



# CMS NOTES de la SMC

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**Javad Mashreghi** (Université Laval)

*Director - President-Elect*

The CMS has recently gone through a challenging and demanding period, marked by investigations, the resignation of several highly respected and devoted members, and the subsequent establishment of both the HR Committee and the Governance Reform Committee (GRC). Since rejoining the Executive Committee last year, I have had the privilege of attending some GRC meetings and serving as a non-voting member of the HR Committee. This experience has given me a close view of the extraordinary dedication, care, and integrity with which the members of these committees have carried out their work. They have devoted an immense amount of time, energy, and thoughtful effort, often under difficult circumstances, to ensure that the CMS remains on a strong and principled path, while also laying the groundwork for a resilient and promising future.

As I stand at the threshold of beginning my mandate as President of the Society, I feel a deep sense of gratitude and admiration, and I would like to express my most sincere and heartfelt thanks to the members of the GRC: Timothy L. Alderson (Chair), Dave Oakden, and Kseniya Garaschuk; and to the members of the HR Committee: Joy Morris (Chair), Andrea Burgess, Adèle Bourgeois, and Matilde Lalin. Their commitment, generosity, and unwavering sense of responsibility to the community are truly inspiring, and the Society is profoundly fortunate to have benefited from their leadership and service.

I would also like to express a very special and heartfelt appreciation to Dave Oakden for his remarkable service as Treasurer over the past fifteen years. Through multiple renewals, each of which he graciously accepted, he has provided continuity, stability, and wisdom at the heart of the Society's operations. As his current term comes to an end this December, it is difficult to overstate the depth of our collective gratitude. We very much hope that he might be willing to continue sharing his wisdom and experience with the Society. His dedication and generosity have left a lasting and meaningful imprint on the CMS.

The Society owes an immense debt of gratitude to all of these individuals. Their generosity of time, their sense of duty, and their steadfast commitment have guided the CMS through a difficult chapter and positioned it for a strong and enduring future. In this brief note, I would like to share my understanding of some important issues that fall beyond the mandate of the above-mentioned committees (at least for the time being), but which, in my view, require careful and timely attention for the well-being and future of the Society.

The revenue generated by the *Canadian Journal of Mathematics (CJM)* and the *Canadian Mathematical Bulletin (CMB)* is fundamental to the Society. Since their publication has been handled by Cambridge University Press (CUP) beginning in 2020, revenue has fluctuated, with an overall downward trend. At the same time, there is a clear and growing expectation that both journals will transition to full open access in the near future. At the most recent Board meeting, a target date of 2028 was proposed by CUP for CMB; however, this timeline was not fully endorsed and remains under discussion. Nevertheless, the broader shift toward open access appears inevitable and brings with it significant challenges.

In 2025, 144 articles were published in CMB and 128 in CJM. Under the current transformative agreement, only 34% of CMB articles and 44% of CJM articles were published as open access. These figures are concerning for several reasons. First, they suggest that nearly 60% of accepted papers are authored by researchers affiliated with institutions that do not have agreements with CUP. A transition to full open access therefore risks losing a substantial portion of our contributor base. If we are unable to attract a sufficient number of submissions from authors at institutions with existing agreements, CJM and CMB could face a rapid decline in submissions. Then, with lower turnout, the resulting meager revenue would largely be absorbed by CUP to cover publication costs and may not even suffice to do so.

In such a scenario, the Society may be forced to consider difficult alternatives. One possibility would be the merger of CJM, CMB, and CMC into a single journal. Another would be to move toward a fully in-house, online-only publication model, especially given the sharp decline in demand for printed copies, which are likely to be phased out entirely. A further concern is that, in the face of declining submissions, editorial boards may come under pressure to lower acceptance standards, an outcome that would be deeply undesirable and contrary to the values of the journals. In short, this is a very real and imminent challenge, one that has the potential to affect not only a primary source of CMS revenue, but also the reputation and long-standing excellence of its flagship publications.

The next item concerns our meetings. Discussions about the number and format of meetings each year, as well as the level of registration fees, are not new; these concerns have been raised repeatedly by colleagues across the community. For many years, the CMS has maintained the tradition of holding two annual meetings: a winter meeting, typically hosted in major Canadian cities, and a summer meeting, organized in other regions of the country. Both have played an important role in fostering interaction and collaboration among Canadian mathematicians at all career stages, from students to senior researchers. There have been suggestions to move toward a single annual meeting, rotating across the country. However, responding to such proposals is not straightforward, particularly given the diversity of perspectives involved. From what I understand, members of the Society tend to focus on the timing, costs, and scientific value of these gatherings, while the CMS office, among other things, must also carefully consider the financial implications, including the risk of budget deficits. In addition, consolidating the current winter and summer meetings into a single, larger event could place significant organizational strain on the office, given its limited staff and resources. The question of how best to structure our meetings is also closely connected to the broader role of Canadian mathematical institutes, which I will address in the next item. In light of all these considerations, it would be prudent for the CMS to establish an ad hoc committee tasked with examining this issue in depth and providing thoughtful recommendations for the years ahead.

Last, but certainly not least, I would like to address the Society's most valuable asset: its dedicated members. Many colleagues volunteer their time and energy to serve on committees and contribute to the work of the CMS, often without any form of compensation. Their commitment reflects a deep sense of responsibility and care for the community, and it deserves to be recognized with the utmost respect and appreciation. It is therefore disheartening to learn, for example, that a colleague was unaware that their committee mandate had concluded, only to discover that their name had simply been removed from the website. Even small gestures, such as a thoughtful message at the end of a mandate, can make a meaningful difference and convey genuine appreciation. Such practices should become standard. Committee chairs, in particular, who carry significant responsibility, merit even more explicit recognition for their leadership and service. More broadly, the CMS needs to strengthen how it celebrates and honors its members. As an example, some of the Society's awards, while important in principle, could be elevated in their visibility and presentation to better reflect the distinction they represent. Investing in recognition, whether through communication, acknowledgment, or celebration, is not merely symbolic; it is a meaningful and lasting investment in the vitality, cohesion, and future of the Society. In this respect, there is clear room to do more, and to do better, in ensuring that members feel valued, respected, and genuinely appreciated for their contributions.

