California Mathematics Council Community Colleges

President's Report

Katia Fuchs, City College of San Francisco

My second year as President of CMC[3] begins, and I find myself both reflecting back on a busy year and also looking ahead at more changes to come. AB 705 (Irwin, 2017) takes full effect in Fall 2019, and colleges are implementing various changes to enter into compliance. CMC[3] as an organization has been involved at both the state and local level to gather information about various implementations, and make sure that mathematics faculty across the state continue to have a voice in the conversations that are taking place during this

time. Our annual Monterey conference in December of 2018 featured a whole strand on AB705 implementation.

Although AB705 has dominated our thoughts and actions for the last year, I'm excited to look to the future. CMC[3] has launched a brand new website (www.cmc3.org/), and we hope that you will find it more easy and intuitive to navigate. We are working on designing an ever-more-streamlined online registration process, which we hope to have perfected in time for our April conference in Lake Tahoe, and certainly for the conference in Monterey in December. The 2019 conference will continue to take place at the Hyatt Regency in Monterey, December 6 and 7, 2019.

I would also like to encourage you to consider speaking at the conference. Furthermore, if you know of someone whom you would like to see on the program, please encourage them to submit a proposal. The proposal form for the 2019 Monterey conference can be accessed at http://www.cmc3.org/conferences/call_for_presenters/fall.html.

Our annual spring conference in Lake Tahoe is around the corner! It will take place April 26-27, 2019. This is our 23rd Recreational Mathematics conference, and we are excited to once again hold it on the beautiful campus of Lake Tahoe Community College. We changed the location of the conference two years ago after conducting a

Table of Contents

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Mark Your Calendar:

47th Annual CMC³ Conference

December 6th and 7th, 2019

Hyatt Regency Monterey Hotel and Spa

The 23rd Annual Recreational Mathematics Conference at Lake Tahoe

Larry Green, Lake Tahoe Community College

CMC³ will host the 23rd annual Recreational Mathematics Conference on Friday and Saturday, April 26 and April 27, 2019. Once again, the conference will be held at Lake Tahoe Community College (LTCC), which is nestled in a beautiful area surrounded by forest and a meadow with a meandering creek. We have secured a large block of rooms at the *Beach Retreat and Lodge* that is just about a mile away from the college. The *Beach Retreat and Lodge* sits right on the shore of Lake Tahoe and is an ideal place to enjoy the Jewel of the Sierras.

This conference is unique in that all the talks are recreational in nature, focusing on applications and other mysteries of mathematics. This year, we have an amazing lineup of speakers. On Friday, Naoki Saito from UC Davis will show us how Laplacians can help us perform image compression such as the JPEG. Then on Saturday morning, the conference resumes with two sessions filled with more amazing uses, facts, and problems from mathematics. We will get all tied up in the mathematics of knot theory, Caliri circles, international mathematics, spectral numbers, and will be challenged with math contest problems.

Next, there will be a catered lunch followed by an outdoor geocaching contest for those who want to explore the beauty surrounding LTCC. After the geocaching event, we are delighted to announce that Terry Krieger from Rochester will present on the humor, curiosity, oddities of mathematics. Two more sessions on recreational mathematics will follow Krieger's talk in which we will all learn more about recreational mathematics, including Charles Dodgson, the mathematics of poker and ham sandwiches, and some very curious real life uses of mathematics.

If you have a **student** who may be interested in being this year's Tahoe Student Speaker, please encourage them to apply. The committee will begin reviewing the applications on March 1. Students can apply online at:

http://www.cmc3.org/students/speaker/call_for_speakers/

The conference begins at 7:30 pm on Friday, April 26 with an opening get-together with some munchies and games. The CMC³ Foundation will be holding some fun activities that will help raise money for scholarships for our students. The conference will conclude by 5:45 pm on Saturday, April 27.

You can register online or you can use the traditional registration form. Registration will include a catered lunch. Full-time students may register onsite for the nominal fee of $10, which includes the catered lunch. For more information, please contact your CMC³ campus representative or Larry Green, Spring Conference Chair, at DrLarryGreen@gmail.com. For the latest information and details about the conference and for the registration form, please visit the CMC³ website at www.cmc3.org.

