

1.6180339887498948482045868343656381177203091798057628621354486227052604628189024497072072041893911374847540880753868917521266338622235369317931800607667263544333890865959395829056383226613199282902679

MetroMath

2.7182818284590452353602874713526624977572470936999595749669676277240766303535475945713821785251664274274663919320030599218174135966290435729003342952605956307381323286279434907632338298807531952510190

Newsletter

Metropolitan New York Section of
The Mathematical Association of America

April 2022



3.1415926535897932384626433832795028841971693993751058209749445923078164062862089986280348253421170679821480865132823066470938446095505822317253594081284811174502841027019385211055596446229489549303820

Bronx

Brooklyn

Columbia

Dutchess

Greene

Manhattan

Nassau

Orange

Putnam

Queens

Richmond

Rockland

Suffolk

Sullivan

Ulster

Westchester

0.5772156649015328606065120900824024310421593359399235988057672348848677267776646709369470632917467495146314472498070824809605040144865428362241739976449235362535003374293733773767394279259525824709492

ANNUAL MEETING

Sunday, 1 May 2022

8:45 AM – 4:05 PM

Virtual

(More Information Contained Within)

0.68268949213708589717046509126407584495582593345320878197478890048598288397440965900176983681127865505654537517323384300945434414234924089321879626546752479682206254609568685354544015799175873205748337

SECTION OFFICERS

Section Representative (2020 – 2023)	Johanna Franklin Hofstra University	(516) 463-5739 johanna.n.franklin@hofstra.edu
Chair (2020 – 2024)	Satyanand Singh NYC College of Technology (CUNY)	(718) 260-5926 ssingh@citytech.cuny.edu
Chair-Elect (2021 – 2024)	Boyan Kostadinov NYC College of Technology (CUNY)	(718) 260-5195 bkostadinov@citytech.cuny.edu
Secretary (2021 – 2024)	Johanna Franklin Hofstra University	(516) 463-5739 johanna.n.franklin@hofstra.edu
Treasurer (2021 – 2024)	Armen Baderian Nassau Community College (SUNY)	(516) 572-7394 armen.baderian@ncc.edu
Vice-Chair for Four-Year Colleges (2021 – 2024)	Benjamin Gaines Iona College	(914) 633-2272 bgaines@iona.edu
Vice-Chair for Two-Year Colleges (2021 – 2024)	Ariane Masuda NYC College of Technology (CUNY)	(718) 260-5213 amasuda@citytech.cuny.edu
Vice-Chair for High Schools (2021 – 2024)	Nadia Kennedy NYC College of Technology (CUNY)	(718) 260-5944 nkennedy@citytech.cuny.edu
Book Exhibit Coordinator	Nadia Benakli NYC College of Technology (CUNY)	(718)260-5925 nbenakli@citytech.cuny.edu
Graph Theory Days Liaisons	Louis V. Quintas , Pace University Armen Baderian , Nassau CC (SUNY) Edgar G. DuCasse , Pace University	lquintas@pace.edu armen.baderian@ncc.edu educasse@pace.edu
Liaison Coordinator	Elena Goloubeva Webb Institute	(516) 403-5925 egoloubeva@webb.edu
Math Fair Chair – Long Island	Joseph Quartararo Northport-East Northport Public Schools	(631) 584-2016 cmleague@optonline.net
Math Fair Chair – NYC	Randy J. Asher Brooklyn Technical High School	(718) 804-6500 rasher@schools.nyc.gov
Metro NEXt Coordinators	Benjamin Gaines , Iona College Mónica Morales Hernández , Adelphi U. Andrew Lee , St. Thomas Aquinas College Johann Thiel , NYC College of Tech.	bgaines@iona.edu mmoraleshernandez@adelphi.edu alee@stac.edu jthiel@citytech.cuny.edu
Newsletter Editor	Abraham S. Mantell Nassau Community College (SUNY)	(516) 572-7383 x 26841 mantell@ncc.edu
Public Relations Chair	Xiaomeng (Vivian) Kong Nassau Community College (SUNY)	(516) 572-7394 xiaomeng.kong@ncc.edu
Speaker's Bureau Chair	Benjamin Gaines , Iona College	(914) 633-2272 bgaines@iona.edu
Student Activities Coordinator	David Seppala-Holtzman St. Joseph's College	(718) 940-5315 dholtzman@sjcny.edu
Section Archivist	Agnes M. Kalemari Farmingdale State College (SUNY)	(631) 420-2217 kalemaam@farmingdale.edu
Webmaster	Eric Rowland Hofstra University	(516) 463-6806 Eric.Rowland@hofstra.edu

TABLE OF CONTENTS

List of Section Officers	2
Table of Contents	3
Map and Membership Count of the Metro NY Section	3
Message from the Chair, by Satyanand Singh	4
Message from the Chair-Elect, by Boyan Kostadinov	4
Message from the Section Representative, by Johanna Franklin	4
Treasurer’s Report, by Armen Baderian	5
25 and 50 Year Members	5
2022 Annual Meeting Program	6
Abstracts and Brief Speaker Biographies	7
In Memoriam: Remembering Janet Liou-Mark, by Sandie Han	8
Featured Article: <i>Some Interesting Questions from the Arithmetic & Algebra Licensing Examinations for Teachers in New York State in 1893</i> , by Raeann Kyriakou	11
Featured Article: <i>Expanding the MAA Metro Conference Discursive Spaces</i> , by Nadia Stoyanova Kennedy	13
Featured Article: <i>Professional Self-Care for Faculty to Promote Resiliency and Efficacy: Tips for Promoting Resiliency by Fighting Stress and Exhaustion (Based on SUNY Roundtable Discussions)</i> , by Janna Liberant	17
Humor: <i>To Market, to Market...</i> , by David Seppala-Holtzman	18
Call For Participants and Involvement	20
Math in the News from the MAA	20
Events Calendar (Local and National)	23
Paid Advertizing	24

0.69314718055994530941723212145817656807550013436025525412068000949339362196969471560586332699641868754200148102057068573368552023575813055703267075163507596193072757082837143519030703862389167347112335



Membership Count: 557 Individual (222 of which are Student Nominees from the 3 Departmental memberships) as of 26 April 2022

Section Web Page – sections.maa.org/metrony

MESSAGE FROM THE SECTION CHAIR

Greetings to all the MAA Metro New York section members, volunteers and supporters at our annual meeting.

Our meeting will be held on May 1st virtually. We invite you to be part of a vibrant, diverse and active group that promotes mathematics across disciplines in a friendly and informal setting while enhancing genuine learning. We encourage you to explore our website at <http://sections.maa.org/metrony/> and participate in our meetings, apply for, or nominate someone for our section's many awards or try to match wits with our problem of the month.

Come and enjoy a day of exceptional interaction in mathematics from presenters that come from high school, academia and industry. There will be special panels of experts that will offer insight into different modalities in teaching, research and interdisciplinary studies.

We are excited and honored to host our distinguished keynote speakers: Dr. Jose Perea, an MAA NAM speaker and Dr. Jennifer Quinn, the President of the MAA.

I look forward to meeting all of you at our annual meeting on May 1st.

Satyanand Singh, New York City College of Technology (CUNY)

1.3247179572447460259609088544780973407344040569017333645340150503028278512455475940546993479817872803299109209947422074251089026390458977955943147570967234717541668390388674187517369315842535499082466

MESSAGE FROM THE SECTION CHAIR-ELECT

Looking forward to getting together again at the 2022 annual meeting.

This year we plan to use Zoom for our virtual meetings, instead of the Hopin platform, as we hope that Zoom provides a more familiar technology framework for our friendly and informal virtual presentations.

Please, join us on May 1st for a day of learning, across pure and applied mathematics, as well as mathematics education at any level.

Hope to see you at our virtual meeting on May 1st.