The Canadian mathematical institutes: PIMS, the Fields Institute, CRM, AARMS, and BIRS (with its distinctive model and mission), stand as remarkable pillars of research activity and intellectual life across the country. Their collective impact on Canadian mathematics is profound and truly inspiring. Day after day, from coast to coast, these institutes sustain a vibrant and continuous stream of seminars, workshops, thematic programs, and conferences. Through these efforts, they not only bring together colleagues from their respective regions, but also attract leading researchers from around the world, significantly elevating the international visibility and reputation of Canadian mathematics. Their dedication, vision, and organizational excellence have created an environment in which mathematical ideas circulate freely and collaborations flourish. The breadth, consistency, and quality of their programming are extraordinary, and their contributions to nurturing both established researchers and the next generation of mathematicians cannot be overstated. Canadian mathematical life is, in many ways, shaped and amplified by their leadership and initiative.

At the same time, one natural consequence of this rich and continuous level of activity is that the landscape in which the CMS operates has evolved. With such a dense network of high-level weekly seminars and conferences taking place throughout the year, there is an increasing need to rethink and adapt the structure of the CMS annual meetings to better align with this new reality, a process that remains to be fully realized. In parallel, there is a clear opportunity, and indeed a need, for the CMS to strengthen its alignment and collaboration with these institutes. In 2021, I proposed the creation of an Institutes Committee within the CMS, with the aim of coordinating and representing Canadian mathematical life at major international events such as the Joint Mathematics Meetings (JMM), the International Congress of Mathematicians (ICM), the European Congress of Mathematics (ECM), and the Mathematical Congress of the Americas (MCA). At that time, the Executive Director of the AMS engaged directly with the CMS, attending meetings and even participating in the summer meeting in St. John's, to encourage and facilitate CMS involvement in the JMM. Although the committee did not continue beyond my mandate and the CMS did not move forward with joining the JMM, the institutes themselves advanced with admirable initiative and cohesion, jointly establishing a partnership with the AMS to participate in the JMM. This development is a testament to their dynamism, foresight, and commitment to advancing Canadian mathematics on the global stage. Their ability to act collectively and decisively in support of international engagement is deeply impressive. I have great admiration for their leadership, and I sincerely hope that in the coming years we will see even stronger collaboration among all Canadian mathematical organizations. By working together more closely, we can further enhance the international presence, influence, and recognition of Canadian mathematics worldwide.

Javad Mashreghi  
2026-04-28  
Québec City

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**Robert Dawson** (Saint Mary's University)

*Editor, CMS Notes*

Many math departments have a custom of gathering to eat together on a regular basis. In some cases it's a brown-bag lunch in the departmental lounge. If there's a faculty club, there's probably a group that meets there. When I was a graduate student at Cambridge, lunches were not a matter of tradition, but morning coffee and afternoon tea breaks very much were.

Shortly after I became a postdoc at Dalhousie, one of the professors told me "You ought to come to Tuesday Lunch." The rules were explained to me. The group met at 11:37 *exactly* in the downstairs hall of the Chase building, then walked eastward along Coburg Road and Spring Garden Road to the intersection with South Park Street. There, on the street corner, at noon, a complicated and ritualized negotiation would take place, under rules laid down by Heydar Radjavi, to decide the restaurant where we'd eat that week.

Anybody could make a suggestion; once a suggestion was made, anybody could veto it. This might seem like a recipe for deadlock, but each participant was restricted to one veto per week, so if  $N$  were in attendance, the algorithm terminated in at most  $N+1$  rounds. Lest the veto power be weakened too much by the single-veto rule, a venue that had been vetoed could not be put forward again that week. Finally, in the spirit of mathematical elegance, these rules did not distinguish between the proposer and others present: if somebody wanted to withdraw a suggestion they could do so, provided that they still had a veto and were willing to use it. (My recollection is that this last rule was sometimes circumvented: if a proposer had a change of heart, and no veto left to put it into practice, somebody else would help out.)

So I went along. Regular attenders included Heydar, Peter Fillmore, Bob Paré, S. Swaminathan, Karl Dilcher, Keith Johnson, Chelluri Sastri and, even after I took a position at SMU, myself; but many others within and outside the department attended sporadically. Over the years, we visited most of the downtown Halifax restaurants. There were weeks when only a few attended, and weeks when our planning meeting came close to blocking the sidewalk.

Then came a period when my teaching and departmental responsibilities made it difficult to attend. Heydar moved to a post-retirement position in Waterloo. After a while, I heard that a few people were still meeting, but (due to some participants' health) the 11:37 meeting and the walk from Dalhousie to South Park Street were no longer taking place, so it was no longer possible to turn up on the spur of the moment. And that was it, until last month I met one of the long-time lunchers at a concert.

"Why don't you come to Tuesday Lunch?" he asked.

"How?" I responded. And so I got myself onto the mailing list that now directs participants to the restaurant of the week. Numbers are smaller, routines simplified, but it's still in many ways what it was forty years ago.

It's good to be back.

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*Notes Contributing Editor*

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*Education Notes bring mathematical and educational ideas forth to the CMS readership in a manner that promotes discussion of relevant topics including research, activities, issues, and noteworthy news items. Comments, suggestions, and submissions are welcome.*

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As detailed in previous columns, more recent developments in the United States of America have fundamentally shifted my relationship with said country. I also mentioned that Education Notes would be dedicated to Canadian (much more than American) mathematics education matters. This particular column, however, is about the Super Bowl; and, as we all know, the Super Bowl is bigger than America. So, with my sporty little caveat out of the way, I wish to note three moments from Super Bowl LX where – Spoiler Alert – the Seattle Seahawks beat the New England Patriots.

The first moment to note was a rather bizarre cutaway shot that took place with a few minutes left in the game. A cutaway shot, in television parlance, is a complementary shot of something, away from the main action to show details or provide further context. In a movie, for example, a cutaway shot might zoom in on an actor's cheek to highlight a tear indicating an emotive response to a conversation between two individuals. In Super Bowl 60, one shot that really caught my attention was the stirring of the Gatorade during the final few minutes of the game. Stirring of the Gatorade?! Ridiculous.

No doubt, Gatorade powders and concentrates are cheaper than premixed Gatorade. However, I'm happy to go out on a limb and argue that the National Football League (NFL) can afford premixed Gatorade. NFL revenue in 2024 exceeded \$20 billion, for example. Even if the NFL is all about using Gatorade powders and concentrates for some bizarre reason, you think they'd splurge on premixed Gatorade for the Super Bowl, and especially for the Gatorade to get dumped on the winning coach. To the victor goes the spoils.

The cutaway shot to stirring premixed Gatorade gets curiouser and curiouser, until gambling gets stirred into the mix. Believe it or not, one of the biggest bets placed during the Super Bowl is the color of the Gatorade that gets dumped on the winning coach. Yellow/Green/Lime received much action this year which, arguably, was related to many thinking Seattle would win the big game and that Yellow/Green/Lime would pair nicely with the "Action Green" accents on the navy coloured jerseys and pants of the Seahawks.

