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[www.maa.org/nocal](http://www.maa.org/nocal)

# MINI-FOCUS

THE NEWLETTER OF THE NORTHERN CALIFORNIA, NEVADA, AND HAWAII SECTION, MAA  
THE GOLDEN SECTION

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## Matthias Beck Wins Section Teaching Award

Matthias Beck, of San Francisco State University, was the winner of the Section Award for Distinguished Teaching of Mathematics for 2012. The award was presented at the annual section meeting at MSRI on February 25th, 2012. The following is adapted from the citation presented to Professor Beck (see website for complete citation).

Matthias Beck earned mathematics teaching credentials from the Universität Würzburg in Germany in 1997, a doctorate in mathematics from Temple University in 2000 and came to San Francisco State University in 2004.

At SFSU Professor Beck is known as both an exemplary teacher and a world-class researcher. He is the author of two textbooks and an extraordinary successful teacher of many subjects - from advanced geometric combinatorics to calculus to teacher preparation. He provides stimulation to students by involving them in projects with high-school teachers and students. He has been directly involved with three doctoral students at the University of California and has supervised twenty master's theses at SFSU.



**Matthias Beck**

Matt is a tireless and highly successful mentor for students, with eleven of his research papers featuring student authors. He has an NSF-funded program to increase the percentage who enter PhD programs. And since 2005, Dr. Beck has co-directed the San Francisco Math Circle, an integrated program for public-school teachers and their students in grades 6 to 11.

One of his senior colleagues wrote, "I do not know any other accomplished research mathematician who also has training in pedagogy... Every one of his students remembers him as a wonderful teacher with a heart." One student remarked, "Prof. Beck is exceptionally [responsive] to students' questions and comments. He also cares especially much about our learning, and goes above and beyond the call of duty to help us." Students and colleagues alike treasure Matt's humbleness and his sense of humor."

We are proud to present this year's Section Award for Distinguished College or University Teaching of Mathematics to an extraordinarily effective, inspiring teacher, Dr. Matthias Beck.



## Report on the 2012 Meeting at MSRI

On Saturday February 25, 2012, at what has to be a true favorite location of the section, there was a meeting at the Mathematical Sciences Research Institute (17 Gauss Way), high above the UC Berkeley Campus and the San Francisco Bay. Our sincere thanks go to former MSRI director **Robert Bryant** for helping to make this meeting a reality. Although no one noticed it at the time (and perhaps no one cares even today) 201222517 is prime!

The meeting broke attendance records in the two most important categories. Overall we had 237 attendees (which broke the previous record of 230 set at Stanford in 2006 and the previous total of 210 when we met at MSRI in 2009), of which 112 were students, shattering the previous record of 85 in 2009.

**Cornelia Van Cott** (University of San Francisco) began the day with an outstanding exposition of knot theory. In an efficient and entertaining manner she took the audience all the way from basic definitions through polynomial and surface invariants to various kinds of doubling constructions and knot cabling and factoring. We all glimpsed the frontiers and learned an enormous amount of very interesting low dimensional topology.



**Cornelia Van Cott**

MAA First Vice President **Francis Edward Su** (Harvey Mudd College) talked about

voting in agreeable societies. This refers to an intriguing setup in which each candidate's platform is represented as a point in an interval or spectrum. (Think of  $[0,1]$  where 0 is all the way *left* and 1 is all the way *right*, with most candidates somewhere in the open interval  $(0,1)$ .) Elections take place by approval voting wherein voters give a subinterval that represents their acceptable range of platforms. In this situation there are some nice theorems that tell us when some candidate will garner a majority of approvals. Maybe we should try this? I wonder though how we would do polling and reporting, and by what formal means could a candidate 'move to the middle'?



**Francis Edward Su**

**Keith Devlin's** (Stanford) luncheon talk was a remarkable historical tale of literary forensics as he told us how (and how he found out that) **Leonard of Pisa** (i.e. **Fibonacci**) was responsible for presenting to the world the algorithms of arithmetic we use today. These algorithms made possible a huge revolution in banking, insurance and international trade. There are truly amazing similarities with what **Steve Jobs** and Apple did for us in modern times! Since Apple no doubt uses these algorithms we can definitively now say that Fibonacci is the father of modern computing. You should check out Keith's book *The Man of Numbers: Fibonacci's Arithmetic Revolution*.



