

Points & Angles

Newsletter of the Metropolitan Mathematics Club of Chicago
Volume XLIX No. 5 Feb./Mar. 2020

Creating Interesting Ways for Students to Be Right and Wrong

March Speaker Eli Luberoff



From I-90 & Southbound I-294: Exit at I-190 West to O'Hare; Exit onto North Mannheim Rd.; Take Mannheim Rd. North 2.25 miles.

From Northbound I-294: Exit at West Touhy Ave.; Take Touhy Ave. to Mannheim Rd.; Turn right on Mannheim Rd.

Public Transit: Take the CTA Blue Line to the Rosemont Bus Terminal; Take Pace Bus #223 to Touhy Ave. & Lee Rd.; Walk East on Touhy to Mannheim Rd.

Friday, March 6, 2020

Doors Open/Social Hour: 5:45 PM

Dinner & Talk: 7:00 PM

Fountain Blue Banquet & Convention Center

2300 Mannheim Rd., Des Plaines

847-298-3636

\$43 for Members, \$49 for Nonmembers

Reserve by noon, Monday, March 2

Online at mmcchicago.org

or by phone at 847-486-4291

Correct math depends on right answers, but meaningful math celebrates both right and wrong answers, allowing students to intrepidly explore and express their reasoning in varied, interesting ways. In this session, we'll examine high- and low-tech ways for teachers to celebrate diverse work and build on student thinking in every form.

Eli Luberoff is the creator and CEO of Desmos, the free online graphing calculator and educational tool. He began his programming life on his TI-83 graphing calculator in elementary school, culminating with a working version of Monopoly (which was destroyed when he removed the backup battery accidentally). He began working on the software that would become Desmos.com during a year-long hiatus from Yale University in 2007, returning to graduate summa cum laude with degrees in mathematics and physics in 2009. In 2011, Eli was selected by Bloomberg Businessweek as one of the top 25 entrepreneurs under 25. For as long as Eli Luberoff can remember, he's been an informal tutor, helping friends and family with homework. Back in his hometown of Amherst, Massachusetts, he remembers occasionally doing his brother's math homework in elementary school in return for a ride to KFC. His motivation (aside from food) has always been a love for teaching. He started tutoring professionally in high school and has been a volunteer/peer/professional tutor ever since. Desmos was born out of Luberoff's own experiences as a math tutor, when he noticed that his younger students were still using the same calculator he had used in school a decade prior. "It blew my mind—because everywhere else, they're walking around with supercomputers in their pockets, but in this, they're still using the same thing," he says.

In addition to the Friday night dinner meeting, Eli Luberoff will also be presenting two workshops on Saturday, March 7. He will share "More Ways to Charge Up Your Classes with the Desmos Calculator" at 9:00 a.m. and "More Ways to Charge Up Your Classes with Desmos Activities" at 10:45 a.m. More information is available on the MMC website. Pre-registration is required. Space is limited.

January Dinner Meeting Talk – Douglas O’Roark

by Serg Cvetkovic

Doug began his talk with the end in mind: “If we design it, they will come,” and THEY have options. The first stop on such a journey is SERENDIPITY. Doug shared his story of growing up in Killeen, Texas, living a cookie-cutter, American life with very little math enrichment available at school. After leaving Killeen to study engineering at MIT and moving to Chicago for an engineering job, Doug fell in love with teaching while tutoring children at the Cabrini-Green housing projects. It was this experience that immediately led Doug to the University of Chicago to study math education under the guidance of none other than our very own Zal Usiskin. At the completion of the program, away went Doug to his true calling, “a cart with support,” at Lincoln Park High School. It was at this point where Doug removed his blazer to reveal a math team shirt from his days of coaching the math team at Walter Payton College Prep, which signified the transition to the second stop of the journey, IML #6 & GOALS.

From the time Doug started at Lincoln Park to the time he left Payton (i.e. to teach at the University of Chicago and also DePaul), Doug has always coached the school math team. He spoke of problem #6 one particular year on an Illinois Mathematics League contest that was brought to his attention by one of his mathletes. Thinking through, talking about, and solving this problem with his mathletes led Doug to incorporate more and more interesting, non-standard problems in his math classes. He noticed that such mathematical discourse was not only making his connections to his students stronger, but it was also making the connections between the students themselves much stronger. The process was building a COMMUNITY.

