

THE MATHEMATICAL ASSOCIATION OF AMERICA  
NORTHERN CALIFORNIA, NEVADA, AND HAWAII SECTION  
Saturday, February 23<sup>rd</sup>, 2013  
University of the Pacific

All presentations are in the DeRosa University Center

PROGRAM

- 9:00 – 10:00 Registration, Coffee Hour, Book Sales  
Registration Fee: \$15 (\$5 for retirees; \$1 for students and unemployed)
- 10:00 Opening Welcome: **Lou Matz**, Assistant Provost for Academic Affairs, UoP
- 10:00 – 10:50 **Katherine Socha**, Math for America  
*Sister Bernadette's Barking Dog Meets Doctor Leadley's Category Theory*  
Presider: **Chris Goff**, University of the Pacific
- 10:50 – 11:00 **MAA Section Business Meeting**  
Presider: **Brad Chin**, West Valley College, Section Chair
- 11:10 – 12:00 **Inez Fung**, University of California at Berkeley  
*Climate Math*  
Presider: **Alon Amit**, Origami Logic, Program Chair
- 12:10 – 1:00 **Luncheon**  
Advance reservation for luncheon (\$20.00) is required.
- 1:00 – 1:30 Presentation of the 2013 Section Award for Distinguished College or University Teaching of Mathematics, **John Thoo**, Yuba College, Teaching Award Committee Chair  
Speaker: **Robert Mathews**, Yuba College; *Math, Music and ... Dental Hygiene*
- 1:40 – 2:30 **Steve Abbott**, Middlebury College  
*A Brief History of Integration from Cauchy to Riemann to Lebesgue to...Riemann*  
Presider: **Brigitte Lahme**, Section Governor
- 2:30 – 3:00 **Student Poster Session**
- 3:00 – 3:50 **Robert L. Devaney**, Boston University  
*The Fractal Geometry of the Mandelbrot Set*  
Presider: **Ed Keppelmann**, Section Secretary and Treasurer
- 4:00 – 5:00 Math Wrangle  
**Tatiana Shubin**, San Jose State University, moderator

For updates, see section web site: <http://www.maa.org/nocal>

## PROGRAM ABSTRACTS

**KATHERINE SOCHA**, Math for America; *Sister Bernadette's Barking Dog Meets Doctor Leadley's Category Theory*

Abstract: Inspired by Kitty Burns Florey's "quirky history" of diagramming sentences, this talk explores category theory, which some think is a quirky approach to understanding mathematics. The speaker's great-grandmother's textbook's definitions and philosophical assertions about English and right living paralleled the speaker's college's category theorist's assertions about mathematics and right living. As Reed and Kellogg wrote, "To study thought through its outward form, the sentence, and to discover the fitness of the different parts of the expression to the parts of that thought, is to learn, to think." Doctor Leadley would have agreed. This talk will move from sentence diagrams to mathematics, concluding with a category theory approach to understanding the relationship between Cantor's diagonal theorem and Goedel's incompleteness theorem.

**INEZ FUNG**, University of California at Berkeley; *Climate Math*

Abstract: Climate models solve the equations for the conservation of momentum, mass, energy, water vapor and CO<sub>2</sub>. We shall review the basis of climate modeling and emphasize new challenges in projecting future climate change. A new potential application of the climate model is for climate treaty verification, wherein satellite, CO<sub>2</sub>, and weather information are assimilated into the model to estimate carbon sources and sinks at the surface. Recent weather events suggest that the weather has become chaotic. Has it? Is this related to climate change? Can we predict chaotic transitions of the climate system? We shall discuss insights gained from the Lorenz equations.

**ROBERT MATHEWS**, Yuba College; *Math, Music and ... Dental Hygiene*

Abstract: The beauty of both music and math is that they enable us to see something we consider familiar in a new and inspiring way. See how music and math intersect in our day-to-day lives in ways we may never have noticed.

**STEVE ABBOTT**, Middlebury College; *A Brief History of Integration from Cauchy to Riemann to Lebesgue to...Riemann*

Abstract: In the first half of the 19th century there was significant ambiguity about the proper definition of the integral: Was it an area or an anti-derivative? Riemann's familiar integral from 1850 - the one we all learn in calculus - was actually a modification of a proposal by Cauchy intended to divorce the integral from the derivative, but it was not without shortcomings. In particular, the class of functions that could be integrated was lacking (i) limits of some convergent sequences and, more surprisingly, (ii) an entire class of derivatives. In 1901, Henri Lebesgue introduced a new definition of the integral that became the undisputed industry standard, largely because of how elegantly it dealt with problem (i). There is, however, a modern and much less well-known integral that is more powerful than Lebesgue's, simpler to define, and solves problem (ii) by providing the world's shortest proof of the Fundamental Theorem of Calculus.

**ROBERT L. DEVANEY**, Boston University; *The Fractal Geometry of the Mandelbrot Set*

Abstract: In this lecture we describe several folk theorems concerning the Mandelbrot set. While this set is extremely complicated from a geometric point of view, we will show that, as long as you know how to add and how to count, you can understand this geometry completely. We will encounter many famous mathematical objects in the Mandelbrot set, like the Farey tree and the Fibonacci sequence. And we will find many soon-to-be-famous objects as well, like the "Devaney" sequence. There might even be a joke or two in the talk.