California Mathematics Council Community Colleges

CMC³ NEWSLETTER

The Seventeenth Annual Recreational Mathematics Conference at Lake Tahoe

By Larry Green, Lake Tahoe Community College

CMC³ will host the 17th annual Recreational Mathematics Conference on April 26 and April 27 this year. The conference will be held in Lake Tahoe's Montbleu Resort Casino and Spa which is located near the lake and has all the amenities including a salon and spa, arcade, shopping area, and of course plenty of table games and slot machines if you

are feeling lucky. This conference is unique in that all the talks are recreational in nature, focusing on applications and other mysteries of mathematics.

The conference begins at 6:30 PM on Friday, April 26th with an opening get-together. Then we will be in the fold with Robert Lang as he presents on the modern science of origami. On Saturday morning, the conference resumes with two sessions filled with more amazing uses, facts, and problems from mathematics. After a lunch break, we will be inspired by Bernt Wahl as he shows us how chaos and fractals work together to mysteriously predict the outcome of roulette. Two more sessions on recreational mathematics will follow Wahl's talk. The grand finale of the conference will be this year's student keynote presenter. The conference will conclude with the traditional celebration and door prize raffle.

Conference registration is $75 for members, $50 for adjunct instructor members, and $110 for non-members, ($75 for adjunct non-members). Registration will include a meal voucher of $15 toward any of the hotel's eating establishments. Full time students may register for the nominal fee of $5 which does not include the lunch voucher.

For more information, contact your CMC³ campus representative or contact Mark Harbison, Tahoe Conference Co-Chair at harbism@scc.losrios.edu or Larry Green, Tahoe

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Recreational Math Conference

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Conference Co-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. This is a one-of-a-kind conference that brings people back each year to enjoy the wonders of mathematics and the beauty of Lake Tahoe.

The President-Elect's Message

Mark Harbison, Sacramento City College

One of my responsibilities as President-Elect is to help out with things like this newsletter article when the CMC[3] President is out on Maternity Leave. Please wish good health to Susanna Gunther and her baby (due in early March) the next time that you see her.

CMC[3] needs your help recruiting the following

- an organized and motivated student to give a presentation in Tahoe 2013;
- faculty to give presentations on something that they really enjoy (math edu. related) in Monterey, 2013; and
- new and returning members to attend both of our conferences, for continued growth.

The CMC[3] Board meets 3 days each year for about 4 hours a day to prepare for the most useful, interesting, comfortable and affordable professional development conferences around. We are faculty **just like you** who enjoy working to maintain a community of professionals dedicated to improving the lives of our students. Information should always be available for all of these items at www.cmc3.org but it's OK to contact me anytime if any details are not easy to find: harbism@scc.losrios.edu   or c: 916-475-9461.

CMC[3] is a non-profit organization, but we do need to maintain a balanced budget. So we will raise conference registration fees slightly, starting Fall, 2013. Membership fees will stay the same. This will be the first fee increase in 7 years, and is necessary to keep up with rising expenses. For example, the food charges in Monterey have increased by 10% every year for the last 5 years. Thank you for understanding.

Call for Proposals for the Mathematics Student Speaker at the 2013 Tahoe Conference

Debbie Van Sickle, Sacramento City College

At the 15th Annual Recreational Math Conference this year, one California Community College student who has investigated a topic or an application of mathematics will be honored. This student will attend the conference and present his or her findings. This twenty minute presentation will be given on Saturday afternoon and serve as the conference's finale. Previous presentations were given by Melissa Thaw (2009), who spoke on the use of cross-sections to measure the volume of a shallow water aquatic region, Andrew Gabriel (2011), who explored Cantor's transfinite set theory, his fierce opposition, and his spiral into mathematical insanity and Jesse Cohen (2012), who's topic was a student's exploration of space and structure. Thanks to a generous donation from Debra Landre, instructor at San Joaquin Delta College, this year's student will receive a $500 scholarship. Student applicants must have a California Community College math faculty member serve as a mentor. Interested students can contact Larry Green atDrLarryGreen@gmail.com for more information. Students can fill out the online application at: http://www.cmc3.org/conference/ callForStudentProposal.html They will be asked to provide their contact information, their mentor's name, a short abstract for the program, a longer abstract for the review committee, and a short biography of the student. This is a wonderful opportunity, so please encourage your students to explore an area or application of math and submit a proposal. For more information contact Larry Green, drlarrygreen@gmail.com.

CMC³ needs YOU!
Barbara Illowsky, De Anza College

How would YOU like to get involved with the activities of CMC³? Stay in the loop of all those high-stake mathematics discussions happening around the state and country? Help plan the Monterey or Tahoe conferences? Make some great friends? I bet you just shouted "yes!" to these questions! Put that enthusiasm into action by submitting your name as a candidate for the CMC³ board, 2014-2015.

Every two years, the CMC³ membership votes on its elected board for the next two years. The elected positions are president-elect, secretary, treasurer, four at-large members, and CMC³ Foundation president. There are also several appointed positions. The president, who next year will be Mark Harbison, makes those appointments in January, after the election results.

How can you get involved? Consider joining the board. There are some positions that require very little time and other positions that require a bit more time. The responsibilities that everyone on the board shares require include attending the three in-person and one virtual meetings per year, participating in discussions, and assisting at the Monterey conference. Each position then has its specific requirements. To learn about the responsibilities associated with each position, read the by-laws on the CMC³ web site: http://cmc3.org/news/CMC3BylawsAndConstitutionApproved.pdf .