COMMUNITY was the third stop on this amazing journey. Doug talked about how something simple like getting t-shirts for the math team was a bonding experience. Doug talked about the tradition of the *Arbitrary Tradition Committee*, which at Payton meant that any time a mathlete had a suggestion for a tradition, they would submit it on yellow paper written in green ink into a box. This provided a segue for a heartwarming story about a student named Timothy, who submitted a tradition proposal, suggesting “we could microwave a light bulb.” Now Timothy was a brilliant kid mathematically speaking, but he was rather awkward socially and erratic by standard norms. However, as odd as his request was, the Payton math team brought a microwave to the ICTM Finals and did proceed to “microwave a light bulb” for a number of seconds (it did light up!) in a hotel room, as a community-building experience.

There is absolutely no doubt that being on a school math team is a transformative experience. Many students build connections and find a community in math team. They also get to experience fun math and math that is outside the standard curriculum. Finally, math team is not a class where you earn grades. However, and this was the inflection point of Doug’s talk, despite the mathematical rigor and community that it offers, to be a good mathlete requires speed and knowledge of certain tricks. Also, if coaches are spending this time teaching clever tricks and how to solve 20 different problems that are completely unrelated to one another, the math is isolated, and there is no progression, no building up of a particular topic. It’s “a series of moments without a crescendo,” essentially. Additionally, there are only so many spots on the team, and a competitive attitude doesn’t always bring out the best in people. There is also the diversity issue (e.g. many more males than females, under-representation of cultures), and let us not forget at math competitions, the problems are done individually, in complete silence, with zero opportunity to discuss the math. There is no question that math team can be an enriching experience, but “outside of the few already stellar mathematicians,” Doug stated, “Is working in solitary silence, using tricks and speed to do isolated math, enriching for most?” Enter MATH ENRICHMENT. Off comes Doug’s Payton Math Team shirt, revealing a QED shirt.

QED is an annual math symposium, in which students research a novel or existing unsolved problem and present their findings in a forum. It is an opportunity for students to find topics that interest them, do math outside the classroom, talk about their math with peers, teachers, and the public, and connect with other like-minded students. Doug also mentioned Math-on-a-Stick, the Julia Robinson Mathematics Festival, summer math camps, and Math Circles of Chicago! Off comes the QED shirt, to reveal Doug’s final non-epidermal layer, his Math Circles of Chicago shirt! To give the audience a feel of what goes on at Math Circles, Doug had us do an activity at our tables, where we take a triangle with three blank spots on each edge, and must use the digits 1 - 6

January Dinner Meeting Talk (cont.)

once, to make the sum of the three digits on each edge the same on all three edges. This led to a discussion in how, from just this simple activity, the mathematical extensions are nearly limitless. Doug and the audience discussed how this activity covers number theory, algebra, graph coloring, symmetry, and even abstract algebra.

Doug closed his talk with discussing the importance of offering options for math enrichment and designing these options with appropriate, individualized cognitive demand in mind, around the dimensions of equity, agency, and identity. Math definitely needs more collaboration and less competition. It needs a community, which promotes not only a growth mindset but the idea that “Math is for Everyone!” Like Doug’s sample math problem, the possibilities are nearly limitless. IF WE DESIGN IT, THEY WILL COME.

Points from the Interior

by Matthew Moran

Greetings MMC Members,

I was thrilled to hear longtime MMC member Doug O’Roark’s Friday talk at our last meeting. Doug was talking about math enrichment, which is a topic that I have spent a lot of time thinking about and working on. In fact, I still work with Math Circles of Chicago, Chicago ARML, NSML, and the ICTM Math Contest, even though I have been out of the classroom for nearly four years.

Doug gave the audience an interesting question to reflect on during his talk, What is the most memorable math enrichment experience you’ve had as a teacher? I have a long list of math enrichment memories, including some pretty impressive math competition success stories from my coaching days at Whitney Young. I look back on those times fondly, and I am still in touch with many of my former students today because of the bonds that were created through math competitions. Surprisingly, none of these competition-related memories topped my list.

At the top of my list is a rather ordinary day in my classroom. The fact that it was during my 7th grade Algebra I class may disqualify it from being math enrichment related, but students were working on research projects for the upcoming QED (<https://mathcirclesofchicago.org/qed/>), so it is definitely math enrichment related.

Every Friday in my middle school classes was “Smurf” or SMURF, short for “Super Math Ultra Research Friday.” For the first few SMURFs of the year, I would present interesting math that students could explore, and I would model a bit on how to ask your own questions about a problem. We’d look at an idea and explore various ways to extend the problem, make conjectures, and prove our conjectures. After 4-6 of these Fridays, students needed to commit to a topic, and then Fridays would be in-class time to work on research with my presence to support the students’ work.

