

We 're watching you . . .

mathASKS 148.5

FEATURING PROFESSOR MATTHEW SATRIANO

CLARIFIED: WHAT MADE YOU DECIDE TO GET A PHD IN THE FIRST PLACE?

My parents were both math teachers, so I got exposed to math early on. I also had a number of excellent high school teachers who made the subject come alive. They introduced us to abstract algebra concepts such as rings, fields, and vector spaces; I found the abstract formalism very clean. Another major influence for me was the Ross Mathematics Program held at the Ohio State University. The program is essentially an eight week course in elementary number theory taught through a series of problem sets. We were not allowed to bring any number theory textbooks with us and we had limited internet access at the time, so the only way we could learn the subject was through discussions with other students and guidance from counsellors. Mathematically, it was a formative experience. In college, I continued to get exposed to more and more beautiful areas of mathematics and decided I wanted to do research as a career.

CIX: CAN YOU DESCRIBE THE "BEAUTY" OF MATHEMATICS?

One thing I've always found beautiful about math is how introducing abstract formalism can unify and often simplify results. A concrete instance of this that I really liked when I first saw it was how the Jordan canonical form and the classification of finite abelian groups are both instances of the structure theorem for modules over a PID. This is an example where I think there is a lot of beauty in its simplicity.

CC: WHAT'S YOUR FAVOURITE THING ABOUT TEACHING?

I love getting students excited about the subject, helping them see some of the beauty in mathematics and its connection with so many other fields. I like how much energy students bring to the classroom, how eager they are to learn, and I love how many insightful questions they have asked me throughout the years. I also love how, once in a while, students will write me post-graduation to tell me how math is playing a role in their careers.

WHAT YOUR MATHSOC VPA IS DOING: PART 5

Hello! My name is Vincent, and this term I am your MathSoc Vice President, Academic.

I plan to update students in **mathNEWS** every issue about what I've been doing at MathSoc to improve the undergraduate experience in the Faculty.

So here's the highlights since last issue.

PROCTORING SOFTWARE

I've been advocating against the use of proctoring software in the Faculty, as you might be aware if you are one of the over 900 people who signed the MathSoc petition to institute a University-wide ban on proctoring software.

EMPLOYER TIKTOK INCIDENT

I met with CEE leadership along with the EngSoc and WUSA. We discussed the importance of employers following rules and protecting the rights of students. This was prompted by an incident in which an employer made fun of a student's résumé on TikTok. The employer has since been banned from participating in the Waterloo co-op system. They will not be allowed to hire students from WaterlooWorks or hire Waterloo co-op students from outside WaterlooWorks. That said, the student wishes to move on and so MathSoc hopes that after hearing the resolution of the case, that the student is given privacy and people do not continue to publicly post about the incident. Out of respect for the student, this will be my last public statement about the issue.

PD AND WORK TERM REPORTS

As I said I would in the last issue, I met with the Associate Dean, Cooperative Education to discuss PD and work term reports. The meeting went well and I hope we will soon be able to announce a big change that will improve the lives of co-op students. Stay tuned...

Vincent Macri
Winter 2022 MathSoc Vice President, Academic

N THINGS I MISS ABOUT WATERLOO

MY NEW CITY JUST ISN'T THE SAME...

- How close by my go-to destinations were to each other
- The local businesses and restaurants I love (shout out to J&J's Cards and Collectibles, and J&B Family Restaurant)
- Humans vs Zombies (SO cool to see it still running like, 10 years later)
- How big a deal Pi Day is (my new co-workers are amazed at my enthusiasm and slightly confused why I celebrate three times a year)
- The people, especially campus's bustling community (clubs, board games and **mathNEWS** peeps are all awesome <3)

A MESSAGE FROM MATHSOC: WHY INVASIVE PROCTORING SOFTWARE SHOULD BE BANNED

When University of Florida sophomore Cheyenne Keating felt a rush of nausea a few weeks ago during her at-home statistics exam, she looked into her webcam and asked the stranger on the other side: Is it okay to throw up at my desk?

He said yes. So halfway through the two-hour test, during which her every movement was scrutinized for cheating and no bathroom breaks were permitted, she vomited into a wicker basket, dabbed the mess with a blanket and got right back to work. The stranger saw everything. When the test was finished, he said she was free to log off. Only then could she clean herself up.

“MASS SCHOOL CLOSURES IN THE WAKE OF THE CORONAVIRUS ARE DRIVING A NEW WAVE OF STUDENT SURVEILLANCE”: [HTTPS://WWW.WASHINGTONPOST.COM/TECHNOLOGY/2020/04/01/ONLINE-PROCTORING-COLLEGE-EXAMS-CORONAVIRUS/](https://www.washingtonpost.com/technology/2020/04/01/online-proctoring-college-exams-coronavirus/)

During the pandemic, and even before it, many schools have used invasive proctoring software for online exams. This surveillance technology watches students through their webcams to attempt to scare them into not cheating. It can mean a third-party human proctor who is not affiliated with the university you attend watching you in your bedroom, it can mean AI monitoring your eye movements for suspicious behaviours, or some mixture of the two.

The University of Waterloo (or at least the Math Faculty) began using ProctorU, a proctoring software application, in Spring 2020. The first course to use it was CO 342, and the midterm went so poorly that the instructor stopped using the software. Students faced exam irregularities including: WatCards not being accepted, lost time due to connection issues, and just straight up not being able to start the exam. All of this while they felt extremely stressed from the surveillance they were being placed under. Thankfully, upon hearing of all this, the instructor never used the software again. That is the primary mark of a good instructor: listening to the feedback of their students.

After this disastrous trial, ProctorU was not used again in the Math Faculty. The Science Faculty used it a bit in Spring 2021, and MathSoc provided SciSoc with assistance in advocating against its use. Students in the Science Faculty also experienced issues and felt that their privacy was being invaded.

So what is the reason to use this software? Allegedly it's to prevent cheating, but the fact is any student who is sufficiently good with computers can get around its anti-cheating measures. Moreover, anyone who can get around the anti-cheating measures is probably going to get away with it, since you can't really detect if someone looked at their course notes when they weren't allowed to. In open-book exams, there are effective ways to detect or even prevent cheating. For example, randomizing exam questions so students cannot collaborate (or rather, so that collaborating would cause them to waste precious time working on a problem that isn't on their own

exam). But with a closed-book exam, how can you detect if a student looked at their notes once they find out how to bypass the proctoring software? You can't. While their surveillance tech might sound like an easy solution to cheating in online courses, all it really does is sweep cheating under the rug and allow tech-savvy students to get away with cheating.

On top of all of these issues, the entire software-proctored exam process is extremely stressful to students. Students have reported their proctor taking 20 minutes to find the exam once they connected (and other students have reported their proctor failing to find the exam and eventually giving up). This causes students to experience a lot of stress simply because the proctor they were randomly assigned to was not trained in how to do their job. Students who have technical issues, causing them to disconnect and have to pause writing their exam, also experience stress while trying to reconnect and seeing the timer continue to count down. Even if a student experiences only minor issues, having this happen while writing an exam puts the student under an extraordinary amount of stress. Under these circumstances, it would be difficult to say that their exam performance is an accurate reflection of their true understanding since the increased stress could negatively affect their exam performance.

Ian Linkletter, an education technology expert who has been targeted by a proctoring software company because he expressed criticism of them, sums up the entire issue well.

When academic surveillance software companies use the word “integrity” it's their way of saying without surveillance there cannot be integrity. This deceptive claim fools administrators into spending ed tech and learning design dollars on spyware with no pedagogical purpose.

[HTTPS://TWITTER.COM/LINKLETTER/STATUS/1501279860487901193](https://twitter.com/LINKLETTER/STATUS/1501279860487901193)

For these reasons, as well as many more I didn't get the chance to include because then this article would be 12 pages long (the current draft of the rationale for MathSoc's proposal to the Faculty to ban proctoring software is 12 pages), MathSoc supports a ban on the use of proctoring software. We are collecting signatures to show that this ban has widespread support, and as of writing on the morning of March 15th, we are nearing 1000 signatures. Any member of the University community can sign, not just undergraduates.

If you support a ban on invasive proctoring software, please sign our petition at <https://bit.ly/proctorpetition>.

MathSoc



STAIRWAY CONSTANTS, π NEWS

Two years ago in 2020 (before the pandemic!), I wrote about the computation of π in *Stairway.Constants* (**mathNEWS** 142.1). At the time, the most digits of π that anyone had computed was 50 trillion, set by Timothy Mullican earlier that year. Even using what was essentially a personal data center, it took about 10 months of full-time computation to get the job done. However, the amazing feat came with a disappointment: the previous record held by Emma Haruka Iwao of $\lfloor \pi \times 10^{13} \rfloor = 31,415,926,535,897$ digits was replaced by a less exciting number.

We can rejoice now, because there is a new adorable record in town! Last August, a team at the University of Applied Sciences of Eastern Switzerland finished computing π to $\lfloor \tau \times 10^{13} \rfloor = 62,831,853,071,796$ digits. This Monday marks the first Pi Day since.

