Augarithms

Volume 16, Number 4 | Visit us at augsburg.edu/math/ | November 4, 2002

Colloquium Series Dates for 2002-2003

Colloquia are usually held on Wednesdays from 3:40 to 4:40 p.m. in Science 108. Note that the November 4th talk is on a Monday! Here is the tentative schedule for 2002-2003:

Mon.	Nov.	4	Ken Kaminsky, Augsburg College*
Wed.	Nov.	20	Michael Kac, University of Minnesota
Wed.	Dec.	4	Loren Larson, Carleton College
Wed.	Jan.	29	Milo Schield, Augsburg College
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 (Monday!)

Ken Kaminsky

This week's speaker is the Math Department's own Ken Kaminsky. He will try to convince you (math majors & minors) to consider careers as actuaries. He will tell you something of what actuaries do, as well as how well they are paid.

If you really want to know the truth, he will be trying to drum up business for his spring Topics course on Actuarial Mathematics.

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

Mathcartoons.com is a website of old and new math and other cartoons by your editor. Visit at mathcartoons. com, and let us know what you think.

What is an actuary?

Ken Kaminsky is talking this week about his course on actuarial mathematics (see the article to the left ←). According to the *Dictionary of Insurance,* by Lewis E. Davids, Sixth Revised Edition (1983), Rowman & Allanheld Publishers an actuary is "A person concerned with the application of probability and statistical theories to the practical problems of insurance and related fields. He or she may specialize in life insurance, property and casualty insurance, pension work, government programs, or a combination of these. His or her responsibilities extend to the calculation of premiums, evaluation of various reserves, forecasting of financial results on both a long-range and a short-range basis, and he or she often has additional executive duties in connection with operation of his or her firm."

And speaking of actuaries...

A local human resourses consulting firm is seeking students to fill two actuarial positions: One is a Health Care and Group Benefits Actuarial Analyst; the other is a Retirement Actuarial Analyst. If interested, see Ken (Sci 137E, x1066) for all the details.

Puzzle & Problem of the week...

THE PUZZLE:

If you construct a 5 x 5 chess board, how many rectangles will there be in total? Note that you need to include squares, because a square is a special kind of rectangle. Can you generalize to n x n?

THE PROBLEM:

Shuffle an ordinary deck of playing cards. Now turn cards over, from the top, one at a time, until the first ace appears. On average, how many turnovers are required?

Send your solutions to the editor. You can drop them in the Puzzles & Problems box just inside the math suite (Sci. 137), or you can *e*-mail them to him at kaminsky@augsburg.edu.

Submitters to the Fogelfroe diploma-distribution problem of the last issue include **Hung Nguyen**, **Sam H. Fowtes** and **Tiny Hans Knekmek**. Older readers may recognize the problem by one of its archaic names "The hat-check girl problem." The surprising answer to the general problem is that p_n (the probability of at least one right) = 1 - 1/2! + 1/3! + ... + $(-1)^{n-1}/n!$ = $\sum_{k=1}^{n} (-1)^{k-1}/k!$, which converges (rather fast) to $1 - e^{-1}$ = 0.63212055882855767840447622983 85391325541888689682321654921631983025385042551001966428527...

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

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Mathematician Biography

Francis Upton

Francis Robbins Upton (1852-1921) studied at Bowdoin College, Brunswick and then he went to Berlin where he studied under Hermann Helmholtz.

He returned to the USA and studied at Princeton University. He became the very first student to officially earn, by examination, a graduate degree from Princeton. He received the degree of Master of Science from Princeton in 1877 after being instructed by C. F. Brackett. It was Brackett who, in 1889, founded at Princeton the first school of electrical engineering in the United States.

After obtaining his Master's degree Upton worked with Thomas Edison on mathematical problems associated with devices such as the incandescent lamp, the watt-hour meter and large dynamos. Although Edison was a genius as an inventor he had no formal education so was unable to translate his intuition into mathematics. For this he relied on Upton who produced mathematical formulations of Edison's ideas.

Upton went to live in Menlo Park, New Jersey, since he worked there in the laboratory that Edison had set up in that village in 1876. The laboratory was a remarkable research environment for Upton to undertake his reseach in. Better equipped than most of the leading university laboratories, it possessed the finest equipment available. Galvanometers, storage batteries, induction coils, wire chemicals, photographic equipment and a forge were available. It also had a research library where scientific publications were held. About twenty skilled machinists, in addition to the mathematical physicist Upton, staffed what was the first ever industrial research laboratory.