At the conclusion of one such SMURF, I asked the class a series of escalating prompts:

1. Raise your hand if you settled on a topic.
2. Raise your hand if you have a question to explore on your topic.
3. Raise your hand if you have a conjecture about your topic.
4. Raise your hand if you have proved a conjecture about your topic.

I was just floored by how many students had their hands raised for #4. It was probably about half of the class who had already selected a topic, found a question, made a conjecture, and PROVED (or they thought they had) the conjecture! This nearly brought me to tears. I was so proud of the work they were doing and so impressed that they were able to chart their own path through a new mathematical idea.

This is the kind of student engagement that I feel really good about. The skills developed through doing math research are more transferable than being able to quickly solve a hard problem on a math competition. I love math competitions, but there is room for much more math enrichment. Doug’s talk was a great reminder of this.

I’m excited about our next Friday talk as well. We have Eli Luberoff, creator of Desmos, back on Friday, March 6, 2020. He will be talking about Creating Interesting Ways for Students to be Right and Wrong. As this meeting falls during Lent, we will have a fish meal option. Please note on your reservation if you don’t want the usual Fountain Blue chicken. You can note if you’d prefer a vegetarian (or vegan) meal at no additional charge or a fish meal for an additional \$10.

Don’t forget to register for the NCTM Centennial Meeting at McCormick Place on April 1 - 4, 2020.

MMC is Co-Hosting NCTM's Centennial Annual Meeting & Exposition in Chicago and YOU Could Be a Big Winner!

At all of MMC's events between now and NCTM 100 (April 1 - 4, 2020, at McCormick Place in Chicago), one registration to the conference will be raffled off!

To be entered in each MMC event's raffle, you will need to:

- 1.) attend the MMC event.
- 2.) become a member or extend your membership in MMC for one year at the event.

Registration for NCTM 100 is open at www.nctm.org/100.

Early bird registration rates are currently available! Group rates are also available!

Gratitude for Conference of Workshops

The MMC Conference of Workshops, held on Saturday, February 1, was a success. Over 350 participants were on hand, attending 90 workshops given by fantastic speakers, experiencing and sharing activities and ideas to bring to their classrooms.

A huge thank you goes out to site coordinator Jennifer Miller, as well as Adlai E. Stevenson High School and their staff members, who made everything run like clockwork, providing not only the beautiful facilities but also food service, technology, directions, and all the other little things that go on behind the scenes that take months of planning.

Thanks also to all of our MMC volunteers who got together folders, came early and stayed late to make sure everything was in the right place for the workshops, and made sure it was cleaned afterward.

We certainly know that teachers have enough on their plates, but fortunately, about 75 decided they could do even more and generously gave of their time and expertise by running workshops for the conference. The concept of teachers sharing and helping other teachers is why the MMC conference has been such a success. The idea that teaching doesn't end at our own classroom door is crucial to bettering Chicagoland's mathematics education. We owe all of our speakers special thanks for all their efforts. Also, some big thanks go out to the afternoon post-session speakers who gave 10-minute talks that stretched our thinking and inspired us to take action. Thank you, Hillary Yanai, Jackie Murawska and Sean Nank, Tom Canright, Steve Starr, Ray Klien, and Tom Reardon!

Soon you'll be hearing about the MMC Conference of Workshops 2021, so start planning now! If you presented this year, think about a workshop you would want to run next year. If you attended, plan to attend next year, but also consider presenting--everyone has those great ideas that they can share. We have a wonderful resource in Chicagoland with our spectacular mathematics community, and it would be great to see even more people willing to share their ideas.

--Nicolette Norris, Rose Sterr, and Maryjoy Heineman--2020 MMC Conference Co-chairs

Do you have a student who is interested in becoming a math teacher?

MMC Scholarship for High School Seniors

The Metropolitan Mathematics Club of Chicago is offering a \$2,000 scholarship for a high school senior who will pursue a career in the teaching of mathematics. In addition, up to two Filliman Scholarships may be awarded for the same amount (funded by a gift from the Filliman estate). The selected students, their parents, and their sponsoring teachers will be invited to the May 15th MMC dinner meeting, at which time the scholarship recipients will be honored.

A selection committee of MMC members appointed by the Board of Directors will determine the scholarship awards. To be eligible, an applicant must be sponsored by a current member of MMC, submit the application, have an official transcript sent, request a letter of recommendation from a mathematics teacher, and respond to the prompts in point E below. All materials must be received by March 6, 2020. Feel free to email your submissions. You will receive a reply, so you know that it is being considered. The committee will evaluate applications and will make a recommendation to the Board of Directors as to the awarding of the scholarship.