The purpose of the cutaway shot to an unnecessary stirring of Gatorade, then, was to remove all doubt regarding the color of the liquid about to get dumped on coach Mike Macdonald. In the past, the Gatorade bath hasn't always gone well. There are many moving parts on an NFL sideline, and the colour of the Gatorade shower can be hard to discern. Last year, the lighting of the stadium and other factors necessitated that the winning coach clear up the confusion swirling as to whether he was doused with Orange or Yellow/Lime/Green Gatorade.

What the quick cutaway shot truly tells me is that (1) gambling's grip on the NFL is stronger than ever, and (2) the extremely high production value associated with NFL football games is being extended to gambling. In general, the different elements comprising the high production value of a NFL football game (e.g. slow motion instant replay, the Spidercam/Skycam system, cameras in the orange touchdown posts, "hidden" microchips in the football, etc.), are used to remove doubt in the game and help enforce the rules (e.g., was that a catch, were they in bounds, did the ball cross the plane or the first down marker, etc.). The Gatorade cutaway demonstrates that NFL television production is now willing to point its lens on the massive, massive legal industry that is NFL gambling. Removing doubt in gambling on the game is important, too.

There are two other moments that indicated, to me, that the high production value of televised NFL football is being utilized for gambling purposes. For example, this year, it was extremely clear when Charlie Puth clearly finished singing the national anthem at Super Bowl LX. All in one shot was the sequence of the seven flyover planes (one big one in the middle) passing over the stadium, Charlie with his mouth clearly shut indicating to all the anthem is over, silent back-up singers and then another flyover plane for good measure. From a television production standpoint, an important shot and not an easy one to pull off. Important because of previous controversy surrounding the over/under of the national anthem performance.

If gambling on Gatorade isn't your thing, maybe you are interested in placing a bet on whether the singing of the national anthem will go, say, under 2 minutes in length or over 2 minutes in length. A simple bet or so it would seem. In the past, sportsbooks were stuck paying out both sides of the bet due to timing and other discrepancies, which, for them, is not ideal. For example, Jon Batiste, last year, had a very protracted final note which had some saying the anthem went under a particular amount of time and others saying that it went over. By way of another example, Gladys Knight took it upon herself to repeat the word "brave" in her rendition of the anthem many years ago, which resulted in some sportsbooks paying out both sides of the bet. Thanks to one shot, it was clear, this year, when Charlie was done with the anthem and there would be no paying out both the over and the under by any sportsbook. Here again, high production value associated with televised football gets utilized for clearing up potential gambling grievances.

The last moment I will mention is the coin toss. In football, the coin toss takes place no more than three minutes before kickoff. That's the rule. The captain of the visiting team calls "heads" or "tails" (also the rule) and then the referee or a designate tosses a coin at the center of the field. The winner of the toss (according to the rules) is granted certain benefits like choosing which end of the field they wish to defend and whether they kick off or will receive the kick off or whether they wish to defer their choice to the second half. Honestly, there is a lot going on with Article 2 (Toss of Coin) of Section 2 of Rule 4 of the NFL rulebook.

Things are much less complicated from a gambling perspective when it comes to the coin toss: heads or tails. As in previous years, the Super Bowl provides an opportunity to, you guessed it, bet on the coin toss before the game. One sportsbook, this year, denoted the coin toss as the "Flip of Destiny" and provided even odds on the coin landing heads (-104) or tails (-104). In other words, if you bet \$104 on the coin landing heads then you would lose \$104 if the coin landed tails, but you would win \$100 if the coin landed heads. Similarly, then, if you bet \$104 on the coin landing tails. A simple bet that garners much attention and action during the Super Bowl.

It sounds silly now putting it in print, but I am and have always been interested in the coin toss at the Super Bowl. I am interested in the running history of the coin toss, and peoples' thoughts on the ever changing ratio, streaks of heads or tails in a row, the curse, and the toss itself. I am also interested in the coin. I am drawn to what constitutes "heads" and "tails" for the coin. Typically, one side has the Super Bowl name and logo, and the "reverse" side has the names and logos of the teams playing in the game. As such, I am always drawn to what the referee deems as "heads" and "tails" for the coin prior to the flip. My interest also lies in the toss of the coin by the referee because, according to the rules, if the coin does not flip, that is, turn over in the air (which I think I've seen), or is compromised in any way (which I also think I've seen) then the Referee shall toss it again (which I haven't seen) and the original call may not be changed. It is at this point, at the very peak of my interest in the Super Bowl, the coin toss, that the otherwise extremely high production value of televised NFL football fails.

In the past, once the "heads" and "tails" of the coin are presented by the referee, the camera shot typically pulls back for an action shot of whomever is flipping the coin and then quickly pans back to the faces of the referee and the captains. Once back into a tight shot of the faces, the referee notes which way the coin landed, whether the visiting team has lost or won the toss and all the other related information about kicking or receiving the ball and which direction teams will play. Important information, for sure, but this bothers me immensely.

The few camera shots that I am truly interested in, especially when it comes to the Super Bowl coin toss, I never get. First, I want a shot of the entire coin toss and evidence of the result. As mentioned, NFL rules indicate that if the toss is compromised "in any way" then the Referee shall toss it again. What, then, counts as a compromised coin toss? I would also like a shot of the coin sitting on the grass. In the past, we took the referees word that the one side with all the logos on it, as opposed to the other side with all the logos on it, has been correctly identified. Let's not forget that this is also the biggest stage in the world for the referees, which means that it is not out of the realm of possibility that a nervous referee could incorrectly identify tails as heads or heads as tails. Not showing the coin, I guess, provides a level of plausible deniability; however, if the latest Super Bowl is any indication, which showed precisely when the anthem was over and the colour of Gatorade, things are going the other direction. If we're going to borrow certain aspects of the high production level of televised football in order to eliminate doubt regarding gambling outcomes then, pardon the pun, let's go all in, especially on the coin toss.