So, how does this work? If you have questions about volunteering and/or submitting your name, feel free to contact me. If you would like a specific position, please let me know. Maybe you do not know what position you would like, but just want to get involved. That is great, too! You could run for "at-large" or ask to

Brain Strain
Joe Conrad, Solano Community College

Welcome to another Brain Strain! This issue's problem is from geometry with a search for gold. Without using trigonometry, find the ratio of the length of a diagonal of a regular pentagon to the length of its side.

The problem from the last issue was: Let x and y be two (possibly) complex numbers. If the sum of their squares is 7 and the sum of their cubes is 10, find the maximum real value of $x + y$.

Solutions were sent in by Larry Green, Brad Krein, Kevin Olwell, Paul Cripe, Fred Teti and Lakshmi Vanniasegaram. For ease of notation, let $x + y = u$ and $xy = v$. Simple computations reveal that $u^2 = 7 + 2v$ and $u^3 = 10 + 3uv$. Solving for u in terms of v from the first equation and substituting into the second and simplifying yields $u^3 - 21u + 20 = 0$. Since $u = 1$ is a solution of this equation, we can now factor the left hand side to become $(u - 1)(u + 5)(u - 4) = 0$. Thus, there are three solutions, 1, −5 and 4, so the maximum value of $u = x + y$ is 4. If existence of such x and y's concern you, you may now use the value of u to find v and then solve for x and y.

Note that each of the three solutions gives separate values for x and y. In fact, the values that correspond to $x + y = 1$ are real whereas they are complex for −5 and 4.

Enjoy the new problem and, as always, send solutions to:

Joe Conrad
Solano Community College
4000 Suisun Valley Road
Fairfield, CA 94534
joseph.conrad@solano.edu

What's Happening at Folsom Lake College

Joy Fuson

Folsom Lake College has been through a season of change, welcoming a new President and two new VPs in the past 18 months. In contrast, our math department has been in a time of stability with 13 full-time faculty members.

Led by Professor LeLe Trieu, we have implemented a Supplemental Instruction program aimed at our remedial courses (and funded by BSI dollars). The workshops meet once a week and are limited to 10 students to provide a collaborative environment in which to review and practice course concepts and integrate discussions of helpful study skills.

The creation, implementation and evaluation of Student Learning Outcomes have been the focus of a great deal of time and energy in our department recently. Each month, a portion of our department meeting is devoted to discussion of the findings from our SLO assessment for one course. This has resulted in changes in how we approach teaching some topics; in some of the wording of the SLOs

CMC³ Foundation Report

Debbie Van Sickle, Foundation President, Sacramento City College

Scholarships

During the 2011-2012 year the CMC3 Foundation awarded a total of $7,200 in scholarships to students attending 18 of our member colleges. The names of the students, chosen by the faculty at each college based on guidelines we provided, can be found in the summer edition of the CMC3 newsletter at http://www.cmc3.org/Newsletters/CMC3Summer12Newsletter.pdf.   We also awarded a total of $200 to the students in our region who earned the highest scores in the annual AMATYC Student Mathematics League 2011/2012 competition (Go to http://www.amatyc.org/SML/index.htm for more information on the competition), $500 to the winner of our Tahoe student speaker competition and a total of $100 to the winners of our Monterey Poster Session.

We will soon begin sending out information to the college representatives of the CMC3 member colleges slated to have students receive scholarships in June of 2013. Please go to our website at http://www.cmc3.org/foundation.html or email me at vansicd@scc.losrios.edu for more information. Students from the following colleges will receive $400 scholarships this year: American River College, Butte College, Chabot College, College of the Redwoods, College of the Sequoias, College of the Siskiyous, Evergreen Valley College, Feather River College, Fresno City College, Hartnell College, Mendocino College, Monterey Peninsula College, Ohlone College, and Sacramento City College.

What's Happening at College of the Redwoods

Erin Wall

Like stating the domain for a rational function, it might be easier to describe what is not happening at College of the Redwoods; however, I'll attempt the more direct approach. Last year in

January 2012, the ACCJC ordered a "Show Cause" sanction for College of the Redwoods; severe budget deficits that are requiring a "right-sizing" of the institution have led to dozens of layoffs and furloughs and paycuts for us all; major building projects that include a new Administration/Student Services Building and Theater along with two Academic Buildings have turned most of the campus into a construction zone. The Student Services and Theater building opened Fall 2012 and the new Academic Buildings are slated to open Fall 2013. New mathematics faculty member Richard Ries, from Norco College, joined us last August, in a full-time tenure-track position at CR's Mendocino Coast Campus. In May 2012, we welcomed a new President/Superintendent, Dr. Kathryn Smith, who moved up here from Ukiah after being President of Mendocino College for seven years. It is a very exciting time, to put it lightly, to be at College of the Redwoods. Everyone is trying to keep a

positive attitude, although we do not yet know the ACCJC's decision about our institution. I firmly believe that all the discussions, assessments, and changes, no matter how how difficult, will lead us to be more efficient and effective in serving our community and our students. There has never been any question about the quality of education here, and now our processes are more transparent, and I see much more cross-district and cross-discipline dialogue that will lead us to new projects and create new directions for the future.

