The California Mathematics Council,
Community Colleges

20th Annual Recreational Mathematics Conference

April 22 – April 23, 2016
MontBleu Hotel and Casino
Stateline, Nevada

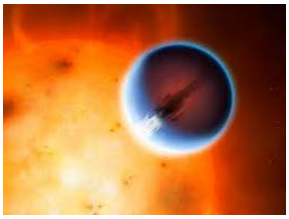
OFFICIAL CONFERENCE PROGRAM

FRIDAY CONFERENCE PROGRAM

REGISTRATION **5:30-7:00 p.m.** **HOTEL LOBBY**

WELCOME AND FRIDAY KEYNOTE

7:30-9:00 p.m. Evergreen A



Bruce Armbrust

Lake Tahoe Community College

Worlds Beyond Our Own

armbrust@ltcc.edu

Throughout history, humanity has explored the world around them. With the advent of the telescope, that exploration shifted towards the stars. Today the search continues for worlds that lie beyond our solar system. This talk will share the history of planetary discovery as well as the various methods of exoplanet detection used today.

SATURDAY CONFERENCE AT-A–GLANCE

	Session 1 9:00 – 10:00	Session 2 10:30 – 11:30	Session 3 2:30 – 3:30	Session 4 4:00 – 5:00
Aspen A	**Pat McKeague** *A Spiritual Side of Mathematics*	**Rick Luttmann** *The Eternal Triangle Part 1*	**Rick Luttmann** *The Eternal Triangle Part 2*	**Cheryl Ooten** *Number Sense and the Chinese Abacus*
Aspen B	**Nathan Carlson** *A Surprising Connection between Two Proofs of the Infinitude of Primes*	**Cliff Nelson** *Government, Liberty and Prosperity*	No Session	No Session
Aspen C	**Lori Maloney** *Math and Statistics with Social Justice*	**Tityik Wong & James Lee** *The Mathematics of Marital Arts*	**Stephan Garcia** *Gauss' Hidden Menagerie: the Graphic Nature of Gaussian Periods*	**Corey Shanbrom** *Where Do Kepler's Laws Hold?*

Join Us for the CMC^3 Foundation Gala

(room # to be announced)

Immediately After the Friday Keynote Talk

$20 Suggested Donation

SATURDAY CONFERENCE PROGRAM

REGISTRATION **8:30 - 10:30 a.m.** **CONFERENCE AREA**

SESSION ONE: 9:00 a.m. to 10:00 a.m.

Pat McKeague, XYZ Textbooks**,** *pat@mckeague.com* **Aspen A**

"A Spiritual Side to Mathematics"

Can the patterns and connections in mathematics strengthen our spiritual perspective? You will judge for yourself. We start with a simple sequence of numbers and end with fractals and chaos. Along the way, we meet philosophers and mathematicians from Pythagoras and Fibonacci, to Pascal and Stephen Hawking. If you like mathematics, this talk is for you. If you dislike mathematics, this talk is especially for you.

Nathan Carlson, California Lutheran University *ncarlson@callutheran.edu* **Aspen B**

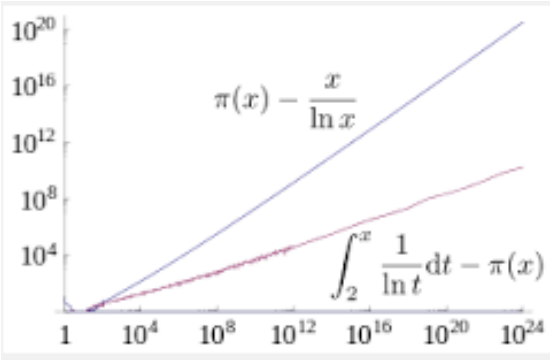
"A Surprising Connection between Two Proofs of the Infinitude of Primes"

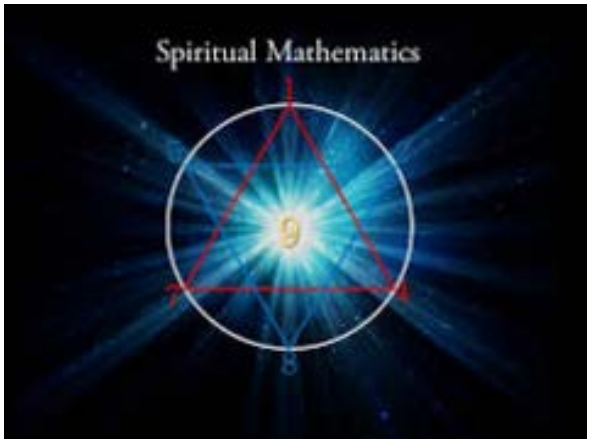
In 1955, Furstenberg gave a surprising topological proof that there are an infinite number of primes. At first glance, the proof seems unusual and unlike other proofs of this famous result. Cass and Wildenberg (2003) and Mercer (2009) unraveled the topology in Furstenberg's proof to uncover the essential number theory. Yet on the surface, none of these proofs seem to bear much resemblance to Euclid's original proof. In this interactive talk, we give a modification of the Furstenberg/Mercer proof that in fact looks much like that classical proof. This demonstrates that -- while Furstenberg's proof seems unusual -- at its core, it is in fact quite similar to the first and most well-known.