The 2012 student poster session had the following intriguing topics:

\* **Derik Birdsall** and **Matt Gagne** of Cal Poly San Luis Obispo did a study of composition operators on linear symbols in Hardy space, looking at properties of norm, numerical range and matrix representation.

\* **Jess Cohen** of Santa Rosa Junior College used trigonometry, calculus and algebraic geometry to prove a very interesting identity.



**Derik Birdsall and Matt Gagne of Cal Poly San Luis Obispo**

\* **Valerie Cormack** of Simpson University gave the history of squaring the circle by starting with the dark side of the lune, as discovered by **Hippocrates** of Chios.

\* **Alex Gerber** and **Matt Rodrigues** of Cal Poly San Luis Obispo used a new data adaptive technique called Empirical Mode Decomposition to analyze ocean sediment (as a proxy for global temperature records) and gain insight into the climate of the Pleistocene era.

\* **Colin Hagemeyer** of Santa Clara University did a study of groups whose Cayley graph is isomorphic to the 1-skeleton of the  $n$ -cube.

\* **James Hall** of Cal Poly San Luis Obispo studied completeness in Archimedean and non-Archimedean ordered fields.

\* **Robert Hildebrand** of UC Davis looked at an advanced form of integer programming, called polyhedral relaxation, which provides polynomial algorithms for special cases of NP problems.

\* **Megan Kuneli** of California State Fresno examined the well-covered dimension of products of graphs arising from paths and cycles. A weighting  $f$  is said to be well-covered if the sum of  $f$

on collections of maximal independent vertices is constant.

\* **Xiaowei Li** and **Rachel Phillips** of Saint Mary's College of California examined the complements of critical graphs. A critical graph is one where the removal of any vertex will force a drop in the graph's chromatic number.

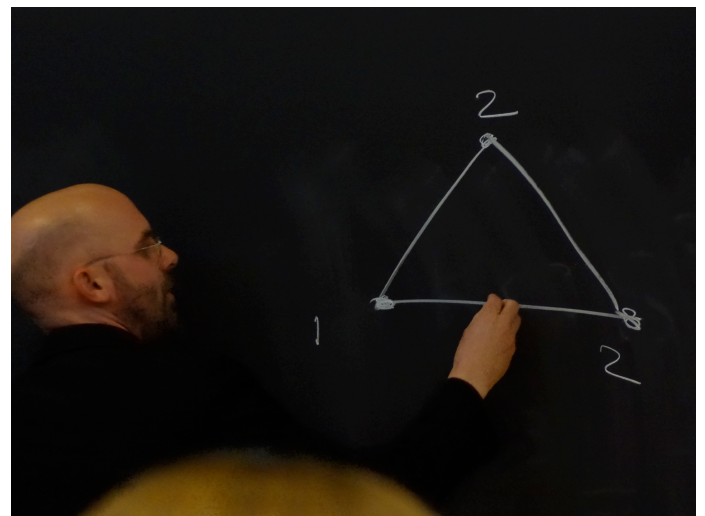


\* **Jamie Peabody** of California State Fresno studied the game of Grim on a graph. In this game players take turns removing vertices and the associated edges. The winner is the player who succeeds in isolating all vertices.

\* **Katherine Urabe** of California State Fresno studied Legendre multiplier sequences. In essence this is an examination of the linear functions of the space of polynomials with only real roots.

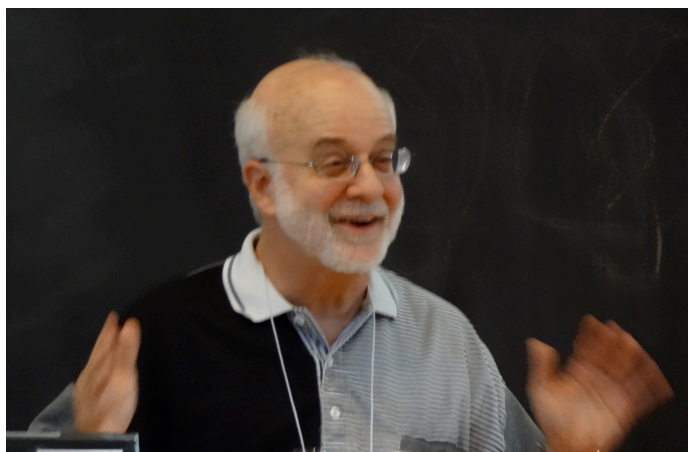
\* **Phillip Williams** of California State East Bay studied ride and tie races. These are where two competitors take turns riding a shared bike or running. Depending on the assumptions made, optimal strategies can use techniques from linear programming.