The Mathematics Department faculty developed our own textbooks for most of our developmental/pre-transfer level courses. The projects began with our Intermediate Algebra book, led by Dave Arnold and Dr. Bruce Wagner, in 1997. We now offer our textbooks for these classes free to our students on CD and online.

You can view our current versions at: http://mathrev.redwoods.edu/PreAlgText/, http://mathrev.redwoods.edu/ElemAlgText/, and http://msenux.redwoods.edu/IntAlgText/ . Along with this was development of the OPTIMATH **O**nline **P**ractice and **T**esting **I**n **Math**ematics software. OPTIMATH testbanks have been developed for

What's Happening at Ohlone College

Bob Bradshaw

At Ohlone College, the past few years have presented us with numerous opportunities and challenges. On the personnel side, we have had four full-time faculty (Ron Staszkow, V. P. Singh, Linda Messia, and Victoria Loukianoff) retire and sadly, had another full-time faculty member, Curtis Bressler, pass away. We have also seen the departure of several of our long-time adjuncts. We have survived through an increase in our adjunct faculty, many of who have stepped up with outstanding professionalism, taking the extra steps to ensure that our students get the best possible support. In Fall 2012, we also had our first full-time hire since 2000. Our new faculty member is Andy Bloom, formerly of Shasta College. Andy has quickly become one of our popular instructors and a full participant in department activities. Going forward, we expect to hire several more full-time faculty over the course of the next en years.

On the curriculum side, we have created two new courses, one in prealgebra and the other in the programming language Matlab. The Matlab course addresses the needs of students who transfer to the engineering programs at schools such as U. C. Davis and Cal Poly, San Luis Obispo. The department has also been fortunate enough to continue offering courses during every summer, despite the statewide budget issues. Finally, the department has modernized the curriculum in many ways, through Learning Communities at the introductory level and through the student use of Mathematica, Matlab, and LaTeX at the transfer level. Students who return to Ohlone for a visit after transferring report that this knowledge has proved advantageous at their four-year schools.

On the facilities side, the College has received the generous support of the community through two separate bonds. The first bond resulted in the opening in Spring 2008 of the Newark Center for Health Sciences and Technology. We offer many math classes in Newark, as part of providing the full general education curriculum at both the Fremont campus and the Newark Center. Our second, much larger, bond was passed in Fall 2010. It will provide funding for modernizing the Fremont campus. Construction is expected to begin in Summer 2014 and will result in substantial changes to the campus. For the Math Department, this will likely mean that our Math Learning Center will move to the heart of campus, as part of a larger student learning commons. It will also mean that our classrooms will be modern, student-centered rooms.

Finally, I want to commend the department on its active participation in college-wide activities. We have had three Faculty Senate Presidents, three chairs of the Technology Committee, a chair of the Curriculum Committee, two union Presidents, and two members of the union negotiations group come from the math department. It is this tradition of college-wide leadership along with our reputation of providing a very strong academic program that makes the math department one of the most well respected departments on at Ohlone.

For further information about the math department at Ohlone College, contact Bob Bradshaw at bbradshaw@ohlone.edu.

Foundation
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2012 Monterey Conference Student Poster Session Award Winners

First place winner, "Filling Up Space: Proving the Crystallographic Restriction Theorem in Three Dimensions" by Antonio Cruz (Solano Community College, advisor Joe Conrad). Second place winner, "Water Quality Implications of Hydraulic Fracturing" by Elizabeth Finch (Sacramento City College, advisor Debbie Van Sickle). Honorable mention, "What makes you hot...or not?" by Morgan Walter, Mark Falcone, Nikki Quittner, Nathanial Abrajano , Ghianmichael Viray (De Anza College, advisor Michael Cao).

Fundraising

CMC3 scholarships are only made possible because of the generosity of our members, our vendors and other contributors. So far in the 2012-2013 fiscal year we have raised $1,470.97
from member donations, $1,800.00 from the CMC[3] board, and $1,972.75 from merchandise and raffle ticket sales at the Monterey conference. We would like to thank all the CMC3 members and Vendors who made donations of money and raffle prizes in 2012-2013 including Guy De Primo, Federick Teti, Wade and Jane Ellis, Cynthia Stubblebine, Pat McKeague(Math TV), Michael Eurbugian, Charles Barker, Rebecca Fouquette, Randy Taylor, Lynn Mareck, Patty George, Rob Knight, Marcella Laddon, Dean Gooch, Mo Geheity, G. Ling, Cynthia Speed, Allyn Washington, Bic Dovan, Barbara Illowsky, Marianne Anthony, Steve Blasberg, Lori Maloney, Debbie Van Sickle, Anne Licciardi, McGraw Hill, XYZ tesxbooks, Pearson, and Cengage and everyone who bought raffle tickets and merchandise.

The CMC[3] Foundation is a nonprofit charitable organization under section 501(c)3 of the Internal Revenue Code. Contributions are tax deductible to the extent allowable under federal law (as long as no goods or services are provided in exchange for the donation). Our Tax Identification Number is 94-3227552. Cash donations can be made in three ways:

- At the time you register for either conference (There is a box to check on the registration form. Please use a separate check, but mail it in the same envelope as your registration form.)
- In person at one of our conferences
- By mailing a check to our treasurer Rebecca Fouquette at 595 Gettysburg Dr
San Jose CA, 95123.