Math Nerd Musings: A Challenge of a Coreq Course

Jay Lehmann, Editor, College of San Mateo

Last issue I presented a pretty rosy experience of my department connecting on a deeper level to *train* for teaching corequisite courses. *Teaching* such courses has had its ups and downs. In Fall 2018, we discontinued offering arithmetic and elementary algebra and introduced corequisite courses in prestatistics and intermediate algebra. This semester we have phased in corequisite stats, and in the fall we will phase in corequisite trig, precalc, and business calc. In my corequisite intermediate algebra course, 54% of the students passed (A, B, or C), which is pretty darn good, considering many of the students would've been placed in arithmetic or elementary algebra in the past. Another colleague had similar results.

This semester, I'm teaching another corequisite intermediate algebra course, but my students have an even broader range of math skills. On the first test, out of 41 students, 8 students scored above 90% and 5 students scored below 10%. Despite using loads of group work, and having two embedded tutors and an embedded counselor, I've been unable to give those five students a fighting chance; their math skills are so weak, I don't have any handholds to help them in significantly ways.

I know of an instructor who has resorted to giving such students different activities that are at their level; he has told those students that they have no chance of passing the course, but the activities will enhance their math skills so they can pass the course on a second try. I worry that that practice is not legal, but with my failure to reach my five students who have not made progress in six weeks, I am empathetic to the instructor's approach.

Having only taught corequisite intermediate algebra twice—one time a smooth ride, one time not—I'm not sure what to expect down the road, although my colleagues who have taught corequisite courses have had similar challenging experiences too. When I have a class like last semester, I'll know that students' prerequisite gaps can be addressed just-in-time during activities. When I have a class like this semester, I'm going to have to mix up my game plan. One thing I might try is to have students with significantly weaker skills form a team and have them work on the same activity as the rest of the class, but there will be warm-up steps and hints for the harder steps. I also might have such students do the same homework assignments as the rest of the class, but there will be additional problems that address perquisite gaps.

The challenge is that my five students who are struggling the most have such weak skills, it's tough to know how low a math level to begin with and how to bridge such a large expanse to current material.

I believe this is a challenge we are all going to face, and we are going to have many conversations in our office hallways and at conferences about how to surmount this challenge. I look forward to those conversations, and if you've already come up with something, please send me an e-mail!

> It's tough to know how low a math level to begin with and how to bridge such a large expanse to current material.

The Pleasures of Problems
Kevin Olwell, San Joaquin Delta

Spring 2019: *ABCD* is a square inscribed in a circle of radius 1. *EFGH* is another square with vertices *E* and *F* on side *CD* and vertices *G* and *H* on the circle. How long is one side of square *EFGH*?

Fall 2018: Jack and Jill live in the suburbs. Every afternoon Jill takes the train from the city to a station in the suburbs and Jack drives from home to pick her up. Both always arrive at the station at exactly 5 pm. One day Jill gets off work early. She gets to the station in the suburbs at 4 pm and decides to walk home along the route Jack takes. As expected Jack meets her along the way and drives her the rest of the way home. Jill gets home 10 minutes earlier than usual. How many minutes did Jill spend walking?

Thanks to Joel Siegel, Fred Teti and Joe Conrad for submitting a solution.

Because Jack also got home 10 minutes early, he saved 5 minutes driving to the station and 5 minutes driving home. Instead of the usual 5 pm pickup, Jack picked Jill up at 4:55. Since Jill started at 4 pm, she spent 55 minutes walking.

All are invited to submit a solution to the Fall 2018 problem either via email or US mail at the address below.

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Workshop on Developing the Skills for Success in Statistics with Open Educational Resources (OER) - Online Homework Systems, Videos, and More
Larry Green, Lake Tahoe Community College

CMC^3, along with the Academic Senate OER Group, is organizing a workshop to bring together mathematics faculty to share open educational resources for the statistics courses and the pre/co requisite courses that we are all working on to address student needs, especially in light of AB 705. This workshop will bring mathematics faculty who teach statistics together to share the approaches being employed to help students succeed in their statistics classes whether it be with a traditional prerequisite or with a corequisite support course. This is a professional development opportunity for faculty to learn ways to find and work with available OER resources, including text-based material, videos, and the MyOpenMath online assignment system. The goal is to work as a mathematics community to provide students with a no-cost collection of resources that will lead them to success in mastering the course content and that can be accessed as references for future use.

The workshop will take place on May 4 from 9:30 to 3:00. We are still working on the planning of the workshop, but it is tentatively scheduled at Solano Community College. The workshop will be funded by the statewide Academic Senate, so it will be offered free of charge, and includes a continental breakfast and catered lunch. Information will soon be posted on the CMC3 website at www.cmc3.org. You can also contact Larry Green at drLarryGreen@gmail.com for additional information about this hands-on workshop.