The guidelines used for selection shall be:

- A. Demonstration of overall academic scholarship with an inclusion of at least eight semesters of college preparatory mathematics (A minimum cumulative grade point average of 3.0, where A = 4.)
- B. A statement of the intention to pursue a career in mathematics teaching
- C. Indication of participation in extra-curricular activities, especially those that may have a positive influence on a teaching career
- D. A letter of recommendation from a math teacher who is familiar with the applicant's academic performance and his or her potential as a mathematics teacher (The teacher must be an MMC member.)
- E. A short response from the candidate (1-2 paragraphs) to each of the following prompts:
 - a. What qualities do you possess that will help you in a teaching career?
 - b. Describe a teacher who has had an impact on your education.
 - c. Was there a time when you struggled with a concept in a math (or other) class? What did you do?
 - d. What was your favorite math class? Why?
 - e. Describe your favorite math problem. What makes it so great?
 - f. What excites you about mathematics?
 - g. Why do you want to teach mathematics? *This response may be longer than the others if necessary.*

In addition to the application form (at mmcchicago.org), applicants must also send:

- 1. A letter of recommendation from a mathematics teacher, *preferably not sent through the applicant**
- 2. A current transcript for seven semesters of high school*
- 3. Responses to the prompts in point E above

Send to: Carrie Fraher
Glenbrook South High School
4000 West Lake Avenue
Glenview, IL 60026
(cfraher@glenbrook225.org)

**Letters of recommendation and transcripts may be sent by separate mail or email.*

MMC Board of Directors—Candidate Biographies

Position of President-Elect:

Danielle (Leibowitz) Grenader: Danielle currently teaches 6th grade math at Cicero East Elementary School. Prior to teaching in Cicero, Danielle taught high school math in the Chicago Public Schools and at Mundelein High School.

Aimee Hart: Aimee currently serves as MMC’s community relations liaison. She has been teaching mathematics for 22 years. She began her career at Josephinum Academy, a small Catholic girls’ school in Chicago and taught at Marymount International School in Rome and Walter Payton College Prep before settling at New Trier High School 14 years ago, where she teaches geometry and BC Calculus. In the past, she coached the math team at both Payton and New Trier but more recently switched to coaching her children’s basketball teams.

Position of Director:

Sara Curran: Sara has taught in CUSD 308 in Oswego for 20 years. She has worked as a 4th grade teacher and gifted education TOSA (instructional coach). Sara has served as MMC’s *Points & Angles* newsletter editor for the last two years. She feels it would be a privilege to join the MMC board.

Serg Cvetkovic: Serg currently teaches mathematics at Kelly High School on the southwest side of Chicago, where he also coaches the school's math team. Additionally, Serg is the current MMC president-elect and a 15-year veteran of the classroom, all at the Chicago Public Schools. His interests outside of mathematics include reading science-fiction novels, tabletop gaming, and proto-European history.

Sheila Hardin: Sheila has been teaching math at Oak Park and River Forest High School for the past 25 years and has been a math team coach for the past 23 years. Sheila has served as a board member of MMC for the last nine years and is currently the Board Chair. Sheila believes that it is important to be a part of the MMC board to continue being part of an organization that is dedicated to mathematics and education.

Laura Kaplan: Laura is currently in her 16th year as a teacher, this being her first at Regina Dominican High School. She has been an active member of MMC since 2005 and was a board member and Scholarship Chair from 2011 to 2017. Laura would be honored to again serve on the Board of Directors of MMC.

Carol Nenne: Carol currently teaches at North Central College and St. Xavier University. She also supervises student teachers for Illinois State University. She’s currently the MMC Treasurer.



Officers

Matthew Moran, President
 Serg Cvetkovic, President-Elect
 Mary Wiltjer, Past President
 Sheila Hardin, Board Chair
 Beth Ann Ball, Secretary
 Carol Nenne, Treasurer

