Augarithms

AUGSBURG COLLEGE

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Mathematics Colloquium Spring Lineup

Colloquia are typically held Wednesdays from 3:40—4:40 in Science Hall 108. Refreshments are always provided.

Jan. →	24	Aaron Luttman, B.[1]
Mar.	7	TBA
Mar.	28	TBA
Apr.	18	TBA

A number of additional colloquia will be added. Please stand by.

[1]Using Video to Understand Leaf Breathing

Aaron Luttman, Bethany Lutheran College

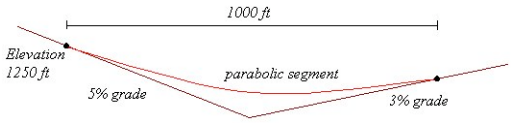
Aaron Luttman

In order to engage in photosynthesis, plant leaves absorb carbon dioxide through the opening of pores in their surfaces called "stomata." Water evaporates through open stomata, however, which is bad for the plant. Thus a plant tries to adjust its stomata so that it balances its need get CO_2 with its aversion to losing H_2O. In order to see how open these pores are, a leaf is injected with a dye that fluoresces when reacting with CO_2. We take pictures of the leaf, and bright regions correspond to areas in which the stomata are closed and the dark regions to areas in which the stomata are open. Pictures are continually recorded as these patterns change with time, and the result is a little "movie." These movies must be processed mathematically, then we can analyze the bright and dark regions. We use partial differential equations and very large computers to figure out how the bright regions change over time, and this information tells us (hopefully!) how the leaf decides when to adjust its stomata. If we can figure out how the leaf makes this decision, then we can get better insight into the biological process involved, which is currently unknown to plant physiologists. Results for an actual leaf and basic analysis of the patterns will be presented.

Problem of the week...

There was no new Problem of the week when we left off last semester. Here is our new problem:[2]

A straight segment of highway with a grade of 5% is to be joined smoothly to a segment of highway with a grade of 3%. This transition is to be accomplished by means of a parabola which begins at a point with elevation 1250 ft. The horizontal distance from the first point to its last point is to be 1000 ft. See Figure below:



What is: (a) the equation of the parabola (relative to some suitable coordinate system), (b) the elevation at which the parabolic curve meets the 3% grade line, and (c) the best location for a drain to remove any accumulating water?

[2]Reprinted with permission from Bradley University's 'potw' page <bradley. bradley. edu/~delgado/>

Puzzle of the week...

There was no new Puzzle of the week last semester's final issue. Here is our new puzzle:

A palindrome is a word ornumber that reads the same backwards or forwards. Numbers such as 606 and 4334 are examples.

While driving his car, Ed observes that the odometer reading, 13,931, forms a palindrome.

Two hours later, the odometer shows a new palindrome.

How fast was Ed probably driving?

Submit your puzzle and/or problem solutions 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

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Fisher-Behrens problem[2]

(Early 20th century) *Statistics*

Named after the British statistician Sir Ronald A. Fisher (1890-1962), this is the problem in *statistics* of finding a test for the equality of the means of two normally distributed populations with different and unknown variances given independent random samples from each. American statistician Henry Scheffé (1907-1977) designed an exact test which uses only some of the information contained in the samples and is only unique when the sample sizes are equal. Behrens and Welsh devised a test which uses all of the information in the samples, but is only approximate.

[2]Article by Martha Limber, Department of Applied Mathematics, University of Waterloo. Reprinted with permission from *Dictionary of Theories*, by Jennifer Bothamley.

Obituary—Everett Pitcher

Everett Pitcher

Our Matt Haines (current Chair) got his Ph.D. at Lehigh University. Everett Pitcher was longtime professor at Lehigh, and a prominent mathematician nationally. Everett Pitcher died recently. Here is an obituary from the MAA web page.

Everett Pitcher (1912-2006) Everett Pitcher, who served as AMS Secretary from 1967 to 1988, died December 4 at the age of 94. He was born in Hanover, New Hampshire to mathematical parents: His father received his Ph.D. from the University of Chicago under E.H. Moore, and his mother was a math teacher. Pitcher himself received his Ph.D. from Harvard University in 1935 under the direction of Marston Morse. He joined the faculty of Lehigh University in 1938 and spent almost all of the rest of his academic career there, serving as chair from 1960 until his retirement from the department in 1978. Pitcher was a founder of the Society for Industrial and Applied Mathematics, a member of its Board of Trustees from 1961 to 1963, and an AMS Associate Secretary from 1959 to 1966. In 1985 he received the Mathematical Association of America Award for Distinguished Service. A lecture series at Lehigh and a chair are named in his honor. Pitcher was an AMS member since 1935.

Mathematician Joke

An American mathematician and his wife are staying in London for the summer.

He decides to pay a visit to an English mathematician friend who lives in a small hamlet in the north.

After arriving, he and his friend talk math for a couple of hours, at which time the Yank decides he should be on his way back to London. The Brit tells him he should stay for lunch and then drive back. The Yank gives in.

After lunch the two are caught up in conversation again for some hours. At this point the Yank announces that he really should be getting back, but the Brit points out that it is almost tea time and the Yank should take tea with him. The Yank agrees with some reluctance.

Once again they are caught up in discussing math when, after a few more hours, the Yank stands up to leave. The Brit again convinces the Yank to stay-this time to dinner-since a place has been set for him at the table. The Yank acquiesces.

After dinner and discussing math again for hours, the Yank says that he really must go. The Brit insists that it is now too late to be driving a long distance and convinces the Yank to stay the night. The Brit points to the phone and tells the Yank he should use it.

"What for?" asks the Yank.

"Why, to call your wife to tell her you won't return to London until tomorrow." replies the Brit.

"No need." says the Yank. "I'll just go out to the car and tell her."