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Editor
Walden Freedman
Humboldt State University

MINI-FOCUS

THE NEWSLETTER OF THE GOLDEN SECTION OF THE MAA

Jesús De Loera Wins Section Teaching Award

Jesús De Loera, of UC Davis, won the 2017 MAA Golden Section's Distinguished College or University Teaching of Mathematics Award. The award was presented at the 2017 Golden Section Meeting at Santa Clara University, California, on March 4, 2017. (Jesús De Loera's complete award citation can be found online at http://sections.maa.org/golden/Teach.html)

Jesús De Loera earned a BS in Mathematics from the National University of Mexico in 1989, an MA from Western Michigan University in 1990, and a PhD in Applied Mathematics from Cornell in 1995. He joined the mathematics faculty at the University of California, Davis in 1999, and has also taught at other universities in the US, Mexico, Germany, and Switzerland. Jesús is a highly successful researcher who has published upwards of 50 papers in professional journals and authored two books. His research has been recognized several times over: he was awarded a 2004 Alexander von Humboldt Fellowship, the 2010 INFORMS Computing Society Prize, and a 2013 John von Neumann Visiting Professorship at Technische Universität München. Jesús' greatest impact since arriving at Davis clearly has been on students, both undergraduate and graduate. He has supervised 30 undergraduate honors theses—with more than 50 others conducting research with him—plus 12 PhD students and seven postdoctoral researchers. Comments from student evaluations state that Jesús is "excited and energetic and his enthusiasm rubs off on everyone" and "Prof. De Loera is the best math professor I have ever had. He used good examples, used humor, and spoke in terms everyone can understand." One of Jesús' colleagues wrote, "He is legendary among students for being friendly, caring and down-to-earth, and everybody (not just students) admires his ability to always find a kind word." For his dedication to mentoring and teaching, Jesús received the 2003 UC Davis Chancellor's Award, the 2006 UC Davis Award for Diversity, the 2007 Award for Excellence in Service to Graduate Students by the UC Davis Graduate Student Association, and the 2013 Chancellor's Award for mentoring undergraduate research. In summary, Jesús De Loera is a researcher and a teacher, excelling as both. Teaching, mentoring, and research are all intertwined in his academic career and philosophy. We are proud to present this year's Section Award for Distinguished College or University Teaching of Mathematics to Jesús De Loera, an extraordinarily effective and inspiring teacher.

News from the Section

Compiled by Walden Freedman, Mini-Focus Editor

Editor's Note: News is included from institutions who replied before the deadline. To avoid being left out next year, please watch for the call for news each fall season, or contact a section officer.

Cal State East Bay

The Recreational Mathematics and Computer Science Club (founded in 2015) hosts activities, guest speakers, and opportunities to learn throughout the year. We are always seeking out speakers, so if you are interested please contact us at mathcsclub@csueastbay.edu. Recent activities include: 3rd Place finish for team "Get Smart" at Google Games 2017. Linda Beverly gave the talk "*Open Source Hack Day at CSU East Bay*" at MathFest 2017. Two members presented at local and/or national math conferences: Linda Beverly on unsupervised machine learning and Bi Nguyen on neural networks, both under the mentorship of Dr. Shirley Yap. In collaboration with CSU East Bay's AWM (Association for Women in Mathematics), the club is hosting a live stream of Stanford's Women in Data Science (WiDS) Conference on March 5, 2018, 9:00 am – 5:30 pm and will also have guest speakers. See http://www.widsconference.org/.

California State University, Fresno

Fresno State ran its fifth summer REU in mathematics in 2017. The nine student participants worked on problems in knot theory and numerical analysis, and will present their results in the joint undergraduate research sessions at the JMM in San Diego, January 2018. The program will run again in Summer 2018, with projects in graph theory and finite geometries, and complex analysis. For further information and application requirements please visit http://fresnostate.edu/csm/math/summer-programs/reu/index.html. For inquiries, please contact tforgacs@csufresno.edu. Dr. Tamás Forgács won the 2016-2017 Outstanding Faculty Research Award in the College of Science and Mathematics. The award recognizes Dr. Forgács' research publications and grant activity, as well as his leadership in promoting undergraduate math research nationwide.

De Anza College

Karl Schaffer will be giving a math-related performance at the Montalvo Arts Center in Los Gatos on March 27, 2018 titled *Calculated Movements*. This is part of a new lecture series at the Arts Center, and will involve live performance, audience interactions, video clips, and lecture. For more information, see http://montalvoarts.org/events/calculated_movements/

Humboldt State University

Drs. Bori Mazzag and Kamila Larripa received an NSF WATCH US mini-grant to expand the Math Modeling Contest framework, specifically to help women be successful in mathematics. Dr. Larripa attended a workshop at Oberwolfach in Germany on Math Modeling in Systems Biology, receiving an AWM travel grant to support her travel expenses. Several students and faculty participated in the Forty-Sixth Annual State of Jefferson Mathematics Congress, October 6-8, 2017 at Whiskeytown Lake, CA. Students and/or faculty from Chico State, Oregon Institute of Technology, Sonoma State, Sacramento State, and Southern Oregon University also attended. The next State of Jefferson Math Congress takes place October 5-7, 2018. See http://www2.humboldt.edu/sojmc for details. Professor Diane Johnson recently retired. Dr. Peter Goetz presented an invited talk on "*Quadraticity and Koszulity for Graded Twisted Tensor Products*" at the Special Session on Noncommutative and Homological Algebra at the Central Sectional Meeting of the AMS at the University of North Texas in September 2017. Dr. Goetz is also an invited speaker in the Special Session on Noncommutative Algebraic Geometry at the upcoming Western Sectional Meeting of the AMS which will take place at Portland State University in April 2018.

Modesto Junior College

James T. Johnson has retired after 37 years of service.

Saint Mary's College of California

There is a new Computer Science hire in the Math/CS Department: Dr. Nada Attar.

