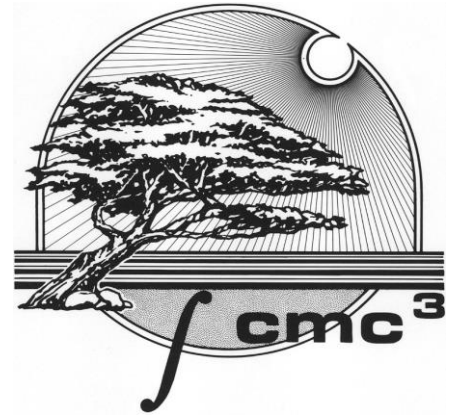


**The California Mathematics Council,  
Community Colleges**



## **21st Annual Recreational Mathematics Conference**

**April 21 – April 22, 2017  
Lake Tahoe Community College  
South Lake Tahoe, California**



# OFFICIAL CONFERENCE PROGRAM

## FRIDAY CONFERENCE PROGRAM

REGISTRATION

5:30-7:00 p.m.

Board Room Lobby

### WELCOME AND FRIDAY KEYNOTE



7:30-9:00 p.m. Board Room

Rick Luttmann

Sonoma State University

*The Battleship Game*



We will discuss a simplified version of the game of “Battleship”, producing the optimal strategies for both an attacking and a defending player. This game, though greatly simplified, will provide an opportunity to understand the principles of the mathematical field known as Game Theory, which uses low-level tools to analyze situations of conflict and competition such as those occurring in economics, criminal justice, romance, and warfare that are not at all recreational.

**Join Us for the CMC<sup>3</sup> Foundation Gala in the Student Center**

*Immediately After the Friday Keynote*

*\$20 Suggested Donation*



### 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
A 208	<b>Steven Davis</b> <i>History of Math in Competitive Math Problems</i>	<b>Steve Blasberg</b> <i>Wanna Hear About My Problems?</i>	<b>Gizem Karaali</b> <i>Can Zombies Do Math? OR Humanism as a Philosophy of Mathematics</i>	<b>Helene Nehrebecki</b> <i>The Math of Rock &amp; Pop</i>
B 103	<b>Sue Welsch</b> <i>The Logic and Literature of Lewis Carroll</i>	<b>Paul Kinion</b> <i>Recreational Exponentiation</i>	<b>John Martin</b> <i>From the Abacus to the iPhone</i>	<b>Tim Melvin</b> <i>The Randomness of Real Numbers</i>
E 106	<b>Walter Kehowski</b> <i>Phoenix Numbers</i>	<b>Michael Serra</b> <i>Pirate Geometry</i>	<b>Charles Barnett</b> <i>Ancient Egypt, Archimedes, the Circle and its Triangle</i>	No Session

# SATURDAY CONFERENCE PROGRAM

REGISTRATION

8:30 - 10:30 a.m.

BOARD ROOM

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

Steven Davis, CSULA,

[sdcomet900@att.net](mailto:sdcomet900@att.net)

A 208

### *“History of Math in Competitive Math Problems”*

Where do writers get their ideas for competitive math problems? Sometimes we just steal a concept from the history of math. Mathematicians over the centuries have always tried to outdo their colleagues by dreaming up more complicated problems for each other to solve. I try to outdo high school students by dreaming up competitive problems that some rely on historical concepts. I will demonstrate a few problems I dreamed up with some help from the history of math. I hope you will participate.

Sue Welsch, Sierra Nevada College

[suewelsch@yahoo.com](mailto:suewelsch@yahoo.com)

B 103

### *“The Logic and Literature of Lewis Carroll”*

Lewis Carroll, who is best known for his seminal publication of the two volumes of "Alice in Wonderland", was a noted Victorian photographer and an Oxford Mathematics Professor who also published books on logic and recreational mathematics. This presentation will discuss some of his work and how he inserted fun and puzzles into every facet of his life.

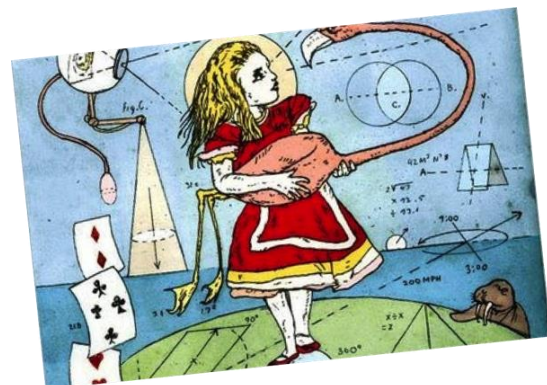
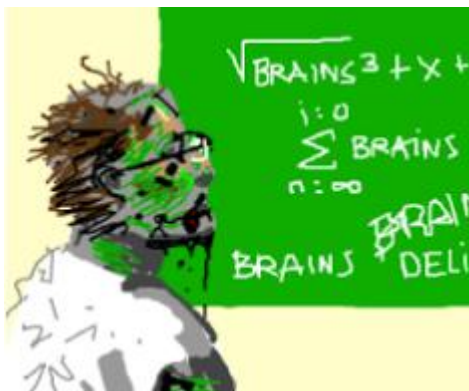
Walter Kehowski, Glendale College, AZ