The History Corner

Joe Conrad, Solano Community College

One of the most challenging topics for students in algebra courses is logarithms. I have found that giving some history of the use of logarithms and how they spread gives the students an appreciation of the importance of logarithms at the time of their invention and for centuries afterward. Of course, I need to show them that they are still useful, but in other ways than originally formulated. What I share here is quite a bit more that I would take the time to tell my students, but we should always be a step ahead of them!

The details of the development of logarithms is more involved than what can be done in this column, so I will try to cover the high points. We probably all know that John Napier is considered to be the inventor of logarithms and we know that the original use was to aid in numerical calculations. Those of us of a certain age recall using them regularly in the era B.C. (Before Calculators) either by employing tables or slide rules. Our students have no concept of either of these things. Adding two large numbers or multiplying them are two equivalent operations (labor-wise) for them, but they can understand how different things would be without calculators or computers.

John Napier (~1550 – 1617) was born near Edinburgh in Scotland and after his father's death in 1608 became the Lord of Merchiston Castle. He had a wide range of interests. His prime interest originally was not mathematical, but religious and when he died he probably thought that he would be long remembered for the bitter anti-Catholic book that he had written in 1593 that had already gone through ten editions and several translations. He also tried his hand at inventions including military machines. Of course, he is not remembered for these things, but for logarithms.

The sixteenth century was full of monumental achievements that set the stage for the seventeenth, but computations were still difficult and time consuming. Prior to Napier, the product-sum identities, such as $\cos(A)\cos(B) = \frac{1}{2}(\cos(A + B) + \cos(A - B))$, were used to change multiplications into additions or subtractions. This process, with the tongue-twisting name of prosthaphaeresis, had first been used in the late 1500's. Also, it was during this time that exponential notation first came into use for positive exponents. A natural observation would be that adding exponents would correspond to doing a product. However, using any typical base means that the numbers you could multiply would be far apart. For example, if we have base 2, we could multiply 64 and 128 by adding their exponents of 6 and 7 to yield 13 and since an exponent of 13 on 2 gives 8192, 8192 must be the product of 64 and 128. Unfortunately, this will not help if you want to multiply 83 and 112.

Since fractional exponents were not yet developed, Napier took another direction and looked for a base that would give less distance between powers. After much work, he decided to use $0.9999999 = 1 - 10^{-7}$. The reasons for such a choice lie in his desire to relate to trigonometric functions and the circle and his dynamical perspective. These are beyond what we can do here. Needless to say, it took a long time, about 20 years, for him to work out tables

of values. These tables were not as extensive as later tables nor did they quite follow what we now call the rules of logarithms, for example, Nap log(10,000,000) = 0, but were enough to develop a method that could be used to simplify calculations.

Napier published his tables in 1614 in Latin under the title (translated as) *Description of the Wonderful Canon of Logarithms*. He had invented the word "logarithm" as a combination of the Greek words for ratio and number. In fact, he originally called them "artificial numbers." This work was met with immediate praise from English and, shortly thereafter, continental mathematicians. In fact, Kepler was one of the first to use them extensively in his astronomical work. Henry Briggs, one of the top English mathematicians of the time, sought out Napier and traveled the many miles from London to Edinburgh to visit in 1615. During their discussions, they came to the conclusion that the tables would be simpler to use if they based the computations on a base of 10 (although they did not call it such). At this time, Napier was near the end of his life and not ready to do another computational marathon, so Briggs took over. Briggs worked out what were called Briggsian (and still are by some) or common logarithms, and published them in 1624. Briggs' tables gave the logarithms base 10 for integers from 1 to 20,000 and from 90,000 to 100,000 to the astonishing accuracy of 14 decimal places! There was a second edition in 1628 that filled in the gaps (thanks to Adrian Vlacq of Holland), which was the basis for common log tables for over 300 years.

Napier also developed what are known as "Napier's bones" to have a mechanical way to use his tables. This led the way for the eventual invention of the slide rule. Several intermediate versions were made, but the first device that would qualify as a modern slide rule was made by William Oughtred (1574 – 1660), who had made a circular slide rule in 1620 and had a version with two linear sliders by 1632.