This year, try as I might, I was unable to establish whether the person flipping the coin started their toss with the coin heads up or tails up. I tried to follow the pass of the coin from the hands of the referee to the hands of the coin flipper, to no avail. There are a few ways this issue (of mine) could be rectified. First, the camera could have zoomed in closer to the coin just as it was about to get tossed. This would have eliminated any guessing associated with the "Flip of Destiny" starting heads or tails up. The camera did take a moment and zoom in on the coin laying on the field to eliminate any doubts regarding whether the coin landed heads or tails, but I had already forgotten which side was heads and which was tails. I know, I know, this all sounds absurd, but no more absurd than fake stirring premixed Gatorade, especially to those adhering to and espousing particular philosophical interpretations of probability

Alternatively, and it'll sound even more absurd, the NFL could embed the same type of chip they put in the football (which is used to determine "exact" yardage on those too close to call plays) into the coin. Stay with me here. Having a chip in the coin would help eliminate any doubt as to whether heads was heads or tails was tails. It would also help with making sure that the coin has turned over in the air or was compromised in any way. See, unlike the national anthem and unlike the Gatorade dumped on the winning coach, the coin toss is part of the game. The coin toss is found in the NFL rulebook (Rule 4 and Rule 16), but it is also a popular wager with high-stakes action (e.g., one person wagered a quarter of a million dollars on "heads" this year), which means that it lives as part of the game and part of gambling on the game, which is a dicey area. The level of scrutiny applied to all other rules of the Super Bowl must be applied to the coin toss, I contend.

The Super Bowl coin toss is one of the most famous coin flips in the world. The history of the coin toss is already being written (e.g., historical results, streaks, curses, etc.). As one of the most popular bets of the Super Bowl, the coin toss will draw more attention and more scrutiny going forward, which provides an opportunity to hear from those ascribing to different philosophical interpretations or probability. I'm not saying that the individual that bet a quarter of a million dollars on the coin toss this year read "Dynamical Bias in the Coin Toss" by Diaconis, Holmes and Montgomery in SIAM Review, but I am saying there's a chance.

Whether you're a propensity theorist or a frequentist, or perhaps you ascribe to the other side of the coin when it comes to philosophical interpretations of probability, Kseniya and I would love to hear your thoughts on the Super Bowl coin toss. Just give us a heads up!

Thomas Drucker (University of Wisconsin–Whitewater)

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CSHPM Notes brings scholarly work on the history and philosophy of mathematics to the broader mathematics community. Authors are members of the Canadian Society for History and Philosophy of Mathematics (CSHPM). Comments and suggestions are welcome; they may be directed to the column's editors:

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'It is a truth universally acknowledged that a single man in possession of a good fortune must be in want of a wife.' With this generalization Jane Austen begins *Pride and Prejudice*. The confidence with which she asserts it makes the reader think that she has every justification for it. One might almost call it a social theorem.

In general, literature is not studded with the kinds of statements one finds in mathematics: theorems, corollaries, lemmata, or axioms. There is one exception to this rule, namely, paradoxes. One question is whether paradoxes in literature and elsewhere are of the same kind as those in mathematics. This article aims to make a case that reactions to paradoxes in other genres may be of some use in dealing with certain paradoxes in mathematics.

There is nothing particularly mathematical about the word 'paradox'. Just as 'orthodox' refers to 'right belief' and 'heterodox' refers to 'different belief', so 'paradox' refers to 'beyond belief' ('para' as a prefix has a range of applications). The word is of venerable antiquity, and examples abound even in Greek times. Anthony Gottlieb, for example, refers to the 'paradoxical' style of Heraclitus, as exemplified in sayings such as 'The upward road and the downward road are the same road' [4, p. 41]. Even better known is the story of Socrates, who was puzzled by the verdict of the oracle at Delphi that he was the wisest of all Greeks. He was aware of how little he knew, but in conversing with others they always seemed to claim more knowledge than they actually possessed.

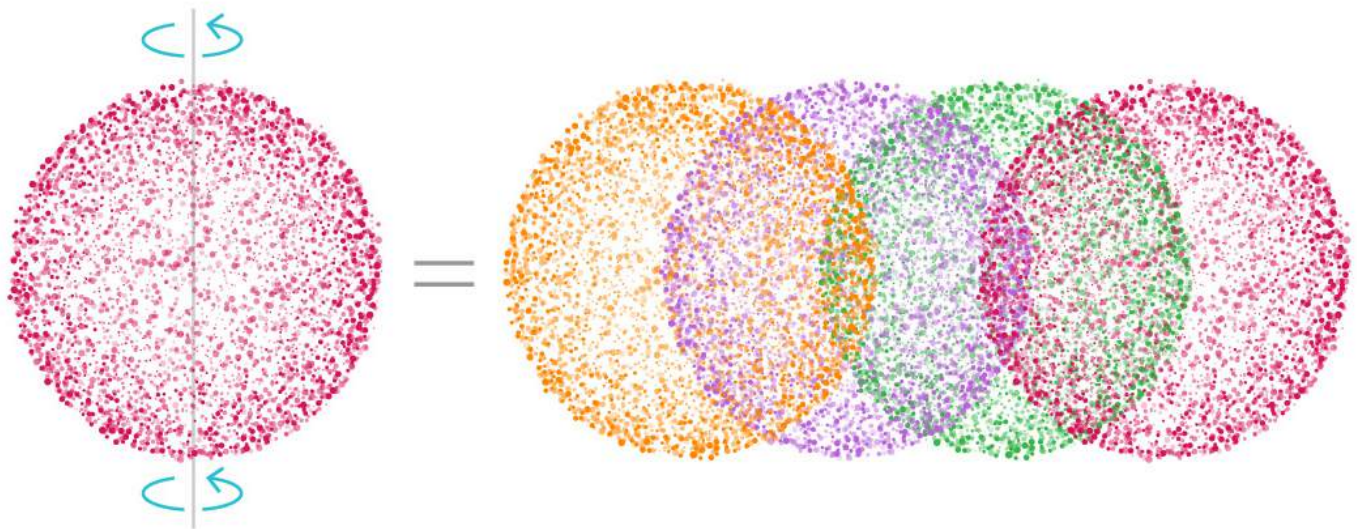


**Figure 1.** Screenshot of a presumably AI-generated Socrates stating a mistranslation from *Apology*, 21d. YouTube video by [thevoiceofsocrates](#), 28 November 2025.

There have been periods in English literature during which paradoxes seemed the order of the day. In the late nineteenth century Oscar Wilde and George Bernard Shaw entertained theatre-goers with a wealth of paradox in play after play. Outside drama G.K. Chesterton made much use of the tool in literary criticism and even in theology. More recently, Jorge Luis Borges created entire stories as a paradox, e.g., 'The Library of Babel' [2, passim]. One of the popular songs in *The Pirates of Penzance*, an opera by Gilbert and Sullivan, builds on a paradox connected with birthdays and leap years.