Santa Clara University

New Hire: Mike Hartglass (Analysis). Frank Farris's book *Creating Symmetry*: *The Artful Mathematics of Wallpaper Patterns* is receiving rave reviews. A Mathematics Learning Center recently opened on campus and is being run by mathematics education specialist Linda Burks.
Optional lab sections were launched for Precalculus, STEM Calculus I, and Business Calculus I. Students meet once a week to work on active learning projects connected to the curriculum of the related course. SCU holds two days of workshops on active learning pedagogies each summer. The number of math and computer science majors has grown from 100 to 350 in four years. Demand for the computer science major just keeps growing. Convergence of series was moved to a math-major only course, giving some breathing room in the STEM calculus sequence and enabling the covering of a few more relevant topics for physics and engineering majors. CS lecturer Natalie Linnell won the college's David E. Logothetti Teaching Award, named for a member of our section whom many will remember. (Past winners of this award from our department were Laurie Poe and Frank Farris.)

University of the Pacific

The math department co-hosted two speakers this fall. In October, Dave Kung, director of MAA Project NExT and a professor at St. Mary's College of Maryland, facilitated a workshop for STEM faculty on the role of pedagogy in diversifying STEM disciplines. Then he addressed the entire freshman class on the topic of paradoxes and the possibility of changing one's mind. Finally, that evening he spoke on the topic of math and music to the general public. In November, Frank Farris, former editor of the MAA's Mathematics Magazine and a professor at Santa Clara University, spoke on the topic of math and art, after which there was a pop-up gallery of several of his works.

A Message from your Congressional Representative

by Ed Keppelmann

Due to a recent change in the MAA bylaws, the Board of Governors has been replaced by the new MAA Congress. There was some sentiment that the Board of Governors was mostly a rubber stamp body to the Executive Board (at least regarding financial issues which it spent an enormous amount of time on). While the first congress was spent with some major grappling about our identity and mission, it was also vibrant with lots of energy and vision, and all discussions were carried out with great congeniality and enthusiasm. While ultimately the following goals and issues were criticized as not quite what we need to be doing, they gave us a start for discussions:

GOALS

- Increase awareness and understanding of mathematics and how it impacts our world
- Build a financially sound and sustainable organization through the establishment of a comprehensive budgetary plan

This second goal comes from the board's serious and valid worry that for approximately the past 12 years the MAA has been running budget deficits at the national level. Do we need to increase registration costs at national meetings or must that remain a source of deficit? The three print MAA journals and MAA Horizons will be published by Taylor and Francis beginning in January 2018. Taylor and Francis will provide international exposure with many useful connections to social media. What remains to finalize is what to do with MAA books. For various reasons we cannot sell hard copies of books at local section meetings. Book publishing is hard to do profitably - MAA books are available on AMAZON since it is felt they reach some who might not otherwise see them but **MAA members should not buy them there since AMAZON takes a 45% cut – please buy them from the MAA online store!**

- Expand, support, and increase engagement of our core member community with relevant programs, and develop and grow membership opportunities for new audience groups

Traditionally the MAA serves tenured faculty and their undergraduate students. We have, with some difficulty, reached out to graduate students and project NEXT both nationally and at the section level. What about part time faculty and interested laypeople?

- Leverage the MAA American Mathematics Competitions (AMC) program to increase visibility of the MAA in the STEM community. Use the program as a method of outreach to strengthen diversity and create a future member pipeline.

The AMC-8 is a low stress 40-minute 12 question test for middle schoolers and the AMC-10 (10th grade and below) and AMC-12 (high school excluding calculus) are 75-minute 12 question tests. Schools can get a discount for registering early and then later purchase the number of tests they need in certain fixed inexpensive packet sizes. Universities and community colleges can host these tests. Those performing well on the AMC 10/12 can be invited to other competitions leading all the way to the International Math Olympiad. (The USA finished fourth in July 2017).

- Develop a comprehensive program for donor development that expands and increases both individual and corporate donations

The MAA development team is always looking for companies who want to sponsor various MAA projects and activities. These companies can get exposure to bright students and good advertising.

IMPORTANT ISSUES

- The evolving role of the MAA in support of professors

What is the niche of the MAA when there are already organizations such as AMATYC, NCTM, and ASA? How can the MAA support two-year college faculty, non-tenure track and part time faculty? What about talking to deans? What role should the MAA have in distance education?

- Reaching out to historically underrepresented groups
- Two MAA opportunities for professional growth: The IP guide and the mentoring network

The instructional practices guide (IP) has just been released with a focus on student engagement. How can this be shared with the membership? Maybe short video vignettes to be shown at section meetings? Through the MAA committee on early career mathematics (a three-year study just completed) mentors have been matched to those either pursuing or within five years of the start of a career in mathematics. This could include everyone from graduate students to industry professionals. What are the options for mid-career (say post-tenure) faculty? How can we remove the stigma attached to asking for a mentor by these individuals and how can we link needs (say a change in creative focus) with expertise? What is the demand?

- Increasing section participation

How can member participation in section meetings be increased? Sections have other activities such as student contests and mentoring programs outside of meetings which are also important. How can we help those individuals who can never go (due to say, distance constraints) still participate in these activities?

- Connecting mathematics with other disciplines

How can the MAA connect with other organizations (such as AAAS, APS, AGU, etc.)? Modeling courses can create an excellent dialogue with faculty and students from other disciplines. When math faculty visit the classes of faculty in other disciplines it can be a real eye-opener. In K-

12 the next generation science standards are always looking for ways to strengthen connections to the common core. Science teachers don't always realize the mathematical expertise of their students and courses and curricula could be made stronger and more engaging.

- How can the MAA Congress support the mission of the MAA?

The second meeting of the congress will take place just before the JMM in San Diego (January 2018) and I look forward to this great adventure as it unfolds.

Report on the Section Meeting at Santa Clara University, Mar. 4, 2017

by Ed Keppelmann, photos by Jonathan E. Shapiro

It is not news to anyone reading this newsletter that the MAA is a vibrant organization with great energy and creative minds that touch on a vast array of intriguing ideas, theories and applications. While the national MAA organization does an enormous amount for members and many others who enjoy mathematics, what may be one of the big ways that the MAA sets itself apart from other professional organizations is its vibrant local structure. The MAA is comprised of 29 sections which cover everything and everywhere from sea to shining sea and Canada too. We have Quebec in the Seaway Section and the tiny (geographically but very dense) Metro New York Section to the vast areas of the Pacific Northwest and of course our own Golden Section which includes northern Nevada, Hawaii and the Pacific Islands. Because of these vast geographical, and yes also cultural differences, it is generally well recognized by the MAA Congress that the governance of the individual MAA sections comes from a kind of States Rights mentality not unlike that conveyed to our own 50 states by the US Constitution.