The CMC[3] Foundation Board of Directors

I would like to thank the members of the CMC[3] Foundation Board of Directors Barbara Illowsky (De Anza College, past president of CMC 3), Hsiao Wang (Sacramento City College), Bic Ha Dovan (Santa Rosa Junior College), and Rebecca Fouquette (De Anza College) for all of their hard work.

Call for Board Members

Contact Past-President Barbara Illowsky (illowskybarbara@deanza.edu) before August 31 if you are interested in being on the ballot for a CMC3 board member position. Elections will be in Fall, 2013.

Pre-Statistics Taught at 16 California Community Colleges . . . and Counting

Hal Huntsman, City College of San Francisco

At most, if not all, of our colleges, students struggle to complete elementary and intermediate algebra — state-wide success rates in these classes hover around 50%. The statistics are even bleaker when we track those who successfully complete a transfer-level math course. Of those enrolled in elementary algebra in a California community college in 2009, only 15% had passed college math by 2012. The college math completion rate for intermediate algebra enrollees was 35% in the same three-year window. For students on their way to taking college-level statistics — often with majors in behavioral and social science — the issue is compounded because algebra curriculum is not well-aligned with the skills and knowledge they will need in those statistics courses.

For these reasons, community colleges around the state (and the nation) have developed new courses that prepare students specifically for college-level statistics. Teams of math faculty from 15 California community colleges have developed courses or experimental pilots with support from the California Acceleration Project (CAP). Following CAP design principles, these math faculty took a close look at what students will need to know when they get to their college-level statistics courses. The learning goals across the courses focus on quantitative literacy, rather than on procedural algebra skills. These one-semester, intensive courses often (but not always) have arithmetic or pre-algebra prerequisites. They are based on the principle that our students are capable of college-level work if we provide them with rich tasks set in compelling contexts with appropriate support in the form of "just-in-time

remediation" and attention to their affective, "learning-to-learn" needs.

These "pre-statistics" courses have yielded impressive early successes — pass rates are high (65-90%) and, more importantly, students starting in a pre-statistics course are roughly two to four times more likely to complete a college-level math course than students starting in elementary or intermediate algebra. (See http://cap.3csn.org for more detailed statistics).

In addition to being successful, the courses are fun to teach. Instructors talk about the engaged, interactive pedagogy, the rigor of their curriculum, and the self-confidence that their students develop. Students talk about math that is useful and interesting. (For interviews with faculty and students from these courses, see http://cap.3csn.org)

Pre-statistics courses are not a replacement for algebra and are not for every student. Many students still want and need the algebra preparation and we will continue to offer the best algebra courses we can. However, colleges around the state are realizing that algebra doesn't have to be the only path to a degree. And, despite some concerns about articulation, most colleges are successfully using a prerequisite challenge process (a sometimes neglected, but important part of Title V regulations) to allow student from pre-statistics courses to take college-level statistics — which remain unchanged and fully-articulated. At these colleges, pre-statistics courses offer an alternative way to succeed in college-level statistics for students who don't need as much algebra.

For more information about getting involved with the CAP community of practice, go to: http://cap.3csn.org/community-of-practice/

To download an FAQ about pre-statistics courses, go to: http://cap.3csn.org/teaching/teaching-pre-statistics-courses/

War Cries About Textbooks

Ken Bull, College of San Mateo

This Bull episode was prompted by prices for textbooks. This semester one of my colleagues is teaching Discrete Mathematics and PreCalculus. For the PreCalculus course the text that he has chosen is an "open source" text and that text costs the students $16 in paper form. For the Discrete Mathematics course he was not able to find a suitable open source text; the bookstore price for the text he chose is $312. What struck me especially was: $312 versus $16! I had pretty much got accustomed to $120 from the big publishers, and I was expecting the open source paper copy to be approximately $40, but no: $312 and $16. What is going on here?

Guerilla warfare is the metaphor that comes to mind. On one side is the establishment -- a few (four to six) big educational publishers, and on the other side -- what at first sight looks to be a motley crew of small publishers, non-profit initiatives, individual authors' self-publishing, start-up companies, etc. Typical of guerilla warfare is that the groups involved are many and diverse; there are not two great armies fighting, but rather one against many small forces. We can all probably name at least three of the big publishers. To get some idea of the diversity and the number of participants on the other side, go to College Open Textbook Community (http://collegeopentextbooks.ning.com/) or the Community College Consortium for Open Educational Resources (http://oerconsortium.org/) and explore the sites until your intellectual capacity for acronyms and clever names is exhausted. Even the very similar names of these and related organizations befits the often many splintered factions and groups in guerilla warfare.

A second aspect of guerilla warfare it that eventually it involves ordinary folk who are forced to make choices that help one or the other side. In our context, the "ordinary folk" includes instructors and students. This piece is meant to serve as a kind of rough map to just one part of the battlefield -- the part where we northern California community college mathematics instructors live.

Some history. Rising textbook costs are nothing new, and the root cause can be specified. It is easy to say that the rising costs are a result of the near monopoly enjoyed by the big publishers, and while this may be the underlying cause, that leaves open the question of how it works. In 2004 and 2005, there were reports by CalPirg and the Government Accounting Office[1] that pointed at a number of factors, all of which serve to limit the market for used books for students. These factors are: frequent revisions, supplementary materials, and (perhaps more recently) custom editions. Both reports noted that essentially the same textbooks are sold outside of North America at lower prices (GAO: ". . .prices [that] reflect market conditions found in each country . . ."). The power of textbook adopters is also often pointed out; those who choose what has to be bought are not those who must buy, a situation also found with prescription drugs.

