Augarithms

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Mathematics Colloquium Fall Lineup

Colloquia are typically held Wednesdays from 3:40 - 4:40 in Science Hall 108. Please note changes. Refreshments are always provided.

Sep.	13	The Augsburg Mathematics Department presents itself. Please note that this week's colloquium is to be held in Science 123.
Sep. →	27	Huseyin Coskun, Augsburg College & IMA*
Oct.	11	Amelia Taylor, Colorado College
Oct.	18	Wendy Weber, Central College (Pella, Iowa)
Oct.	25	Matt Haines & Ken Kaminsky, Augsburg College
Nov.	8	TBA
Nov.	29	Richard Jarvinen, Winona State University & NASA

*This week's colloquium...

Ameboid Cell Motility: A Model and Inverse Problem, with an Application to Live Cell Imaging Data by Huseyin Coskun

In this talk a discrete model for ameboid cell movement, together with the corresponding inverse problem formulation will be introduced and discussed. The model uses classical mechanical tools.

Based on the model, the inverse problems can be posed: depending on the constitutive relations and governing equations, what kind of characteristic properties must the model parameters and unknowns have in order to reproduce a given movement of the cell, provided that position is given? The inverse problems which were not previously addressed in the area of cell motility are also analyzed.

Huseyin Coskun

The inverse problems provide the model parameters that give some insight, principally into the mechanical aspect, but also, through scientific reasoning, into chemical and biophysical aspects of the cell.

The model consists of a system of second-order ordinary differential equations with the corresponding inverse problem, which can be written as a linear algebraic system.

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

Editor-in-chief.............Ken Kaminsky
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Problem of the week...†

The 'World Series' problem from v20.1 had one partial solution from **Richard Garnett.** Each team can get to four games first in $C(7, 4) = 7!/(4! \times 3!) = 35$ ways, so there are $2 \times 35 = 70$ ways to play the series (Richard got the 35).

Here is his week's problem: A mathematics professor and four mathematics students are in a square room, 10 feet on a side. The four students are stationed at the room's four corners, each student armed with a water pistol having a range of 10 feet. What is the area of that portion of the room in which the professor is simultaneously in range of all four water pistols?

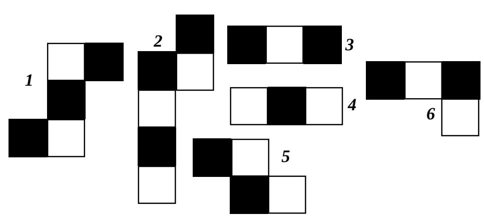
Submit your solution to the editor at kaminsky@augsburg.edu, slip them under his door at Science Hall 137E, or put it in the puzzles and problems box just outside of Su's office.

†adapted with permission from Bradley University's 'potw' page <bradley.bradley.edu/~delgado/>

Puzzle of the week...

There were many solvers of the toothpick puzzle from vol. 20.1. These were: **Prof. Phil Adamo**, History, **Philip Brown**, **Richard Garnett**, **Martin Sotola**, **Matt Hessler**, **Nick Swanson**, **Luom Seidenkranz**, and **Evan Fuhs**.

Here is this week's puzzle: The six sections below are parts of a 5 x 5 checkerboard grid. Piece them back together to form the original pattern.



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Similes Used by High School Students[†]

Each simile listed below was actually used by high school students in their various essays and short stories

Long separated by cruel fate, the star-crossed lovers raced across the grassy field toward each other like two freight trains, one having left Cleveland at 6:36 P.M. traveling at 55 mph, the other having left Topeka at 4:19 P.M. at a speed of 35 mph.

He spoke with the wisdom that can only come from experience, like a guy who went blind because he looked at a solar eclipse without one of those boxes with a pinhole in it and now goes around the country speaking at high schools about the dangers of looking at a solar eclipse without one of those boxes with a pinhole in it.

She caught your eye like one of those pointy hook latches that used to dangle from screen doors and would fly up whenever you banged the door open again.

The little boat gently drifted across the pond exactly the way a bowling ball wouldn't.

From the attic came an unearthly howl. The whole scene had an eerie, surreal quality, like when you're on vacation in another city and "Jeopardy" comes on at 7 P.M. instead of 7:30.

Her eyes were like two brown circles with big black dots in the center.

Her vocabulary was as bad as, like, whatever.

He was as tall as a six-foot, three-inch tree.

Her date was pleasant enough, but she knew that if her life was a movie, this guy would be buried in the credits as something like "second tall man".

John and Mary had never met. They were like two hummingbirds who had also never met.

The thunder was ominous-sounding, much like the sound of a thin sheet of metal being shaken backstage during the storm scene in a play.

The red brick wall was the color of a brick-red Crayola crayon.

His thoughts tumbled in his head, making and breaking alliances like underpants in a dryer without Cling Free.

[†]*Source: www.dreamhaven.org/~data/humor/hsstudent.html*

Lindemann's Theorem(1882)

Named after German mathematician Carl Louis Ferdinand von Lindemann (1852-1939), but is sometimes called the Lindemann-Weierstrass theorem after German mathematician Karl Theodor Wilhelm Weierstrass (1815-18970 who made more rigorous the original ideas of Lindemann.

It is the result in NUMBER THEORY whereby for any distinct algebraic numbers $\alpha_1, \ldots \alpha_n$, and any non-zero algebraic numbers $\beta_1, \ldots \beta_n$ it is the case that

$$\beta_1 exp(\alpha_1) + \ldots + \beta_n exp(\alpha_n) \neq 0.$$

It is an immediate consequence of this result and the identity $exp(i\pi) = -1$ that the number π is transcendental. This solves the ancient Greek problem of constructing with ruler and compasses only a square with area equal to that of a given circle; in particular, the length $\sqrt{\pi}$ being transcendental cannot be classically constructed and so the quadrature of the circle is impossible. Lindemann's theorem also includes the transcendence of e (proved earlier by Hermite) and of $\log(\alpha)$ for algebraic α not zero or one.

Article by Michael Bean, Department of Pure Mathematics, University of Waterloo.
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Math Anxiety Diet

Stressed out over exams? Try the Math Anxiety Diet:

BREAKFAST:
- 1 poached egg
- 1 slice dry whole wheat toast
- 1/2 grapefruit

LUNCH:
- 4 oz. lean broiled chicken
- 1 cup steamed zucchini
- 1 cup herb tea
- 1 oreo cookie

MID-AFTERNOON SNACK:
- rest of package of oreo cookies
- 1 quart rocky road ice cream
- 1 jar fudge
- 2 doughnuts

DINNER:
- rest of bag of doughnuts
- 1 large pizza with the works
- 1 large pitcher of beer
- 3 Milky Way bars
- 1 frozen cheesecake eaten directly from the freezer