Well, if the sections of the MAA are like US states then where are the capitals of those states? That might be a point of debate in many sections but here in the Golden Section one with any sense of history must surely claim that our capital is Santa Clara University. At the time of this writing, Santa Clara can boast (although they are humble and rarely do) of no less than five Haimo winners (three of which have gone on to national victories), a former MAA president in Gerald Alexanderson, and long-time section treasurer and heart of the Putnam Exam, Leonard Klosinski. There are so many other connections of Santa Clara to the MAA – I can't begin to do them all justice! The numerous authors of MAA books alone could merit several long enjoyable articles! My point here is simply that a section meeting at Santa Clara University is always a splendid idea!

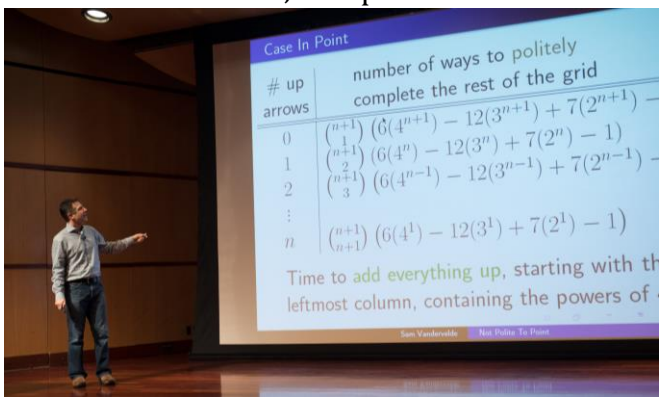
We began the day with section visitor **Tim Chartier** of Davidson College who spoke to us about March Mathness. Since our meeting took place in March this was even more timely as Tim took us on a wonderful tour of the mathematical

insides of College Basketball's annual tournament of 64. Tim points out that since there are 9,233,372,036,854,775,808 (that's right, 9.2 quintillion) ways to fill out a bracket of 64, it is not surprising that no one has ever gotten one completely correct. And yet Tim and his students have found methods to create brackets that defeat 99.9% of the experts. If this piques your interest, see all the great material at http://marchmathness.davidson.edu/. Especially interesting is the article titled "*Got March Madness? Try Math*!".

Tim was followed by Santa Clara's own young prodigy **Nicolette Meshkat** who spoke about parameter identifiability of biological models.

The goal here is to use input/output data from a biological model to identify parameters that effectively describe one instance of the model from another thereby giving a biological researcher unique insight into the systems they are studying. She has created her own algorithm for this using differential algebra and Groebner bases. Many people commented to me how absolutely fascinating they found this material.

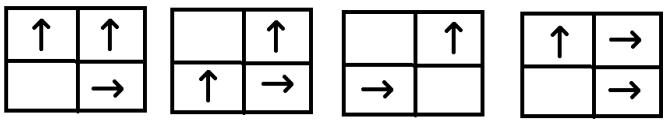
Sam Vandervelde (Dean of San Francisco's own Proof School for K-12 math prodigies) took us up to lunch time with a wonderful mathematical diversion called "*It's not polite to point*". In addition to the math, he sprinkled his talk with



the unique challenges faced by a school like the one he directs. For example, knowing that you must teach all the subjects, when in the day do you do math? And within a math class how do you make sure you cover all the basics even though your students could easily slip from standard precalculus to say, wild identities in hyperbolic trigonometry? They might actually prove the Goldbach conjecture and yet not cover the graphs of rational functions! That will not do!

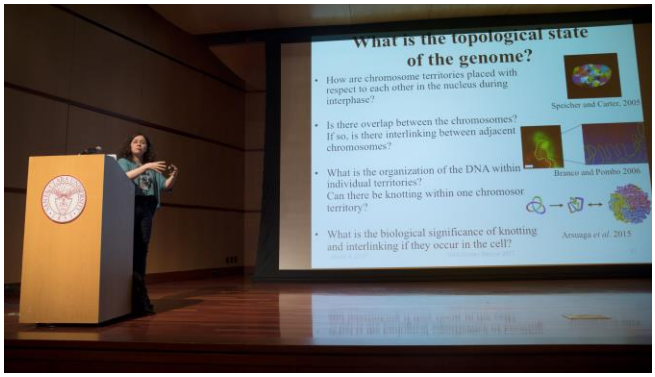
What was truly inspiring during the talk was Sam's excitement for the many things that have been discovered in his topic – the thrill is not so much his discoveries but rather what he helped his young middle schoolers to see and exposit to their peers.

The basic problem that Sam's talk addressed is the following: Given an *m* by *n* grid of squares, in how many ways can a subset of those squares be filled with up and right pointing arrows in such a way that no arrow points at another arrow? For example, with a 2 by 2 grid there are 31 ways to do it – four of which appear below:



It turns out that the best way to count the possibilities is by using the *Worpitzky* numbers first described back in 1883. If you want to know more, please check out Sam's Monthly article "*The Worpitzky Numbers Revisited*" which should appear around February 2018.

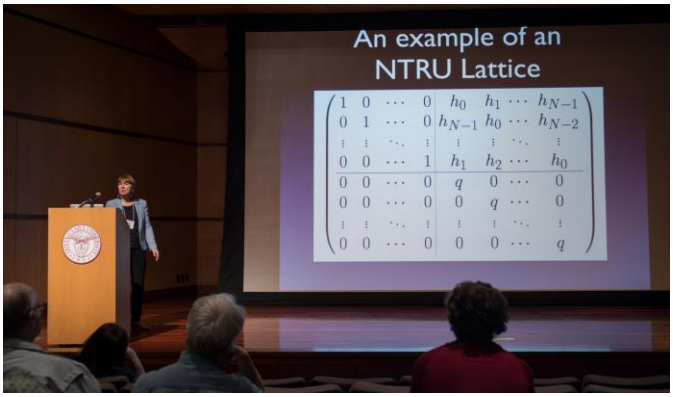
After lunch and plenty of time to enjoy the student posters and the art exhibition (see the discussion of the posters below), we heard from **Mariel Vasquez** of the UC Davis College of Biological Sciences. Mariel studies the topology of DNA.