That was 2005. Have things changed since then? From the side of the establishment, apparently not; if anything, according to the plot shown here[2] the slope of prices since 2005 is steeper still. On the other hand, there are all kinds of challenges to the establishment. One of the most common has been for instructors to self-publish their own materials and (for mathematics instructors) their own exercises. There are a number of small ("micro"?) publishers[3] that publish materials at a lower cost. Many of these alternatives make extensive use of internet access to materials, and most are connected with "creative commons" licensing[4] in some way. Moreover, there is a recent

initiative[5] that promises to trawl the internet, and put together texts from free materials.

At some point the ordinary folk have to get involved and have to make decisions. In real guerilla warfare, those at the foot of ladder are usually the first to be directly involved, but eventually those "closer to the establishment" are forced to make decisions. In our context, the folk are the instructors and students. We will focus on the decisions that we have to make as mathematics instructors. On the student side, there is a recent *Chronicle of Higher Education* article about student decisions[6], although many of us probably have some ideas about what students do, and those ideas also influence our decisions.

At this point I will have to rely on the experience of those I know -- primarily those in my own department. It is a pity that I must rely on my own limited observations, but here I see a role for CMC[3]. I suggest that CMC[3] systematically gather data on the choices that instructors in the CMC[3] are actually making regarding text book adoption. We have no overall idea about what proportion of textbook adopters opt for texts from the big publishers, what proportion publish their own materials, or what proportion use a "creative commons" text by another author. Other questions: what role does on-line homework play in our decision making? Which of our adoption decisions are individual instructor decisions and which are departmental decisions?

Many years ago, CMC[3] collected and printed a (largely inaccurate) profile of each department including information on texts used. The data were not very good or at that time very useful, but that situation has changed. Good data now would be useful. Intelligence, it would be; and it might even influence the factions and the establishment[7].

Before describing some of the parameters of decision making (again, only from the experience of this writer and his colleagues) it may be worthwhile to ask why (or even if) we need a textbook at all. What does a text do for us? Most of us teach one or more sections of about thirty or so students. These "classes" can be thought of as temporary and not very tightly bound communities, perhaps related to larger but even less tightly bound communities of students taking the same course, or sequence of courses. One obvious practical purpose of a text is that it gives a sequence of exercises (or experiences) to be gone through, where these exercises are tied to the examples and explanations in the text[8]. Another purpose of a text is to give these loose communities a focus that is not solely the spoken words of the instructor; a text works as a somewhat independent but common authority. Even if we disagree with the text, still it is something shared between the students and instructor, but somewhat independent of the instructor; it is there to be referred to, asked about, commented upon. Thus, a text distracts attention from the instructor to the material, which is always a good thing. A text serves as a physical trace that what is being studied has an existence of its own, apart from assignments, tests, and most horribly, grades. For these practical and more theoretical pedagogical reasons, I will assume that some kind of text -- whether in print form or electronic form -- is a good thing to have. Then comes the business of choosing a text in the context of guerilla warfare.

As instructors, we are individually inclined to naturally gravitate to the establishment, and only partly out of inertia -- although inertia may explain a good part of instructors' choices overall. (But again, we do not have the data!) We may especially appreciate the polishing that the editorial process gives to the finished product of a book, especially if we have tried writing ourselves. On the other hand, we are also drawn in the opposite direction: we may want to choose

a lower cost text alternative. How can we do that? A good place to start are the two websites listed at the beginning of this article. Judging from the experience of my colleagues, one needs to be prepared for considerable research to see whether the text is what will fit the course being taught, and be prepared for finding some really good material but also some material that does not meet one own standard or needs, and some material that is not good at all. Cooperating with the guerillas comes at a cost. Fortunately, it is mostly just time.

A major issue has to do with on-line homework systems. I would guess (but again, I do not have the data) that for mathematics instructors, on-line homework is the one "supplement" that is widely used, especially as we are being pushed to mount more on-line courses, or courses that have an on-line component. These systems can present us with a problem. One of my colleagues has chosen an open source text with which he is quite satisfied, but has decided not to use an on-line system for that class. One option might have been the WeBWork platform (see http://webwork.maa.org/) and its library. The WeBWork platform allows one to build exercises on line, and there is a library of already-built exercises. My colleague had been using the WeBWork library for other courses, but decided that the library was not extensive enough for the course he is teaching, and does not feel he has the time to create exercises using WeBWork, although he is pleased with the way it works. Another colleague has been creating WeBWork exercises for Trigonometry over some years, where he felt that the current library was not sufficient. Overall, however, without a sophisticated platform such as WeBWork, making on-line exercises is very difficult. For most instructors, using an already made on-line program is the most feasible option. At least one of the smaller publishers has an on-line system and there are at least two other free initiatives at the time this is being written.[9]

Another option for both text and on-line homework is to use the major publishers' offerings, but to be canny about the alternatives presented to the students. Sometimes the major publishers' on-line system is more affordable as a stand-alone item than the textbook alone, and certainly less costly than the text bundled with the on-line homework. The on-line homework option often gives the student on-line access to the text. Now, since the examples in previous editions of the text mostly stay the same, students can be told that if they wish to have a paper version of the text, previous versions (which can be found at cheaper prices) will be acceptable for examples, and for the homework, they will rely on the on-line part. One can help matters by flagging differences in references to examples in different versions of the text. Again, this option takes some research and some work.