In 1879 the design of the electric light bulb was perfected. Despite several eminent scientists predicting that electric light bulbs in a circuit would never work, a lamp powered by current produced by dynamos was demonstrated on October 21, 1879. It was Upton's home in Menlo Park which was the first private house in the world to be lit by electricity, the lamps being powered by a station in Menlo Park capable of lighting 30 bulbs.

Upton became a partner and the general manager of the Edison Lamp Works which was established in 1880. It became part of the General Electric Company in 1892.

The Francis Robbins Upton Fellowships at Princeton are named Upton's memory.

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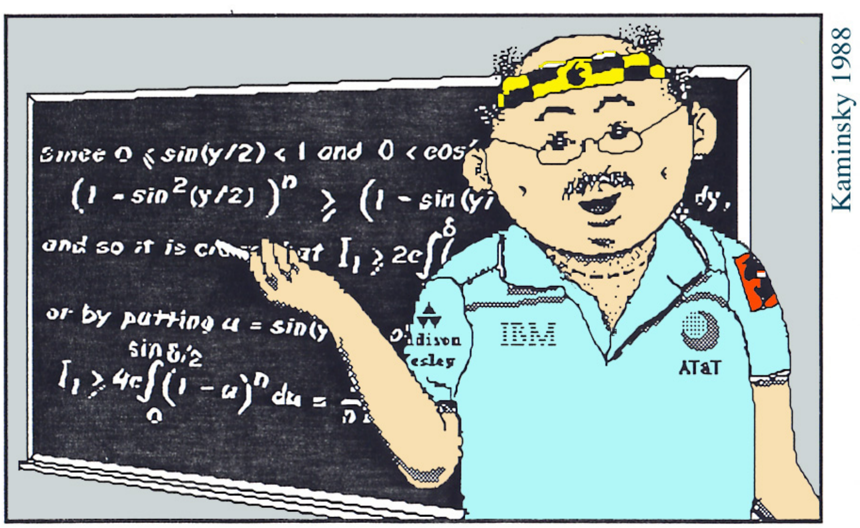
Cartoon Corner



Professor Fogelfroe cashes in on the lucrative endorsement craze.

Pretty graph of the week...

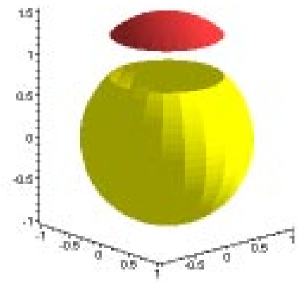
The graph below is that of a sphere of radius one truncated above $z = 3/4$, shown in yellow*, and the truncated top raised 1/2 units, and shown in orange*. The two surfaces are rendered by:

$\boldsymbol{s}(\phi, \theta) = [\sin(\phi)\cos(\theta), \sin(\phi)\sin(\theta), \cos(\phi)]$,

for $\cos^{-1}(3/4) \le \phi \le \pi$, $0 \le \theta \le 2\pi$, and

$\boldsymbol{t}(\phi, \theta) = [\sin(\phi)\cos(\theta), \sin(\phi)\sin(\theta), .5+\cos(\phi)]$,

for $0 \le \phi \le \cos^{-1}(3/4)$, $0 \le \theta \le 2\pi$.



*See the graph in color at augsburg.edu/math/augarithms.

Math Tool Helps FBI Store Fingerprints...

The FBI has a database of 200 million fingerprint records stored in the form of inked impressions on paper cards. With 30,000 new cards a day coming in from all over the country, the Bureau faced a serious data storage and retrieval problem. In " Fingerprints Go Digital," an article in the November 1995 issue of Notices of the AMS, Christopher M. Brislawn describes the mathematics behind a state-of-the-art solution developed at Los Alamos National Laboratory.

The solution uses a mathematical tool called wavelets. Like the Fast Fourier Transform, which has been used by scientists and engineers for many years now, wavelets provide a means of representing and organizing complicated data by breaking it into smaller, more tractable mathematical components. For example, such tools have been used to break human speech into its harmonic components, thereby helping to create computers that can imitate and recognize human speech.

In addition to representing information in simpler component parts, wavelets have the capability to ``zoom in'' on particularly complicated portions of the data. For this reason, wavelets are especially suited to the compression of images for computer storage, making them a natural choice for the solution of the FBI's fingerprint problem.

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http://www.ams.org/new-in-math/mathnews/fbi.html