Religion has long had to deal with paradox, and the line attributed to Tertullian ('Credo quia absurdum'—I believe it because it is absurd) has been part of Christian theology for many centuries. Koans in Buddhist tradition often seem to be nothing but paradoxes. Douglas Hofstadter in his *Gödel, Escher, Bach* devotes several chapters to koans and their uninterpretability [5]. In Matthew Bagger's *The Uses of Paradox* [1], he suggests a way to deal with paradoxes in a religious setting that will come up again at the end of this piece.

Paradoxes in mathematics have had various effects. The consequences of [Russell's paradox](#) (the inability to determine whether the set of all sets that are not members of themselves is a member of itself) for Frege's project in his *Grundgesetze* are well known. One can argue that Gödel's success in pulling down *Principia Mathematica* was founded on a [paradox like the Liar](#). The [Banach-Tarski paradox](#), by contrast, has not involved rewriting any mathematics. Its conclusion (that one can cut up a ball into a finite number of pieces and then reassemble them to get a ball twice as big as the original ball) runs up against common sense, but then most of us do not have the kind of common sense able to deal with infinitely thin knives. By contrast, the paradox of the Liar continues to generate philosophical responses. Some have argued that the problem with 'This statement is false' is its self-referential character, but then versions offered by Quine and Yablo, among others, seem to raise the same problem without the self-reference [6, p. 9; 3, pp. 50–51].



Rotating the **East group** to the **West** duplicates the **South**, the **North**, the **starting points**, and the **East group** itself.

**Figure 2.** One visualization of the Banach-Tarski paradox. Artwork by Samuel Velasco for Max G. Levy, “[Banach-Tarski and the Paradox of Infinite Cloning](#),” *Quanta Magazine*, 26 August 2021.

What makes something paradoxical? The collision with common sense usually comes as something of a surprise. There is often some kind of humour in seeing how common sense has to learn to adapt to calculations. Probability offers a number of such paradoxes, such as the [birthday problem](#) (it only takes 23 people in a group to make the probability of a shared birthday greater than 1/2) or [Simpson's paradox](#) (what's true of all subsets individually may no longer hold when they are aggregated).

Perhaps a plausible analogy is the situation with regard to the [Continuum Hypothesis](#). Gödel was able to show that if one added a certain axiom to the standard axioms for set theory, the resulting system was able to show that the Continuum Hypothesis (there is no infinity between the number of whole numbers and the number of reals) is true. Then Paul Cohen demonstrated that if one added a different axiom to the standard axioms, the resulting system was able to show that the Continuum Hypothesis was false. In both cases the additional axioms were shown to be consistent with the standard axioms.

There is a further problem with this conflict that did not arise in the case of Euclidean and non-Euclidean geometries. As pure mathematics they may be equally legitimate, but when they came up against the structure of the universe, non-Euclidean geometry won the contest. There is no obvious universe to serve as an arbiter for the axioms that refer to infinite sets.

In fact, infinity has long been a source of paradoxes—one can put this down to the inability of common sense to handle the infinite. The demonstration that infinite sets can have proper subsets of the same cardinality prevents us from falling back on the Euclidean notion that the whole is greater than the part. Surely there is also something paradoxical about the [Löwenheim-Skolem theorems](#), even if we do not refer to them as paradoxes. They assert, after all, that if a set of axioms has an uncountable model, then it also has a countable model, and if that does not run up against such common sense as we have about the infinite, I do not know what does. The fact that cardinality depends on one's machinery for finding one-to-one correspondences makes it sound as though the size of a set could depend on the order in which one is tallying members.



**Figure 3.** An 1880 drawing of the 'paradox trio' from Act II of *The Pirates of Penzance*, in which the Pirate King and Ruth hold Frederic at gunpoint while they explain the paradox engendered by his February 29 birthday. Commissioned by D'Oyly Carte Opera Company for the opera's London premiere. [Gilbert and Sullivan Archive](#).

Quantum mechanics has also been a source of paradoxes, and one can argue that it is a source of nothing but paradoxes. The continuing literature on how to interpret the formalism that produces correct predictions suggests that there is no consensus about interpretation, however ready the community of physicists may be to accept the formalism. Hidden variables have been shown not to work, and if it is necessary to alter one's logic, that has a paradoxical character in its own right.

When one has contemplated certain paradoxes and beaten one's head against the wall in trying to resolve them, one may be tempted to argue that some paradoxes are not necessarily in need of resolution. That seems to be true of Zen koans, for example, and perhaps riddles like the Mad Hatter's 'Why is a raven like a writing-desk?' It may not be easy to dispose of the nagging suspicion that at least one prong of the paradox must be based on an error in reasoning. There are plausible fallacies that do not yield their faults up on preliminary inspection, such as Kempe's claim to have proved the Four Colour Theorem in 1879, which was only refuted in 1890.

What Bagger points to as a way out is what he calls 'cognitive asceticism' [1, cap. 2]. The term 'cognitive dissonance' has been widely applied to the situation of not being able to resolve apparently conflicting statements. Much psychological effort goes into trying to dissolve the dissonance on the assumption that the dissonance itself is a source of tension. What Bagger suggests, specifically in the realm of religion, is a kind of acceptance without feeling that the world is necessarily crashing around one. Some paradoxes are a blow to common sense but allow for a way forward with common sense chastened. When paradoxes apparently lead to a contradiction, it might typically be felt in mathematics that this sort of acceptance is bound to lead to the acceptance of every statement. On the other hand, it may be the case that if one puts up a few roadblocks in one's logic, then the notion that accepting both sides of a paradoxical conclusion is fatal can be resisted. There are, after all, paraconsistent logics, and it may not be surprising that it is to them that paradoxes lead.

## References

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- [6] Quine, W. V. (1966) *The Ways of Paradox and Other Essays*. New York: Random House.

*Thomas Drucker is currently chair of the Philosophy of Mathematics Special Interest Group of the Mathematical Association of America. At the 2025 MathFest in Sacramento, he was one of the organizers of a session on paradoxes, in which he also spoke. He retired from teaching at the University of Wisconsin–Whitewater in 2021.*

George Grätzer

Ask not what your country can do for you—  
ask what *you* can do for your country.  
*John F. Kennedy, Inaugural Address, 1961*

As Parts I and II illustrate, ChatGPT can be extremely helpful for mathematical research and writing. You should always be careful about the advice you receive. Remember: the responsibility is yours to ensure that your paper is correct.

This paper presents examples of situations in which ChatGPT misleads. Each example is presented as a prompt, a ChatGPT response, and a brief analysis explaining the error and how to detect it.

Check everything. Let this be your guiding principle: ChatGPT is an *assistant*, not an oracle.

1. A FALSE LEMMA

**Prompt.**

Let  $L$  be a finite modular lattice. If  $a$  is join-irreducible and  $a \leq b \vee c$ , must  $a \leq b$  or  $a \leq c$ ?

