M. Singer**, Massachusetts Institute of Technology. Atiyah and Singer will receive the Prize "for their discovery and proof of the index theorem, bringing together topology, geometry and analysis, and their outstanding role in building new bridges between mathematics and theoretical physics." Read more about the Abel Prize at http://www.abelprisen.no/en.

3D-Mars: Mars in Stereo*

To free view stereographs (stereo pairs of photographs, as seen at right) without using equipment, the left eye must look at the left hand picture of the pair and the right eye must look at the right hand picture. This is a difficult thing to do at first as you must look at the picture almost as if it were an object thirty feet away or more. Your eyes should not converge. They should look along parallel tracks, as far as possible, like railway lines that meet at the horizon.

*For more (and better) 3D pictures of the surface of Mars, visit http://www.stereoscopy.com/mars/