Every cell in your body (about 10 micrometers in diameter) contains about three billion base pairs of DNA! How does such a strand wrap around

itself – how does it replicate and how do the chromosomes (which are each portions of this DNA) interact with one another and the chemicals that the cell processes and uses for energy? Are there knots? How tightly are things wound and how does this change over time? These are all marvelously intriguing questions for which the theory of polygonal curves and computer modeling can shed great insight. There is a wonderful series of YouTube videos on all of this at http://ucd-advance.ucdavis.edu/mariel-vazquez.

The final talk of the day was by **Jill Pipher** of Brown University on Cryptography. All modern cryptosystems use so called 1-way functions involving operations that involve easy encoding but hard decoding unless you know the so-called trap door. Conveying the trap door in a public but secretive way is the revolution of the Diffie–Hellman key exchange. Traditionally the easy encoding involved forming a product of two large primes while the decoding required knowing those prime factors. [For a marvelous number theoretic poster Jill noted that we should visit the 1-100 factored poster of Richard Evan Schwartz at https://www.math.brown.edu/~res/poster.html.]



Starting in 1998, Jill worked with two other colleagues to develop a cryptosystem whose hard problems involve finding the lattice point in many dimensional space which is closest to a given point. It's really hard when the basis vectors are massive and trap-door minimally hard when they are small and efficient. If one day we have quantum computers, then factoring products of large primes will become easy, but lattice problems will still be tough! There is a great YouTube video where Jill explains some of this at https://www.youtube.com/watch?v=rK4yjrDL9J0.

There was a total of ten posters, all of them absolutely outstanding: (you won't believe the diversity of these topics!)

Summer Al-Hamdani and **Alexandra Leon** of CSU Fresno with faculty advisor Dr. Tamás Forgács looked at multiplier sequences. Rohly these are sequences of numbers which, when multiplied by the various coefficients of certain polynomials will carry polynomials with only real zeroes to other polynomials with only real zeroes. This work looked at how Bessel-type functions and Laguerre polynomials interact in these ways.

Linda Beverly and **Perry Aliado** of CSU East Bay with faculty advisor Shirley Yap used an application of locally linear embeddings to do visual color analysis in videos and maintain this information when the video is compressed. For example, it is essential in many cases that video compression maintain the geometric information inherent in certain color intensive portions of the video.

Jordan Collignon of CSU Monterey Bay with faculty advisor Dr. Todd Kapitula (ICERM) used a three-compartment PDE model to examine the diffusion of toxic lead in the body between the blood, the cortical bone and the trabecular bone. This is where lead poisoning can do the most damage in lowering IQs for children and making bones brittle. The non-linear interactions of diffusion between these compartments in the model are telling scientists more than was previously known.

Rosa M. Garza of the University of Southern California with faculty advisor Dr. Neelesh Tiruviluamala presented work on Ultrasound Nerve Segmentation. Using techniques of AI and neural networks, they developed a way to locate the exact position of nerve cells in ultrasound images.

Victoria Kelley of UC Davis with faculty advisors Dr. Juan Cordovez (Universidad de los Andes) and Dr. Carlos Castillo-Chavez (Arizona State University) looked at the sexual transmission of the Zika virus in Colombia. The traditional spread of this disease is through mosquito bites, but their SIR models also show some component of human sexual transmission.

Ha Nguyen and **Rodolfo Garcia** of San Jose State University with faculty advisor Dr. Elizabeth Gross looked at ERGMs (Exponential Random Graph Models). By computing statistics for very complex graphs (like those of a social network), one can reduce the study of that graph to the

study of some revealing standardized model. In this case the statistics are the number of edges, 2-path loops and 3-path loops. The key to the standard model graphs then seems to involve the graph's automorphism group and the singular points (i.e., vertices responsible for connectivity) of the graph.

Ryan Pugh of Cal State Monterey Bay with faculty advisor Dr. Alison Lynch looked at how early stage undergraduates view proofs and what they see as convincing arguments.

Kecia Sako of San Jose State University with faculty advisor Dr. Jordan Schettler looked at the connections between projective geometry and music. The cross ratio of four collinear points and the distances between them can be interpreted on a guitar or as major triad chords on a piano.

Timothy Schur of Santa Clara University with faculty advisor Dr. Aaron Melman studied improvements of the Cauchy and Pellet radii of matrix polynomials for a large number of engineering problems.

Jennifer Young of Santa Clara University with faculty advisor Dr. Nicolette Meshkat used Mathematica code to create compartment models and their corresponding graphs for analyzing the parameters involved in biological systems models.

For more info on the posters, go to http://sections.maa.org/golden/documents/POSTERS2017.pdf

While attendance was slightly down from the UC Davis meeting (perhaps because we were uncharacteristically late by meeting in March rather than February) with an attendance of 179, we could still boast that over 40% of those in attendance were students. Our mission to teach and model great learning and expositing carries on.

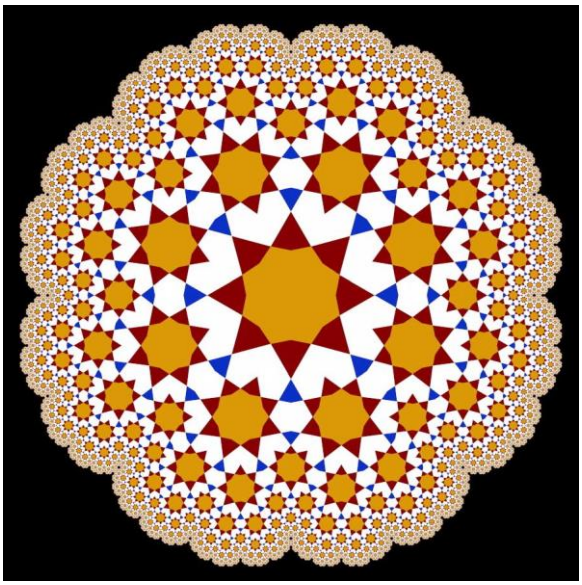
Mathematical Art Exhibition

by Vince Matsko with exhibition photos by Jonathan Shapiro and art work photos by the artists

The 2017 Meeting of the Golden Section marked the second year that an exhibition of mathematical art was on display. The Mathematical Art Exhibition featured a dozen artists and almost 30 individual works in a wide variety of media, both two- and three dimensional. The display hall was bustling with activity – for some, this was the first mathematical art exhibition they had ever been to.

Artists were deluged with questions. It was a nice change, for while many non-mathematicians are fond of asking "How long did it take you to make that?", most participants were keenly interested in *how* a piece was made – the intricate

mathematics involved in creating a work of mathematical art.

