Augarithms

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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**	**Danrun Huang, St. Cloud State University***
Apr.	5	TBA
	26	Missy Larson & Dan Wolf, Augsburg College

*This week's speaker...

... is Danrun Huang, Professor of Mathematics at St. Cloud State University. His talk is titled *Honeybees and Fibonacci Identities.*

Danrun Huang

How many times have you seen or heard of the Fibonacci numbers 1, 1, 2, 3,5,8,13,21,...?

From elementary to advanced math courses, from the leaves on a stem to the surface of a pineapple, from snail shells to beehives, Fibonacci numbers are found everywhere! There are so many patterns and laws hidden in a sequence of Fibonacci numbers, and a lot of them can be formulated as identities. People have used various ways to prove Fibonacci identities.

In this talk, I will show how honeybees can prove scores of Fibonacci identities, from the simple to the very sophisticated. This talk is adapted from what the author presented at the 2005 MathFest in Albuquerque, New Mexico.

The talk is presented in PowerPoint and is designed for all students and faculty.

Problem of the week...[1]

There have not been any solvers to POTW of the previous issue. We'll try again—this time with a little hint.

Suppose we pick 2006 oints at random in the plane, and that no three of them lie on a line. Is there always a line in the plane which divides the set of points into two parts of 1003 points each?

Hint: Consider the set of slopes of lines joining all possible pairs of points. How many are there?

Submit your solution to the editor at kaminsky@augsburg.edu, slip them under his door at Science Hall 137E, or put it in the puzzles and problems box just outside of Su's office.

[1]reproduced (and adapted) with permission from Bradley University's 'potw' page <bradley.bradley.edu/~delgado/>

Puzzle of the week...

We received correct solutions to last issue's Puzzle from **Paul Bjorkstrand** and **Billy Helm**. Serious attempts were made by **Nyla Anderson** and **Steve Vacca**. Here is your new puzzle (part (*c*) is for a $1 prize):

(*a*) The digits 1, 2, and 3 can be arranged to form 6 different 3-digit numbers. What is the sum of these 6 numbers?

(*b*) The digits 1, 2, 3, and 4 can be arranged to form 24 different 4-digit numbers. What is the sum of these 24 numbers?

(*c*) The digits 1, 2, 3,..., and n can be arranged to form $n!$ different n-digit numbers. Find a formula for the sum of these $n!$ numbers. Evaluate the formula for $n = 7$.

Submit your solution to the editor at kaminsky@augsburg.edu, slip them under his door at Science Hall 137E, or put it in the puzzles and problems box just outside of Su's office.

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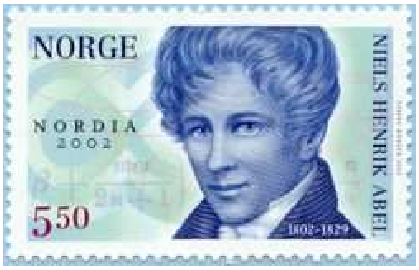
The bi-weekly newsletter of the Department of Mathematics at Augsburg College

Editor-in-chief..............Ken Kaminsky
<kaminsky@augsburg.edu>

Great Norwegian Mathematician—

Niels Henrik Abel*



Niels Henrik Abel (August 5, 1802–April 6, 1829), Norwegian mathematician, was born in Finnøy. In 1815 he entered the cathedral school at Christiania (as Oslo was then called), and three years later he gave proof of his mathematical genius by his brilliant solutions of the original problems proposed by Bernt Holmboe. About this time, his father, the vicar Søren Georg Abel, a poor Protestant minister, died, and the family was left in straitened circumstances; but a small pension from the state allowed Abel to enter Christiania University in 1821.

Abel's first notable work was a proof of the impossibility of solving the quintic equation by radicals (see Abel-Ruffini theorem.) This investigation was first published in 1824 in abstruse and difficult form, and afterwards (1826) more elaborately in the first volume of *Crelle's Journal*. Further state sponsorship enabled him to visit Germany and France in 1825, and having visited the astronomer Schumacher (1780–1850) in Altona near Hamburg he spent six months in Berlin, where he became well acquainted with August Leopold Crelle, who was then about to publish his mathematical journal. This project was warmly encouraged by Abel, who contributed much to the success of the venture. From Berlin he passed to Freiberg, and here he made his brilliant researches in the theory of functions: elliptic, hyperelliptic, and a new class now known as abelian functions being particularly intensely studied.

In 1826 Abel moved to Paris, and during a ten month stay he met the leading mathematicians of France; but he was poorly appreciated, as his work was scarcely known, and his modesty restrained him from proclaiming his researchings. Pecuniary embarrassments, from which he had never been free, finally compelled him to abandon his tour, and on his return to Norway he taught for some time at Christiania. In early April 1829 Crelle obtained a post for him in Berlin, but the letter bringing the offer did not reach Norway until two days after Abel's death from tuberculosis at Froland Ironworks near Arendal.

The early death of this talented mathematician, of whom Legendre said "quelle tête celle du jeune Norvégien!" ("what a head the young Norwegian has!"), cut short a career of extraordinary brilliance and promise. Under Abel's guidance, the prevailing obscurities of analysis began to be cleared, new fields were entered upon and the study of functions so advanced as to provide mathematicians with numerous ramifications along which progress could be made. His works, the greater part of which originally appeared in *Crelle's Journal*, were edited by Holmboe and published in 1839 by the Swedish government, and a more complete edition by Ludwig Sylow and Sophus Lie was published in 1881. The adjective "abelian", derived from his name, has become so commonplace in mathematical writing that it is conventionally spelled with a lower-case initial "a" (see abelian group and abelian category; also abelian variety and Abel transform).

In 2002, the Abel Prize was established in his honour.

*Source: Wikipedia, the free encyclopedia

From the Dictionary of Theories*

Peano's axioms (1879, 1889) Named after Italian mathematician Giuseppe Peano (1858-1932) who published a formulation of them which was widely read. The were actually first stated by German mathematician Richard Dedekind (1831-1916).

These are a set of axioms which formalize the theory of arithmetic; that is, the theory of the natural numbers. Among the axioms is the assumption that each number has a unique successor. Also included is the axiom of INDUCTION. Although it was not known to Dedekind at the time, these axioms have models which are very different from the ordinary natural numbers. These so-called non-standard models of arithmetic are non-Archimedean and have the peculiar property of possessing infinitely many 'infinite' integers.
Encyclopedic Dictionary of Mathematics (MIT Press 1987)

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