Boyan Kostadinov, New York City College of Technology (CUNY)

0.43429448190325182765112891891660508229439700580366656611445378316586464920887077472922494933843174831870610674476630373364167928715896390656922106466281226585212708656867032959337086965882668833116361

MESSAGE FROM THE SECTION REPRESENTATIVE

I was notified that I had been elected Section Representative on March 13, 2020. Since then, the MAA has had to adapt to handle two new challenges, one less expected than the other: serving its members over the many phases of this pandemic and a more general change of course associated with its withdrawal from the organization of the Joint Meetings.

The intention has been for the MAA's focus to shift towards the sections and the individual members as part of this general change of course. One noteworthy initiative is the establishment of two new lecture series for section meetings: the MAA NAM Lecture Series and the MAA AWM Lecture Series. Indeed, one of our plenary speakers this year is an MAA NAM Speaker. There is also a plan for MAA sections to standardize their websites using a new universal template. The MAA's online presence has expanded as well to include virtual social hours and webinars, which have been particularly useful given our new reliance on remote communication. MAA Connect, a general social platform for all members, was established in early 2020, and while our section uses it primarily for announcements, I would love to see more conversation on it.

A new focus on DEI efforts and supporting minoritized members of the mathematical community has also been declared. This is the sort of endeavor that will require a sustained effort over time, and I hope that the will to engage effectively with these issues endures.

I am looking forward to my first in-person Congress meeting this August. I will certainly reach out to you all in advance of the meeting to ask what concerns or issues you would like me to carry to it, but please contact me if you think of anything first – and I hope many of us are able to meet at MathFest.

Johanna Franklin, Hofstra University

TREASURER'S REPORT

(as of 3/31/22)

Business Checking	\$ 9,123.27
<u>Business Money Market</u>	<u>\$13,092.88</u>
Total	\$22,216.15

All accounts are with J.P. Morgan Chase Bank. Further details will be provided at the annual meeting.

Armen Baderian, Nassau Community College (SUNY)

25 and 50 Year Members

The following members will be recognized during the Awards Ceremony at our May meeting.

25 Years: Anthony Weaver (Bronx CC, CUNY), Howard B. Sporn (Queensborough CC, CUNY), Jay S. Dweck, John Derbyshire, Karl Peter Krog (Marist College), Satyanand Singh (New York City College of Technology, CUNY)

50 Years: Charles I. Steinhorn, Joseph Newmark (College of Staten Island, CUNY), Marie T. McKellar, Richard D. Feuer, Rochelle E. Meyer.



2022 ANNUAL MEETING PROGRAM
Sunday, May 1
(Virtual)

- 8:45 - 8:55 AM Welcome
Dr. Satyanand Singh, Chair of the Metro New York Section of the MAA,
New York City College of Technology (CUNY)
- 9:00 - 9:45 AM Invited Speaker
The Underlying Topology of Data
Dr. Jose Perea, Northeastern University & MAA NAM Speaker
- 10:00 - 10:45 AM Invited Speaker
Solving Mathematical Mysteries
Dr. Jennifer Quinn, University of Washington, Tacoma & MAA President
- 11:05 - 11:15 AM Break
- 11:20 - 12:35 PM Contributed Paper Sessions I
Research Session: Applied Mathematics I (Presider: Dr. Ariane Masuda)
Research Session: Pure Mathematics I (Presider: Dr. Ezra Halleck)
Research Session: Data Science and Miscellaneous (Presider: Prof. Bruce Kan)
Pedagogy Session: Mathematics Education I (Presider: Dr. Nadia Kennedy)
Student/Faculty Session I (Presider: Dr. Eric Rowland)
- 12:40 - 1:25 PM Lunch Break/Contributed Poster Session (Supervisor: Dr. Johanna Franklin)
- 1:30 - 2:45 PM Contributed Paper Sessions II
Research Session: Applied Mathematics II (Presider: Dr. Boyan Kostadinov)
Research Session: Miscellaneous II (Presider: Dr. Johann Thiel)
Pedagogy Session: Mathematics Education I (Presider: Dr. Nadia Benakli)
- 2:50 - 3:20 PM Metro NExT Meeting
Dr. Jennifer Quinn, President of the MAA
Prof. Mónica Morales Hernández, Adelphi University
Dr. Andrew Lee, St. Thomas Aquinas College
Dr. Tia (Mutiarra) Sondjaja, New York University
Dr. Johann Thiel, New York City College of Technology (CUNY)
- 3:25 - 4:15 PM Business Meeting (Presider: Dr. Satyanand Singh)



Presentation Abstracts and Speaker Biographies

INVITED SPEAKERS

THE UNDERLYING TOPOLOGY OF DATA

DR. JOSE PEREA, Northeastern University & MAA NAM Speaker



Abstract: Topology, and particularly algebraic topology, seeks to develop computable invariants to quantify the shape of abstract spaces. This talk will be about how such invariants can be used to analyze scientific data sets in tasks like time series analysis, semi-supervised learning and dimensionality reduction. I will use several examples to illustrate real applications of these ideas.

Biography: Jose Perea is an associate professor in the department of mathematics and the Khoury college of computer sciences at Northeastern University. Prior to Northeastern, he held positions as an assistant professor of CMSE and Mathematics at Michigan State (2015-2021), and as a visiting assistant professor of Mathematics at Duke University (2011-2015). He holds a PhD in Mathematics from Stanford University (2011) and a BSc in Mathematics from Universidad del Valle, Colombia (Valedictorian, Summa cum laude, 2006). He is one of the inaugural 2022-2024 lecturers for the Mathematical Association of America and the National Association of Mathematics, a recipient of a 2020 NSF CAREER award, a 2020 honoree of Lathisms (Hispanic heritage month), and a 2018 honoree of Mathematically Gifted and Black (black history month).

SOLVING MATHEMATICAL MYSTERIES

DR. JENNIFER QUINN, UNIVERSITY OF WASHINGTON, TACOMA & MAA PRESIDENT



Abstract: Much as mysteries in fiction consider evidence, find common patterns, and draw logical conclusions to solve crimes, mathematical mysteries are unlocked using the same tools. This talk exposes secrets behind a numerical magic trick, a geometric puzzle, and an unknown quantity to find a fascinating pattern with connections to art, architecture, and nature.

Biography: Jennifer Quinn is President of the Mathematical Association of America (MAA) and professor of mathematics at the University of Washington Tacoma. She earned her BA, MS, and PhD from Williams College, the University of Illinois at Chicago, and the University of Wisconsin, respectively. She received MAA's 2007 Haimo Award for Distinguished College or University Teaching and a 2006 Beckenbach Book award for *Proofs That Really Count: The Art of Combinatorial Proof*, co-authored with Arthur Benjamin. As a combinatorial scholar, Jenny thinks that beautiful proofs are as much art as science. Simplicity, elegance, transparency, and fun should be the driving principles. She strives to bring this same ethic to her classroom, administrative work, and professional service.

Committed to making mathematics accessible, appreciated, and humane especially during the global pandemic, Jenny and the #TacomaMath workgroup of the STEAM Learning network chalked puzzles outdoors and produced Math Around Town Videos to create a culture of love for math in the community. In addition, Jenny began the blog *Math in the Time of Corona* where she chronicles her experiences on emergency remote teaching of mathematics, maintaining humanity, and building community in isolation. And speaking of community, she hosts virtual social hours to bring MAA members together monthly. Look for announcements on MAA Connect.

IN MEMORIAM



by Sandie Han, Professor
Department of Mathematics
New York City College of Technology (CUNY)

Dr. Janet Liou-Mark was a Professor of Mathematics at New York City College of Technology (City Tech), City University of New York (CUNY). After receiving her doctorate in mathematics education at New York University, she accepted a tenure-track position at City Tech's mathematics department, where she dedicated 22 years to education until her passing in September 2020 to cancer. She was honored as Professor Emeritus.