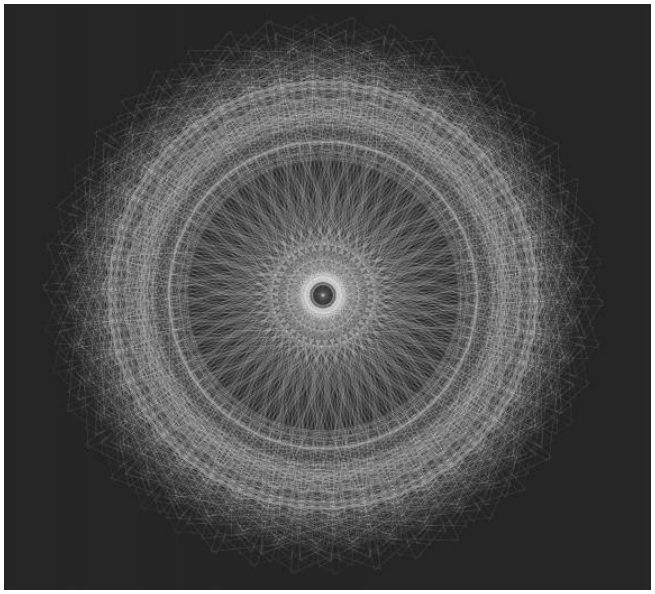


Islamic 8-fold Fractal Flower (Median), by Phil Webster

Shirley Yap, (former Golden Section Governor), deserves kudos for beginning this fine tradition. She comments, "*I exhibited an art piece at the Joint Mathematics Meetings in 2016 ... The kind of delight that came from people's faces convinced me that the art was really drawing them to math in a way that was different from how I had seen before*." As mathematical artists know, this is a common reaction to others interacting with mathematical art for the first time.

Gwen Fisher with some of her paintings

For most mathematical artists, the mathematics is *just* as important as the art itself. Gwen Fisher remarks, "*The thing that keeps bringing me back to bead weaving is mathematics. Of course, I love colors of glass beads and the way they sparkle, but mostly, I keep returning to my seed beads because I keep finding new ways to use and represent mathematical structures with them*."



Symmetric Koch Curve I, by Vince Matsko

Are you interested in showcasing some of your mathematical art at the 2018 Golden Section Meeting at CSU East Bay? Send a note to Vince Matsko at vince.matsko@gmail.com for more information about how to submit your work for inclusion in the Art Exhibition, or see page 13 of this Mini-Focus newsletter!

Interested in serving in a leadership role? (chair cycle, teaching award committee, etc.)

Interested in hosting the section meeting?

Please contact one of the officers listed on the cover for more information.

⇒⇒⇒ We want you! ⇐⇐⇐

Teaching Awards: Call for Nominations

2019 MAA Golden Section Distinguished College or University Teacher of Mathematics Award (General)

&

2019 MAA Golden Section Distinguished College or University New Teacher of Mathematics Award

The MAA has two awards for distinguished college or university teaching of mathematics: the Deborah and Franklin Tepper Haimo Award (instituted in 1991) and, for beginning college or university teachers of mathematics, the Henry L. Alder Award (instituted in 2003). The recipient of the Golden Section Teaching Award (General) is nominated by the Section for the MAA Haimo Award. The recipient of the Golden Section New Teaching Award is nominated by the Section for the MAA Alder Award if the recipient holds a Ph.D. The Golden Section has a two-step nomination process that consists of (i) the initial nomination, and (ii) the full nomination. The initial nomination is very simple, and requires the filling out of a one-page form together with a one-page summary that supports the nomination. After screening the initial nominations, the Teaching Awards Committee will invite the nominators of clearly competitive nominations to submit full nominations.

Members of the Golden Section are encouraged to nominate their exceptional colleagues for the two Golden Section Distinguished Teaching Awards (New Teacher and General). The formal Call for Nominations and the Nomination Form files are available at

http://sections.maa.org/golden/Teach.html.

These files describe the award and eligibility requirements. The initial nomination deadline is

April 30, 2018.

Please direct questions to John Thoo, Teaching Awards Committee Interim Chairman, at the Department of Mathematics and Statistics, Yuba College, 2088 N Beale Rd, Marysville, CA 95901-7605, jthoo@yccd.edu.

Previous New Teaching Award Winners

An asterisk precedes names of those who went on to win a national Alder Award.

2016 **Martha Shott**, Sonoma State University

Previous General Teaching Award Winners

An asterisk precedes names of those who went on to win a national Haimo Award.

1992 **G. D. Chakerian**, UC Davis
1993 ***Paul R. Halmos**, Santa Clara University
1994 **Jane Day**, San José State University
1995 ***Edward M. Landesman**, UC Santa Cruz
1996 **G. Thomas Sallee**, UC 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**, UC Davis
2001 **Wade Ellis, Jr.**, West Valley College
2002 ***Paul Zeitz**, University of San Francisco
2003 **Peter Tannenbaum**, Fresno State
2004 ***Gerald L. Alexanderson**, Santa Clara Univ.
2005 **Russell Merris**, Cal State East Bay
2006 **Tatiana Shubin**, San José State University
2007 **William Fisher**, Chico State University
2008 **John B. Thoo**, Yuba College
2009 ***Allan J. Rossman**, Cal Poly San Luis Obispo
2010 **Dennis Smolarski**, Santa Clara University
2011 **Joseph Conrad**, Solano Community College
2012 ***Matthias Beck**, San Francisco State University
2013 **Steven Blasberg**, West Valley College
2014 **Duane Kouba**, UC Davis
2015 **Michelle Manes**, Univ. of Hawaii at Mānoa
2016 **Serkan Hoşten**, San Francisco State University
2017 **Jesús De Loera**, UC Davis

Jesús De Loera receiving the 2017 MAA Golden Section's Distinguished College or University Teaching of Mathematics Award

THE MATHEMATICAL ASSOCIATION OF AMERICA – GOLDEN SECTION
Saturday, February 24, 2018, at California State University, East Bay
Talks in the New University Union Multipurpose Room A
Poster Session and Mathematical Art Exhibition in the New University Union, Second Floor
Lunch in the Dining Commons

Registration 8:00—11:00 am **Refreshments** 8:30—10:30 am
New University Union Multipurpose Room A

8:45–9:00 **Opening Welcome**
New University Union Multipurpose Room A
Presider: **Joe Conrad**

9:00–9:50 **Susan Jane Colley**, Oberlin College
Counting Curves: Tales from the Enumerative Crypt
Presider: **Ken Suzuki**

9:50–10:05 **Golden Section Business Meeting and Congressional Report**
New University Union Multipurpose Room A

10:10–11:05 **Jesús De Loera**, UC Davis
For linear algebra lovers: Carathéodory's theorem and its relatives
Presider: **Shirley Yap**

11:10–12:00 **Deanna Haunsperger**, Carleton College
Halving Your Cake
Presider: **Frank Farris**

12:00–1:00 **Lunch** (Dining Commons, see map)
Cost: $15 in advance. You must have a ticket to have lunch, tickets to be purchased in advance while registering.