These three suggestions are the only ones that come from my limited experience; more could come with more data.

There is another article in the *Chronicle of Higher Education* on this topic (but not focused on mathematics)[10] that provoked the comment: "The book is dead" and went on to say that although he collects antiquarian books, he reckons that modern print is "going the way of the folio." One of the casualties of the war? Even if the commentator proves to be right, we are not there yet, and so we have decisions to make. Moreover, it is also time to start considering whether we want to help the death of print or not. The death of print sounds terribly close to illiteracy.

AMATYC CONFERENCE is at Anaheim, CA this year!

October 31-November 3, 2013
See the Calendar for details.

Through the History Glass

J. B. Thoo, Yuba College, `jthoo@yccd.edu`

[This is the second in a series on logarithms.]

In the last installment, we noted that it is a common misconception that Napier invented the natural logarithm, and that in fact

$$\text{Nap}\log x = 10^7 \log_e\left(\frac{10^7}{x}\right).$$

In this installment, we provide Napier's definition of logarithm in his 1614 work, *The Construction of the Wonderful Canon of Logarithms* [3]. We then show how Napier's logarithm is related to the natural logarithm.

We begin, however, with Carslaw [2, p. 77], who tells us that

> Before we can understand Napier's work, it is necessary to call to mind that his object was to render calculations with sines, cosines, etc., especially the calculations of the astronomer, an easier matter. To the mathematicians of his time, the trigonometrical functions were not *ratios*, but *lines*, or the measures of lines. The *sine of the arc AB* [accompanying figure], as they would put it, was the *line BM*....
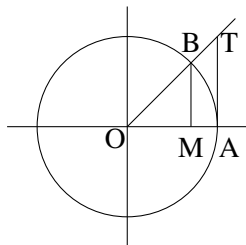
In the Trigonometrical Tables, which had been calculated by German mathematicians to an enormous degree of accuracy, these functions were given as integers, the radius being the sine of $90°$, or the *sinus*

totus. When additional accuracy was required, the radius was chosen proportionally large. In the Trigonometrical Tables used by Napier, it was 10^7....

Now we give Napier's definition of logarithm that appears in his work [3, pp. 16–19].

22. *It remains, in the Third table at least, to place beside the sines or natural numbers decreasing geometrically their logarithms or artificial numbers increasing arithmetically.*

[...]

26. *The logarithm of a given sine is that number which has increased arithmetically with the same velocity throughout as that with which radius began to decrease geometrically, and in the same time as radius has decreased to the given sine.*
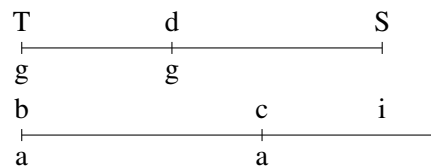
> Let the line T S be radius, and d S a given sine in the same line; let g move geometrically from T to d in certain determinate moments of time. Again, let b i be another line, infinite towards i, along which, from b, let a move arithmetically with the same velocity as g had at first when at T; and from the fixed point b in the direction of i let a advance in just the same moments of time up to the point c. The number measuring the line b c is called the logarithm of the given sine d S.

Napier's definition may appear to be somewhat cryptic. To decipher it, we rewrite his definition

as the following pair of differential equations that would be suitable for a first calculus course.

$$\frac{dg}{dt} = k(r-g), \quad g(0) = 0, \quad \left.\frac{dg}{dt}\right|_{t=0} = r;$$

$$\frac{da}{dt} = r, \qquad a(0) = 0.$$

Here, k is the constant of proportionality and r is the radius TS. The equations are coupled by the relations $x = r - g$, $y = a$, and Nap $\log x = y$. (That is to say, x is "a given sine" and y is "the logarithm of the given sine.")
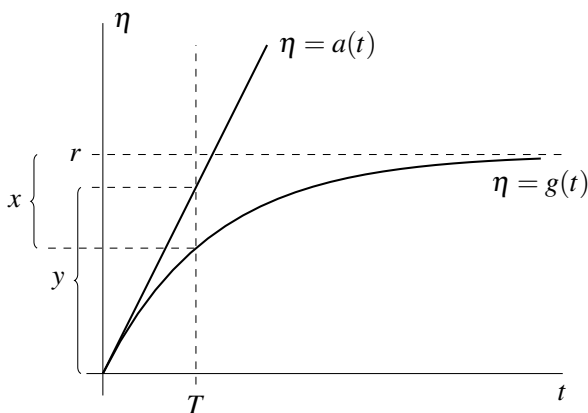
Solving the first equation, we find that $x = r - g = re^{-t}$, so that $t = \log_e(r/x)$. Solving the second equation, we find that $y = a = rt$. Therefore,

$$\text{Nap}\,\log x = y = r\log_e\left(\frac{r}{x}\right).$$

Finally, taking the radius r to be 10^7 as Napier did, we obtain our assertion that

$$\text{Nap}\,\log x = 10^7 \log_e\left(\frac{10^7}{x}\right).$$

Napier's invention of logarithms is all the more impressive when we note that he published his work in 1614 before Descartes introduced our modern notation for exponents in 1637, and before Newton was born in 1643.