Janet had an extraordinary career and a remarkable record of achievement. She co-authored five book chapters and 15 peer-reviewed journal articles on peer-led team learning (PLTL), peer assisted learning, mentoring, interdisciplinary learning, enhancing diversity in STEM, engaging students in internship, and engaging underrepresented minority participation in undergraduate research. She co-published three books: *The companion for the first year at City Tech*, *A Handbook on Mentoring Students in Undergraduate Research: Proven Strategies for Success*, and *Exploring calculus using a maple approach*. She organized 21 conferences and presented at 22 international conferences and 49 national conferences. She received 13 awards for her excellence in higher education. Among the awards are the 2011 CUNY Chancellor's Award for Excellence in Undergraduate Mathematics Instruction, Mathematical Association of America (MAA) Metropolitan New York Section 2014 [Award for Distinguished Teaching of Mathematics](#), and City Tech's 2018 Teaching Recognition Award. She was named City Tech's 2017 – 2018 [Scholar on Campus](#).

Among her achievement is a long list of national grants where Janet was key personnel as the principal investigator (PI) or the co-Principal Investigator (co-PI). They include the National Science Foundation (NSF) Research Experience for Undergraduates (REU), Improving Undergraduate STEM Education (IUSE), Math and Science Partnership (MSP), Division of Undergraduate Education (DUE), STEM Talent Expansion Program (STEP), the U.S. Department of Education Minority Science Engineering Improvement Program (MSEIP), and several MAA TENSOR Women & Mathematics grants. These grants supported a wide range of initiatives, aimed at engaging and supporting students particularly women and underrepresented minorities in STEM.



Janet inspired and nurtured a culture of mentoring and undergraduate research at City Tech. As a) director of the Honors Scholars Program; b) faculty advisor for the National Society of Collegiate Scholars (NSCS); c) key member of the Black Male Initiative (BMI) task force, and d) distinguished member of City Tech's Undergraduate Research Committee, she helped to bring numerous programs and opportunities to the college. These programs and opportunities include: Honor Scholars research, Poster Sessions, Research Mixers, Undergraduate Research, and Research Mentoring. She seamlessly integrated these rich and invaluable supports into the students' educational experiences. The lives and scholarships of countless students were transformed by these programs and opportunities. Janet also helped to diversify and to build student participation in the Atmospheric Sciences. To that end, the American Meteorological Society named its 30th Conference on Education (CoE) session "The Dr. Janet Liou-Mark Memorial Session on Effective Strategies for Increasing Minority Participation in the Atmospheric Sciences." That session, yet named in her honor, remains one of the CoE's biggest participant draws each year. Moreover, the City Tech Undergraduate Research mentoring handbook she co-authored, has provided a mentoring model that has been adopted by many institutions nationwide.

Janet started the peer assisted learning program at City Tech in 2007, it was later renamed peer-led team learning (PLTL). Her work helped form a national organization, the Peer-Led Team Learning International Society (PLTLIS), for which she was a founding member. She served on the board of directors from 2012 – 2016 and organized the inaugural PLTLIS conference at City Tech in 2012. [Read more](#). Janet continued her work as the coordinator of the PLTL program at City Tech, expanding the program to Chemistry, Construction Engineering, and Mathematics. In addition, she developed the [Mathematics Preparatory Workshops](#) and wrote six workbooks ranging in topics from Algebra to Calculus. Over the years, Janet trained hundreds of peer leaders and supported thousands of students in mathematics learning.

Janet impacted not only students, but also faculty in support of their work and career. She had been conducting the Teaching Portfolio workshops for faculty at City Tech since 2004. Her teaching portfolio was featured in *The Teaching Portfolio* by Peter Seldin. Wanting to support women faculty in work-life balance, she organized the Women in STEM luncheons, creating a space for women to support each other navigating the academic landscape. During 2019 – 2020, she served as the interim director of the Faculty Commons; some of the work she started continues to this date such as the Faculty Commons monthly newsletter and her vision to form a mentoring network for faculty.



Janet was devoted to the work of the Mathematical Association of America (MAA) Metropolitan New York Section. She held various leadership positions for over ten years including serving as the [section chair](#) until 2020. For her leadership and contribution to MAA, she received the MAA Metropolitan New York Section 2019 [Award](#)

for Distinguished Service. A Janet Liou-Mark Student Mathematics Award was set up by the Metropolitan New York Section of MAA with a donation from Janet Liou-Mark and family to recognize two students every year for their outstanding achievement in mathematics. The award is a befitting symbol and reminder of Janet's lifelong work and devotion to student success.

Janet's work was far reaching to another continent. She went on a missionary work to Africa, spending four summers at Malawi, where she built libraries and organized women's conferences. Many walked as far as 26 miles to attend the conferences. She remained connected with the Malawian women until her final days.



Janet had a great personal impact on me. She was a role model, a cheerleader, a friend, mentoring me through the tenure and promotion process and supporting my work throughout my career. Many share my sentiments, she was kind, caring, and giving, always encouraging and lifting people to their fullest potential. She had a huge heart that touched the life of each person she crossed path with. Beloved by students and colleagues, her legacy lives through the people and the programs she helped build.

Tributes from Janet's students:

Suhua Zeng, Applied Mathematics, 2009: As an immigrant, when I first started college, I had no confidence speaking English with my classmates. Professor Janet Liou-Mark recruited me as a Peer Leader and encouraged me not to be afraid to communicate with others. She dedicated her time listening to us and helping us build skills. She brought us to local, regional, and national conferences and encouraged us to present and network with others at the conferences. She helped me transform from a silent immigrant to an active student leader. In my junior year, Professor Liou-Mark spoke to me about my plan after graduation. She encouraged me to pursue graduate studies and showed faith in my success. I took her advice, enrolled in graduate school, and got my master's in Applied Math and Statistics. I am currently in the Ph.D. program. She had our back whenever we needed help and cheered us on when we reached a milestone. She deeply impacted my life and personal goal. She shared her experience and knowledge with me and inspired me to do the same. I returned to City Tech in 2016 to be an educator following in her footsteps.



Jodi-Ann Young, Computer Engineering, 2010: Professor Liou-Mark will forever to me be kind, motherly, intelligent, thoughtful, loving, caring, compassionate, giving and spiritual. She taught me to thrive, examine and maximize my potential. She saw the potential in me that I didn't see and encouraged me to pursue more than an undergraduate degree. She showed us her love and her pure heart in each interaction we had with her. Her legacy lives on through us. Thank you, Professor Liou-Mark, for being the guiding light we needed, that pillar of strength that believed in our abilities.

Julia Rivera, Mathematics Education, 2017: Working with Professor Liou-Mark has been an honor and a blessing. I am truly grateful for the time I spent with her at City Tech. I never thought I would work alongside one of the greatest persons at the College. Not only was she the kindest and the most down-to-earth person but she taught me to never give up. I am a better person and better educator because of her encouragement. Although Professor Liou-Mark was a workaholic always busy, she took me under her wing to mentor me, and made time to listen and gave me great advice about work and life. I know she will always be there rooting for me. What I can do to repay her for all that she's done for me is to be a great educator and continue where she left off.

Mukadder Cinar, Applied Mathematics, 2018: I met Professor Liou-Mark when I joined the PLTL program, I also participated in a research project and internship under the IUSE Program directed by her. She conducted many workshops on various topics outside the conventional academic classes to educate and prepare students for real life and organized trips for students to attend and present at conferences. She was the person I shared my problems with and received guidance about them. She was kind, caring, and always prioritized students' needs. All those workshops, trips, conferences, and programs gave me a feeling of belonging to the great City Tech community and led to my current job as the mathematics adjunct lecturer.

Jiehao Huang, Applied Mathematics, 2018: Prof. Liou-Mark had always been my role model. I am so proud and blessed to be one of her students who participated in the programs she developed at City Tech such as REU, IUSE, Peer Leading, and the Honors Scholars Program. She was the main reason why I went to graduate school and pursued higher education. Her thoughtfulness, kindness, and dedication helped shape who I am today.