**ChatGPT response.**

Yes.

Since  $a$  is join-irreducible, it cannot be written as a nontrivial join. From  $a \leq b \vee c$ , modularity allows the inequality to be distributed over the join. If  $a \not\leq b$  and  $a \not\leq c$ , then  $a$  would decompose as a join of smaller elements, contradicting join-irreducibility. Therefore  $a \leq b$  or  $a \leq c$ .

**Analysis.**

The statement is false. It holds in finite *distributive* lattices but fails in general modular lattices.

Let  $M_3$ . Let  $a$  be one of the three atoms, and let  $b$  and  $c$  denote the other two atoms. Then

$$a \leq b \vee c = 1,$$

but

$$a \not\leq b \text{ and } a \not\leq c.$$

ChatGPT silently replaces distributivity with modularity. The argument reads correctly but proves a different theorem.

2. A DIAGRAM WHOSE GEOMETRY LIES

**Prompt.**

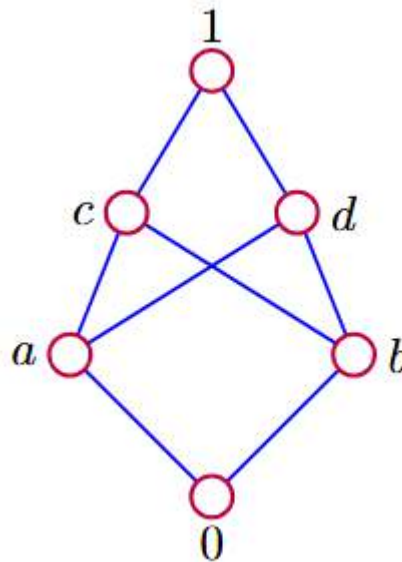
Draw a diagram of an ordered set with elements

$$\begin{aligned} 0 < a < c < 1, \\ 0 < a < d < 1, \\ 0 < b < c < 1, \\ 0 < b < d < 1, \end{aligned}$$

where  $a, b$  are incomparable and  $c, d$  are incomparable. Use a symmetric layout.

**ChatGPT response.**

Here is TikZ code for the requested diagram:



**Analysis.** Formally, all required edges are present, and no covering relation is missing. The code compiles, and the diagram looks clean and symmetric.

The problem is geometric. Because  $c$  is placed above and to the left of  $b$ , and  $d$  above and to the right of  $a$ , the picture suggests

$$b < d \text{ and } a < c,$$

even though neither relation is intended. The eye naturally reads the chains

$$0 < a < c < 1 \text{ and } 0 < b < d < 1,$$

so the intended incomparabilities  $a \parallel c$  and  $b \parallel d$  are contradicted.

3. *LaTeX* ADVICE THAT INTRODUCES AN ERROR

**Prompt.**

The compilation stops with the error Environment example undefined. How can this be fixed?

**ChatGPT response.**

Add `\usepackage{example}` to the preamble to define the environment.

**Analysis.** There is no standard package that defines an example environment. The suggested fix does not address the error.

The correct solution is to define the environment explicitly or replace it with an existing theorem-like environment. The error message itself already identifies the problem.

#### 4. A CORRECT THEROEM WITH AN INCORRECT PROOF

**Prompt.**

Let  $L$  be a finite lattice. Assume that every join-irreducible element of  $L$  is join-prime. [1] Prove that  $L$  is distributive.

**ChatGPT response.**

Let  $L$  be a finite lattice in which every join-irreducible element is join-prime. Since  $L$  is finite, every element can be written as a join of join-irreducible elements. Let  $x, y, z \in L$ .

Write  $x = a_1 \vee \dots \vee a_n$ , where each  $a_i$  is join-irreducible. Then

$$x \wedge (y \vee z) = (a_1 \vee \dots \vee a_n) \wedge (y \vee z).$$

If  $a_i \leq y \vee z$ , then since  $a_i$  is join-prime, we have  $a_i \leq y$  or  $a_i \leq z$ . Thus

$$x \wedge (y \vee z) = (x \wedge y) \vee (x \wedge z),$$

and  $L$  is distributive.

**Analysis.** The theorem is correct. The proof is not.

The crucial error occurs in the first displayed equation. The argument implicitly assumes that

$$(a_1 \vee \dots \vee a_n) \wedge t = (a_1 \wedge t) \vee \dots \vee (a_n \wedge t),$$

which is already a form of distributivity. The proof therefore uses the conclusion to justify itself.

Join-primality applies only to inequalities of the form  $a \leq x \vee y$ . It provides no justification for distributing meets over joins. The reasoning conflates an order-theoretic property of individual elements with an algebraic identity of the lattice.

A correct proof proceeds by analyzing irredundant join-representations and comparing them elementwise, rather than by manipulating lattice identities.

This error is dangerous for several reasons:

- the theorem itself is true,
- the proof outline looks standard,
- no step is obviously false,
- and the circularity is deeply

#### 5. A DEEP STRUCTURAL ERROR

**Prompt.**

Let  $L$  be a finite lattice. Assume that every join-irreducible element of  $L$  is join-prime, that is,

$$a \leq x \vee y \Rightarrow a \leq x \text{ or } a \leq y \quad \text{for all } x, y \in L.$$

Show that  $L$  is distributive.

### ChatGPT response.

Let  $L$  be a finite lattice in which every join-irreducible element is join-prime. Since  $L$  is finite, every element can be expressed as a join of join-irreducible elements. Let  $x, y, z \in L$ .

We show distributivity. Consider  $x \wedge (y \vee z)$ . Write  $x = a_1 \vee \dots \vee a_n$  as a join of join-irreducibles. Then

$$x \wedge (y \vee z) = (a_1 \vee \dots \vee a_n) \wedge (y \vee z).$$

By join-primality, for each  $a_i$  we have  $a_i \leq y \vee z$  implies  $a_i \leq y$  or  $a_i \leq z$ . Hence

$$x \wedge (y \vee z) = (x \wedge y) \vee (x \wedge z),$$

so  $L$  is distributive.

**Analysis.** The conclusion is correct: a finite lattice in which every join-irreducible element is join-prime is distributive. However, the argument above is invalid.

The error is subtle. It occurs in the transition from join-primality of individual join-irreducible elements to a distributive identity involving arbitrary joins and meets.

The key unjustified step is the implicit claim that

$$(a_1 \vee \dots \vee a_n) \wedge (y \vee z) = (a_1 \wedge (y \vee z)) \vee \dots \vee (a_n \wedge (y \vee z)),$$

which already assumes distributivity. The proof applies distributivity in order to establish distributivity.