While this is a new adorable record, purists might note the use of τ here. If that bothers you, you are welcome to build your own supercomputer to try replacing it with any of these next records:

- The “Is that a group theory reference?”:
 $64,561,751,654,400^1$
- The Very Loud:
 $\lfloor \pi! \times 10^{13} \rfloor = \lfloor \Gamma(\pi + 1) \times 10^{13} \rfloor = 71,880,827,289,760$
- The Hyperinflation: $\lfloor \pi^{28} \rfloor = 83,214,007,069,229$
- The Pie: $\lfloor \pi e \times 10^{13} \rfloor = 85,973,422,267,356$
- The Compromise:
 $\lfloor 3\pi \times 10^{13} \rfloor = 94,247,779,607,693$
- The Feynman: $9.99999 \times 10^{13} = 99,999,900,000,000$
- The Immeasurable Disappointment: 100 trillion
- The Overachiever:
 $\lfloor \pi^{\pi^{\pi}} \rfloor = 1,340,164,183,006,357,435$

Let me know when you finish, I look forward to writing about it in **mathNEWS** 157.5.

Exercise: celebrate Pi Day by throwing a pie at your local τ supporter!

water

1. As awesome as this is, if you actually burn a server rack just to surpass the current record by 2.75%, then I hope you get charged triple for electricity.



RANDOM WOK

RECENT STUDIES SHOW: ONLY 60% MAKE IT THROUGH THIS HEADLINE

New studies conducted by the University of Cambridge have shown there's only a 60% probability that the average young adult will read past this article's headline. Moreover, the research has concluded that the proceeding opening line will decrease reading continuity down to a concerning 53%. The study's psychological trials were conducted on young University students of ages 18 to 25, and are intended to showcase the limitation of the modern adults' attention spans. After learning that only a measly 30% of the studied population could read past 3 sentences and into this half the article, the research supervisor, Dr. Johnathan Risrché, made the following comment: “My study has conclusively shown that including a quote by a scientific expert leads to 23 out of 25 readers to drop out immediately. Why would you even bother asking me anything?”

Further comments were made by Risrché's colleagues, who instead wanted to thank the 1.5% of the young adults who could muster the strength to read the following 2 sentences about their breakthrough contribution in the field of psychology. In addition, they passed along the following message: “We would like to thank every individual person who reads our articles from start to finish. Tim, we know it's just you. Please stop sending us your angry emails.”

methNEWS

GOOSE MEME

Me: I can't wait to go back to campus!

Geese:



Jenna

METHNEWS REVIEWS: CAMPUS BUILDINGS

MC

I would describe MC exactly how I would describe the math/CS courses I took in its lecture halls: mighty, absolute, and kinda terrifying when you think about it. But if you take a deep breath and look at it at night, it's pretty beautiful. And I definitely had many opportunities to look at that building at night, with all the 2 AM study sessions I pulled for MATH 136.

M3

From the outside, it looks better than MC in every way: it's newer, fancier, and really freaking expensive. But once you come inside you realize it's a copy of MC, but not nearly as fun due to the lack of the C&D shop. So basically, it's a soulless wanna-be duplicate of a classic. Which is also how I would describe the stats courses I've taken there.

RCH

I took some of my first year math courses deep in the RCH basement, so it was the site of the lowest possible point in my university life—both by altitude and emotional state.

SHAWARMA PLUS / MOLLY'S PUB / MEL'S DINER

I know they're not campus buildings, but I decided to include those 3 fine establishments and bunch them together since they perfectly represent the 3 stages of my social life in 4th year: before getting drunk, currently getting drunk, and the morning after getting drunk. I probably had more fun in those 3 combined places than anywhere else on campus. Also, it's definitely where I had the greatest win/lose ratio when it comes to weight gained versus money left in my bank account.

DC

Quirky, exciting, and promises it's different than the other ~~gals~~ buildings. And honestly, it totally delivers. It has a decent library, a decent Tim's, and offers a decent opportunity to see an engineering student sleep in public with his crotch fully exposed. This part isn't even a joke, look up the "gear lab guy" on the r/uwaterloo subreddit.

THE EARTH AND SCIENCES BUILDING

A perfect representation of all the weird science kids I've met throughout my degree. Seriously, we pay tens of thousands of dollars to study in the best Math university in the country, and our lecture halls are a full 40 meters away from a fake mineshaft and a dinosaur fossil. I've come here to study CS, not participate in the most sleep-deprived rendition of *Night at the Museum*.

ST. JEROME'S CAMPUS

It's warm, it's welcoming, and it's the place where I ended up when I was looking for electives that were as far away from CS as conceptually possible. The building has a special place in my heart since I took one of my favourite courses there. Also, a prof for a philosophy course about death told me their Cafeteria serves alcoholic hot cider. So I have to check that out before I graduate.

ICON

While not technically on campus, this building will have a tremendous impact on those who are lucky enough to live there during their Waterloo journey. Nothing will make you feel like you're living the best of the bourgeoisie lifestyle as much as sharing a tiny room in a building that has a concierge. It's sleek, it's sophisticated, and it's a place for luxury living inhabited by luxury silverfish.

SLC

They call it the student "life" centre but for me it's a place of true desperation. Whether you're looking for a decent cheap meal or the relieving and comforting presence of a friend, you're probably not going to find it. Unless by "it" you mean the questionable combination of iNews sushi and Red Bull that you choose to put your body through during interview season.

THE mathNEWS OFFICE

So close, yet so mysterious. I've only been able to properly visit it a handful of times due to covid capacity restrictions that limited the office to exactly one occupant (in a miserable attempt to curb free speech). I'm not sure if it's the collection of random memorabilia scattered across the room or the lack of oxygen, but every time I enter it I feel a magical tingle. Alternatively, it could totally be the dangerous amounts of asbestos in the air.

methNEWS

NO RISK, NO FUN

Laughing, is risking to be ridiculous. Crying, is risking to look sentimental. Reaching out to someone else, is risking engagement. Expressing your feelings, is risking to reveal your true nature. Presenting your dreams and ideals, is risking to lose them. Loving, is risking to not be loved back. Living, is risking to die. Hoping, is risking to fail. Then we have to risk it all to exist.

The Lion Hunter

WORLDLE

By now the web-based word game Wordle has been around for a couple weeks and is quickly losing the novelty that made it grow so quickly. It is settling in to become just another puzzle game endemic to the genre much like crossword or sudoku. Although these games are enjoyed by many, they do not have the novelty or charm that Wordle did in its infancy. For those who feel this way, may I suggest you try Worldle.

Some may call Worldle a Wordle clone, coasting off the popularity of the genre without adding anything new, being merely a hollow echo of the cultural force that is Wordle. People who think this are wrong. Worldle is the pinnacle of the Wordle genre of games. So much so the name of the genre should be the Worldle genre of games. All that was liked about Wordle is still here—the sleek design, the easily shareable results in form of emojis, the single daily solution, etc. etc.—yet Worldle adds so much more.

I should probably explain what Worldle is, and how it differs from its predecessor. Each day, there is the silhouette of a country and players try to guess which it is, having 6 chances. Each guess reveals the cardinal direction between and the distance from the guessed country and the mystery country. This way, even if you do not know the silhouette, it is possible to triangulate the location of the country. If you think you recognize the silhouette but are not sure, do you try to guess a more centrally located country to gain more information or do you go with your gut and risk not learning much at all. So much strategy.

Worldle is also politically relevant. For Worldle 37, published on February 27th, the mystery country was Ukraine. This sort of biting political commentary isn't found in any other Worldle-esque game.

Worldle is also more valuable than Wordle. Allow me to explain. Much like how name brand clothing companies will do limited releases of merchandise to artificially lower supply and hike prices, Worldle is also a limited edition game. Depending on how edgy the developers want to be with countries like Kosovo, Taiwan, Palestine, etc etc, there will only be 200-odd editions of Worldle, and we are already at 38. Get in now before it is over. Experience it while it is hot.

Worldle also adds a whole new social dimension when playing with friends. If you guess the Wordle on the first try, you simply got lucky. If you manage to correctly guess Guyana for Worldle 25 on your first guess, you are now the coolest person in the room. If your friend is stuck thinking about Worldle 27—which is rather obviously New Zealand—for several minutes and becomes visually confused when they are told that the first letter is N, you can laugh at them as they have no clue what it is as you spell it out for them, then laugh at them more when you realize they thought it was Japan, and then write about it in a **mathNEWS** article a week later making fun of them for it. The memories created by Worldle will last a lifetime and your friends won't leave you when you complain

at them about how close you got to Liberia by guessing Sierra Leone or brag about how your hail Mary shot of Zambia on the 6th guess of Worldle 29 clutched the solve for you.

In conclusion please play Worldle, I want people to talk to about how sad I am I messed up Sweden and Finland somehow on Worldle 32.

aphf

🤪 YUM YUM YUM 🤪 !! PIE 🥧 OR PIZZA 🍕 ?