1.7320508075688772935274463415058723669428052538103806280558069794519330169088000370811467747292249493756756261414154067030299699450949989524788116555120943736485280932319023055820679748201010846749232650

FEATURED ARTICLES

Some Interesting Questions from the Arithmetic & Algebra Licensing Examinations for Teachers in New York State in 1893

by Raeann Kyriakou, St. Francis College

Presently, to become an elementary school teacher, one must pass examinations to obtain a license to teach in the state in which you choose. This was also true many years ago. In the late 19th century, teachers would obtain licenses to teach in the elementary and secondary schools within New York State through specific examinations on subject content matter and on pedagogy.

However, there has often been conversations about how much mathematics preparation is needed for an educator to be well prepared to teach mathematics at each level. The nineteenth century was no different. There were examinations on specific topics, such as arithmetic, algebra and geometry, which were required for specific tiered or numbered licenses in New York State (Kyriakou, 2014).

These examinations took the form of approximately 10 questions on each exam with short answer solutions. For the scope of this article, I will focus on the arithmetic and algebra exams. Some of the topics on the arithmetic exams were compound with denominate numbers, decimals, definitions, factoring, mensuration, operations, percentage and interest, ratio and proportion, sequences and

series. Similarly, some of the topics on the algebra examinations involved algebraic expressions, the binomial theorem, exponents, and factors (New York State Department of Public Instruction, 1894).

Let's take a look at Question 3 from the 1893 NYS Arithmetic Examination.

Persons A, B, C, and D work together on a task. A and B together can perform 8/15 of the entire task. Together, B and C can perform 1/2 of the task, with A and C working together can complete 11/30 of the task. What part of the task work can D complete?

A problem like this would be solved today using algebra and linear equations. However, since this is an arithmetic examination equation, we can assume that the required solution did not require equations, but rather some reasoning. One common textbook of the time, *New School Algebra* by Wentworth (1898) suggests the use of common fractions to answer this problem.

One possible way to reason using only arithmetic is as follows:

Imagine that A and B worked the given time together, then B and C worked together the same time and finally A and C worked together the same time.

Altogether they would do $\frac{8}{15} + \frac{1}{2} + \frac{11}{30} = \frac{42}{30} = \frac{7}{5}$ of the work.

However, in these conditions, A, B and C would produce twice as much than in reality, since each is counted twice in this last calculation. Hence, D would also produce twice as much. Together they all would have completed the task twice.

It follows from here that two times what D did is $2 - \frac{7}{5} = \frac{3}{5}$. Thus, D can complete $\frac{3}{5} \cdot \frac{1}{2} = \frac{3}{10}$ of the task.

In this 1893 NYS Arithmetic Examination, there were 10 questions, 5 of which were percentage and interest questions. If one examines the textbooks of the time, one will see that these types of questions are common in grade school curriculums in New York State.

Here is an example from the 1893 NYS Algebra Examination.

Question 9: *Find the values of x and y in the equations $x^3 + y^3 = a$ and $x + y = b$.*

This question addresses simultaneous system of linear and polynomial equations. While for some a and b solutions can exist, they cannot exist for others. However, the textbooks of the time answered similar questions, but did not go into such detail of the existence of certain values (Ray, 1841). Instead, a procedure was demonstrated, and the same process is followed here to solve the problem.

$$x^3 + y^3 = (x + y)(x^2 - xy + y^2) \quad [1]$$

Consider $(x + y)^2 = x^2 + 2xy + y^2$

$$(x + y)^2 - 3xy = x^2 + 2xy + y^2 - 3xy$$

$$(x + y)^2 - 3xy = x^2 - xy + y^2 \quad [2]$$

Note the right-hand side of [2] matches a factor on the right-hand side of [1], so the left-hand side of [2] will be substituted into the right-hand side of [1].

$$x^3 + y^3 = (x + y)((x + y)^2 - 3xy) \quad [3]$$

Substituting the given: $x + y = b$ and $x^3 + y^3 = a$ into [3] gives $a = b(b^2 - 3xy)$. Solving for

xy gives: $xy = \frac{b^3 - a}{3b}$ [4]

Substituting $y = b - x$ into the left-hand side of [4]: $x(b - x) = \frac{b^3 - a}{3b}$

After some manipulation, we get $3bx^2 - 3b^2x - b^3 + a = 0$. Applying the quadratic formula gives:

$$x = \frac{3b^2 \pm \sqrt{12ab - 3b^4}}{6b}, \text{ and then } y = b - \frac{3b^2 \pm \sqrt{12ab - 3b^4}}{6b}.$$

Analyzing past examination questions is a way to get a glimpse into the history of the mathematical expectations of our New York State educators and school system. Further questions could be asked such as *how have these expectations evolved and why have they evolved?* However, the purpose of this article is to bring attention to some of the mathematical requirements of elementary school teachers at the end of the 19th century, as well as to offer some mathematics to explore.

Citations:

New York State Department of Public Instruction (1894). *The New York State Examination Questions: Being the questions given at all the examinations for state certificates from the beginning to the present time*. C.W. Bardeen, Publishing. Syracuse, NY.

Kyriakou (2014). On requirements in mathematics for elementary school teaching in New York State during the 19th century, *The International Journal for the History of Mathematics Education*. Vol. 9. No 2.

Ray, J. (1841). *Arithmetic: Designed for Academies and Schools*. Philadelphia: A.S. Barnes & Co.

Wentworth, G. (1898). *New school algebra*. Boston: Ginn & Company

0.63092975357145743709952711434276085429958564013188042787065494383868520138091480506117268854945174556135401593831371519492344914693647541368619639334995003596664058474331167745221561259619985186867278

Expanding the MAA Metro Conference Discursive Spaces

by Nadia Stoyanova Kennedy
New York City College of Technology (CUNY)

The most recent MAA Metro NY Conferences (2020, 2021, and this year's), as is the case with many other events, were impacted by COVID-19 such that the conference format was changed from an in-person to a virtual one. I am sure that the organizers had a lot of work to do, not only in developing the agenda and organizing the presentations, but in ensuring that the technological infrastructure in place would make the presentations work. The organization was nearly impeccable, and virtual attendance made for easier transitions from one conference room to another and from one presentation to the next. However, at the end of the day it felt like I hadn't talked to any conference participants. I did ask some presenters a few questions, and I answered a few during my presentation, but the conference felt like a resoundingly non-dialogical event to me. That said, I have to give credit to the conference organizers for setting up a *Slack* conference space, where the conference attendees offered some reflections on presentations, connected with other attendees, and commented on aspects of the conference itself. *Slack* felt like a much-needed space, one possible niche in which inter-action could take place.

Typically, much of the conversation during a conference happens between sessions—often during coffee and lunch breaks, cocktail and other social gatherings, rather than during the conference sessions themselves. Most conferences are set up in a way that prioritizes presentations delivered in a monological lecture style, rather than a conversational one. Very often conversations are limited to the last 5 minutes of a given session and represented by a Q&A exchange, which is typically not a dialogical one.

Although we often think of dialogue as a space of interactional civility, in which interlocutors who differ may openly speak and listen together, theorists consider dialogue as standing apart from other forms of

communication such as chatting, arguing, or negotiating. In Nicholas Burbules' view, dialogue is "an activity directed towards discovery and new understandings, which stands to improve knowledge, insights, or sensitivities of its participants" (1993, p.8).

The over-arching purpose of dialogue--a word, which comes from the Greek "dia" — through--and "logos" is to make meaning together between a group of interlocutors through the "word," or "reason." The interlocutors in a dialogue do not try either to win an argument or to simply exchange opinions based on their own assumptions. Rather, as David Bohm notes "Dialogue is the collective way of opening judgements and assumptions." (p. 53) As such, it requires reflective thinking and the opportunity for all participants to have a chance to contribute to the process.