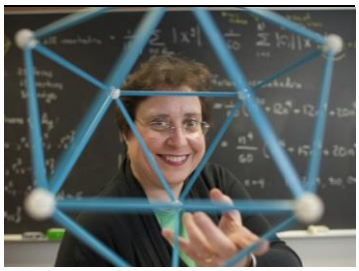
1:00–2:00 **Student Poster Session/Mathematical Art Exhibition**
Second Floor New University Union
Organized and curated by Shirley Yap, CSU East Bay

2:10–3:00 **Serkan Hoşten**, San Francisco State University
Applied Algebraic Geometry Explained with Pictures
Presider: **Jim Smith**

3:10–3:25 **Teaching Awards Ceremony**
New University Union Multipurpose Room A
Presider: **John Thoo**

3:30–4:20 **Paul Zeitz**, University of San Francisco
How vs. Why, part II
Presider: **Ed Keppelmann**

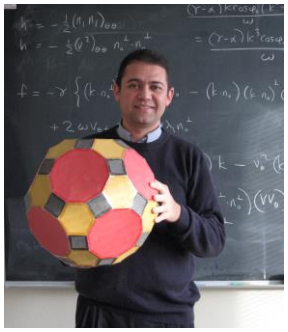
Program Abstracts



SUSAN JANE COLLEY, Oberlin College, *Counting Curves: Tales from the Enumerative Crypt*

Abstract: We will consider the Steiner problem (1848) of five conics: to determine how many conics are simultaneously tangent to five others. We will review some of the history surrounding this problem and some of the ingredients needed to solve it. Finally, we'll speed ahead to modern times and briefly sketch joint work with Gary Kennedy (*Ohio State University*) and Lars Ernström (*Ericsson*) that uses mathematical techniques inspired by ideas in theoretical string theory to address some analogous questions about "higher-order" contact of plane curves.

JESÚS DE LOERA, UC Davis, *For linear algebra lovers: Carathéodory's theorem and its relatives*



Abstract: Are you someone that found linear algebra the most awesome and beautiful subject in the universe? Do linear equations and vectors make you smile? Then I have the theorem for you: Carathéodory's Theorem! It states that any vector in the convex hull of a subset X of $\mathbb{R}^d$ can be expressed as a linear convex combination of at most $d + 1$ vectors of the set X. It is a variation on the basic fact that vectors in $\mathbb{R}^d$ can be expressed as linear combination of a basis (with d vectors). My talk will consider this lovely theorem, and its many relatives and variations. I will show some applications (e.g., in economics, logistics, and signal processing) and how it touches in the inner depths of the mathematician's soul. I will offer open questions for people young and old to solve, so come prepared to fall in love with $A\mathbf{x} = \mathbf{b}$ once more!!

DEANNA HAUNSPERGER, Carleton College, *Halving Your Cake*

Abstract: Here is a problem as old as humanity: given a resource to be shared (water, land, cake), how can it be shared fairly between several people? The answer, in the case of two claimants, is simple and ancient and known to every five-year-old with a sibling: I cut; you choose. Things get much more interesting, and challenging, if one has more than one sibling. How do we make fair divisions?

SERKAN HOŞTEN, San Francisco State University, *Applied Algebraic Geometry Explained with Pictures*

Abstract: Algebraic geometry is the study of geometric shapes that are solutions sets of polynomial equations. In the last 25 years, advances in symbolic and numerical methods made meaningful applications of this field possible. This talk will survey various applications in optimization, robotics, and data science.

PAUL ZEITZ, University of San Francisco, *How vs. Why, part II*

Abstract: The last time I gave a talk at a regional MAA meeting, I discussed the importance of striving for understanding *why* something is true rather than settling for seeing *how* it is true. I still consider this to be the central question in mathematics, yet it is often something few students are even aware of. I will recycle some of my favorite examples from the earlier talk, and share some new examples as well.

How to Register

All participants should first register online on the Golden Section webpage at

http://sections.maa.org/golden/CSUEB2018.htm

Look for the two links at the top of the page. You can then complete the registration by payment with a credit card (with an 11% surcharge) or by regular mail. For the mail option, send a check (arriving no later than Friday, February 16, 2018 and made payable to the MAA) to

MAA 2018 Meeting & 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 or (775) 722-0658.

General Retired Student (all levels) or unemployed Speaker, poster presenter, student worker	$20 $10 $5 Free (register online with pay by mail option)
Luncheon	$15 (in advance)
Suggested donation to support student members	$10

Please consider sending an extra $10 to support student members.

Mathematical Art Exhibition

The Golden Section will again host a mathematical art exhibition. The exhibition will take place in the **Second Floor New University Union** during the break between the morning and afternoon sessions (1:00 to 2:00 pm). During that time, the artists will be present to discuss their works with viewers. If you know anyone who produces art with a strong mathematical theme or content, please encourage them to submit their piece for consideration in the exhibition. Artists are expected to register for and attend the meeting. Artists are also responsible for their pieces throughout the meeting. Artist participants may store their pieces in a locked room until the exhibition begins. **Submissions**: Please email at most two photos (< 10 MB each) of each piece you would like to submit, along with a brief description (< 100 words) of the piece, to vince.matsko@gmail.com. **Deadline for submission**: Wednesday, February 7, 2018

Dan Bach (see www.dansmath.com)

Nick Mendler of The University of San Francisco

Mathematical Art Exhibition at the Santa Clara University Meeting, March 2017

Directions to the Meeting at Cal State East Bay

From **San Francisco Bay Bridge**: Cross the Bay Bridge and get on 880 South. Exit the Jackson St. East turnoff in Hayward. As you come off the freeway, go to the first signal and make a right turn on Santa Clara. Santa Clara will turn into Harder Road. Follow Harder Road 1-1/2 miles to the University.