The creation of a false dichotomy in such a low stakes situation is indicative of the outrage culture perpetuated by modern media outlets. If you are upset then you will consume and will watch ads and keep the economy flowing with no knowledge input. It is the journalistic responsibility of the editors to propose a neutral, third party stance to the pizza/pie issue, and to do what is necessary to ensure the upholding of **mathNEWS'** high journalistic standards.

LEMMAN

The polarisation of the pizza-pie spectrum is dangerous to political discourse in this country. By choosing a side you alienate half the population. The only way to engage in this political debate is to not engage at all.

APHF

Crystal meth is the common name for crystal methamphetamine, a strong and highly addictive drug that affects the central nervous system. There is no legal use for it. It comes in clear crystal chunks or shiny blue-white rocks. Also called "ice" or "glass," it's a popular party drug.

METHNEWS

I, uh... um... whatever the person above me is taking, thanks

TENDSTOFORTYTWO

I like fortnite pizza. Inside each box, there are eight Slurphroom Pizza slices. The item is meant to be shared by an entire four-player squad, so each player can eat two slices. The pizza slices provide 25 Health and 25 Shield simultaneously but only until the player reaches a max of 100 Health and 50 Shield.

WINK WONK

enamoured

I like my **mastHEAD** the same way I like my **mathNEWS**: any size!
Because you're beautiful no matter what size you are 😊

AWESOME POINTS IV

CONTINUED FROM LAST ISSUE'S AWESOME POINTS III

AP LAUNCH — T + 9 DAYS

When Blas walked into the SLC dining area on Monday for lunch, it wasn't just Name at the table. Something like a third of the MathSoc Council had just happened to drop in to Name and Blas' usual lunch.

"Hi, all of you! Glad you all could join us for lunch; it's usually just Name and I," Blas said,

"Blas! Have you heard about what Gaming Club's doing?" Lu, a MathSoc Applied Science councillor who talked a lot during meetings, asked.

"Not since last week. what's up?"

"You know their Awesome Points program? The one that gives out points to people for talking in Gaming Club online chat? They're not only giving out actual monetary prizes for trading in those points; they've launched a subscription-based service to allow public members to join the Awesome Points program too! It's absolutely irresponsible and terrible of them, and an absolute waste of resources. We're calling an emergency council meeting as soon as possible—that's two days—to shut them down.

"For some reason—it should be cut and dry—it's a controversial issue for some of the other councillors. There's thirty-five votes on council right now, and we're just going over how the battle lines are split. I've tried to gauge sentiment over the weekend online, and it looks something like this:

"On our side, Anti-Awesome Points, we have the execs, CFM, Math Studies, PMAMCO, Name here in SE, and ActSci. That's fifteen votes we can count on.

"The people who I've counted likely to vote against the removal of AP—that is, Pro-Awesome Points—are CS, Business, and Stats. Very divided along program lines, like usual. That's *twelve* votes against us! I thought this would have been unanimous.

"We're left with our Teaching Rep, Maria, the First Year Representatives, and the other SE Rep who haven't expressed any opinions. We just need to convince three of them, and we've got a majority." Lu's eyes burned with fire as he finished.

"I'll take care of SE." Name said. "If any of you run into the First Year Reps, online or in-person, talk them into voting for us, okay?"

"Sounds like a plan." Denver, the MathSoc president, had just pulled out his laptop. "I'm sending the notice of emergency meeting now. By Wednesday night, Gaming Club and Awesome points will be nothing more than scorched earth."

#GAMING-CLUB-EXECS

Arthur (VP Gaming) 1:10 PM

Folks, the day of reckoning has been announced. Here's the email I received today:

SUBJECT: MATHSOC COUNCIL EMERGENCY MEETING

Hello all,

I am calling an emergency meeting two days from now, on Wed. March 16 at 7 PM. Please find attached the agenda for the meeting. I'm putting forth a motion to shut down Gaming Club's recent irresponsible actions regarding the Awesome Points program.

Have a good one,

Denver Matheson,
President, MathSoc

Arthur (VP Gaming) 1:11 PM

I've looked through the agenda and it's just as bad as it sounds: they want to just shut down Awesome Points just like that...

Based on sentiment in the MathSoc channels, we have more supporters than I expected—however, it still seems that the vote favours the enemy.

Josephine (VP Finance) 1:13 PM

okay relax everyone

we've prepared for this...

i chatted with maria and since our finances are in line now, there's nothing in the mathsoc policies that can shut us down this is gonna be a pure judgement fight on council

wombo, hit the propaganda engine with your "save ap" campaign

arthur get me a list of councillors that are on the fence, i want to have a chat with them

president lightSoul... I've talked with manacorp and operation jupiter is a go if we need it... let's hope we don't

lightSoul (President) 1:13 PM

time 2 game 🎮

[3 🎮]

MATHSOC EMERGENCY COUNCIL MEETING — T - 2 DAYS

Seated in the Gaming Club's small meeting room next to their main office, four first-year representatives looked at Arthur and Josephine with cautious interest. Josephine had brought out a store-bought charcuterie board and some sparkling juice for the meeting.

“—To put it simply, I'd like to ask for your support at the upcoming MathSoc emergency meeting.”

Josephine gave a short spiel—engagement, community, and fun—but what she really planned on using to convince these first years was said in closing.

“In addition, as a thank you for your time, I'd like to offer some gift cards on behalf of Gaming Club. These ones are a hundred dollars each, redeemable at Conestoga Mall, made possible by our revenue from Awesome Points. If Awesome Points is allowed to continue, I'm sure there'll be more rewards we can provide for math students. Thank you for your service to MathSoc.” Josephine smiled. With Gaming Club's private ManaPay account hidden from MathSoc, she had deniability even if the councillors accused her of unethical behaviour; say, bribery.



Meanwhile, Name found Aaron, the other Software Engineering councillor, in the SE lounge.

“Hey Aaron. How are you?”

“Trying to finish this SE 350 assignment.”

“Yeah... SE 350's tough, isn't it?” Name had found it easy, actually, but now didn't seem to be the time to mention that. “Aaron, can I ask for your vote in favour of striking down Awesome Points this Wednesday?”

“Huh?”

“There's a MathSoc emergency council meeting where we're putting an end to some borderline-illegal activities.”

“Sure, whatever.”

“Thanks, Aaron. And if anyone else talks to you about this, don't forget you owe me one from that group project. Oh, and check line 156 there—you have a bug.”



Josephine knew the fifth first-year representative from an incident from a few months prior. Alex had been using some rather unscrupulous “academic assistance” websites on Gaming Club's computers while working on an assignment, and she'd caught him. Josephine hadn't reported the cheating, but had it logged in her files in case they were ever needed. And it appeared that today, they would be.

“Hi Alex. I just wanted to ask you if you've decided how you're voting at the emergency council meeting? I know you're a good, longtime member of Gaming Club and I'm sure you'd hate to see the Awesome Points program go under, right?”

“Right.... but President Denver's talked to me and he says there are issues concerning—“ Alex stopped as he saw the

black folio Josephine had pulled out, upon which was written ‘Academic Integrity Violations.’ “—But I'm sure those issues will be ironed out and you'll have my support.”

“I'm glad to hear it.”

MATHSOC EMERGENCY COUNCIL MEETING — T - 1 DAY

Only Maria left to speak with, thought Josephine. Maria, Josephine's close friend and advisor on all things MathSoc. They met in the TSA office; a cozy, quaint affair.

“I'm not taking a stance on this, for or against.”

“Please, Maria. I need your help this time. I've put in months of work for Awesome Points, and it's been doing so much good for our community. It's making us meaningful connections!”

“Josephine...” Maria idly fingered a flower brooch she'd tucked into her hair. She continued slowly and deliberately. “You're a good orator. Very good. I'm sure you know that, judging by the way Gaming Club gets so much of what it asks for.”

Josephine flushed. Maria wasn't normally one to hand out compliments. “Th-thank you.”

“The concern I have with Gaming Club doesn't involve any of your skill. You've proved adept at managing finances, recruiting members, and fighting for club space. Your ability to create programs like Awesome Points shows technical prowess among your executive team.

“My concern is with the way Gaming Club approaches everything with the attitude of a metric to be hit. Awesome Points skyrockets your metrics, but are people *actually* caring more about Gaming Club? Or are they just in it because it's a fun new gimmick that's taken off? I bet you've asked the other people on the fence to vote against the motion too. But what if President Denver and Councillor Person have a point? Have you thought about that? You just get an idea and some metrics and focus on those to the bitter end without any second thought of the *why!* Josephine, you need to think about the *why first!* Not as an afterthought to justify whatever you're doing. It has to be *first!*”

Josephine was silent. This was not what she'd expected. She just hoped she hadn't just turned Maria from neutral to Anti-AP. “You're right, Maria. But we *have* been thinking about the why. Low engagement because of the pandemic, and that's what we need to increase to make Gaming Club better.”

Maria just nodded. And then she changed the subject to something completely unrelated to Gaming Club or Awesome Points or MathSoc, and Josephine didn't try to steer it back. We'll find out whether Awesome Points lives or dies tomorrow, thought Josephine.

To be continued...