Lori Maloney, Sacramento City College *maloneL@scc.losrios.edu* **Aspen C**

"Math and Statistics with Social Justice"

Often times, mathematics instructors use real-world applications in the classroom in an effort to present mathematics as meaningful and useful to students. Mathematics and statistics problems that stem from social justice concerns can be a way to motivate and engage students while using authentic applications of math to their lives.





SESSION TWO: 10:30 a.m. to 11:30 a.m.

Rick Luttmann, Sonoma State University rick.luttmann@sonoma.edu **Aspen A**

"The Eternal Triangle, Part 1"

One of the simplest non-trivial entities in all of mathematics is the triangle -- it takes just three locations anywhere in the universe to get started. But there is an incredibly rich lore to triangles, and many surprises. There are coincidences that are almost mystical.

The four most well-known "special" points of a triangle: circumcenter, incenter, orthocenter (plus orthocentric sets, and a theorem on concyclicity), and centroid (plus triangle of medians, the Van Lamoen circle of circumcenters); isogonal conjugates and the symmedian point; the Euler line and Meyer's Theorem; Feuerbach's Theorem; the circle of Bellot-Rosado and Sachelarie's Theorem; Ceva's Theorem; the Gergonne Point; excircles; the harmonic relationship of the radii; the Nagel point; the Merck point.

Cliff Nelson, College of Marin cliffnelson@gmail.com **Aspen B**

"*Government, Liberty, and Prosperity*"

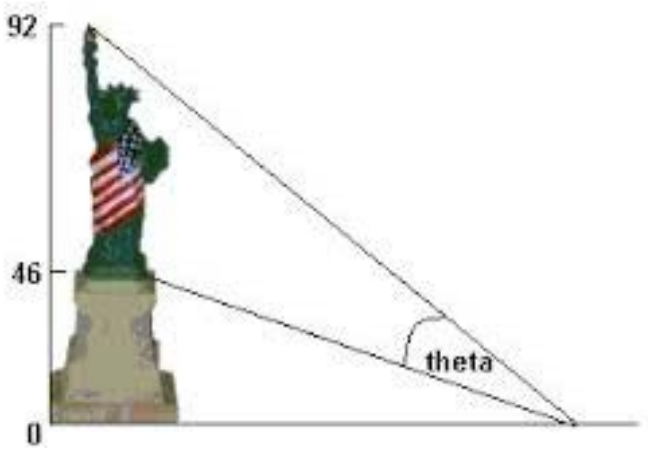
How would you define government and what is the appropriate scope of governmental powers? This interesting and controversial question will be addressed in this talk from mathematical, economical, and philosophical perspectives. Come and enjoy a thought provoking discussion!

Tityik Wong and James Lee, College of Southern Nevada

tityik.wong@csn.edu & james.lee@csn.edu **Aspen C**

"The Mathematics of Martial Arts"

Mathematics and martial arts are two of the greatest human creations. In this talk, a brief survey of some current studies and the authors' own research results will be presented. No martial arts background is necessary to enjoy the talk. The audience will have opportunities to participate and experiment.



Lunch Break: 11:30 am to 1:00 pm

Your voucher is good at any time, Friday through Sunday, April 22 - April 24, 2016
at any of the MontBleu eating establishments

Keynote Presentation

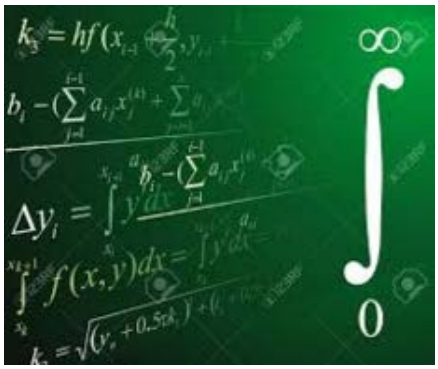
1:00 p.m. - 2:15 p.m. Evergreen A

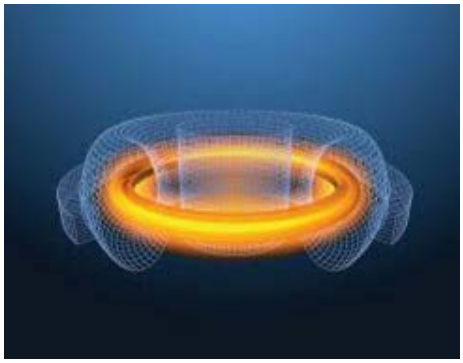
Paul Zorn

St. Olaf College zorn@stolaf.edu

"Extreme Calculus"