\* **Zafeirakis Zafeirakopoulos** of the Austrian Research Institute for Symbolic Computation did an examination of Partition Analysis and showed how the problems that arise have a very intriguing description in terms of polyhedral geometry.



**Matthias Beck with a rather easily colored graph**

In our history I suspect it is a first that our newly-awarded teaching award winner was also an invited speaker. (Most winners speak the following year, not 20 minutes after they win!) **Matthias Beck** (San Francisco State University), whose sectional award was followed by the national Haimo award, gave a delightful talk on combinatorial reciprocity theorems (i.e., when negative inputs to counting formulas have valuable interpretations) and geometric graph theory. You might like to check out his texts *Computing the Continuous Discretely: Integer-point Enumeration in Polyhedra* (with **Sinai Robins**) and *The Art of Proof* (with **Ross Geoghegan**).



**Ron Fagin, enjoying both P and NP**

**Ron Fagin** of IBM told us some amazing tales about an almost proof that  $P=NP$ . Solving this problem will earn you a Clay Institute mathematics prize of \$1,000,000, and, more importantly, will provide the world with incredible computing insight into some of the most important tasks that computers can perform. The sociology of examining someone's argument and keeping up with that in the internet era is remarkably different than attempts at some of the classical problems from earlier days. Few problems have such significance though so this is certainly a unique situation.

*Ed Keppelmann, Secretary-Treasurer*

## 2012 Northern California Undergraduate Mathematics Conference

On April 21, 2012, students and faculty gathered at California State University, Stanislaus for the Northern California Undergraduate Mathematics

Conference. There were 65 participants at the conference representing over 20 community colleges, universities, and industry partners. Over the course of the day, there were 15 student presentations in 2 parallel sessions. All student presenters spoke for 15 minutes, and talks ranged from number theory and complex analysis to topology and abstract algebra. In addition to student talks, two Stanislaus alumni math majors and two others comprised a career panel, which all participants attended at the end of the day. Keynote speaker **Reviel Netz** of Stanford University spoke about the Archimedes Palimpsest, and Invited Speaker **Colin Starr** of Willamette University spoke about partial inertia.

The conference was sponsored by The Mathematical Association of America, via a Regional Undergraduate Mathematics Conference grant (supported by NSF grant DMS-0846477), along with additional major funding from the California State University, Stanislaus Office of Research and Sponsored Programs and minor financial support from the California State University Stanislaus Department of Mathematics.

*Brian Jue, Cal State, Stanislaus*

## Problem from the 2012 Wrangle

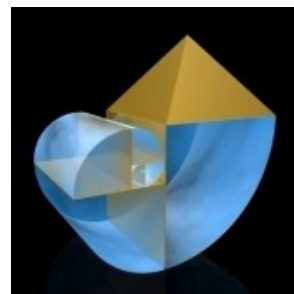
The 2012 section meeting again concluded with the team competition known as a Math Wrangle, which combines mathematics with elements of team sports and debate with a dose of strategy. Rules and sample problems can be found at <http://sigmaa.maa.org/mcst/>.

The 2012 problems were the following.

1. In triangle  $ABC$ ,  $\angle A = 120^\circ$ . Suppose that  $D$  is a point on the angle bisector of angle  $\angle A$  with  $AD = AB + AC$ . Find the angles  $\angle CBD$ ,  $\angle BCD$ , and  $\angle BDC$ .

2. Suppose that the sum of the squares of two complex numbers  $x$  and  $y$  is 7, and the sum of their cubes is 10. What is the largest real value that  $x+y$  can have?

3. Does there exist a trapezoid with the property that the (positive) difference of the lengths of its sides is bigger than the (positive) difference of the length of its bases?





4. Austin takes red and black cards out of a bag and arranges them on a table into two stacks. It is prohibited to place a card on top of a card of the same color. The 10th and 11th cards placed by Austin on the table are both red, while the 25th card is black. What color is the 26th card placed on the table?