Especially with the new Briggsian version and mechanical aids, the use of logarithms spread across Europe and were being used in China in a couple of decades. I try to get my students to understand what it meant in the first half of the seventeenth century for an advancement to travel half way around the world in such a length of time. This could only have happened if logarithms represented a major breakthrough in computational efficiency.

I should not end without tying up a couple of loose ends. First, as with many mathematical discoveries, when the ingredients are in place for something, it can happen in more than one place. Concurrently with Napier, the Swiss clockmaker, Joost Bürgi, was developing a similar table of logarithms. He used a different base than Napier, but he explicitly wrote about the observation of the relationship between the geometric sequence of powers and the corresponding arithmetic sequence of the exponents. While he may have started his computations prior to Napier, Bürgi did not publish until 1620, so he lost the priority battle.

Another loose end is the question about base-*e* logarithms or natural logarithms. In England, especially, natural logarithms are sometimes known as Napierian logarithms and *e* is called the Napierian constant. There is no

evidence that Napier knew of the constant that we now call *e*. It is true that his logs satisfy

$$\text{Nap } \log(y) = 10^7 \log_{1/e}(y/10^7).$$

However, this was not noticed for a long time. It was Euler (who else?) who first used *e* to designate the base of what was sometimes called the hyperbolic logarithms, although he used other letters in earlier papers. By the time he wrote the amazing *Introductio in Analysin Infinitorum* (*Introduction to Analysis of the Infinite*), written in 1745 and published in 1748, he had settled on *e*. (This was not because he was naming it after himself, as sometimes assumed, but more likely because earlier letters were already used.) It was also Euler who first defined logarithms in the way we do in algebra class (along with functions and function notation.) Prior to that, the natural logarithm was defined as the area under the graph of $y = 1/x$ from 1 to x. (This can still be seen in some calculus texts.)

My last observation about the history of logarithms is about the name "natural logarithms." This name was first used by Nicholas Mercator (~1620 – 1687) in his 1668 work *Logarithmo-technia*. It had been observed by others before that the area under the curve $y = 1/x$ follows a sum-product relationship similar to exponents. (Yes, this was before Newton published the *Principia*!) Mercator developed a series representation for this area. It is what we develop in Calc II classes as the power series for $\ln(1 + x)$. Using the two ideas, he could develop and, here's the important part, compute logarithm values much more easily than had been done by Briggs and others.

The development of logarithms was one of several factors that opened the way for people later in the seventeenth century to make scientific and mathematical discoveries that still affect us today. Laplace is noted as saying, "Logarithms, by shortening the labors, doubled the life of the astronomer." Not only astronomers, but others in the budding fields of science and commerce benefited greatly by the computational ease that logarithms provided at that time and for the next 350 years until the invention of readily-available calculators and computers.

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Exam Cheating and How Instructors Facilitate It

Dean Gooch, Santa Rosa Junior College

A few years ago, I taught a linear algebra class for the first time in a while. During the first exam, I noticed three of my less-than-diligent students' behavior. They sat next to each other and seemed to be having a hard time. They were taking much too long on this exam. Most of the rest of the students had already finished.

I scrutinized their behavior to see if there was something going on. They seemed exasperated but were not looking at each other's papers. Each of them was glued to their calculators and repeatedly hitting their arrow keys. I was not sure what they were looking for in their calculators. I generally tell my students that their calculators have a large amount of storage space and that I would not clear the memory from their calculators. I also warn them that I do not give old exams. That is, I rewrite new exams every time.

When I graded all of the exams, I found out that these three students each had excellent answers to exam questions that I had given on past exams, but had nothing to do with the questions on the current exam. I would have considered what they did to be cheating, but their scores were already so pathetic, that they had appropriately self-penalized. I let the class know of the problem and repeated that I did not give the same exam twice. All of my exams are original works. The three students eventually dropped the class.

I should explain why I do this. I am dyslexic. I cannot read old notes and thus need to make up my lecture plans just prior to lecture. This is a bonus because every time I teach a subject, I teach it in a fresh way. In this way I feel that I improve my teaching each time I teach the course. Hence my exams represent a different tack on the same material each time it is taught.

Years ago, one of my really sharp female linear algebra students came to me to thank me for writing new exams every time I give them. She explained that her former teacher had reused his exams and that the fellows in the Engineering Club had all of this instructor's old exams on file. The student had recently moved to the area and was working as a technician in an engineering firm. She was taking the few classes that she needed to transfer into an engineering or mathematics program since she had already taken most of the requirements for transfer. Her gender and the fact that she was not in the engineering program made it impossible for the rather exclusive engineering club to want to share their files with her. She felt that she had been at a disadvantage in the previous class, but that now she could compete fairly in my course.