Although dialogue has recently been elevated to a central place in our approaches to teaching, it seems to have been afforded very little space in academic conferences. Inclusion of some dialogical conference spaces would, I think, benefit the participants, and may serve various purposes. Such spaces could bring diversity to the conference meeting format and further promote new forms of participation. With this in mind, I'd like to use Burbules's (1993) classification of types of dialogue in order to make a few suggestions for opening new dialogical conference spaces at future MAA Metro conferences.

1) Dialogical Spaces for Conversation

One basic idea is to leave more unstructured conference time between formal presentations. Such moments are often informally constructed around coffee breaks, lunch, or between sessions. Exchanges must be brief due to the limited time, but they are marked by tolerance, interest in each other's work, and sharing of current projects, ideas. Such conversation are not aimed at resolving differences or reaching an agreement; their main purpose is to gain understanding. I find such spaces important for making academic connections with colleagues from other institutions, learning about projects, practices and events, forging collaborations, and talking to students and teachers. I am sure that there may be different ways of structuring conversation spaces. One similar form, *speed networking*, which has been adopted in corporate settings, is a brief encounter between multiple professionals who briefly share information about themselves (Speed networking, n.d.).

2) Dialogical Spaces for Inquiry

Dialogical inquiry aims at answering a specific question, or finding a resolution for a specific contentious issue (e.g. Given the current pandemic situation, should courses be taught online, in - person, or hybrid?) with the purpose of reaching a consensus. Such questions are typically not the sort of information-seeking questions that are typically encountered in conversation. Rather, they are "big questions" — common to most people, central to our living together, and contestable, as they do not have one simple answer (Splitter & Sharp, 1995; Wiggins & McTighe, 2005). They are also questions that best lend themselves to communal, collaborative deliberation—a discursive setting in which participants are engaged in putting forward arguments and evaluating and making judgments about the arguments of others. Typically, during such inquiry various positions are put offered, and alternatives are examined, with the goal of resolving differences.

"Inquiry dialogue," as Walton (1998) calls it, is truth-directed and aims at collectively arriving at a conclusion or judgment on a common, central and contestable issue that is deemed the most reasonable and acceptable by the community. The criteria for reasonableness and acceptability of a judgment are as follows:

- ✓ The judgment must rely on sound argument and good reasons;
- ✓ The judgment must be clear;
- ✓ It must be well informed; and
- ✓ It must reflect multiple and diverse perspectives (Lipman, 2003).

In other words, viable arguments and judgments are ones that can withstand the interrogation, evaluation and even critique of the community.

Dialogical inquiry of this sort may take different forms and could be allocated different times and spaces during a conference. Such a space could be allocated within a single presentation, at the end of panel presentations, or the end of morning or afternoon presentations. For example, some mathematics education conferences—for example those organized by the Mathematics Education and Society group, have started to schedule time for dialogue after each presentation. Questions for deliberation might be offered either by the presenter and/or solicited from the audience. In such a context, dialogue is inclusive and convergent, as the task at hand is to work towards finding an agreed-upon answer. A similar format might be incorporated in panel discussions, where several presentations are thematically interconnected, and could be followed by dialogical inquiry into questions relevant to all presentations.

3) Dialogical space for Debate

Debate is typically represented by critical and divergent dialogue, which does not aim at consensus or resolution of differences. For example, two panels of academics or students might be engaged in discussing, critiquing and defending two different positions, e.g. positions on charter schools, which has stirred a large public debate in recent year (Leonhardt, 2018). The emphasis of a debate should be placed, not on competition but on comparing and contrasting the merits of the two positions by putting forward the strongest possible arguments to defend them and the strongest possible critique to challenge them. Questions that contribute to this kind of dialogue mostly probe and challenge arguments and their assumptions. This form of dialogue could be taken advantage of when examining different positions on public arguments pertinent to our work as academics and educators.

4) Dialogical Spaces for Instruction

A critical and convergent dialogue could use critical questions with the aim of moving the discussion towards a defined conclusion. An example of such dialogue would be if an expert engages an audience of students in a “leading” form of dialogue in a workshop. A classic example of this methodology is found in Plato’s dialogue *Meno*, where Socrates leads Meno toward certain conclusions through questioning and critiquing his statements. Dialogue of this kind, typically identified as Socratic Dialogue, is a guided form of teaching, in which Socrates’s (or the teacher’s) role is described as a “gadfly” and a “midwife” — the former provoking critical analysis on the part of participants and the latter bringing forth connections and synthesizing ideas. As long as such dialogue includes all participants, and is undertaken in a spirit of cooperation, open communication and mutuality, it can provide a powerful context for analysis, synthesis, making connections, and exploring assumptions. Here we might invoke Vygotsky’s (1978) concept of a “zone of proximal development” (ZPD), which signifies the level at which a given participant is able to make some connections and draw conclusions. Given that each individual participant operates in a specific ZPD, the group may be understood to function in an expanded ZPD—the union of all individual ZPDs, so to speak — in which participants can aid each other grasping and utilizing these cognitive processes.

Finally, I want to mention a form that might be called *agora* — unstructured conference gathering place, with no predetermined form of dialogical engagement. Depending on the individuals who gather and their interests, they may decide to use the time for conversation, or agree on pursuing dialogical inquiry on a specific chosen question(s). Again, the Mathematics Education and Society conference uses the agora format to convene inquiries around emergent questions stemming from preceding presentations or conversations; and indeed, a brief Internet search for new conference formats employed in other disciplines shows a multiplicity of new forms of dialogical engagement. Two examples of these are *Unconferences* and *CampFire* sessions. (Budd et al, 2015). An “unconference” is a participant-centered meeting in which attendees decide as a collective on the agenda and discussion topics. This format provides a good opportunity for researchers from different disciplines to work collaboratively on

topics or projects of common interest. The goal of most unconferences is to prioritize conversation over presentation. On the other hand, a *CampFire* session begins like a short traditional presentation (about 15 min), then morphs into a discussion facilitated by the presenter that is centered on questions from the audience.

So far, I have outlined a few possible scenarios for structuring more dialogical spaces at the MAA Metro conference. I have given a few suggestions and pointed out existing dialogical conference formats with the hope of initiating a discussion in response to the question, “What the MAA Metro Conference might look like so that it is more beneficial to all of us?”

As I mentioned earlier, in my experience the most stimulating conference discussions generally take place over coffee breaks, during which attendees can interact with each other and discuss various topics, including their own research interests, in a more informal manner. Expanding the number of conference spaces dedicated to such conversations could nourish and stimulate networking and further collaborative endeavors. The inclusion of spaces dedicated to inquiry could allow participants to collectively explore questions related to formal presentations, or to the common, central, and contestable “big questions” and that we all share as academics and educators in the metro area. Spaces for debate and guided dialogical instruction could be beneficial for both academicians and students, and offer promising opportunities for rapprochement between the two groups. Finally, the inclusion of an *agora* promises to facilitate the spontaneous creation of emergent spaces for meeting, conversation, and reflection inspired by either the formal conference presentations or by participant interests. As with the recent conference, it is conceivable that some of these can be organized as virtual spaces, even after the end of the pandemic.