[Walter.Kehowski@gccaz.edu](mailto:Walter.Kehowski@gccaz.edu)

E 106

### *“Phoenix Numbers”*

Let  $x$  be a number in base  $b$ . Split  $x$  after the  $k$ th digit into  $y|z$ , and then reverse the digits to obtain  $ry$  and  $rz$ , still regarded as numbers in base  $b$ . If  $x=ry*rz$  then  $x$  is called a  $k$ -Phoenix number in base  $b$ . Many examples will be provided as well as proving the existence of infinitely many  $k$ -Phoenix numbers in any base.



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

Steve Blasberg, West Valley College [steve\\_blasberg@wvm.edu](mailto:steve_blasberg@wvm.edu)

A 208

### “Wanna Hear About My Problems?”

Steve Blasberg is the past Test Developer for the Student Math League, a national math competition for two-year college students sponsored by AMATYC. As he has done for many years at the Tahoe Conference, he will present some of the most interesting, creative, and challenging problems (and solutions!) from last year's Student Math League contest.

Paul Kinion, Rochester Tech CC, MN [paulkinion@gmail.com](mailto:paulkinion@gmail.com)

B 103

### “Recreational Exponentiation”

Recent work on sampling distributions for small samples has revealed a fascinating recursive method for calculating  $N$  raised to the  $n$ th power where  $N$  and  $n$  are natural numbers. Step one: Pick a number  $K$ , any natural number. The algorithm is surprisingly flexible and straight forward. Bring paper and pencil.

Michael Serra, NCTM [mserra@earthlink.net](mailto:mserra@earthlink.net)

E 106

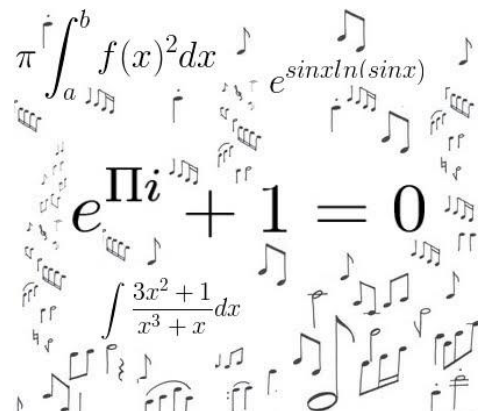
### “Pirate Geometry”

Participants will see Buried Treasure games and puzzles in rectangular, polar, spherical, and 3-D coordinate systems. Participants will learn how to incorporate these activities into their teaching of transformations in the rectangular coordinate plane. The focus is on reasoning while playing games and solving puzzles.

## Lunch: 11:40 a.m. to 12:30 p.m.

*At the Student Center*

Lunch will be preceded by a Head and Tails Probability Game and followed by a Mathematical Geocaching Competition



# Keynote Presentation

1:00 p.m. - 2:15 p.m. Board Room

John Callas

Director of the Mars Rover Project at JPL and Math Faculty at Pasadena City College

*“Are We Alone in the Universe? Essentially a Mathematical Question.”*

Five hundred years ago, Copernicus advanced the theory that the Earth was not the center of the Solar System. That theory revolutionized our understanding of the Universe. It was initially met with great opposition because of what it meant about our own significance. Today there is a second Copernican revolution underway that will once again alter our significance. Advances in technologies and techniques, and the application of mathematics are enabling the detection, observation and study of Earth-like planets around other stars with recent results suggesting an incalculable number of candidate worlds. And several deep-space missions are currently exploring potentially-habitable worlds within our own Solar System as possible abodes for life beyond the Earth. With several candidate habitable worlds within our Solar System, and a likely uncountable number of solar systems in the Universe, we are once again left with a great challenge to our own significance. Within the next few years, we may be poised to answering that central question, "Are we alone in the Universe?"