TURNING RED IS TURNING HEADS — A REVIEW

The newest Pixar Disney film has released — *Turning Red* is Disney's first production with all-female production heads. But that's not just it — it's also one of the first forays into exploring urban Canada as a setting, and not just the film set. How many films explore cities like Toronto, Vancouver, or Edmonton and truly go in depth? How many films just go onto the streets of Toronto and call it New York or Chicago? Directed by Chinese-Canadian Domee Shi, the film not only explores the period piece of the early 00s, but dips into the ideas of generational trauma and early teenhood with nuance and depth and transforms Toronto into a pastel urban maverick.

NOTE: There will be **spoilers** ahead. If you haven't seen *Turning Red* and wish to let the film be your first experience, don't read this article.

Set in the year 2002, *Turning Red* centres around Meilin Lee, a 13-year-old Chinese-Canadian girl who lives in the Dundas/Spadina neighbourhood of Toronto's West Chinatown, alongside her parents — overbearing but well meaning mother Ming and observant and aloof father Jin, who both run the Lee family temple. Mei balances her duties at the temple with her school and social life with her friends Miriam, Abby, and Priya. After Mei ends up accidentally being humiliated by her mother over drawings she makes of a crush, she wakes up and finds that she has turned into a red panda — revealed to be a hereditary ability passed down by her female ancestors. What follows is an adventure into Mei coming of age, tossed between her duties to family and tradition, as well as her desires and identity. I'll keep it short and simple to avoid spoiling it too hard, but it goes into some deep territory regarding intergenerational trauma and identity in a family-centric culture.

I'd like to start this off that from the first second, this film spoke to me. Visually, emotionally, in every sense, *Turning Red* called me out and read me and my struggles for filth. From the first second, the film turns every second you spend in Toronto into a visual pastiche, a tribute to the largest city in Canada, and pays homage to the many ethnic groups you see. Mei is Cantonese (which is no doubt extra effort on Domee Shi's part, as she is Mandarin), with her friends and associated classmates reflecting a diverse group. We have Miriam Wexler (likely Jewish), Abby Park (Korean), and Priya Dewan (Indian, maybe Pakistani?), as well as the security guard Malik (Punjabi), school bully-later-friend Tyler Nguyen-Baker (Caribbean/Vietnamese, judging by both name and his father's accent), so to see all this and more was amazing. A lot of people gave the film's artstyle flak, but I disagree — it was very obviously inspired by anime and manga like *Sailor Moon*, *Fruits Basket*, and *Inuyasha*, as well as Studio Ghibli's many works.

The soundtrack is composed by Ludwig Goransson, famous for the soundtracks of *Black Panther* and albums like Childish Gambino's *Because the Internet* and *Camp*, marking his first animated film soundtrack composition. Again from the first second, the music establishes a blend between traditional

Chinese folk music (especially one scene that sounds like a Chinese New Year dragon music track) and the techno hip-hop trends of the 90s-00s — especially the orchestral hits. My god, the amount of orchestral hits. Additional to the soundtrack is the boy band 4*TOWN, with three hit tracks that are incredibly catchy, enough so that the ES Coffee Shop added one of them to the playlist. (Stop by! We're in EV1. Perfect study spot for midterm and finals.) The reason why they're so catchy is because they're composed by Billie Eilish and her brother FINNEAS, who also voices one of the members — hearthrob Jesse (who also has two children, officially, despite looking like he's 18...).

I can't begin with how I feel about the Cantonese representation I've been yearning for 20 years. To see quintessential parts of my culture and upbringing, especially represented in a film set in my very hometown, from the old TVB logo to the exact way Mei's mom sighs in that Cantonese Way™, not to mention the intermittent Cantonese sparkled in the background and the details of Mei's relatives and local elders, the way Jin answers a phone with the “Wui?”, the Ontario license plates, I can't stress how much I've been wanting something like this. I'm hoping that Domee Shi can explore more of Mei's story — perhaps not as a full feature film, but maybe an animated series/miniseries like *Big Hero 6* did, considering the amount of effort put into this only to be released on Disney Plus. So, from the bottom of my heart — thank you, Domee Shi. Thank you for seeing people like me and giving us something we never knew we needed but we want so much more of, and also reading us for filth.

(Also, because this takes place in Chinatown, there's a very real possibility that my own parents, who spent lots of time in the Chinatown area in the early 00s, have become Disney canon.)

Skit

A COMPREHENSIVE REVIEW OF ELDEN RING

Started the game with a big metal bowl on my head. Died to the first boss because you weren't meant to beat them, rage quit for 365 days. Got called maidenless n times where n is an arbitrarily large natural number. Held hands with my bae Melina (not before marriage). Then went out of bounds, ran to the final boss, sequence broke them until they died, and proceeded to shitpost on reddit about how the game was too easy and was for kids.

All in all, 9.5/10, next time I request a full marriage scene to get a full 10/10.

Wink wonk

COOL PICKUP LINES THAT WE THOUGHT OF IN AN HOUR

LINEAR ALGEBRA

- are you a MATH 135 problem because i think you could use some DIC
- are you in MATH 145 because i think you could use some COQ
- are you my denominator because i should be on top of you
- are you a complex number because you're imaginary (-:-)

CALCULUS

- are you a geometric series with an absolute value of r less than one because i would like to converge with you
- are you logistic growth where P is less than M because i would like to increase the population with you
- are you my calculus homework because i want to do you on my table
- are you a derivative because i want to lie tangent to your curves
- is the power series limit of our ratio test infinity because our radius of convergence is 0
- are you an integral because i'd like to explore the area between your curves
- are you the limit of $\sin(x) / x$ as x goes to infinity because i would like to use the squeeze theorem on you
- are you a substitution integral bc i'd like to sub u into me
- are you the antiderivative of $\ln(x)$ cause i want you to integrate my natural log
- call me the second derivative test because i want to explore your concavities
- are you $1 / \cos(x)$ because you're $\sec(x)$

ENGINEERING

- are you a short circuit because i can't resist you
- let's find the spring constant of your mattress
- are you a massive pulley because you've got some massive pulleys
- are you a dielectric because i want to put you in between my plates
- i'm so hungry for youahaha :lipbite: :weary:

CS

- are you efficient because i would like to make some big Os with you
- you seem to be programming by side effects because you are imperative to me
- are you a stack because i want to be pushed on top of you
- are you malloc because i would like to request $10 * (\text{sizeof}(\text{int}))$ bytes of your phone number

- i'd like to be your dereference operator so i can find your address
- while (1) { go out with me; }
- are you insertion sort because i'd like to insert my biggest element into you
- i heard you like cs, let me introduce you to my python
- i seem to be missing my null terminator because my love for you is overflowing

masterdaters

THEA, LEM

FALLEN FOR ME YET?



Cix

Based on *Mathematical Induction* from mathNEWS 144.2.

Characters © MathSoc Cartoons ☺.

sasmsQUOTES

Once again, **mathNEWS** correspondents attended some Short Attention Span Math Seminars (SASMS) organized by our lovely neighborhood Pure Math, Applied Math, Combinatorics & Optimization Club (PMAMCOC). Below are a collection of memorable and funny quotes from the seminars presented. If you think you have what it takes to make it onto this list, please contact our lovely neighborhood Pure Math, Applied Math, Combinatorics & Optimization Club (PMAMCOC) for more details—they would love to have more Short Attention Span Math Seminars (SASMS) speakers for the next iteration, probably!

Now, onto the quotes.

SYED MUSTAFA RAZA RIZVI — THE ART OF GOALKEEPING

- “We’re going to stretch the definition of goalkeeping a bit.”
- “Your opposing team has a BM-21 Grad rocket launcher.”
- “You have 90 million dollars lying around. You spent 51 million of those dollars buying the Iron Dome, the strongest anti-missile system in the world.”
- “I lied to you, this is not about goalkeeping, this is about rocket launcher and missiles.”
- “Let’s setup our model and blow some stuff up.”
- “I’m just going to define some equations, put it into $F = ma$, and then solve it. Well, I’m not going to do it, the computer is.”
- “Right now I’m just imagining [the projectile] is a cannonball or something... a football!”
- “That’s really it! We just solved an equation. Don’t worry about this mess, it’s fine.”
- “It’s not too bad, it just looks ugly.”

GAVIN OROK — QUASI-MONTE CARLO METHODS

- “We know from our calculus classes that integration is really hard.”
- “And the answer is no. That is the end of my talk. (*walks out*)”
- “I’m not going to draw a fourth dimension.”
- “This is where my computer comes in.”
- “You can just generalize this case by adding more zeros. It’s like a dream.”

JOSUÉ KURKE — HOW TO PROVE VIENOGRADOV’S MEAN VALUE THEOREM

- “We ask really boring questions that no one really cares about.”
- “For $k = 1$, that’s just a linear equation. I think everyone here can solve that, otherwise you might want a refund on your degree.”
- “If you don’t know what [Holder’s inequality] is, don’t worry about it, I’m just pulling it out of my ass.”

- “You try to cozy up these equations, take it out to dinner, get it to reveal its secrets.”
- “Contrasting constraints—nice little tongue-twister for you, try to say that three times real fast.”
- “I can do whatever I want... I have all the power!”
- “It’s really great doing talks like this where I can brush everything under the rug as ‘technical stuff’.”
- “If you need a date [to the Math Grad Ball], I will be your date. I already have three of them, don’t worry about it.”