I believe that such spaces might quickly become valuable and valued, above all for their capacity to bring together and put in conversation all participants — academics, teachers, and students. They promise to play an instrumental role in expanding professional networks, engaging participants in dialogue about shared interests and important ideas, and in helping strengthen the community of mathematics and mathematics education researchers, teachers and students

References

- Bohm, D. (1996). *On dialogue*. New York: Routledge.
- Budd, A., Dinkel, H., Corpas, M., Fuller, J., Rubinat, L., Devos, D., Khoueiry, P., Forstner, K., Georgatos, F., Rowland, F., Sharan, M., Binder, J., Grace, T., Traphagen, K., Gristwood, A., & Wood, N. (2015). Ten simple rules for organizing an unconference. *PLoS Computational Biology*, 11(1).
- Burbules, N. (1993). *Dialogue in teaching: Theory and practice*. New York: Teachers College Press.
- Leonhardt, D. 2018. A plea for a fact-based debate about charter schools. *New York Times*, July 23, 2018, Section A, p. 19.
- Lipman, M. (2003). *Thinking in education*. Cambridge University Press.
- Plato (1961). Meno. In E. Hamilton & H. Cairns (Eds), *Collected dialogues of Plato*. (pp. 353-384). Princeton: Princeton University Press.
- Speed Networking* (n.d.). Retrieved from <https://careervision.org/speed-networking-quick-way-expand-professional-contacts/> on June 25, 2020.
- Splitter, L., & Sharp, A. (1995). *Teaching for better thinking: The classroom community of inquiry*. Hawthorn, Victoria: Australian Council for Educational Research.
- Vygotsky's (1978). *Mind in society*. (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds). Cambridge: Harvard University Press.
- Walton, D. (1998). *The new dialectic: Conversational contexts of argument*. Toronto, Canada: University of Toronto Press.
- Wiggins, G., & McTighe, J. (2005). *Understanding by design* (Expanded 2nd ed.). Alexandria, Virginia: Association for Supervision and Curriculum Development.

**Professional Self-Care for Faculty to Promote Resiliency and Efficacy:
Tips for Promoting Resiliency by Fighting Stress and Exhaustion
(Based on SUNY Roundtable Discussions)
by Janna Liberant, Rockland CC (SUNY)**

Do you feel tired and stressed out this semester? Many faculty members in Mathematics and Computer Science departments report that they feel especially exhausted and dispirited, even after coming back on campus to teach their students. They feel that students are missing basics and their lack of motivation is extremely difficult to overcome. In my recent conversation the phrase “I feel like I am swimming upstream” came up.

In the Faculty Wellness and Careers Study (recent Course Hero study of 570 faculty members, <https://www.coursehero.com/blog/faculty-wellness-research/>) more than half of college faculty report signs of professional burnout with 40% considering leaving their current jobs. Faculty stress has a bimodal distribution shape through the pandemic. Nearly one in four reported the highest level of stress at the onset of the pandemic and more than one report having the highest stress as of now. 74% reported having high stress levels from teaching using a new mode of instruction. Specifically, Mathematics was reported as a subject which was challenging to teach using online mode of instruction. Most faculty members stated that they needed help from administration. To improve their current level of job satisfaction, faculty named increased compensation (53%), modifications to teaching schedule or load (46%), new technology or better access to technology support (34%), and increased staff/teaching assistant support (26%).

But how can Mathematics and Computer Studies faculty ease students’ stress—and their own anxieties themselves?

Faculty experts in stress, anxiety and inclusion offer guidance for self-mental health care and supporting students. I hosted a SUNY Roundtable Discussion in November, 2021 to engage other faculty in a conversation about tips for promoting resilience. During my discussions with colleagues from different disciplines we decided to try one or more of the following suggestions. The series will continue in April to see if any of those proposed ideas were helpful in alleviating stress.

The first suggestion was to reflect on what’s missing in their lives and fill that gap with a hobby. For instance, someone who feels they are spending too much time on Zoom teaching and attending other online meetings should take up mindfulness or yoga. Several faculty members mentioned that they are already taking classes and reading.

We should also set boundaries between work and our personal lives. For example, make it a rule to not send emails between noon on Friday and Monday morning. This would be difficult to achieve, since in our profession timely response is crucial in helping our students succeed. Just like most of my colleagues, I would not be able to follow that suggestion.

Elimination of any assignments or activities that don’t have a clear purpose was cited as great advice. Many faculty used the pandemic to reflect on the meaningfulness of their assignments and the amount of work they do themselves. Some rearranged the activities and rewrote their syllabi to accommodate the new teaching methods. Mathematics faculty increasingly used the online content and learning management systems in order to grade the assignments and exams. Instructors can put extra energy into more purposeful activities and students will appreciate fewer categories of assignments.

Mathematics and Computer Studies faculty can make their online courses more inclusive by gathering feedback from students on what would make learning spaces more accessible. We get observed and evaluated every year, but what about gathering our own data? Can we make our own surveys, so that they are more closely related to the courses and topics we are teaching? This would help students to connect with us better and prevent the burnout they feel at the moment.

Instructors should also adjust their assumptions about when students are and aren't engaged. Some of us are still teaching the remote classes. So what does a blank screen represent? A blank screen could simply mean a student may not feel comfortable showing their surroundings or they may not be feeling well themselves. Our assumptions can hinder the teaching process and alienate our students. We need to slow down and take a deep breath, according to the experts. Many faculty at the Roundtable Discussions agreed.

What are your strategies for coping with stress? Do you teach online or live? I would love to hear from you at jliberan@sunrockland.edu.

1.4142135623730950488016887242096980785696718753769480731766797379907324784621070388503875343276415727350138462309122970249248360558507372126441214970999358314132226659275055927557999505011527820605715

HUMOR

To Market, to Market...

by David Seppala-Holtzman, St. Joseph's College (Brooklyn)

Dan was desperate. His business didn't have a cash flow; it had a cash gush. And the gush was decidedly in the wrong direction. Dan was the owner, CEO, CIO and all of the other chief things of Daniel's Dentifrice, a toothpaste company in the mold of Tom's of Maine. The one and only piece of good news is that Dan had recently got the local drug store to carry his product. This good news was tempered by the fact that the local drug store was about to go out of business.

Dan was so desperate that he decided to enlist the help of his brother-in-law, Rex. Dan disliked nearly everything about Rex, starting with his name. Parents should never name their little boys Rex, he thought. Children so named grow up with delusions of grandeur. Worse, they tend to be destructive because they confuse their name with "wrecks." To top it all off, Rex was in marketing, a field that Dan considered shameful. The job of marketers, Dan thought, was to convince people to act against their own self-interest by means of deception. All of this notwithstanding, Dan needed Rex's help.

After listening to Dan's sad tale, Rex responded with a slap on the back. "Danny boy, of course I'll help you! After all, blood is thicker than water!" This was a trifecta of negatives. Dan disliked back slappers, hated being called "Danny boy" and couldn't believe that Rex was so dumb as to believe that in-laws were blood relatives. Nevertheless, these were desperate times so Dan stifled his reaction. "Thank you, Rex, I really appreciate it," Dan managed to say calmly.

One week later, Rex dropped by with a script for a radio advertisement. As Dan read it over, his spirit sank to a new low. "Oh my God, Rex, are you trying to get me sent to prison?! You know that the FCC doesn't allow false advertising."

"Calm down, Danny boy. There is not a single false statement in that script."

Dan didn't know where to begin. "Let's start with: '*There's never been a better time to try Daniel's Dentifrice.*' How can I claim that when today is no better than yesterday or tomorrow to try my toothpaste?"

"Precisely," responded Rex, "I didn't claim otherwise. This is a very common trick. I've negated a comparative. 'Not better' does not mean 'worse.' If I say, 'not less than three,' people think that I've said 'greater than three.' In fact, that statement really means 'greater than *or equal* to three.' Here, saying 'there's never been a better time' is perfectly consistent with every day being equally auspicious."

"OK, but what about the claim that Daniel's Dentifrice is the fastest growing company in America?!" "Well, didn't you go from having no outlet to having one? That's an infinite percent increase. Surely no other company can claim growth of that magnitude."

“And here you claim that I am offering coupons so that you could save up to 75%. You know I can’t afford to do that. Moreover, you mention possibly adding an additional 25% off. You know that discounts aren’t additive, they’re multiplicative. If one were to offer 50% off and an *additional* 50% off, that doesn’t make the product free. It makes it 75% off.”