More concretely, join-primality applies only to inequalities of the form  $a \leq x \vee y$ . It says nothing about how meets distribute over arbitrary joins. The argument silently treats  $\wedge$  as if it distributes over  $\vee$  on the left, which is exactly what must be proved.

This example is particularly instructive for several reasons:

- the theorem itself is true,
- the proof outline looks standard,
- each sentence is individually reasonable,
- and the error occurs only at the level of algebraic

## 6. A STANDARD EXAMPLE MISCLASSIFIED

### Prompt.

Give an example of a finite modular lattice that is not distributive. Name a standard lattice, describe its diagram, and explain why it is modular but not distributive.

### ChatGPT response.

A classical example is the lattice  $N_5$  (the pentagon lattice). It has elements  $0, a, b, c, 1$  arranged so that  $0$  is below  $a$  and  $b$ ,  $a$  is below  $c$ , and both  $b$  and  $c$  are below  $1$ . This lattice is modular but not distributive.

Modularity follows from the fact that there is no sublattice isomorphic to  $M_3$ . Non-distributivity is witnessed by the failure of the distributive law for the triple  $(a, b, c)$ . Thus  $N_5$  is a finite modular, non-distributive lattice.

**Analysis.** The classification is wrong. Among the two classical five-element lattices, only  $M_3$  is modular and non-distributive. The pentagon lattice  $N_5$  is the *smallest nonmodular* lattice.

The argument compounds this error. It “proves” modularity of  $N_5$  by invoking the absence of an  $M_3$  sublattice, even though  $N_5$  is the standard counterexample to modularity. The appeal to “no  $M_3$ ” sounds authoritative but is factually false.

This example illustrates a different kind of failure. The response has the following features:

- uses familiar notation ( $M_3$ ,  $N_5$ ),
- cites a standard characterization (forbidden sublattices),
- and gives a fluent informal

Yet it mislabels one of the best-known small lattices in the subject.

## 7. CONCLUSION

In every example above, the ChatGPT response is fluent, confident, and plausible. In every case, it is incorrect.

Verification is therefore not optional. It is an essential part of any serious mathematical use of ChatGPT.

[1] An element  $p \in L$  is called *join-prime* if, for all  $x, y \in L$ ,

$p \leq x \vee y$  implies that  $p \leq x$  or  $p \leq y$ .

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## Call for Scientific Sessions

The Canadian Mathematical Society (CMS) welcomes and invites scientific session proposals for the 2026 CMS Winter Meeting in Montreal from December 11-14, 2026.

- The purpose of the scientific sessions is to share cutting edge research on a given mathematical topic, as suggested by the organizers.
- Sessions are scheduled blocks, with each block ranging from 2 to 2.5 hours in length, and take place from December 12-14. Typical scientific sessions have between 10 and 20 talks of 20 minutes each, with 10 minutes between talks, but 50-min talks are possible. Indeed, the organizers are welcome to suggest non-traditional usage of the block times and format.
- In accordance with the CMS mandate to propose conferences which are accessible and welcoming to all groups, diversity amongst organizers and speakers is strongly encouraged. To support organizers in their important work and in their efforts towards inclusivity and diversity, the CMS will host an open call for abstracts for all sessions, and asks organizers to consider all eligible abstract submissions for their session.
- Diversity includes topics of interest, career stages, geographic location, and demographics; designated underrepresented groups include, but are not limited to, women, Indigenous Peoples, persons with disabilities, members of visible minority/racialized groups, and members of LGBTQ2+ communities.
- Note that there will be a separate follow-up call for Education Sessions.
- All proposed sessions should be in line with the [CMS Code of Conduct](#).

### Proposals should be submitted online, and will require the following:

1. Names, affiliations, and contact information for two or three organizers: A lead organizer and one or two co-organizer(s).
2. A title and a two to three-sentence summary that will be posted on the website for potential speakers.
3. The number of blocks requested (blocks are 2 or 2.5 hours long).
4. A pdf file including a description of the topic and purpose of the session (1-2 paragraphs), as well as a description of considerations made towards an equitable and inclusive session for a diverse group of participants. This file will not be publicly posted.
5. A spreadsheet including list of possible speakers. Please have columns "Last Name", "First Name", "Affiliation", "Career Stage", and "Webpage", with as much information filled out for potential speakers as possible. This file will not be publicly posted. The template for the list of potential speakers can be found [here](#).

Proposals will be selected by the Scientific Organizing Committee, limited by available classroom space, with priority for sessions that show intention to include a mix of senior and junior researchers, to make parts of their session accessible to graduate students, and to include speakers from designated underrepresented groups.

### A note on Organizers

The lead organizer should hold a PhD or equivalent in the area of expertise relevant to the subject of the session. Having a senior researcher (e.g. Professor or tenured Associate Professor) paired with someone earlier in their career (e.g. tenure track Assistant Professor or Postdoctoral Fellow) would be ideal.

We ask that each potential organizer only propose a single session.

### Submission Form and Deadlines:

Please submit proposals by filling out [this form](#). There will be two rounds of submissions. Proposals submitted by June 19, 2026, will be considered in the first round, with responses ongoing. The deadline for the second round will be August 31, 2026.

[Submit Session](#)

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## Call for Education Sessions

The Canadian Mathematical Society (CMS) welcomes and invites education session proposals for the 2026 CMS Winter Meeting in Montreal, Quebec, from December 11-14, 2026.

The education session proposals will be selected by the CMS Meeting Education Session Committee, which will also schedule the accepted sessions, in communication with the session co-organizers.

In accordance with the CMS mandate to propose conferences which are accessible and welcoming to all groups, diversity amongst organizers and speakers is strongly encouraged. To support organizers in their important work and in their efforts towards inclusivity and diversity, the CMS will host an open call for abstracts for all sessions, and asks organizers to consider all eligible abstract submissions for their session.

Diversity includes topics of interest, career stages, geographic location, and demographics; designated underrepresented groups include, but are not limited to, women, Indigenous Peoples, persons with disabilities, members of visible minority/racialized groups, and members of LGBTQ2+ communities. [Please see here for more information](#) about what is meant by diversity, and for tips towards organizing an inclusive session.

Note that there will be a separate call for Scientific Sessions.

All proposed sessions should be in line with the [CMS Code of Conduct](#).