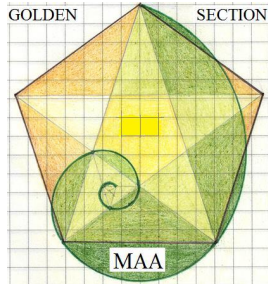
5. What is the largest positive integer  $n$  for which there exists a unique integer  $k$  satisfying the inequality  $8/15 < n/(n+k) < 7/13$ ?

6. The function  $f$  defined on the set of ordered pairs of positive integers satisfies  $f(x,x) = x$ ,  $f(x,y) = f(y,x)$ , and  $(x+y)f(x,y) = yf(x, x+y)$ . Calculate  $f(14,52)$ .

7. A convex polyhedron has for its faces 12 squares, 8 regular hexagons, and 6 regular octagons. At each vertex of the polyhedron one square, one hexagon, and one octagon meet. How many segments joining vertices of the polyhedron lie in the interior of the polyhedron rather than along an edge or a face?

8. Notice that  $6! = 8 \cdot 9 \cdot 10$ . Find the largest positive integer  $n$  for which  $n!$  can be expressed as the product of  $(n-3)$  consecutive positive integers.

—Ed Keppelmann, University of Nevada, Reno



### Golden Section Logo Contest

Do you have an eye for design? Can you graphically display your love for the mathematical sciences? The Golden Section is holding a contest to find our new logo, which will represent us on our website and at the Centennial Procession of

Sections at MAA MathFest 2015. Not-so-secretly spread throughout this document are examples to give you ideas.

Guidelines and Helpful Tips:

\*Consider incorporating "The Golden Section" (e.g. the golden ratio), the geography of Northern California, Northern Nevada, Hawaii and the Pacific US islands, and/or our goal to learn about all kinds of new mathematics for students, teachers and the public.

\* Designs need to be digital and bit-mapped graphics should use at least 600 dpi

\* Use of the national MAA logo is not recommended.

Submission and question can be emailed to Secretary/Treasurer Ed Keppelmann.

### 2013 Northern California

#### Undergraduate Mathematics Conference

The 9<sup>th</sup> annual Northern California Undergraduate Mathematics Conference will be held on April 20, 2013, at California State University Chico. The NCUMC showcases the achievements of undergraduates and gives aspiring mathematicians an opportunity to present their work in a supportive environment. The conference will also include a career panel discussion, a poster session, a "best math joke" competition, and more. The keynote speaker is **Persi Diaconis** of Stanford University. See [sites.google.com/site/nocalumc](http://sites.google.com/site/nocalumc) or contact [nocalumc@gmail.com](mailto:nocalumc@gmail.com) for updates and details.

### Proposal to Amend the Bylaws of the Section

The Executive Committee of the Section, in response to the desires of the national MAA that section bylaws be both relatively consistent across sections while also reflecting the various section's individual characteristics, is proposing the following revisions to our bylaws. In the draft below **bolded text** indicates new language to be inserted, and ~~strikeout text~~ indicates text to be deleted.

According to the current bylaws, such a modification can only made at a regular meeting with the support of a majority of those present. It is the intent of the Executive Committee to ask for such a vote during the 2014 annual meeting.

The Executive Committee encourages all members to review the proposed changes, and to respond with suggestions to any member of the committee. It would be most helpful were members to email Ed Keppelmann, Section Secretary-Treasurer, specifying their comments.

See <http://sections.maa.org/golden/GoldenBylaws.htm> for the current bylaws.

**Proposed By-Laws of the Golden Section: Draft (1/2/2013)**

**I. NAME.** The Golden Section of the Mathematical Association of America for Northern California, Nevada, and Hawaii. Depending on the context, either or both parts of this name (the geographical or the descriptive) may be used to denote the section, although it is expected that in most situations the section shall be referred to as simply The Golden Section.