John L. Callas, of NASA's Jet Propulsion Laboratory, Pasadena, Calif., has been project manager of NASA's Mars Exploration Rover project since March 2006. Previously, as science manager and then deputy project manager, he had helped lead the rover project since 2000. Callas grew up near Boston, Mass. He received his Bachelor's degree in Engineering from Tufts University, Medford, Mass., in 1981 and his Masters and Ph.D. in Physics from Brown University, Providence, R.I., in 1983 and 1987, respectively. He joined JPL to work on advanced spacecraft propulsion, which included such futuristic concepts as electric, nuclear and antimatter propulsion. In 1989 he began work supporting the exploration of Mars with the Mars Observer mission and has since worked on seven Mars missions. In addition to his Mars work, Callas is involved in the development of instrumentation for astrophysics and planetary science, and teaches mathematics at Pasadena City College as an adjunct faculty member.

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

Gizem Karaali, Pomona College

[gizem.karaali@pomona.edu](mailto:gizem.karaali@pomona.edu)

A 208

*“Can Zombies Do Math? OR Humanism as a Philosophy of Mathematics”*

Skimming through recent book and movie titles, one might imagine that we are headed for a zombie apocalypse. Many have written about what this would entail for our civilization, for our culture, and even for our consumerist tendencies. In this talk we will look at yet another facet of this phenomenon: What would happen to our mathematics? Guided by the history and the philosophy of mathematics, we will pose and search for answers to fundamental questions about the nature of mathematics and how it relates to our humanity. It is this speaker's main goal that by the end of the talk, the audience will be able to answer the question on the title, along with a few other, possibly more respectable, philosophical questions, such as "What is 3?"

John Martin, Santa Rosa Junior College

[jmartin@santarosa.edu](mailto:jmartin@santarosa.edu)

B 103

*“From Abacus to iPhone”*

During the seventeenth century, several individuals began working on ways to coax answers to arithmetic problems from metal. This activity led to the invention of the first mechanical calculators, the precursors of our modern computers. In this presentation, John will talk about the history of these machines and the lives of the mathematicians who invented them.

Charles Barnett, Las Positas College

[cjbarnett2@comcast.net](mailto:cjbarnett2@comcast.net)

E 106

*“Ancient Egypt, Archimedes, the Circle and its Triangle”*

*“Two PI beats PI as the Circle Constant”*

Everybody knows that all circles, independent of “size”, possess a common circumference-to-radius ratio. But “everybody” did not always know. How was the ratio discovered, and why did later writers settle on the circumference-to-diameter ratio (PI) instead of 2PI? And how did the ancients conceive of and estimate the measure of the area of a circle? A little fantasy mixed with some tentative history yields a plausible story.

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

**Helene Nehrebecki**, American River College [helene.nehrebecki@asu.edu](mailto:helene.nehrebecki@asu.edu)

**A 208**

### ***“The Math of Rock and Pop”***

Have you ever noticed that math and music are closely related? I decided to research this relationship myself and share the results. We will discuss the mathematics of music, particularly rock and pop. Experiments performed by Pythagoras show how frequencies are intentionally made so people can enjoy music. Included will be a demonstration on measuring frequencies on a chromatic scale, ratios of major musical chords, the designing of instruments, a brief history of popular music, and the math behind melodies and lyrics. COME FOR THE MATH, STAY FOR THE ROCK N ROLL!

**Tim Melvin**, Santa Rosa Junior College [tmelvin@santarosa.edu](mailto:tmelvin@santarosa.edu)

**B 103**

### ***“The Randomness of the Real Numbers”***

In this talk, we will explore the ideas of countably infinite vs. uncountable sets and Turing computable numbers. We will show the set of all computable numbers is countable using a different method than Turing did in his seminal paper. We will use this to get a glimpse of the randomness and complexity of the real numbers.

## TAHOE STUDENT SPEAKER

**Board Room, Saturday at 5:15 to 5:45 P.M.**

**Gabriel Fredericks**

*Solano College*

### ***Practical and Theoretical Significance of L-Functions***

Complex analysis is an important field in modern mathematics, having many important applications in both pure and applied mathematics, as well as many disciplines of science. An overview of the history and importance of holomorphic functions, Dirichlet series, and L-functions will be given as well as their applications in mathematics.

Gabriel Fredericks is a student of mathematics at Solano Community College. When he is not busy with schoolwork Gabriel enjoys learning mathematics beyond the scope of what is normally given at Solano Community College from professors and books. He plans to earn a PhD in theoretical mathematics.





Join us for the CMC<sup>3</sup> 45<sup>th</sup> Annual Fall Conference!

Hyatt Regency Monterey Hotel and Spa  
 Friday December 8 – Saturday December 9, 2017  
*Visit [cmc3.org](http://cmc3.org) for information*

Conference Coordinator  
 Program Chair  
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**CMC<sup>3</sup> wishes to express a special "Thank You" to  
 Lake Tahoe Community College for providing the venue for this conference.**