Because of this experience, even when I have had very little time to write exams, I will make sure that they are not the same ones I had previously given. I also mentioned this issue to the student's previous instructor, and the instructor made sure that all students had access to all his old exams from then on. He does use some of his old problems, but the entire exam is never the same.

I was actually unaware that many instructors reuse the same exams over and over again.

A number of years ago, a colleague came to me with two exams. She pointed out that she was sure that one student had copied off the other. She was sure the male student was cheating off his girlfriend, but the instructor had not noticed anything during the exam. She produced copies of the two exams

and asked what I thought. This was the final exam in that course.

I looked at the exams and realized that his exam had answers that were imperfect representations of the problems on the woman's paper. When I looked a little closer at the two exams, I noticed a problem that neither student got correct. Their answers made no sense, but they had mysteriously derived work that had elements of the correct answer. It was as if they had also copied from a third student whose work had been differently interpreted by each. I asked if they could have copied from a third student. The instructor let me know that no one sat near them during the final.

I asked if they could have gotten a copy of the final beforehand. My colleague said she reused the same final every semester, but did not return these exams and would not allow a copy of the exam to leave her office.

I looked at the two exams again and found another problem that in both cases contained mostly the gibberish of a student who did not know enough to cheat off of another's exam. There were mysteriously obtained work with elements of correctness, but most of the work made no sense. This gibberish was different for each of the two students. It appeared that they had both copied off of an exam that they had in their possession. At least, that is my guess. An image of an old exam had probably been downloaded to their respective calculators.

Recently, a former student who is very bright and successful told me that one of her instructors had very few failures and added that a student would have to be really stupid to fail his course. The student told me that this instructor rotates his exams on a three-semester cycle. Students over the years had copies of his old exams and quickly figured out this cycle. The students of the

now much more inclusive Engineering Club tracked this and noticed these cycles many years ago. Every student who is in any way interested is given a copy of all of their future exams with answers at the beginning of each course each semester for this instructor. Apparently, this is well known among the students and this instructor is very popular.

Many of the students store these exams on their calculators for use during the exam. The student who told me this said that she found other people's work confusing and did her own work. Some of her fellow students also felt the same way.

All of these practices were a surprise to me. One practice that I have troubles with is that of handing out a practice exam before an exam. It tends to narrow the study focus of the students. I feel exams should sample of their knowledge of the students and all of the material should be studied. If a topic is definitely not going to be on an exam, I let the students know.

Some instructors will give the practice exam and then make the given version of the exam a slightly different version of the practice exam with maybe numbers changed and problems slightly altered.

Clearly, not writing new exams is a way of saving time. All I can say is that I enjoy creatively crafting fresh exams. It does take a lot of time, but I think that if we want to provide a strong education for our students we should do what we can to avoid facilitating cheating.

I would not advocate that our students not be allowed graphing calculators with their ability to store large text files. I know some of my colleagues no longer allow students to use calculators on their exams. I really have no problem with that either. I know that those instructors write exams that

reflect the lack of calculator use.

I really do not have all of the answers to these problems, but I felt it was important for all of my colleagues to be aware that their exams are kept and filed by student groups even if they are not handed back and that graphing calculators have a huge capacity to store files.

Also, other means of cheating exist as well. One example is the use of the hidden cell phone that a student uses to take pictures of the exam and has someone else work out the problems. Unfortunately for these students, their knowledge of the material is usually so bad that they often cannot show work and are often caught. Do you check your students' work?

I often tell my students that they should not cheat in the current class otherwise they will not have enough knowledge of the material to cheat in the next class. I explain that this is a recursive process.

Call for Nominees

Please consider joining the CMC³ Board. Contact Past President Joe Conrad if you are interested in running. (See page 2 for contact information.)

CMC³ Foundation Report

*James Sullivan, Foundation President, Sierra College*

The CMC³ Foundation conducts fundraising events and solicits donations in order to award scholarships and prizes to qualified and deserving California Community College students who demonstrate promise and interest in the area of mathematics and mathematics education. The CMC³ Foundation Scholarship fund sponsors the Student Poster Contest, Student Speaker Award, and California Community College Mathematics Student Scholarships. The Foundation Board offers its gratitude to our generous members who's donations make the monetary awards for these programs possible.