From the **San Mateo Bridge (Highway 92):** Heading east on the San Mateo bridge, Highway 92 turns into Jackson St. As you come off the freeway, go to the first signal and make a right turn on Santa Clara. Santa Clara will turn into Harder Road. Follow Harder Road 1-1/2 miles to the University.

From **Oakland Highway 880 South**: Follow 880 to the Jackson St. East turnoff in Hayward. As you come off the freeway, go to the first signal and make a right turn on Santa Clara. Santa Clara will turn into Harder Road. Follow Harder Road 1-1/2 miles to the University.

From **Oakland Highway 580 South**: Follow Highway 580 to Hayward exiting at the 238/South Hayward turnoff. This brings you onto Foothill Blvd. Follow Foothill, staying in the left lane. You will reach a major intersection, follow signs that say Mission Blvd. Follow Mission Blvd to Carlos Bee Blvd. Make a left turn there and stay in the right lane. The university is at the top of the hill.

From **San Jose, Fremont, Union City and Surrounding Areas Via Highway 880**: From 880 North take the Jackson St. East turnoff in Hayward. As you come off the freeway, go to the first signal and make a right turn on Santa Clara. Santa Clara will turn into Harder Road. Follow Harder Road 1-1/2 miles up the hill to the university.

From **Palo Alto and the Surrounding Areas via the Dumbarton Bridge**: Get on the Dumbarton Bridge heading east and then take 880 North. Follow 880 North and get off at the Jackson St. east turnoff in Hayward. As you come off the freeway, go to the first signal and make a right turn on Santa Clara. Santa Clara will turn into Harder Road. Follow Harder Road 1-1/2 miles to the university.

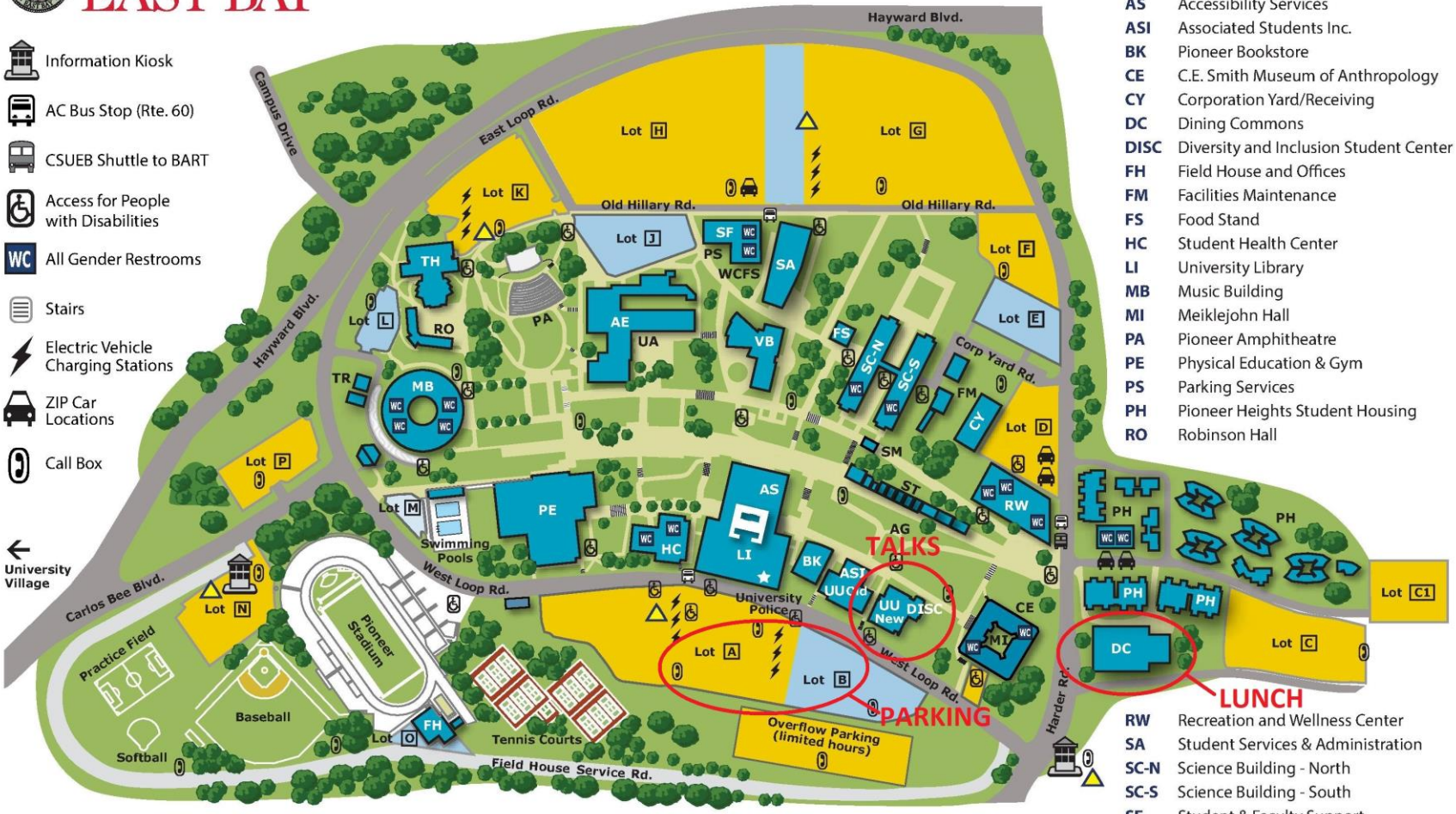
From **Walnut Creek and San Ramon Areas via Highway 680 South**: Take 680 South to 580 West. Take the Castro Valley turnoff. As you come off the freeway, make three immediate left turns (following the signs for Hayward) this will bring you heading down Center Street. At the bottom of the hill, at the next light make a right turn onto "B" Street. Follow "B" Street to Mission Blvd, turn left on Mission Blvd. Follow Mission Blvd to Carlos Bee Blvd. Make a left turn there and stay in the right lane. The university is at the top of the hill.