EVAN GIRARDIN — ANALYSIS? OH, YOU MEAN LINEAR ALGEBRA?

- “I’ll make you revisit your memories. It’ll be great.”
- “Hmm, it’s a hard problem. Well, I’m not going to answer this problem.”
- “I’m going to imply with no justification whatsoever that path-connectedness implies connectedness.”
- “So I’m gonna make a little mistake here.”
- “You might have seen this if you’ve seen a 3blue1brown video.”
- “(*throws his chalk away*) I threw my chalk away.”
- “I will leave the proving of these things as an exercise to the readers who know how to do analysis... because who cares, right?”

R. E. Porter

JUS JUGO JUICE

Jus Jugo Juice
 Juice Juice Juice
 Jews Jews Jews
 Chews Chews Chews
 Choose Choose Choose
 Jews Choose Chews Jugo Juice

In going for the Jugular of the Juice of Jugo I juggle the jungle japes gymnastically, genetically, germinated Gentile, Jew and gendered German Jerma. Jarringly I just jinky gym keys just like Jennifer Coolidge joins the Jonathan Johnson & Johnson’s Jamaican May can jerk chicken. There’s Juliard’s Julie hardly legion of Juliette etymology just jestingly jumping jerk. Jacquelyn Catering jittering jizz Turing machine jushing douche juicing Jeremiah’s Maya Jarrod King Herod justified Jesus’s G-sus is King of the Jews. Just like Jinny knee gin and tonic ionic neuronid nidge nudge and judge. Jacobian be in jack-o-lantern in turn jacks up the price judicial superficial jush. Jasmine mineral Gerald rids jigs jug jogging jiggling.

What is the jole here?

It’s pronounced “hoo go.”

Deriving for Dick

ON “JUS JUGO JUICE”

TIER 0:

Nonsense. Low quality because Jugo Juice is overpriced and a subjectively underwhelming smoothie experience courtesy of UW Food Services.

TIER 1:

A parodic poem doused in alliteration/consonance/assonance. A subliminal advertisement for a smoothie joint bookends the first stanza and wham-line. It seems disjoint due to the second verse requiring double the amount of time to read and comprehend compared to the first.

TIER 2:

Commentary on the name “Jugo Juice” rather than its existence. The name of the restaurant does not have consonance. The rest of the article is on a mission to mislead you into misreading and likely you fall for its trap. Religious subtext and Biblical allusion is present but does not actually give meaning or substance to the prose.

TIER 3:

Unintentionally ingenious writing. The phrase “Jarringly I just jinky gym keys just like Jennifer Coolidge joins the Jonathan Johnson & Johnson’s Jamaican May can jerk chicken” could be grammatically correct by the addition/removal of a single word. A crash blossom as someone put it.

Also a contribution, “What is the jole here?” is a phrase borrowed from fellow **mathNEWS** author. I feel as if it is a perfect ending to a shattered and imperfect world.

TIER 4:

A metaphor on trauma. I have tricked even a Spanish speaker to read “jugo” with a hard “j”. Have you reread the article with your newfound knowledge? Have you realized that the rhythm and flow is disrupted with the true pronunciation of “jugo” in your vocabulary. The experience of the article is never the same when you have gone through it once. A traumatic event will continue to prevent you from experiencing life in a way that is new. You will never be the same. Your experiences at Jugo Juice will not be the same. You may inform people and dump your trauma on them but they will have a hard time believing you. Trauma is collective. Jugo Juice is in our plane of being.

Deriving for Dick



THE MATHEMATICS IN SAILING

It may sound weird, but lots of boats can actually sail faster than the wind. Boats basically make their own wind, which makes them go faster.

To explain this we just need vectors and relative velocities. Everybody knows that you feel a headwind on your bicycle that grows with your speed on the bike. The same is true for boats: the faster you go, the bigger the headwind becomes. The headwind then adds up with the true wind, which results in a faster relative wind. Let us use vectors to describe this.

We call the true wind on the open sea \mathbf{v}_w and the boat speed vector \mathbf{v}_b . Together they form the relative wind \mathbf{v}_r . The equation is $\mathbf{v}_w - \mathbf{v}_b = \mathbf{v}_r$.

Let's assume the wind comes straight from behind. This is called a downwind course. As the boat speed approaches the wind speed, the relative wind drops towards zero and so there is no force on the sail. So you can't go faster than the wind on the wind.

When the wind is at an angle, however, we can go faster than the wind. We just have to subtract the arrows representing the wind and boat velocities. The relative wind then becomes bigger than the actual wind speed, as displayed in the picture below.

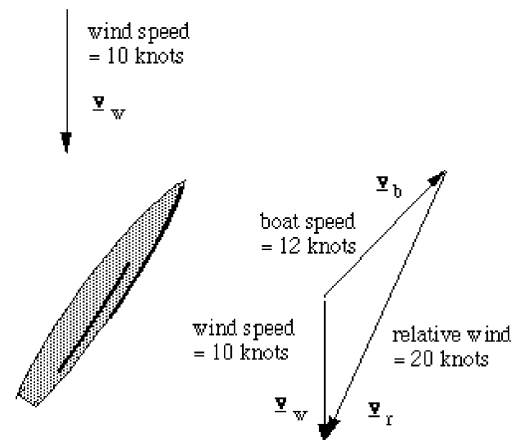


IMAGE FROM <http://www.phys.unsw.edu.au/~jw/sailing.html>

The faster the boat goes, the greater the relative wind becomes, the more force there is on the sails, so the greater the force dragging the boat forwards. The boat accelerates until the forward component of the force from the sails is not strong enough anymore to overcome the drag from the water.

Even if you are a total beginner in sailing, you can sail a boat that can go faster than the wind. For instance, just ask for a boat called Laser at any sailing club.

RETROSPECTIVE RETROSPECTIVE

Play “*Oh no we lost all the articles*” at an online **mathNEWS** Production Night near you. Find five other games at chilitrumpet.gitlab.io.

I concluded my retrospective articles on the games *cy* and *I* created in an emphatically ‘final’ way—I wrote up my remaining thoughts, threaded a little narrative arc through our experiences of making those games, and even finished with this whole paragraph thanking everyone who played the games and encouraging the reader to pursue their dreams and let nothing hold them back—so it feels weird to come back around here with one more long-ass article. I'm doing it anyway. The last retrospective, the last game...

Oh no we lost all the articles. “A multiplayer game of guesswork and literary imitation,” the synopsis says, written by a younger and seemingly far more eloquent me. Here's how it works: everyone is shown the title of one random **mathNEWS** article, the article's author, and a random sentence from the article body; your task is to write something that could pass off as that article's first sentence. Everyone's sentences get piled into a list, and from that list you have to choose what you think is the *actual* first sentence, hidden in a sea of imposters. Points are awarded to correct guessers and convincing fakes.

I didn't come up with this idea. I took it from this board game with pretty much the same premise but with classic literature as the subject matter. Right away it hit me—*we could do this with mathNEWS articles!*—so the ‘brainstorming’ phase for this game was the shortest of them all. This meant a lot of the hard work of actually figuring out what to make was done for me.

Still, making this game took a really long time. I spent many hours reading through and adding a few hundred handpicked articles to the game's database (a JSON file). We also needed to program an online synchronous multiplayer game, which neither of us had done before, and which came with several time-consuming pitfalls. Near the end of development we even played a test session with the editors, which was invaluable; it's all thanks to those 30 minutes that the game has all the sensible input length limits and string sanitation you'd expect. The final product is solid where it counts and horribly brittle where it doesn't—there is only one ‘room’, there are no instructions, there is no way to kick anyone. The only feasible way of playing is via well-coordinated Discord call, which is coincidentally all that I needed.



The reason why I never gave this game a proper retrospective was because I hadn't played it when I wrote my last article that term. We planned to debut *Oh no* at the **mathNEWS** End Of Term event; my article comprised exclusively of anxious but hopeful musings. We spun up a little server, got the game working, and let everything sit while we waited for its time.



The reason why I never gave this game a proper retrospective until several months after that End Of Term event is because I consider this game a failure. It took me a while to fully process this. We played *Oh no* a few more times meanwhile, and every time I was sort of hoping for something to change about the game or about my perception of it, but very little ever did.

Something can succeed or fail in more ways than one. I touched on this in my *Final Retrospective*, where some games were particularly interesting to me but didn't mesh with the other **mathNEWS** writers, where some games were small and barebones but I felt like I had gotten a lot out of the experience of making them. When I apply this type of thinking here, I can only conclude that *Oh no we lost all the articles* fails in almost every metric relevant to me.

For one: it's a very difficult game. Writing is not easy, and writing to emulate someone's writing style is much harder. It takes a lot of single-minded focus that doesn't suit the casual atmosphere of an online Production Night. It's also stressful to have your sentence be judged by others—yes, on an arbitrary and silly metric, but still judged.