**II. PURPOSES.** The purposes of ~~The Golden~~ this Section shall be to ~~promote and conserve interest in mathematics, to provide meetings for the presentation and discussion of papers, to furnish an opportunity for fellowship to teachers of mathematics, and to carry out in this region any other purposes of the national organization~~ **advance the mission of the MAA on a regional level (namely within the territory defined in Article III below); to offer guidance to the MAA as it forms and fulfills its mission; to provide professional development and networking activities for section members and mathematics students and teachers (at all levels) in geographically accessible locations; and to promote discussion and action on issues affecting mathematics teaching, learning, and research in the region.**

**III. MEMBERSHIP.** The membership in the section shall be members of the Mathematical Association of America whose mailing addresses are in ~~(1) all counties of California except the following thirteen counties: Imperial, Inyo, Kern, Kings, Los Angeles, Mono, Orange, Riverside, San Bernardino, San Diego, Santa Barbara, Tulare, and Ventura; (2) all counties of Nevada except Clark County; (3) all of Hawaii and other Pacific Islands;~~ **have the following postal codes:**

**California: 934XX, 936XX-939XX, 940XX-961XX**

**Hawaii: 967XX-968XX**

**Nevada: 893XX-898XX**

**Pacific Islands: 969XX**

Exceptions may be made by the MAA membership department upon request of the affected member. Other members of the Association shall be welcome at all meetings and persons not members will be invited to attend meetings.

**IV. OFFICERS.** ~~The officers of this Section shall be a Chair, a Vice-Chair, A Secretary-Treasurer, and a Program Chair. The Executive Committee shall consist of the above named officers together with the Sectional Governor. The Chair shall be the Vice-Chair of the previous year and the Program Chair shall be the Chair of the previous year. The tenure of office shall be five years for the Secretary-Treasurer and one year for the Vice-Chair, Chair and Program Chair. The Secretary-Treasurer shall be elected every five years and the Vice-Chair each year at the first meeting of the calendar year. The new officers shall assume office upon adjournment of the first meeting of the year. Nominations may be made by a nominating committee appointed by the Chair, but this shall not prevent other nominations being made by any member at the time of the election. The officers are empowered to fill any vacancy which may occur. Officers other than the Secretary-Treasurer shall not be eligible to succeed themselves after a full term of office.~~

**1. The officers of this Section shall be a Chair, a Vice-Chair, a Secretary-Treasurer, and a Program Chair.**

**2. The Executive Committee shall consist of the above named officers together with the Section Governor.**

**3. Each officer must be a member of the MAA and of the Golden Section.**

**4. Terms of Office:** The Chair shall be the Vice-Chair of the previous year and the Program Chair shall be the Chair of the previous year. The tenure of office shall be five years for the Secretary-Treasurer and one year for the Vice-Chair, Chair and Program Chair. The Secretary-Treasurer shall be elected every five years by the current executive committee, and the Vice-Chair each year by the general membership at the first meeting of the calendar year. The new officers shall assume office upon adjournment of the first meeting of the year. Nominations for Vice-Chair may be made by a nominating committee appointed by the Chair, but this shall not prevent other nominations being made by any member at the time of the

election. The Section Governor will be the result of an election among the members of the section, administered by the MAA.

5. Vacancies in positions: Except for the Section Governor, the Executive Committee is empowered to fill any vacancy that may occur between elections, until the next scheduled meeting when elections would occur. For the Section Governor, the MAA Board of Governors elects a replacement to complete the unexpired term when a vacancy occurs between elections.

6. Officers other than the Secretary-Treasurer shall not be eligible to succeed themselves after a full term of office.

7. Duties of the Officers: (These are minimal duties and not a limiting list)

a. The Chair shall preside at each business meeting of the section and at meetings of the Executive Committee. The Chair shall appoint committees of the section and shall be an ex officio member of each such committee unless specifically barred by vote of the membership at an official section meeting or unless otherwise specified in these bylaws.

b. The Vice-Chair shall maintain the minutes of all regular business meetings and whenever possible represent the section at national meetings.

c. The Program Chair shall help organize the next annual meeting and help seek out commitments and/or possible locations for future meetings.

d. The Secretary-Treasurer's duties include the handling of the financial obligations of the section and the full tracking and reporting of these transactions; the promotion of the financial health of the section in accordance with the section's mission and traditions; and the collection of registration fees and the receipt of funds provided by the MAA. It is expected that this position will maintain the historical continuity of the section; serve as communication liaison between the national MAA and the general membership; and oversee the maintenance of the section website. The Secretary is also responsible for sending meeting reports after each meeting of the section and an annual section report to the Committee on Sections.

e. It is expected that as needed the section will also incorporate additional officers and committees such as Newsletter Editor, Teaching Award Selection Committee and Chair, and book sale coordinator.