The Student Poster Contest takes place during the Annual Fall Conference in Monterey. The winner of the 2018 Student Poster Contest was Cody Vig from Solano Community College. Cody was awarded a $300 scholarship for his poster "Noether's Theorem and its Applications to
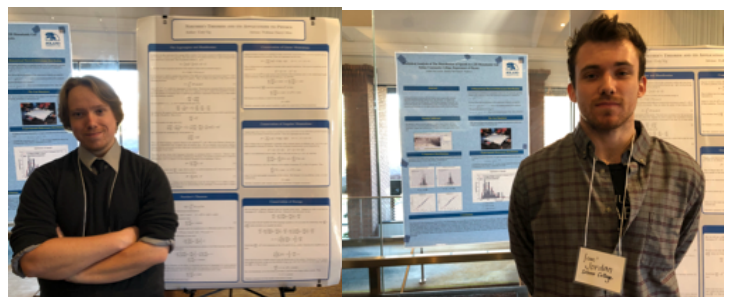
Physics". His presentation was very thorough and enlightening. Darryl Allen of Solano Community College was Cody's faculty sponsor. Chris Rodriguez and Daniel Enriquez from Hartnell College each received a $150 scholarship for their

joint poster entry titled "Yield Forecasting Modeling Design".
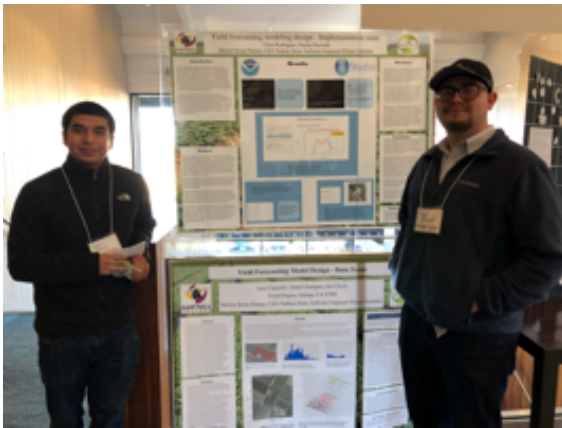
They presented a summary of their contributions as members of a team who worked on a project that involved collecting pertinent data in the field and developing mathematical models to assist strawberry farmers predict daily crop yields. Their faculty sponsor was Brian Palmer of Hartnell College. Jordan Van Leueven from Solano Community College was presented with a $250 scholarship for his poster "Approximating A 2D Boltzmann Distribution." Jordan presented the results of his original research on using a custom-made gas simulator with ball bearings to test the quality of the simulations fit to the theoretically predicted 2D Boltzmann distribution. Zak Hannan of Solano Community College was Jordan's faculty sponsor. Brendan Noffsinger from Yuba College was awarded a $250 scholarship for his poster "Insurgent Convergence".

Brendan's poster explored the depths of theoretical convergent series that contrasts with the calculus topic of convergence and divergence. His presentation was very interesting and covered a brief history of these series in addition to the proof of the Cesaro Summation. Brendan's faculty
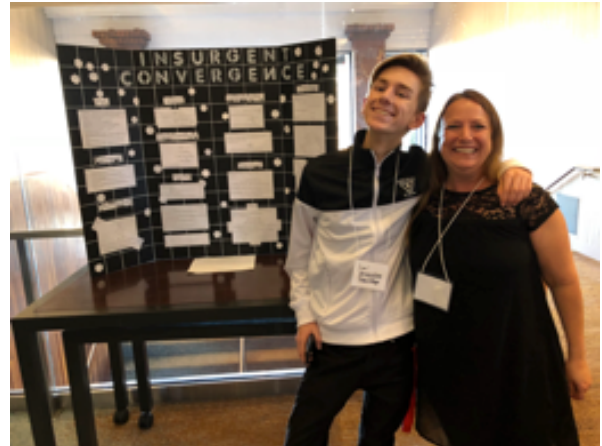
sponsor was Erika Noffsinger of Yuba College. The Foundation Board offers its congratulations to the 2018 Student Poster Contest award recipients and deep appreciation to their faculty sponsors for contributing to the success of the CMC³ Student Poster Contest.