For more information, please see http://www.csueastbay.edu/about/visitor-information/driving-directions.html

Parking Information and Meeting Location

Parking is free on Saturday; no permit is required. Lots *A* and *B*, off of West Loop Road, are closest to the New University Union (see annotated campus map). **Registration**, **refreshments**, and the **talks** will be in the New University Union Multipurpose Room *A*. The **poster session** and **mathematical art exhibition** will be in the New University Union, Second Floor. **Lunch** will be in the Dining Commons. See the next page for an annotated campus map or visit http://www.csueastbay.edu/about/visitor-information/maps-campus-locations/hayward-campus-map/index.html. For reference, the university's street address is 25800 Carlos Bee Boulevard, Hayward, California 94542-3004.

CAL STATE EAST BAY



AE	Art & Education
AG	Agora Stage
AS	Accessibility Services
ASI	Associated Students Inc.
BK	Pioneer Bookstore
CE	C.E. Smith Museum of Anthropology
CY	Corporation Yard/Receiving
DC	Dining Commons
DISC	Diversity and Inclusion Student Center
FH	Field House and Offices
FM	Facilities Maintenance
FS	Food Stand
HC	Student Health Center
LI	University Library
MB	Music Building
MI	Meiklejohn Hall
PA	Pioneer Amphitheatre
PE	Physical Education & Gym
PS	Parking Services
PH	Pioneer Heights Student Housing
RO	Robinson Hall
RW	Recreation and Wellness Center
SA	Student Services & Administration
SC-N	Science Building - North
SC-S	Science Building - South
SF	Student & Faculty Support
SM	STEM Offices
ST	Support Temporary Offices
TH	University Theatre
TR	Athletics Temporary Offices
UA	University Art Gallery
UU	University Union
VB	Valley Business & Technology Center
WCFS	Welcome Center for Future Students

Food service location, menus, and hours of services vary. See **csueastbay.campusdish.com** for more information.

GENERAL PARKING (Decal, Daily & Hourly Permits)
Lots A, C, C1, D, F, G, H, K, N, P, Overflow

FACULTY/STAFF PARKING
Lots B, E, H, J, L, M, O
Students & Visitors after 5 p.m. with permit

DAILY/HOURLY PERMIT DISPENSERS
$10.00/day, $2.00/hour
Permits Required:
Monday – Thursday: 7 a.m. to 11 p.m.
Friday: 7 a.m. to 5 p.m.

METERED PARKING
$2.00/hour
Portions of West Loop Rd. (1-hour limit)

ACCESSIBLE PARKING (University Permit also required)
Available in all lots except Lot P

Additional general parking available at **University Village**, 25400 Carlos Bee Boulevard, Hayward, CA 94542 (Permit Required)

Office of University Communications 2017

Call for Student Posters

Who, When and Where

All undergraduate and graduate math students, Saturday, February 24, 2018, at the annual meeting of the MAA Golden Section at California State University, East Bay.

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.

Why

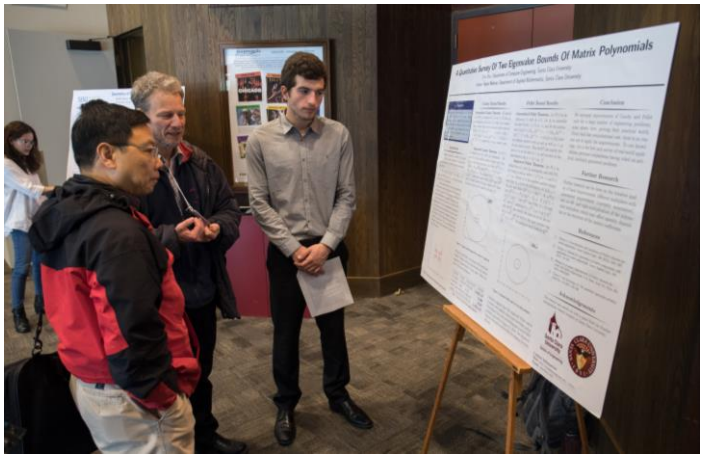
The meeting provides a great opportunity to learn about interesting and entertaining areas of mathematics, as well as to network with other students and professors. Student presenters receive **complimentary registration and Saturday luncheon**, plus a **free one-year membership to the MAA** or (for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

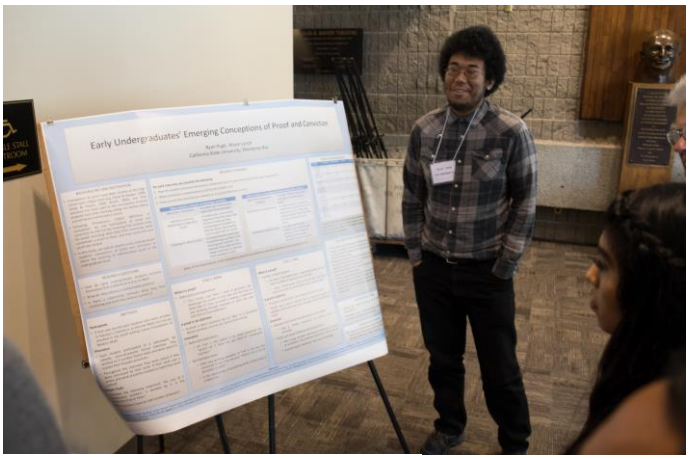
Details

If you wish to participate or have any questions (e.g., whether your idea is appropriate for presentation or what size font to use on your poster), contact Professor Kristen Beck (see contact info below). Participants must have an email address, possibly through a faculty mentor, where they can be contacted. Email your *name* and an *abstract* (two-five sentences, LaTeX typesetting is acceptable), including *poster title*, name of *institution*, and name of *faculty advisor*, to Professor Beck, no later than **Friday, February 16, 2018**. All student posters should be typed, illustrated, and displayed on a poster board that is three feet tall by four feet wide. Posters will be on display throughout the meeting, including during the scheduled poster session from 1:00 to 2:00 pm. For more information about the 2018 Golden Section Meeting at California State University, East Bay, visit http://sections.maa.org/golden/CSUEB2018.htm.

Contact

Kristen Beck, Department of Mathematics & Computer Science, Saint Mary's College of California, Moraga CA 94575 Office Phone: (925) 631-6298 E-mail: kab24@stmarys-ca.edu.





Poster Session at the Santa Clara University Meeting, March 2017