Previous columns are on the Web at `<http://ms.yccd.edu/~jb2/histglass.html>`.

References

[1] Florian Cajori, *A History of Mathematical Notation: Two Volumes Bound As One*, Dover Publications, Inc., New York (1993).

[2] H. S. Carslaw, "The discovery of logarithms by Napier," *Math. Gazette*, Vol. 8, No. 117, May 1915, pp. 76–84.

[3] John Napier, *The Construction of the Wonderful Canon of Logarithms*, William Blackwood and Sons, Edinburgh and London (1889). Translated from Latin into English with notes and a catalogue of the various editions of Napier's works by William Rae Macdonald. In the public domain at `<http://books.google.com/books?id=Zlu4AAAAIAAJ>`.

College of Redwoods

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most of our courses: http://msenux.redwoods.edu/cgi-bin/online/s13/OTportal.cgi. Two years ago, the department developed three new review courses as part of the "Math Jam" program, to help students review Pre-Algebra, Elementary Algebra, and Intermediate Algebra (http://mathrev.redwoods.edu/mathjam/). The Math Jam courses and materials have been successful in assisting students to help them place appropriately into our math course sequence with remarkable success. The Math Jam materials were created by Michael Butler, Steve Jackson, Elizabeth Arnold, Amber Buntin, and Chris Panza under the guidance of Dave Arnold and Dr. Bruce Wagner. The materials are accessible online and are available both to students registered in the Math Jam courses and also to anyone wishing to brush up on their mathematics skills. We are now working on a way to use these courses to accelerate the developmental sequence for students who successfully completed this level of material in high school, but, placed back into remedial courses upon entering college. A pilot will be included as part of the college's First Year Experience program in Fall 2013.

With the State's focus on improving outcomes for basic skills students and the promising results and exciting ideas coming out of the California Acceleration Project, some of which were presented at CMC^3's Fall 2012 Conference, we in the process of evaluating our current developmental sequence with the intent of developing alternative pathways in remediation beyond Math Jam. We have an alternative to the traditional Intermediate Algebra course, Math 194 Intermediate Algebra for Social Sciences and Business, which was developed just over a year ago with mathematics faculty Michael Butler and me working in collaboration with business faculty Dr. Michael Dennis and Chris Gaines. This new

course is a data-driven intermediate algebra course and allows successful students to subsequently take general education courses, Elementary Statistics or Contemporary Mathematics. (STEM students are advised to take the traditional Intermediate Algebra course on the pathway toward calculus.)

While we face many challenges at College of the Redwoods, the mathematics department faculty understand the need for change, and we are reaching out together to embrace it. All the members of the mathematics department, full-timers and part-timers, are extremely committed and wonderful to work with. We have a great collection of diverse talents and opinions which, when combined, lead to extraordinary ideas and projects. I wouldn't want to be anywhere else.

CMC³ needs YOU!

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be appointed in January. Contact me and we will set up a time to chat. (illowskybarbara@deanza.edu)

You are welcome to attend our next meeting the day after the Tahoe conference and/or our September meeting to get some first-hand information. I will collect names through August 31st and submit the slate of candidates to the current board at its September board meeting. The actual ballots will be mailed to the membership in early October.

Please contact me with any questions about joining the board. This is a fabulous organization. It is YOUR organization. I hope you consider becoming a leader in it.

President-Elect's Message

(continued from p. 3)

Finally, please stay informed about some potential multi-year grants that could affect community college mathematics and statistics.

- A group of people known as 3CSN intends to improve collaboration among faculty of "best practice" ideas. Contact Thomas Carey <tcarey@projects.sdsu.edu>;
- Basic skills instruction can be improved with research coordinated by the CA Academic Senate (ASCCC). Contact Beth Smith <Beth.Smith@gcccd.edu>; and
- A variety of proposed alternative pathway to Statistics are being proposed by Myra Snell <MSnell@losmedanos.edu> and by others.

CMC^3 intends to share information about these opportunities, so that faculty can make informed decisions about their future. Please participate if you are available.

I look forward to seeing everybody who attends the Tahoe conference on April 26-27, 2013 and the Monterey conference on December 13-14, 2013.

Folsom Lake College

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themselves; and also in how we are assessing what students have learned. We are hoping that by continuing this process, our teaching efficacy will improve.

Although it does not seem in any way revolutionary, our department is making a real effort to create time to interact with one another with the sole intent of "talking shop". We have come to realize that without prioritizing this time to discuss honing our craft with one another, it often doesn't happen and we lose out on the opportunity to help each other improve.

Math Nerd Musings

Jay Lehmann, College of San Mateo

When I first taught, I made the mistake of giving too many pep talks. After a few cheerleading rallies, students tune you out. I've learned to wait for that critical moment when a class needs a boost. For some classes it happens within the first three weeks, for others mid-semester, for still others never.

How do you identify that key moment? Easy. It's when there's that first notable drop in quiz or test performance. This is where teaching for twenty-two years comes into play. I know what students are capable of and how to write tests accordingly. If students do poorly, it's about their knowledge base, not my crafting of the test.

Over the years, I've had quite a bit of practice delivering pep talks, which have gradually developed into what I affectionately call "The Speech." That's not to say The Speech is exactly the same every time. For me to do anything exactly the same over and over is the kiss of death, which is not exactly the best way to deliver a pep talk. But there are several key talking points that I find myself making each time.