~~V. MEETINGS. Meetings may be called at any time by a vote of the officers, or by resolution by the members at a previous meeting. There shall be at least one meeting and preferably two or more, each year. The places, times, and programs for the meeting are to be arranged by the officers of the section.~~

1. The section normally shall hold at least one program meeting and at least one business meeting (preferably two) each year.

2. A business meeting or program meeting may be called at any time by a vote of the Executive Committee or by resolution of at least 15 members of the section.

3. The places, times, and programs for the meetings are to be arranged by the officers of the section.

4. The quorum for a business meeting shall consist of not fewer than 4 of 5 section officers (see IV #6) and 8 total members of the section. No business may be transacted at business meetings when less than a quorum is present.

VI. FEES AND USE OF ASSETS. The assets of the section shall be used exclusively to further the purposes of the section. In the event of the dissolution of the section the remaining assets shall become property of the national MAA, to be used for purposes consistent with the bylaws of that organization.

~~VI.~~ VII. AMENDMENTS. ~~These By-laws may be amended by a majority vote of the members present at any regular meeting.~~ Subject to subsequent approval by the Board of Governors of the Mathematical Association of America, these bylaws may be amended by 2/3 of the votes cast by a quorum at a program meeting of the Section.



## Call for Student Posters for the 2013 Mathematical Association of America Northern California, Nevada, and Hawaii Section Meeting

**When:** Saturday, February 23rd, 2013

**Where:** DeRosa University Center, University of the Pacific, Stockton, California

**What:** Presentations of research, new approaches to old problems, solutions to problems from mathematics journals, results of class projects or mathematical modeling contests, historical investigations in pure and applied mathematics, mathematical topics outside the standard curriculum, or mathematical investigations arising from internship experiences.

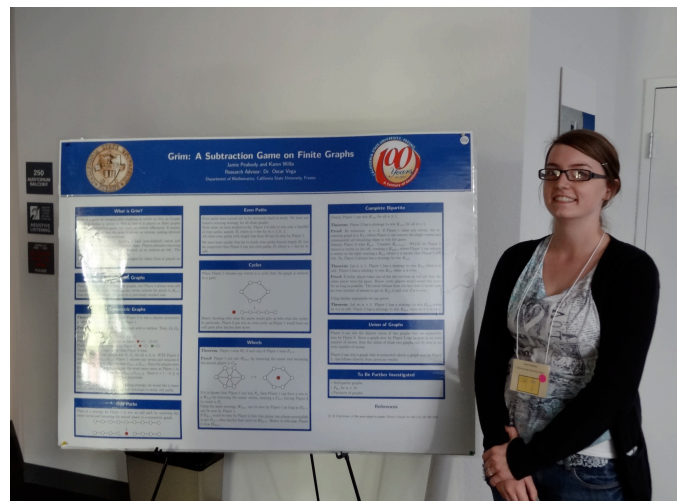
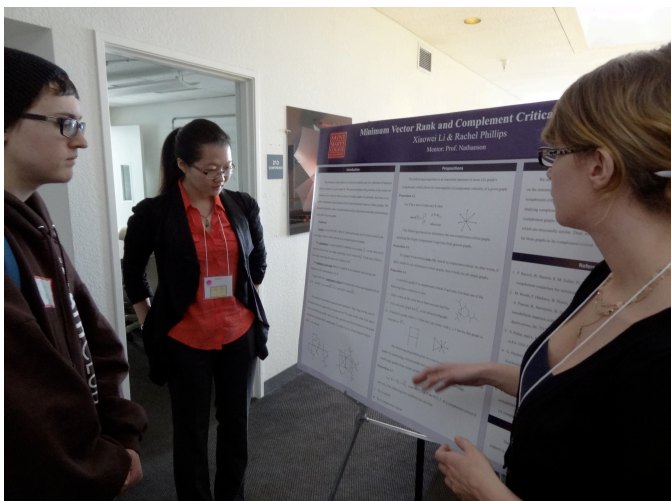
**Who:** All undergraduate and graduate mathematics students.

**Why:** The meeting provides a great opportunity to learn about interesting and entertaining areas of mathematics, as well as to network with other students and professors. Student presenters receive **complimentary registration and luncheon**, plus a **free one-year membership to the MAA** or (to those who are already members) a **free book**.

**Details:** All posters should be typed, illustrated, and displayed on a board 3 feet tall by 4 feet wide. Posters will be on view throughout the meeting, including the scheduled poster session.