Submissions for the Student Speaker Contest are currently being accepted online at http://www.cmc3.org/students/speaker/call_for_speakers/ . Please encourage your outstanding students to submit a proposal. The Student Speaker Award recipient has the honor of concluding the CMC³ Spring Recreational Mathematics Conference held at Lake Tahoe Community College on April 27, 2019, by giving a 20-minute presentation on a topic related to Mathematics. They will also receive a $500 Scholarship. The deadline to apply for the Student Speaker Contest is March 17, 2019.

The CMC³ Foundation is pleased to announce the offering of $6,000 in total scholarship funds available to qualified and deserving California Community College mathematics students. As a member of CMC³, you have the opportunity to nominate one worthy student for a CMC³ Foundation Scholarship. Students eligible for nomination must have successfully

completed a minimum of 30 college units, including at least 8 units at a CMC³ member college, are currently enrolled in a minimum of 6 units at a CMC³ member college, and have completed at least one mathematics course at the level of second semester engineering calculus or higher. Nomination packets must be completed and submitted by April 1, 2019. The nomination packet is available for download on the CMC³ Foundation website http://www.cmc3.org/students/scholarships/ .

CMC³ Foundation scholarships are made possible through generous donations from our members like you. Please consider supporting our scholarship fund this year by making a tax deductible cash donation either by credit card or PayPal using this QR code or the "Donate" button on the CMC³ Foundation website http://www.cmc3.org/foundation/donate/ or by mailing a check directly to Leslie Banta, CMC³ Treasurer, Mendocino Community College, 1000 Hensley Creek Rd, Ukiah, CA 95482.

Anyone is welcome to attend our board meetings. If you'd like to attend, please contact anyone on the board. We'll be happy to tell you the date and location of our next meeting.

President's Report
(continued from p. 1)

membership survey, and the change was such a positive one that we have decided to stick with it.

The spring conference is a "recreational" one because our speakers typically focus on topics outside of pedagogy. For example, this year our talk topics will include Laplacians, knot theory, combinatorics, Indian mathematics, poker, and other mathematical curiosities! The entire program for the conference can be found at http://www.cmc3.org/conferences/spring/. I very much hope to see you there! While the program is full for this year's spring conference, I would like to invite you to consider nominating a **student** to be the featured student speaker! The student speaker gets a modest scholarship, along with a great experience presenting a mathematical topic, and free registration to the conference. Please visit the site http://www.cmc3.org/students/speaker/call_for_speakers/ for more information, and to nominate a student.

Both of our conferences give great opportunities for community college mathematics faculty to learn about what's happening in their profession and interact with colleagues from across the region. Of course, the fact that they are held in two of the most beautiful places on the planet is not to be forgotten! Please come and join us this year in Tahoe and Monterey!

Calendar

March 1—2, 2019: CMC³-South 34th Annual Spring Conference at Kellogg West Conference Center, Pomona, CA. Contact: Larry Perez at lperez@saddleback.edu. Website: www.cmc3s.org

March 14—17, 2019: ICTCM at Scottsdale, AZ. Website: www.pearson.com/us/about/news-events/events/2019/03/ictcm-2019-conference.html

March 16, 2019: SVCCM Conference at Sierra College, Committee Chair Donna Smith, email: dosmith@sierracollege.edu

March 29—30, 2019: OhioMATYC Annual Conference, Mohican Lodge and Conference Center, Perrysville, OH. Contact: John Nadel. Website: www.ohiomatyc.org

April 25 - 27, 2019: ORMATYC Meeting, Inn at Spanish Head, Lincoln City, OR. Website: www.ormatyc.org

April 26-27, 2019: CMC³ 23rd Annual Recreational Mathematics Conference, Lake Tahoe CC, South Lake Tahoe, CA. Contact: Larry Green, Lake Tahoe Community College, (530) 541-4660 ext. 341, drlarrygreen@gmail.com

October 11 - 12, 2019: MichMATYC Conference, Henry Ford College Website: www.michmatyc.org

November 14–17, 2019: 45th AMATYC Annual Conference, Milwaukee, WI. Website: https://amatyc.site-ym.com/page/2019ConfHome?

December 6—8, 2019: CMC North 62nd Annual Conference, Embracing Cultural Diversity in Mathematics, Pacific Grove, CA. Website: www.cmc-math.org/conference-overview

December 6–7, 2019: CMC³ 47th Annual Conference, Hyatt Regency Monterey Hotel and Spa, Monterey, CA. Contact Jen Carlin-Goldberg, Santa Rosa Junior College (707) 527-4746, jcarlingoldberg@santarosa.edu

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