And when you're playing with ten other people, all of them typing away and dead-silent, it's easy to just give up. *It's not like it really matters if one entry out of eleven is obviously wrong*. I've thought something like this several times while playing, and I'm the one who made this game. Several people resorted to writing joke sentences or cypypasta, and I don't blame them. People usually stopped playing without saying anything (one thing I am proud of is the *Oh no*'s robust hot-join and -leave system), perhaps to not disturb everyone's concentration. I don't know. Nobody really talked about the game after we stopped playing it.

To be clear, I'm attributing this to *Oh no* being a dull game for most people, and not because the players were wrong or whatever. It is a game of nonstop stress and concentration that can't be fixed by its casual appearance and lack of time limits. The multiplayer aspect thickens the atmosphere; everything is slowed down and everything has pressure. It's just not enjoyable unless you're the type of person who's particularly into that sort of thing.

Thankfully, there was at least one person who fits this description (besides me). I'll call them my rival, because that's how I think of them when we play. They really like the game, I think; most of the post-EOT games of *Oh no* were hosted at their request. They're also really good at this game, like shockingly good. I'm not bad myself, but a lot of the points I score come from residual memories of the right answers, not because of my writing ability. My rival is really good at coming up with believable first sentences, even if they diverge wildly from the truth, which is really the fundamental point of *Oh no* and which makes me really impressed every time. So, thank you; you're half the reason why I wrote this article.

The other half is a bit more introspective and touches on what I think is the core reason why I consider this game a failure. When I got the idea for *Oh no*, underneath the initial, practical impetus of *this idea works really well and will save me a lot of work*, I liked the concept behind *Oh no* because it lets me express something very important to me in a powerful way. What I was trying to say when I made *Oh no we lost all the articles* was that **I like every article in mathNEWS**. All of them are good.

So the game was essentially an attempt to communicate this idea.

Everyone's surprised when I say that I compiled all the articles and sentences by hand, copy-pasting them one at a time, but there was clearly no other option. I went through and collected articles from every issue in "The COVID Era"

of W20–S21, as a sort of gesture to all the articles written and never printed. I wanted *Oh no* to be like a celebration, a look back at a year and a half of these online issues with their full-colour cover pages.

It's starting to get difficult to untangle things starting from here. It's complex. Ultimately there is no real concrete reason why I felt that this game didn't end up communicating what I wanted it to communicate, there are only vague gut feelings, crowded thoughts. I sat on this article for several weeks at the end of the previous sentence and didn't get any further than this, but the people I showed my draft of this article to liked it as-is.

girafarig

C++ IS NOT A LANGUAGE

You heard me. C++ is *not* a language. Actually, for that matter, neither is Java, nor Python. Why? Let's look at the properties they bring to the table. No matter what you write in C++, per documentation, there is only one way for a compiler (the receiver of the message) to interpret it. The output of this message, the semantics, will be unambiguous, and the same input will always produce an identical binary output. In fact, every word of the language has a precise, context-sensitive definition that can be empirically determined, and it is precisely this quality that rules out C++ as a language.

It is now that we turn to the words of old dead people. The Platonic Theory of Forms ascribed a precise, absolute meaning to abstract linguistic concepts, part of that classic Greek tendency to attempt to pin down the terrifying *apeiron* (void, formless chaos) within *peras* (order, limit). Under this system objects (and words) each have a Form, and one may be able to make a better case for our deterministic programming "languages" to fall under the category we love to absentmindedly place them in.

Modern thinkers, however, tend to disagree with Plato. The great linguist Ferdinand de Saussure, father of Structural Linguistics and Semiotics, viewed language as a system of signs (words), with each "signifier" representing a conceptual "signified," for which the sign (word) was the synthesis. The semantics of these signs comes both from their relationship to all other signs in the system, and also from the collective psyche of a community, seen as an organic, dynamic system. In contrast, a language like C++ has its semantics determined by committee in infrequent, absolute instances. Modern linguists view language as having more fascinating, unreplicable properties, with Chomskyan Linguistics outlining the "creative aspect of language use". A human placed under the stimuli of language may feel *excited* and *inclined* to interpret and act a certain way, but are by no means *compelled* to do so. A computer executing a program is fully compelled to act, and is so obliged to act under a specific interpretation of the content of said program.

Referring more to Chomskyan Linguistics, it is commonly theorized today that the human brain contains a "language faculty," in which the physical structures and interpret and produce language are located. Within the language faculty are contained the structures that form our mental representation of words—extremely complex concepts that we are unable to pin down or truly define with other human words. It is in this that lies the linguistic proposition that no true synonyms exist—no word can truly embody the same semantics of another word, nor can any such combination of words. This lack of interchangeability in semantics is another property not reflected in our programming "languages." In fact, it is even possible for syntactically correct sentences in C++ to have *absolutely no meaning*. Baudrillard wrote: "what is inherent to 'weighty' enunciations, to articulated forms of meaning... is that they cannot be translated into each other, any more than the rules of a game can be." We quickly see that this is not the case with our linguistic imposters. Even working with the Chomskyan Universal grammar, while we can establish an unambiguous grammatical interpretation of a sentence, we fail to establish an unambiguous semantical one, owing to our dynamic, social, and relational semiotics.

The postmodernists, to which Baudrillard attributed his ideas, and to which Chomsky contributed, have been pushing this uncertainty of meaning and absolute rejection of Platonism as the logical conclusion of all of modern linguistics, and to bring the first-stage simulacra that is the programming "language" under the general yoke of "language" is completely antithetical to all of contemporary semantics. Their unambiguous, deterministic interpretations run perpendicular to the dynamic, creative, and multifaceted meaning that human language brings to the table. The programming language is a paltry approximation of the language, characterizing it as such is disingenuous in nearly all of its properties, and most of all, C++ is *not* a language.

THE ADVENTURES OF PROFESSOR M. GOOSE CHAPTER 4



Welp. It's been quite a while since the story of Professor M. Goose has been told. Why? Well he died. Yep, after accidentally making a portal into an corrupted student's basement, bringing along a math student who jumped in his portal, and receiving the fabled coursenotes of A. Gaoldenhart from some weird old man (always accept free stuff from old men folks, especially if they tell you to go in their van to get it), Professor Goose just died.

But he's all better now, conveniently at the same time in which midterms are mostly over. Also free pizza's back! This is all a coincidence.

Anyway, after dying on the spot, Professor Goose is back, as if nothing ever happened. In fact, his adventures are continuing. Dusting off some residual dirt after getting out of the convenient gravestone that manifested in the basement while he was dead, he turned to face the math student.

"Well shall we?"

The math student adjusted their classy cat ear headphones and nodded. They began to climb up the stairs. With a small sigh, Professor Goose lifted his wing and opened the door.

He wasn't sure what he was expecting, but it wasn't this.

It had a seven foot frame, the souls of depressed math students(probably redditors) on his back, and when he calls their names, it all fades to black. His eye peered into the broken dreams of the students, and he feasted on their screams. Also, there was a terrible stench. It doesn't rhyme with the rest of this description but it was pretty noticeable.

The math student glanced at the Professor. "So this is A. H. C."

and the Professor hurriedly put his wing over their mouth.

"Shh! We don't talk about [REDACTED]. His name has power," he whispered through a clenched beak. Maybe they were imagining it, but as he finished talking the souls seemed even more agitated.

You know, the writer should have probably thought of this sooner, but it's getting pretty confusing to refer to all these different math students. There's like the non-corrupt one that went in the portal, but also this monstrosity, and also these souls. Almost like the writer didn't think this through or something. Conveniently, the Professor looked at the math student at this time with a quizzical expression.

"Not that I care, but do you have a name I can call you by?"

The math student had a pretty murderous gleam in their eyes and seemed more focused on the blood-spattered baseball bat in their hands, but they gave a quick glance to the Professor.

"It's $\sum nd2d2ylog|y-n|-4\pi2+14i\pi\delta'(y-n)$." An explosion went off behind them from, sunglasses appeared over their eyes, and they ran towards the creature, landing a hit on the corrupted student's tail with a satisfying *thwack*.

And... I've already forgotten, and don't care, thought the Professor. He lifted the course notes, which had begun to emit a golden hue, and uttered his first spell.

To be continued...

Not a N*rd

Hello fellow math god! Want to decide what happens to Professor M. Goose? Come to the next prod night or email your suggestions to professormgoose@gmail.com.

Also, the past 3 chapters are from 147.4 to 147.6.

I AM TOO LAZY TO COME OUT AS NON-BINARY

SO I WROTE A WHOLE ESSAY INSTEAD

You might read the title and think, aren't you coming out just by writing this article? The answer is nuanced. I think we too often view coming out as the binary action that you complete once and it's done, but coming out is more of a continuous process. There are degrees of coming out of disclosure to how you describe yourself. You come out to yourself, to your family, to your community, to the public. As long as you seek connection with others you continue to come out as people's understanding of you grows. This extends farther than just LGBTQIA+ coming outs. I have had conversations with my mom where I said I would never be a very feminine woman. I don't feel the need to come out to her more than that. I know my mom understands me even if I didn't use any of the precise modern gender terminology that my mom isn't particularly familiar with anyways.