**What to do:** Email your name and abstract (2 to 5 sentences), including poster title, name of institution, and name of faculty advisor (if applicable), to Professor Veomett, by Friday, February 15th, 2013. If you wish to participate or have any questions (e.g., whether your idea is appropriate for presentation, what size font to use in your poster) contact Professor Ellen Veomett.

**Contact:** Ellen Veomett. Department of Mathematics, Saint Mary's College of California, Moraga CA 94556, (925) 631-8302 (Office), [erv2@stmarys-ca.edu](mailto:erv2@stmarys-ca.edu)



Saint Mary's students Xiaowei Li (left) and Rachel Phillips discuss critical graphs; Jamie Peabody (Cal State Fresno) happy with her poster on Grim, from the 2012 student poster presentation.

**Call for Nominations  
for the  
2014 Mathematical Association of America  
Distinguished College or University Teaching Award**

Each year the MAA identifies outstanding teachers of college and university mathematics and recognizes their achievements at the sectional and national levels. Members of the Golden Section are encouraged to nominate their exceptional colleagues for the Golden Section Distinguished Teaching Award.

The award committee uses a two-stage approach. Initial nominations, consisting of a simple form and a statement by the nominator, are due December 20<sup>th</sup>, 2013. After reviewing these preliminary nominations, the award committee will ask submitters of clearly competitive nominations to complete additional documentation for the Section Award and consideration for a National Award.

The formal Call for Nominations and the Nomination Form files are available at [www.maa.org/nocal](http://www.maa.org/nocal). These files describe the award, eligibility requirements, and the timeline for review. The Nomination Form and statement by the nominator can be submitted via electronic or postal mail. An e-mail acknowledgment will be sent upon receipt of the nomination package. Thank you for your assistance in this important effort.

Please direct questions to Professor John Thoo, Teaching Award Committee Chair, at Mathematics Department, Yuba College, 2088 N Beale Road, Marysville CA 95901-7605, [jthoo@yccd.edu](mailto:jthoo@yccd.edu)

**Previous Winners: An asterisk precedes names of winners of a national Haimo Award.**

- 1992 **G. D. Chakerian**, University of California, Davis
- 1993 **\*Paul R. Halmos**, Santa Clara University
- 1994 **Jane Day**, San José State University
- 1995 **\*Edward M. Landesman**, University of California, Santa Cruz
- 1996 **G. Thomas Sallee**, University of California, Davis
- 1997 **Jean J. Pedersen**, Santa Clara University
- 1998 **Donald C. Pfaff**, University of Nevada, Reno
- 1999 **\*Leonard F. Klosinski**, Santa Clara University
- 2000 **\*Evelyn Silvia**, University of California, Davis
- 2001 **Wade Ellis, Jr.**, West Valley College
- 2002 **\*Paul Zeitz**, University of San Francisco
- 2003 **Peter Tannenbaum**, California State UniversityFresno
- 2004 **\*Gerald L. Alexanderson**, Santa Clara University
- 2005 **Russell Merris**, California State University - East Bay
- 2006 **Tatiana Shubin**, San José State University
- 2007 **William Fisher**, California State University - Chico
- 2008 **John B. Thoo**, Yuba College
- 2009 **\*Allan J. Rossman**, California Polytechnic State University - San Luis Obispo
- 2010 **Dennis Smolarski**, Santa Clara University
- 2011 **Joseph Conrad**, Solano Community College
- 2012 **\*Matthias Beck**, San Francisco State University

## University of Pacific MAA Sectional Meeting

**Registration** is online, at <http://tinyurl.com/GoldenMAA2013>.

Registration is Regular \$15; Retired or unemployed \$5; Students \$1. Lunch is \$20.

Please pay by sending a check (arriving no later than February 22, 2013) payable to the MAA to  
MAA 2013 Luncheon

Department of Mathematics and Statistics MS084

University of Nevada Reno

Reno, NV 89557

If you experience any problems, contact Ed Keppelmann at [keppelma@unr.edu](mailto:keppelma@unr.edu) or 775-722-0658.