### Proposals should be submitted online, and will require the following:

1. Names, affiliations, and contact information for all session co-organizers. Early career researchers are welcomed to propose sessions.
2. The education session's title, and a 2-3-sentence summary that will be posted on the CMS Meeting website if your proposal is selected.
3. A pdf file including a description of the topic and purpose of the session (1-2 paragraphs), as well as a description of considerations made towards an equitable and inclusive session for a diverse group of participants. This file will not be publicly posted.
4. Indicate the number of time blocks needed. A block can be between 2 and 2.5 hours in length.
5. A list of potential speakers, which includes those who have tentatively confirmed to present, with their full name and affiliation. A request of tentatively confirmed speakers is based on the need to evaluate an education session proposal on EDI consideration. An inclusive and diverse set of speakers is highly encouraged.
6. The structure of your session. Traditionally, each presenter gets 20 minutes to talk, 5 minutes of Q&A, and a 5-minute buffer for transition. We are open to different formats as well, such as a panel, interactive session/workshop, 10-minute lightning talks, etc.

We kindly ask that organizers consider not presenting at their own session. However they are welcome to consider presenting at any other education session.

Proposals will be selected by the CMS Education Oversight Meetings Committee. If you have any questions, please email Andie Burazin ([a.burazin@utoronto.ca](mailto:a.burazin@utoronto.ca)) and Sarah Watson ([meetings@cms.math.ca](mailto:meetings@cms.math.ca)).

The CMS kindly asks session organizers to consider all eligible abstract submissions for their session, as up to 30 speakers per session can be accommodated.

All sessions will take place from December 12 to 14, 2026.

### Submission Form and Deadlines:

Please submit proposals by filling out [this form](#). There will be two rounds of submissions. Proposals submitted by June 19, 2026, will be considered in the first round, where preference will be given to first round submissions. The deadline for the second round will be August 31, 2026.

Submit Session

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## Call for Nominations: 2027 Krieger-Nelson Prize

Calls for Nominations

March 2026 (Vol. 58, No. 2)

The Canadian Mathematical Society (CMS) is currently welcoming nominations for the 2027 Krieger-Nelson Prize. This award recognizes outstanding research by a mathematician who identifies as a woman.

Deadline for nominations: September 30, 2026. No nominations or documents will be accepted beyond this deadline.

Visit our website for more information: <https://cms.math.ca/awards/krieger-nelson-prize/nomination-information/>

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## Call for Nominations: 2027 Coxeter-James Prize

Calls for Nominations

March 2026 (Vol. 58, No. 2)

The Canadian Mathematical Society (CMS) is currently welcoming nominations for the 2027 Coxeter-James Prize. This award recognizes young mathematicians who have made outstanding contributions to mathematical research.

Deadline for nominations: September 30, 2026. No nominations or documents will be accepted beyond this deadline.

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## Call for Nominations: 2027 Jeffery-Williams Prize

Calls for Nominations

March 2026 (Vol. 58, No. 2)

The Canadian Mathematical Society (CMS) is currently welcoming nominations for the 2027 Jeffery-Williams Prize. This award recognizes mathematicians who have made outstanding contributions to mathematical research.

Deadline for nominations: September 30, 2026. No nominations or documents will be accepted beyond this deadline.

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## Call for Nominations: 2027 Cathleen Synge Morawetz Prize

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Calls for Nominations

March 2026 (Vol. 58, No. 2)

The Canadian Mathematical Society (CMS) is currently welcoming nominations for the 2027 Cathleen Synge Morawetz Prize. This award recognizes an author (or authors) of an outstanding research publication.

Subject area for 2027: Geometry and Topology

Deadline for nominations: September 30, 2026. No nominations or documents will be accepted beyond this deadline.

Visit our website for more information: <https://cms.math.ca/awards/cathleen-synge-morawetz-prize/nomination-information/>

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## Call for Nominations: 2026 Inclusion in Mathematics Prize

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Calls for Nominations

March 2026 (Vol. 58, No. 2)

The Canadian Mathematical Society (CMS) is pleased to announce the creation of the [Inclusion in Mathematics Prize](#), a new award recognizing individuals or groups who have made meaningful contributions to fostering a diverse and inclusive math community in Canada.

Nominations for the 2026 Inclusion in Mathematics Prize will be open from **April 15 to June 15, 2026**. An overview of the nomination process and requirements can be found here by [clicking here](#).

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### CMS Student Committee

The CMS Student Committee (StudC) is excited to announce **four student-focused events** at the 2026 CMS Summer Meeting:

#### Student Social

**Time:** 7:30 PM, June 5 (tentative)

**Location:** To be decided

Relaxed social to meet other students! Free for all attendees.

#### Poster Session

**Date:** Saturday, June 6

**Deadline:** May 1

**Committee Members:** Kate Tretiakova, Ludovick Bouthat

Showcase your research! Presenters give a 3–5 minute overview to judges. Prizes for top 3 posters.

Submit your abstract: [Poster Form](#)

Poster tips: [Poster Guidelines](#)

#### Student Development Workshop

**Date:** Sunday, June 7

**Committee Members:** William Verreault

1-hour professional development talk for graduate students.

#### Student Research Session

**Date:** Saturday & Sunday, June 6 & 7

**Deadline:** May 1

**Committee Members:** Rebecca Abi Abdalah, Cherie Eze

**Contact:** [studc-summer26-talks@cms.math.ca](mailto:studc-summer26-talks@cms.math.ca)

Graduate students are invited to share their work in a supportive environment.

How to participate:

- [Register for CMS Summer Meeting](#)
- Send abstract to [studc-summer26-talks@cms.math.ca](mailto:studc-summer26-talks@cms.math.ca) by the posted deadline
- Late submissions may be considered

More info: [StudC website](#)

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## Message to Members about Presidential Resignation

Announcements

March 2026 (Vol. 58, No. 2)

### CMS Executive Committee

On November 7, 2025, Dr. Barbara Csimá resigned from her position as President of the Canadian Mathematical Society. Dr. Csimá served the CMS as president during a period of significant challenges that demanded extraordinary levels of time and commitment from all members of the Executive Committee and Board, well above and beyond what any of us anticipated when we took on these positions.

We acknowledge and appreciate the dedication and contributions that Dr. Csimá has made to the CMS, both before and during her time as president. Dr. Csimá, whose research is in computability theory and logic, is an outstanding mathematician in the Department of Pure Mathematics at the University of Waterloo who contributes greatly to the Canadian mathematical community.

Dr. Iliá Binder of the University of Toronto, who had been serving as Vice-President (Ontario), has been appointed as President for the remainder of Dr. Csimá's term. His vice-presidential role has been filled by Dr. Monica Nevins of the University of Ottawa.

We would like to apologise for the delay in clearly notifying our members of this change in our leadership.

[from the Executive Committee]

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