“Two key phrases here, Danny boy. I said ‘*could save*’ and ‘*up to 75%*.’ That is perfectly consistent with a customer saving zero percent. Really, the only way that you could violate that statement is to give a customer a discount *greater than 75%*. By saying ‘*up to*,’ I have placed a *ceiling* on the amount that could be saved, not a *floor*. People fall for that all the time. And regarding the additional discount, can I help it if people misconstrue that?”

“And Rex, you go on to claim ‘*No toothpaste brand has more fluoride than Daniel’s Dentifrice.*’ You know that we all have the same amount of fluoride.”

“There’s that handy-dandy negated comparison again, Danny boy. Works every time!”

Dan didn’t know what to do. On the one hand, he truly disliked the thoroughly sordid nature of this entire enterprise. He would be deceiving people without technically lying. He didn’t feel that this small loop-hole really absolved him of guilt. Rex’s parting argument that magic acts work by way of misdirection and we don’t accuse magicians of evil-doing didn’t salve his conscience. On the other hand, Dan truly was desperate. And so, after a spirited internal debate, Dan ran the commercial.

Within two weeks, his business turned around. Cash was finally flowing in the right direction and a large drug store chain picked up his product for distribution. Dan ran the ad several more times and things kept getting better. He was simultaneously happy and unhappy about all of this. Finally, once he had recouped his entire investment and made quite tidy sum on top of that, Dan sold his business to Rex, at a discount, of course, to compensate him for the commercial.

Now, with time on his hands and money in the bank, Dan wrote a book, "*Caveat Emptor: Don't Be a Mark for the Marketer*," in which he detailed all the dirty tricks he had learned from Rex. The royalties from the book were sufficiently large that Dan could retire comfortably. He was now financially secure and his moral compass was reset to True North.

Epilogue:

Both Dan and Rex were both doing quite well financially, profiting handsomely from opposite sides of the same coin. The two men, each having taken the measure of the other, developed, if not a friendship, at least a mutual understanding. It was in this spirit that Dan invited Rex to lunch. Walking to the restaurant, Dan stopped and pointed to a 99 Cent store. The sign in the window read, “All Merchandise is 99 Cents and Up.” “I dare say, that sign could legitimately hang in the window of our local Mercedes Benz dealer,” Dan remarked. Rex smiled. “It could, indeed, Danny boy, it could indeed.”



CALL FOR PARTICIPANTS AND INVOLVEMENT

Go Back to School, Join *The Mathematics Speakers Bureau!*

Do you have a talk which would be suitable for local area students or their faculty? We are seeking mathematicians interested in sharing their knowledge, enthusiasm, and love of mathematics. Now in its 54th year, the Mathematics Speakers Bureau (MSB) is composed of dedicated mathematicians who volunteer to speak to students and faculty of regional middle schools, high schools, colleges and universities on topics reaching beyond the traditional mathematics curriculum.

The primary goals of the MSB are to stimulate the interests of local youth in mathematics, to provide opportunities for students to meet active and enthusiastic mathematicians, to motivate students towards careers in the mathematical sciences, and to encourage cooperation between corporate and academic institutions in the mathematical education of area youth. Volunteers provide information about talks they are willing to give and the Bureau, in turn, advertises these talks to the faculty of local area schools. Schools contact speaker volunteers directly to make specific arrangements for a visit. Volunteers determine the number of presentations they give in any given academic year and always maintain the right to decline any invitation to speak. The Bureau web-page (sections.maa.org/metrony/speakers.html) contains an up-to-date listing of available speakers and their proposed talks. Additional information regarding the goals, history and operation of the Bureau can also be found at this site. If you wish to volunteer with the MSB, please contact Bureau Chair Ben Gaines at bgaines@iona.edu.

MetroMath Needs You!

Consider submitting a short announcement, commentary, article, study, experience, or other newsworthy item in the next issue of *MetroMath*. Contact the editor, Abe Mantell, via e-mail: mantell@ncc.edu.

0.56714329040978387299996866221035554975381578718651250813513107922304579308668456669321944696175229455763802497286678978545235846594007299560851643928999461431157149295980359437669847463560613422684614

MATH IN THE NEWS FROM THE MAA

(much more can be found at: <http://www.maa.org/news>)

Team USA Earns First Place at 2022 European Girls' Mathematical Olympiad

This spring, [Team USA earned first place](#) in the 11th [European Girls' Mathematical Olympiad](#) (EGMO), with each student also earning a medal for their individual performances. The EGMO is an international mathematics competition focused on gathering teams of young women from around the world to engage in a two-day competition.

For the past two years, the EGMO has been hosted virtually; however, this year, the competition switched to a hybrid format, allowing the 222 participants to participate in person or virtually. Typically, the competition is held in rotating European countries. This year, Team USA traveled to Hungary to participate in person. The 2022 US EGMO team included Kaylee Ji, 16; Vivian Loh, 15; Jessica Wan, 15; and Isabella Zhu, 16. This incredible team was led by equally remarkable team leaders Rachel Zhang and Oleksandr Rudenko, who helped prepare the students and support pre-competition engagement.

This year's EGMO saw tight competition among 57 teams. Team USA's first-place accomplishment surpasses their second-place title at the 2021 EGMO, as well as their fourth-place title at the 2020 EGMO. This is the second time Team USA has won first place at the EGMO, the first being EGMO 2019. Along with this incredible achievement, each member of Team USA earned a medal for their individual performance: Kaylee Ji, silver medal; Vivian Loh, gold medal; Jessica Wan, gold medal; Isabella Zhu, gold medal

MAA AMC Awards \$25,000 to 43 Young Women for Top Mathematics Performance

The Mathematical Association of America (MAA) is proud to continue to close the gender gap in mathematics by awarding certificates to 632 young women for their participation in this year's MAA American Mathematics Competitions (AMC). The 43 highest-scoring young women will also be honored with scholarships.

As of March 2022, women make up only 34% of the STEM workforce, despite [equal achievement in mathematics and science between female and male students in K-12 education](#). In 2019, MAA launched its [MAA AMC Awards and Certificate program](#) to address this disparity. The program's goal is to inspire young women to pursue their love of mathematics by celebrating their achievements and strengthening their confidence in their mathematical abilities. For the second year in a row, MAA was able to offer a total of \$25,000 in funding to support these young women in breaking down barriers in mathematics.

Both award and certificate recipients can be found online at [MAA AMC](#), as well as on [M-Powered](#), the hub of the MAA AMC community. Award winners will receive \$5,000 in scholarships for each competition in which they placed in the top five scores (AMC 8, AMC 10A, AMC 10B, AMC 12A, and AMC 12B). The top five scorers in each of the 29 MAA sections will also receive certificates commemorating their accomplishments.

"As this program continues to grow, I hope that young women around the country feel recognized for this accomplishment and validated as an integral part of the math community," said Jennifer Barton, Director of Competitions. "Women belong in math and we will continue to find ways to recognize them as well as other underrepresented groups. I am so proud to acknowledge their accomplishments. Congratulations to all of the winners!"

MAA's ability to encourage and motivate young women in mathematics would not be possible without the support of our generous donors: Akamai Technologies, AwesomeMathGirls.org, Jane Street, The D. E. Shaw Group, and Two Sigma.

If you are interested in supporting this initiative, or other MAA programs, visit our [website](#).

82nd Putnam Competition Announces Top Students in Undergraduate Mathematics

The 82nd annual Putnam Competition, administered by the Mathematical Association of America (MAA), recognized Massachusetts Institute of Technology as the top team, five undergraduate students as Putnam Fellows, and one undergraduate student as the Elizabeth Lowell Putnam Prize winner – all for their high scores in the challenging six-hour mathematics competition.