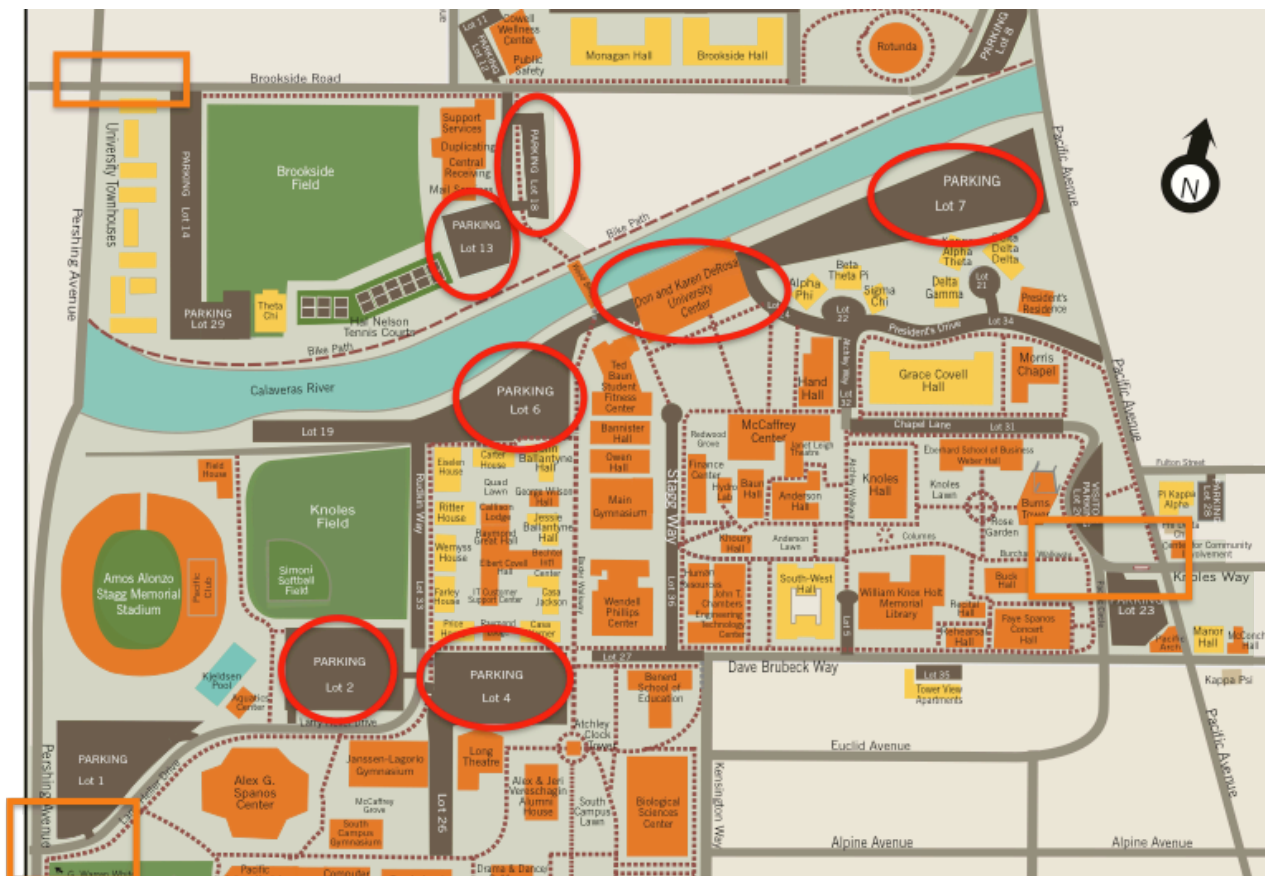
**Directions:** See <http://www.pacific.edu/About-Pacific/Campus-VisitMaps.html> for full directions. In brief:

**From the south:** Take I-5 northbound to Stockton. Exit Pershing Ave. Continue north on Pershing to campus. The campus will be on your right.

**From the Bay Area:** Take I-580 toward Livermore, then I-205 towards Tracy, which will merge with I-5 northbound to Stockton. Exit Pershing Ave. Continue north on Pershing to campus. The campus will be on your right.

**From the north:** Take I-5 southbound to Stockton. Exit Alpine Ave. Turn left onto Alpine. Continue on Alpine, which will take you directly onto campus.

**Parking and Location:** Parking is available in Lots 2, 4, 6, 7, 13 and 18, all of which are within easy walking distance from the DeRosa University Center.





**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.