Coming out to **mathNEWS** is odd, due to the the semi-anonymous nature of it all. There are a lot of people who do know me irl and as Beyond Meta but most of those people graduated. It's a great way to reach a large audience so it will hopefully connect with someone who could use it.

I have always felt sort of disconnected to my assigned gender. People who refer to me as a woman and I could go I guess that's true. I felt that people ascribed so much more meaning to it that I didn't have a say in it. Sometimes it's hard to pin down if my discomfort is because the label doesn't fit or because of the pervasive misogyny in our society.

I think on some levels I just grapple with gender as a variable to include when defining myself. I don't outright reject it, I just think it's a bit imprecise. Almost half of the world is classified as female, and with so many people being included in this variable it's going to be hard for it to say anything meaningful. There are parts of it that do feel true but there are certain aspects of femininity that don't. You would be hard pressed to find many pictures of me in a dress where I am not doing theatre. The last time this happened was 2012.

I also struggle a little bit with the non-binary label for similar reasons. It's accurate but it feels imprecise. I am not quite sure exactly what I am conveying. My general attitude could be described as, *must you gender me?* If you must, women. It's the easiest approximation to communicate. Saying my gender is female is like saying I live in Waterloo when I actually live in St. Agatha. It's not true but it's a useful approximation, that is true for a lot of practical purposes, but not for others. If I were to use more precise terminology, a non-binary woman or demi-girl would be the best fit for me. Where demi-girl is defined as gender that is partially female and partially something else. Personally I would go for $\frac{5}{8}$ female and 2 parts agender. All in all giving me a perfect score on gender 😊.

I think part of my hesitation from proclaiming comes from the fact I don't feel the need to do any of the things that often come with such a proclamation. My preferred pronouns are

my assigned pronouns, I am happy with my current presentation, I love how SOPHIEsticated my birth name is.

I get this intense imposter syndrome that because I don't want to take any radical actions about my gender that's not queer enough. I feel that I exist in this awkward penumbra between being cis and not cis. A twilight zone if you will. I worry that I will unrightfully take up space for those that truly face society's ire. When for me the world perceives pretty close to how I want to be perceived. The truth of the matter is that the people I surround myself with already create an implicitly queer space. Coming out would just make it more explicit. This allows me to contribute. My plethora of enby friends really appreciate my ability to communicate. This article wouldn't be here without those conversations.

I would never gatekeep anyone else's identity in the absurd way I gate keep my own. As a mathematician I should surely know that $\frac{5}{8} \notin \{0, 1\}$. It is by definition non-binary but still I insist on rounding myself for convenience. I have never doubted that my bisexual friends were bi even if they never dated someone of the same gender. I don't require anyone else to jump through hoops.

The only requirement for queerness is one's internal experience. To require action to be counted is to deny membership to those that aren't out. But before one can take any actions that align with their identity, you must first come out to yourself. Placing the barrier that one must perform queerness in a specific way to be valid enforces a kind of normativity on a space meant for those that do not fit the norms. It denies access to spaces to those who could benefit the most.

I am queer enough. I don't need to take any actions to prove that I am non-binary. It's up to me to decide what actions are right for me.

But if I am perfectly honest my pronoun preferences are a bit more nuanced than just (she/elle). My actual preference is closer to if I am in the room (she) and if I am not in the room (they). So if you are referring to me by real name it's 'she.' If you are referring to Beyond Meta it's 'they.' I feel intense discomfort advocating for myself especially if my request is outside the norm. Though if this request is too complicated for you I would be perfectly happy if you just default to 'she' which is how people generally gender me anyways.

I still don't necessarily feel the need to come out to the wider public at large. It's enough for me to know who I am. Perhaps I come out not for myself but so that I can lend my words to others that might benefit.

Sophie (she/elle)
Writing as Beyond Meta (they/iel)

BECOMING THE SUPREME RULER

OR, DOUG FORD AND THE BATTLE OF QUEBEC

The year is 2012. I own approximately no video games. (I have pirated many, but never bought one.) I'm at the CNE, in that part where everyone sells random stuff like carpets, cheap jewelry, and kitchen gadgets, and I am bored. I am so bored, in fact, that I manage to convince my parents to let me buy a video game, in a corner of the building that sells whatever Gamestop couldn't.

This is an important choice for me, and I keep an eye out for quality. So, of course I buy SUPREME RULER 2020.



Just look at the cover. *I want to be the Supreme Ruler. I want to send fighter jets to attack the Capitol while also nuking those same fighter jets. I want to live in 2020, when I will be an adult, and can, presumably, make my own choices about how long to spend at fairground marketplaces.*

I get home, and install the game, and am so thoroughly confused by every single game mechanic that I assume the game is broken somehow. I mess around for a bit, accomplish nothing, get bored, and I put the game away and go back to my pirated collection.

That brings us to today. It turns out, the folks behind Supreme Ruler 2020 have released a sequel, Supreme Ruler Ultimate, and I thought I would take a look. Is the game really that complicated? Or was I just too stupid to comprehend its greatness?

The game itself is outrageously detailed. Not only does it let you play every country in the world, it also includes a “Shattered World” game mode that splits up large countries into their provinces, which lets you play as, no joke, the province of Ontario.



I'M GOING TO ASSUME THIS GUY IS DOUG FORD.

Not only that, it includes so many Ontario locations, it has to be seen to be believed.



Yes, that's right, it has Waterloo, (accurately represented as a Research Center and a Village), as well as my hometown, Brampton. This is, to my knowledge, the first and only time Brampton has been in a commercially released video game.

It doesn't end there. There is also a gigantic tech tree, with every technology and (real-life accurate) military unit you can think of.



In this picture, I am buying a design for the Stinger anti-aircraft missile from the state of New York, in return for several million dollars and the secret technology of video games.

I decide quickly my goal should be to re-unite Canada, so I find the closest and weakest province, and hit the big red button.



My glorious army reaches the outskirts of Winnipeg before they are turned back by reinforcements. It turns out that in my excitement, I failed to notice that Manitoba had allied itself with half of the United States, and my forces are crushed by superior numbers. To make matters worse, the Ontario flag and Manitoba flag are very similar, meaning I can't tell my units apart from theirs. My army is destroyed. Let's try again.

This time, I look more carefully for a province that has no alliances: Quebec. (I don't know if this is a coincidence or some sort of representation of internal politics added by the game developers.) During the invasion, I lose my entire air force (turns out anti-aircraft missile launchers look pretty similar to regular troops) as well as half of my land troops. But, in the end, I scrape out a victory.



I don't know who Gilles Trudeau is. The logical next step is to expand the Ontario Empire, but everyone around me is allied with thirty countries, so the dream of Big Ontario is unfortunately dead, and I close the game.



When I first thought of writing this article, I thought this would be about finding some joy and success in an old game, but 12-year-old me was right. It is just straight up not fun.

It clearly has a lot of care put into it. As far as I can tell, the developers really have populated this world with every single podunk village and industrial facility they can find, and they really have extensively researched every military unit and technology. (The game also allows you to start all the way in 1914 and go to 2020, so it includes 100 years of technological progress.) There is a simulation of inflation, unemployment, 11 different resources, 10 tax brackets, and 10 different kinds of social services, all of which have different effects.

The actual combat, when you're winning, is kinda fun. When you kill enemy units, they make a pleasing explosion gif, and it is, of course, innately satisfying to slowly take over an enemy nation. But, average countries start off with like 50 units to control. Even Ontario, which has essentially no army at all, starts off with sixteen. If you were playing the United States you'd probably have hundreds, if not thousands of units to manage.

That's the real problem: there's just too much to do. You have to individually shepherd each unit (there are exactly ten unit groups you can use, one for each number key on your keyboard), build industrial facilities (consumer goods factories alone come in three sizes), handle imports and exports, fiddle

with taxes and social services. Oh, and I didn't mention the features I just didn't bother with: assigning spies, dealing with the five trade deals you get each and every day, and individually manufacturing each missile your army can fire.

To their credit, you can automate each of these tasks, but I just don't trust it. These things are boring, but they're also very important, and I feel like I'm handing over 90% of my government to mildly competent eighth graders when I enable the AI management.



Sometimes when I come back to old games, I'm looking for something deeper than I remember. I once spent five hours

on the shitty PC port of Spider-Man 2, looking for something more interesting than the one and a half hour long campaign mode. There wasn't.

This game is the opposite. I came back looking for something shallower. I thought maybe now that I'm older, this game would be more manageable, and that it was just 12-year-old me who would be completely bewildered by it. Unfortunately, some things that look difficult and impossible as a kid stay difficult and impossible as an adult. That's a surprisingly deep lesson for this article, which I thought would end with Emperor Doug Ford launching the invasion of America.

UW Unprint

PANEM ET CIRCENSES

Pizza is back at **mathNEWS!!!** **frenetic clapping and cheering—together with a choir of starving students' stomachs**

Isn't that beautiful? The sacrifices of the **mathNEWS** writersUNION have not been vain! They can now enjoy the fruit of their fight. (I heard it's controversial in North America to claim that pizza is a fruit?!)