There were 2,975 participants from 427 institutions who participated in the Putnam Competition on December 4, 2021. A [list](#) of top college and university teams, as well as top students participants, is available from the MAA. The highest score on the 82nd Putnam competition was 119 out of a possible 120 points. Cash prizes are awarded to the Putnam Fellows, the Elizabeth Lowell Putnam Prize winner, and the mathematics departments and student members of the highest-ranked teams.

Top Five 2021 Putnam Teams:

1. Massachusetts Institute of Technology
2. Princeton University
3. Harvard University
4. Stanford University
4. University of California, Los Angeles

U.S. Team Earns Fourth Place at the Romanian Master of Mathematics

The U.S. team earned fourth place at the Romanian Master of Mathematics (RMM), organized remotely for the first time, on October 11 - 16, 2021. The RMM is a challenging international high school mathematics competition that allows students to exchange mathematical ideas and engage in cross-cultural communication with other students from around the world.

The U.S. team, organized by the Mathematical Association of American (MAA), has participated in the RMM since 2012. In 2020, the U.S. team placed 3rd. In 2018 and 2019, the U.S. team placed 1st.

A total of [22 teams](#) from around the world competed at the 13th Romanian Master of Mathematics. Over the course of two days, students work through six problems; the team score is based on the combined highest three individual scores.

USA Team Members: 1 gold medal, 3 silver medals, and 2 bronze medals

Each U.S. team member received an individual award:

- Rishabh Das (17 years old) - SILVER medal (individual rank #12)
- Andrew Gu (17 years old) - GOLD medal (individual rank #4)
- Jessica Wan (15 years old) - BRONZE medal (individual rank #55)
- Samuel Wang (16 years old) - BRONZE medal (individual rank #46)
- Jaedon Whyte (17 years old) - SILVER medal (individual rank #25)
- Daniel Xia (17 years old) - SILVER medal (individual rank #29)

Po-Shen Loh of Carnegie Mellon University served as the U.S. Team Leader, and Evan Chen served as the U.S. Team Deputy Leader.

The U.S. team was spread across 6 different locations across the country, all competing under rigorous regulations to ensure the integrity of the competition. Ankan Bhattacharya and Andrew Gu served as observers.

Recreational Curiosities to Unsolved Conjectures: A Review of Manjul Bhargava's "Patterns, in numbers and nature, inspired me to pursue mathematics" by Rupert Li

Prime numbers must be a manmade construct, right? Few animals possess the mental faculties to count, much less be concerned about whether an integer has any nontrivial factors. But then why do North American cicadas follow either a 13 or 17-year life cycle? One of the most prominent hypotheses is that choosing prime numbers reduces risk of hybridization, i.e., the mixing of two broods of cicadas. With cicadas emerging every 13 and 17 years, they only appear in the same season once every $13 \cdot 17 = 221$ years. If we instead took two composite numbers, such as 12 and 18, we would find that broods hybridize once every 36 years, more than six times as frequently. Number theorist Prof. Manjul Bhargava of Princeton University, the first Fields medalist of Indian origin, sees this natural pattern and others as a source of inspiration to pursue mathematics, whose essential nature is discovering and explaining patterns. In his [video](#) "Patterns, in numbers and nature, inspired me to pursue mathematics," Bhargava presents incontrovertible mathematical truths in nature as an illustration of how recreational curiosities can quickly lead to deep mathematics at the frontiers of human knowledge.

Math and numbers appear in all aspects of life, even in language. Sanskrit poetry, which Bhargava studied and deeply admires, consists of long, two-beat syllables and short, one-beat syllables. Thus, poets are interested in possible rhythmic patterns within a given number of beats. For example, how many patterns of short and long syllables span exactly eight beats? The answer turns out to be a Fibonacci number, as Sanskrit linguists had known long before Fibonacci's time. In fact, the Fibonacci numbers repeatedly appear

in nature as well: any natural spiral, such as a pinecone or a sunflower, will have a Fibonacci number of spirals—regardless of whether you look at it clockwise or counterclockwise! Understanding why patterns like these occur is fundamental to the pursuit of mathematics, providing reassurance that patterns are not mere coincidence and deepening our understanding of the underlying mechanisms of nature. Conversely, one's diverse set of experiences, even those in seemingly unrelated areas, can provide valuable insight into mathematics.

Beyond observing patterns in the natural world around him, Bhargava to this day also enjoys finding curious patterns in numbers, a sentiment we can all relate to. One of his favorite numbers as a child was 142857. If you multiply this number by 2, you get 285714; multiplying by 3 yields 571428, and similarly multiplying by 4, 5, or 6 all yield some number obtained by reading 142857 from some starting point, wrapping around at the end (you may recognize 142857 as the repeating decimal representation of the fraction $1/7$). Naturally, one may ask if there are other so-called cyclic numbers, to which the answer is yes: you can multiply the sixteen-digit number 0588235294117647 by 1 through 16 to obtain cyclic shifts of the same number. Surprisingly, whether there are only a finite set of cyclic numbers is still an unsolved problem in mathematics.

Some may argue that there is a wide schism between recreational math problems like these and modern-day math research, that nowadays math has outgrown its avocational, natural pattern-driven roots to become a lofty world disconnected from reality. However, Bhargava argues that mathematical curiosities that we enjoyed as children are still closely connected to state-of-the-art math research. For instance, a major unsolved problem in number theory is Artin's conjecture. If proven, Artin's conjecture would imply that there are infinitely many cyclic numbers, so in many ways the patterns Bhargava observed at a young age continue to inspire the mathematics he studies decades later. Diving into why patterns such as Fibonacci or cyclic numbers occur offers powerful insights into even deeper mathematics. And ultimately, sequences and structures in nature are denizens of mathematical truth. So, I encourage you to always be open to observing new and interesting patterns, and to never stop wondering: why?

1.1447298858490017411434273513530587116472948129153115715136230714721377698848260797836232702754897077020098122286979891590482055279234565872790810788102868252763939142663459029024847733588699377892031

EVENTS CALENDAR

Metropolitan New York Section Meeting • May 1, 2022, Virtual

For more information see this newsletter, or visit: sections.maa.org/metrony/

2022 STEM Summer Institute • July 24-26, 2022, Alfred, NY

For more information visit: <http://www.nysstemeducation.org/2022-stem-summer-institute/>

MathFest • August 3-6, 2022, Philadelphia, PA

For more information visit: www.maa.org/meetings/mathfest

NCTM Annual Meeting & Exposition • September 28 – October 1, 2022, Los Angeles, CA

For more information visit: <https://www.nctm.org/losangeles2022/>

NCTM Regional Conference and Exposition • November 30 – December 2, 2022, Baltimore, MD

For more information visit:

<https://www.nctm.org/Conferences-and-Professional-Development/Regional-Conferences-and-Expositions/>

AMTNYS 72nd Annual Fall Conference • October 28-29, 2022, Rochester, NY

For more information visit: <https://sites.google.com/amtnys.org/main/conferences/annual-fall-conference>

AMS Joint Mathematics Meeting • January 4-7, 2023, Boston, MA

For more information visit: <https://www.ams.org/meetings/national/national>

0.91596559417721901505460351493238411077414937428167213426649811962176301977625476947935651292611510624857442261919619957903589880332585905943159473748115840699533202877331946051903872747816408786590902

PAID ADVERTISING



MANHATTAN COLLEGE

MASTER'S IN APPLIED MATHEMATICS - DATA ANALYTICS

**A small program with personal attention in NYC,
a big center of data science.**

CORE CURRICULUM: applied linear algebra, computational methods and databases, machine learning and operations research, probabilistic and statistical modeling.

EXPERIENCE THE UNCOMMON
MANHATTAN.EDU/GRADUATE

MetroMath accepts advertising at \$50 for a half-page ad and \$100 for a full-page.

0.20787957635076190854695561983497877003387784163176960807513588305541987728548213978860027786542603534052177330723502180819061973037466398699991126317864120573171777952006743376649542246381929737430539