Does The Speech work? Who's really to say what works or doesn't about anything we do? There are far too many variables to control. But my sense is that it does inspire at least a few students to work harder and smarter. And the class becomes definitely more connected to the course and me. It's that palpable.

What follows is The Speech. I offer it in hopes that it amuses you, inspires you to create your version of The Speech, and suggests to new instructors that even experienced instructors are

sometimes disappointed with their students' performance—struggle and innovative problem solving are a continued presence in the art of teaching. The Speech may seem exceedingly long, but I'm a very fast talker.

Here's The Speech, delivered to my business calculus class yesterday, after 56% of the class got Ds and Fs on a quiz:

I have some good news and some bad news.

Bad news: Many of you did poorly on the quiz.

Good news: We're going to spend an extra day reviewing the material.

Bad news: The upcoming test is going to be just as hard as the quiz.

Good news: You've got three days to turn things around.

Bad news: If you did poorly on the quiz and continue your same study practices, you might not be happy with your test performance. As Einstein once said, insanity is doing the same thing over and over again and expecting different results.

Good news: You have the power to change your behavior. You can start today. What should you do? You know the drill: do the homework, do extra problems, form a study group, read the book, write and take a practice test, visit the math center, visit my office hours, hire a tutor, say positive affirmations, and so on. But don't just do one of these things. Do five. Doing five new things not only attacks the problem from different angles, it also sends a message to your being that you're not in Kansas anymore. If you start using five new strategies and your response is, "Surely I'll do well now," then you'll know you're on the right track.

Last year I lost thirty pounds, which I think is pretty impressive, but it didn't come about by some vague plan that I'd lose weight. Instead, I used my Rule of Five to design a program to lose weight. The plan was to 1) exercise more, 2) snack on fruits and nuts so I wouldn't be famished going into meals, 3) affirm that I'd reached my weight goal, 4) stop eating cereal (my comfort food), and 5) stop eating just shy of feeling full, recognizing that it takes about fifteen minutes for your body to know when it's satiated.

More impressive than losing the weight, I've kept it off, which I've been able to do by continuing my five-prong approach. Studies have shown that if you do something for 21 days it becomes habit.

The final good news is that you can make a change in your performance in this class, but to do so, you'll have to make significant changes in your behavior. Pick five things that you truly believe will make a difference and start today.

You shouldn't feel poorly if you haven't performed well on the quiz. I have taught many, many classes before that at some point or another had trouble on a quiz or test. When this happens, it doesn't mean the class isn't great. No, what defines greatness is whether the class responds to the bump in the road by changing their behavior to ensure success.

> What defines greatness is whether the class responds to the bump in the road by changing their behavior to ensure success.

Calendar

February 23, 2013 MAA Northern California Section Meeting, University of Pacific, Stockton, CA. Contact: Edward Keppelmann (775) 784-4445, email: keppelma@unr.edu or Brad Chin (408)-741-2189, email bard.chin@westvalley.edu

March 1-2, 2013 CMC³-South 28th Annual Conference, DoubleTree Hotel, Orange, CA. Contact: Art Nitta, (909) 274-5386, email: anitta42@gmail.com

March 15-18, 2013 Teachers Teaching with Technology, Philadelphia, PA. Contact: Renee Hartshorn, (888) 282-8233, email: rhartshorn@ti.com

March 21-24, 2013, 25th Annual International Conference on Technology in Collegiate Mathematics (ICTCM), Boston, MA. Contact: Joanne Foster (800) 472-6288 or (207) 676-8688, email: joanne.foster@pearson.com

April 2-7, 2013 7th International Conference of Mathematics Education and Society (MES 7), Cape Manor Hotel in Sea Point, Cape Town, South Africa. Contact: Kate le Roux , email kate.leroux@uct.ac.za

April 17-20, 2013 NCTM 91st Annual Meeting, Denver, CO. Contact: NCTM Office (703) 620-9840, email: annlmtg@nctm.org

April 26-27, 2013 CMC³ 17th Annual Recreational Math Conference, MontBleu Resort Casino and Spa, South Lake Tahoe, NV. Contact: Larry Green, (530) **541-4660 ext. 341, email: drlarrygreen@gmail.com**

June 13-14, 2013, AMATYC Southwest Regional Conference, Coconino Community College, Flagstaff, AZ. Contact: Ana Jiménez, (520) 206-7667, email: ajimenez@pima.edu

June 17-20, 2013, 7th Annual International Conference on Mathematics Education and Statistics Education, Athens, Greece. Contact: Gregory T. Papanikos, email: atiner@atiner.gr

September, 2013 11th International Conference on Technology in Mathematics Teaching (ICTMT-11), Bari, Italy. Contact: TBA

October 23-25, 2013 NCTM Western Regional Meeting, Las Vegas, NV. Contact: NCTM Office (703) 620-9840, email: regconf@nctm.org

October 31-November 3, 2013 AMATYC 39th Annual Conference, Anaheim, CA. Contact: AMATYC Office, (901) 383-4643, email: amatyc@amatyc.org

December 13-14, 2013 CMC³ 41st Annual Conference, Portola Hotel and Spa, Monterey, CA. Contact: Mark Harbison, (916) 558-2687, email: harbism@scc.losrios.edu

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