Directors

Beth Ann Ball (2018-2021)
 Maine South H.S., Park Ridge

Steve Condie (2018–2021)
 Illinois Math & Science Academy
 (retired), Aurora

Serg Cvetkovic (2017–2020)
 Thomas Kelly H.S., Chicago

Peter DeCraene (2017–2020)
 Evanston Township H.S. Evanston

Carrie Fraher (2018-2021)
 Glenbrook South H.S., Glenview

Joyce Gajda (2019–2020)
 Oak Park & River Forest H.S., Oak Park

Sheila Hardin (2017–2020)
 Oak Park & River Forest H.S., Oak Park

Aimee Hart (2019–2022)
 New Trier H.S., Winnetka

Maryjoy Heineman (2019–2022)
 Evanston Township H.S., Evanston

Janice Krouse (2019–2022)
 Illinois Mathematics & Science Academy, Aurora

Danielle Grenader (2018–2021)
 Cicero East Elementary, Cicero

Matthew Moran (2017–2020)
 Chicago Public Schools (retired)

Nicolette Norris (2019–2022)
 Chicago Vocational Academy, Chicago

Steven Starr (2019-2022)
 Lakeview H.S. (retired), Chicago

Mary Wiltjer (2019-2022)
 Glenbrook South H.S., Glenview

Officials

Community Relations and Development	Aimee Hart
Conference Co-Chairs	Nicolette Norris Rose Sterr
Conference Registrar	Peter DeCraene
Finance Committee Chair	open
Historian	Paul Christmas
Membership Coordinator	Mary Wiltjer
NCTM/ICTM Affiliate Representative	Steve Condie
Points & Angles Editor	Sara Curran
Publicity and Posters	Paul Christmas
Scholarship Chair	Carrie Fraher
Social Media Chair	Danielle Leibowitz
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Follow MMC on Social Media!



Is your membership current? Check your mailing label to see when your membership expires. You can renew by mail with the form below or renew in person at the next dinner meeting.

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<small>ELECTRONIC-ONLY MEMBERSHIP</small> Check the box below for electronic-only membership. You will receive an email with a direct link to each issue of <u>Points & Angles</u> when it is posted on the web site, often before paper copies are mailed. You will no longer receive <u>Points & Angles</u> by mail. <input type="checkbox"/> Electronic-Only Membership	<small>MEMBERSHIP TYPE</small> Check one: <input type="checkbox"/> 1 year (\$35) <input type="checkbox"/> student*, 1 yr (\$22) <input type="checkbox"/> 2 years (\$65) <input type="checkbox"/> 1 st yr teacher*, 1 yr (\$22) <input type="checkbox"/> 3 years (\$90) <input type="checkbox"/> retired, 1 yr (\$28)																
<small>FORM USE</small> Check one: <input type="checkbox"/> New Membership <input type="checkbox"/> Renewal <input type="checkbox"/> Former Member <input type="checkbox"/> Change of Address	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;"><small>MEMBERSHIP COST</small></td> <td style="width: 10%; text-align: right;">\$</td> <td style="width: 30%;"></td> </tr> <tr> <td><small>DONATIONS</small></td> <td></td> <td></td> </tr> <tr> <td style="padding-left: 20px;"><small>SCHOLARSHIP FUND</small></td> <td style="text-align: right;">\$</td> <td></td> </tr> <tr> <td style="padding-left: 20px;"><small>SPEAKER FUND</small></td> <td style="text-align: right;">\$</td> <td></td> </tr> <tr> <td>TOTAL AMOUNT OF CHECK</td> <td style="text-align: right;">\$</td> <td></td> </tr> </table>		<small>MEMBERSHIP COST</small>	\$		<small>DONATIONS</small>			<small>SCHOLARSHIP FUND</small>	\$		<small>SPEAKER FUND</small>	\$		TOTAL AMOUNT OF CHECK	\$	
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*The student and 1st-year teacher memberships are only available as electronic-only.

Make check payable to MMC

MMC Membership and Change of Address Form

Mail completed form and check to:

MMC
 7339 W. Ibsen St.
 Chicago, IL

Upcoming Events

- Fri., Mar. 6 Eli Luberoff **Creating Interesting Ways for Students to be Right and Wrong**
- Sat., Mar. 7 Eli Luberoff **Saturday Workshops:**
9:00-10:15 a.m.—More Ways to Charge Up Your Classes with the Desmos Calculator
10:45 a.m. – 12:00 p.m.—More Ways to Charge Up Your Classes with Desmos Activities
- Wed.-Sat., April 1-4, 2020 **NCTM Centennial Annual Meeting: Celebrate 100 Years—Looking Back and Moving Forward, Chicago**
- Fri., May 15 Zalman Usiskin **Some Great Middle and High School Mathematics Lessons Few People Teach**

Send upcoming event items to sburnett_308@yahoo.com no later than the date of the MMC dinner meeting preceding the issue in which the item should appear. All items are subject to editing.

Your membership renewal date appears in the upper right corner of the label