There is more to elementary calculus than may first meet the eye, especially to those of us who teach it again and again. Well-worn calculus techniques and topics---polynomials, optimization, root-finding, methods of integration, and more--- often point to deeper, more general, more interesting, and sometimes surprising mathematical ideas and techniques. I will illustrate my thesis with figures, examples, and calculation, and give references to MAA publications and resources that can support taking elementary calculus to its extremes.





SESSION THREE: 2:30 p.m. to 3:30 p.m.

Rick Luttmann, Sonoma State University *rick.luttmann@sonoma.edu* **Aspen A**

"The Eternal Triangle Part 2"

Part I of this talk is a highly-recommended prerequisite to Part II, which will include: Torricelli's Problem, Fermat's Theorem, two Fermat points, and Dao's Theorem on Fermat Circumcircles; Napoleon's Theorem; Morley's Theorem; Van Lamoen's Theorem and point; Steiner's Theorem; Wallace's Theorem; the Erdös-Mordell inequality; inscribed ellipses; the Theorems and Corollaries of de Guzman, Romero-Marquez, Chakerian, and Luttmann (the "Spanish-American" Theorem) including Pascal's Magic Hexagon Theorem and Desargues's Theorem on projectivities (as time permits).

Stephan Ramon Garcia, Pomona College Stephan.garcia@pomona.edu **Aspen C**

"***Gauss' Hidden Menagerie: the Graphic Nature of Gaussian Periods***"

At the age of eighteen, Gauss established the constructibility of the 17-gon, a result that had eluded mathematicians for two millennia. At the heart of his argument was a keen study of certain sums of complex exponentials, known now as Gaussian periods.

It turns out that these classical objects, when viewed appropriately, exhibit dazzling array of visual patterns of great complexity and remarkable subtlety. (Joint work with Bill Duke, Trevor Hyde, and Bob Lutz).

SESSION FOUR: 4:00 p.m. to 5:00 p.m.

Cheryl Ooten, Santa Ana College Cheryl.ooten@yahoo.con **Aspen A**

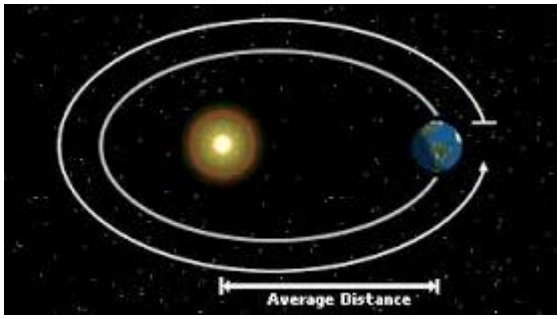
"Number Sense and the Chinese Abacus"

Be introduced to fascinating Chinese mathematical symbols and systems. Through world history of abacus development, learn how and why the Chinese used the abacus. Practice basic operations (addition, subtraction, and multiplication) on a Chinese abacus to discover its advantages and use for developing student number sense.

Corey Shanbrom, CSU Sacramento corey.shanbrom@csus.edu **Aspen C**

"Where Do Kepler's Laws Hold?"

The only homogeneous Riemannian geometries admitting dilations are Euclidean spaces. We explain the surprising relationship between this theorem and Kepler's third law of planetary motion. Kepler's first two laws are known to hold in spherical and hyperbolic geometries, while the third law fails. We then investigate this problem on the Heisenberg group.



TAHOE STUDENT SPEAKER

COSMO A 5:15 P.M.

Nick Saal

Santa Rosa Junior College

Summation Methods on Divergent Series

In this talk, I will discuss summation methods that can be applied to certain divergent series in order to get a "convergent" value. I will show some surprising results that these methods lend themselves to, and while counter-intuitive these results are indeed of value in areas of applied mathematics.

I am a dedicated and enthusiastic math major at Santa Rosa Junior College. I hope to transfer to UC Berkeley in the fall to major in pure mathematics, and then attend graduate school to obtain a PhD. When I am not busy with school, I am an avid musician.

Door prizes will be held immediately after the Student Speaker session.

Join us for the CMC^3 44th Annual Fall Conference!

Hyatt Regency Monterey Hotel and Spa

Friday December 9 – Saturday December 10, 2016

Visit cmc3.org for information

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CMC^3 wishes to express a Special "Thank You"
to Sacramento City College for printing the programs

and to Anna Vopalensky
and the entire staff of the MontBleu Hotel and Casino!

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