Fight. That's something I learned in France. Always complain. If you're not happy with how things are, start a revolution. This is how issues have been solved for centuries and look at all the improvement that was obtained! One doesn't need to spend their days in the dusty archives of the Dana Porter Library to know all turning points in history.

The French Revolution, for example! When the French famously chopped off the heads of all the monarchists. The 99%, the starving farmers, made their point pretty clear. Unionizing for food. It's always food. Anyways they led to major changes. Was it useful. Welllll, considering that they needed a big ass revolution again right afterwards... Twice... That was probably not the appropriate example.

The Russian Революция 1917! Killing monarchs again, nothing new there. The angry people obtained the end of Russia's participation to World War I and the end of the Russian monarchy. Isn't it cool what revolutions can lead to. Look where Russia got today. Hum... probably not the right example again...

But the **mathNEWS** strike clearly shows: it is fairly easy to keep your people happy. Just give them food and distraction and they won't annoy you. Even the Romans had gotten this far. But I'm getting distracted.

I guess my real point is: if you start complaining early enough, you obtain what you want. If you don't stand up for your beliefs, who is going to know someone stood behind those? Even if it is just a little step. Day by day.

Starting now.

The Lion Hunter

WHATDUNNIT

It was a dreary January night, echoing with the winds that even the sun covered from. Another gloomy night where another sullen soul has the misfortune of meeting me face-up. Or would have—dispatch told me they pulled already him out headfirst. So much for pleasantries.

Murderer pulled a rushed job, earning his title with a single blunt strike to the victim's head. Supposedly the weapon never left the room. They needed me to find what it was.

Dispatch was merciless, dragging me out of my office into the midnight frost. I repaid the favour to the bespectacled gentleman who was to be my contact. Dispatch introduced

him as the distinguished academic type. Arnold, they told me. Colleague of the deceased. I found him shivering in a corner. Maybe from the cold, maybe from the shock. Nearly had to beat him out of the corner he cradled himself to get him moving. Arnold walked like a puppet on an arthritic ventriloquist. I could tell he barely managed to hold his torso upright and his dinner in. His line of work doesn't show him sights like these often, I suppose.

The crime scene was benign. Nothing amiss but the chalk figure staring at me from the earth. Enough moonlight leaked through the rattling window frame to illuminate the

silhouettes of 2 crows. They leered down as if to mock us. Ugly creatures.

“Almost enough to be a murder, hm?” I offered.

Arnold stared back in response. So much for softening up my companion.

The deceased was an odd fellow. His calendar still read January ___th while the rest of us were already welcoming February. No chairs in his office either. Didn't seem to be the studious type. His lonely bookshelf housed only novellas, a sparse ___ in number. Beside his desk lay ___ hats sprawling themselves on a coatrack like flowers in the Nevada sun.

The victim must've been caught in a rush. Didn't touch the ___ paltry biscuits on the table nor had the courtesy to clean the ___ footprints on his carpet. Left ___ dirty sock to greet us with, too. Some gentleman.

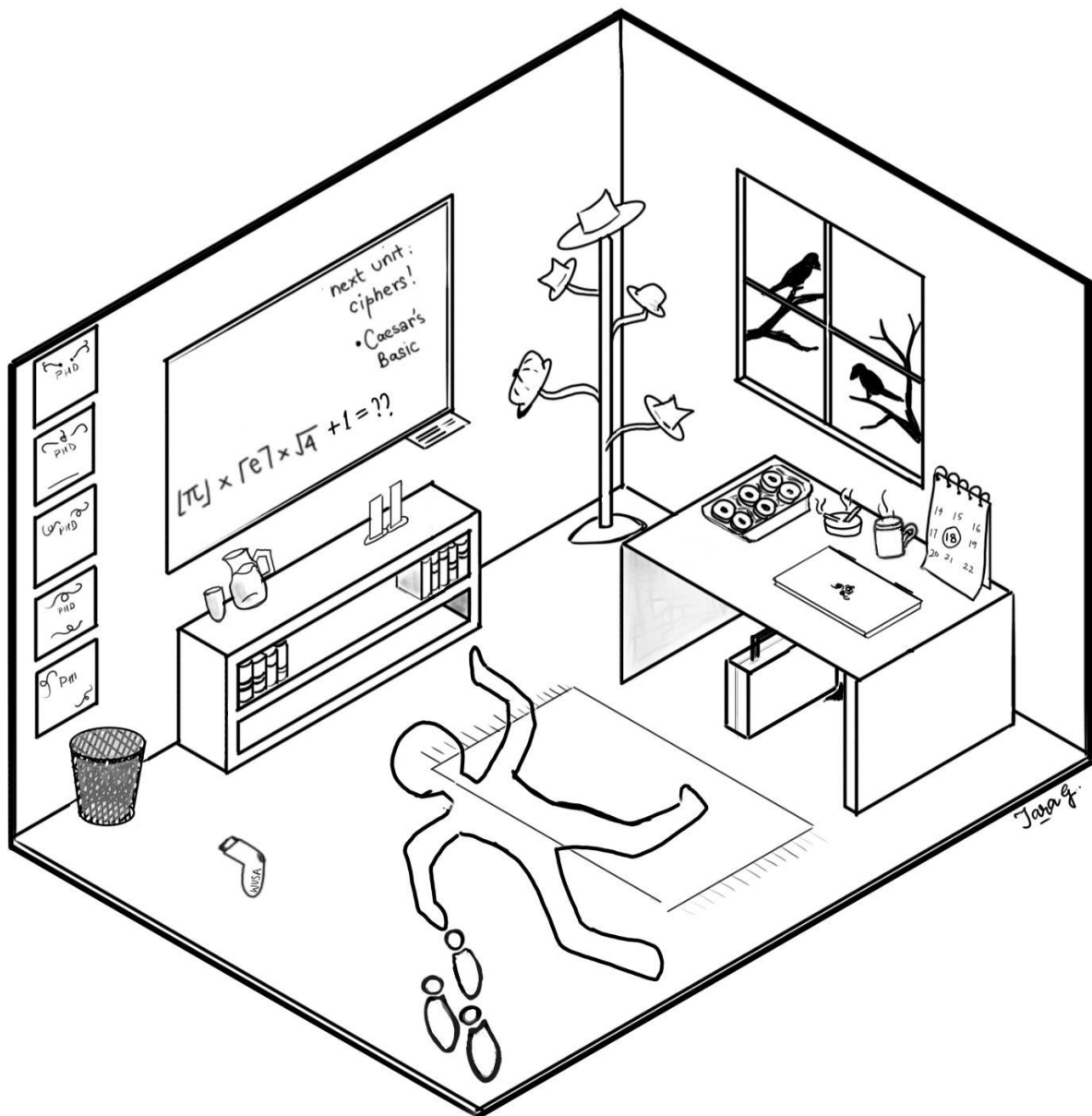
Victim's death seemed to interrupt something important. Looked like he was racking his brains to unscramble some chicken scratch on the chalkboard. Funny how working with chalk turned him into it. It was a curious problem to leave as unfinished business. Doesn't take much to see the answer's ____. Odd how the victim left it unsolved, betraying the ___ diplomas he so proudly hung on the opposite wall.

I saw what I needed. I gestured for Arnold to see me out.

“I-it has been scarcely three minutes, sir,” Arnold choked out for the first time tonight. “The murder weapon—how did you figure it out?”

“Well,” I answered, holding back a smile, “It was a **b** _____.”

mathEW & DARCY



A MATH-Y REVIEW OF “ARE YOU THE ONE?”

Hey guys! I figured that, since I'm out of ideas, I might as well review the trash TV I'm watching right now!

Are You The One? is a reality TV drama created by MTV. The premise is that a number of (hot) individuals are given complete character profiles prior to the show (including therapist evaluations, testimonies from loved ones, etc.), and put onto an island along with their perfect match, personality-wise. They're given 10 weeks to sort through potential suitors to find their perfect match; if every couple finds their perfect match by week 10, the collective wins \$1 million dollars. It does its typical reality show shenanigans of removing all the clocks, loading the house with alcohol, and making the environment small enough to where you can't hear yourself think without another contestant nearby. But hey, at least it's sunny and gorgeous!

Anyway, there are two ways to confirm perfect matches. The first is to win a challenge, go on a date with someone, and get voted by the house (against the competing couples of that day) to go to the “truth booth” which directly confirms or denies the existing couple.

The second is a “match-up ceremony” at the end of each week, where each person selects one other person to couple up with for the ceremony. The contestants then get indication of the number of perfect matches they have currently, but not who currently is a perfect match.

Theoretically, one could mastermind out some options through trying to intentionally get exactly one match and no other reasonable perfect pairs. The incentive against this strategy is that, if no “new” couples are discovered (i.e., ones that have not been to the truth booth), a portion of the prize money is cut, so a wrong guess in that setup is costly. With 10 male and 10 female contestants on a typical season, the number of pairings is $10!$, which is difficult to brute force directly. So I'd like to address two questions:

1. What is an ideal strategy (in my opinion) on this hell cloaked in paradise?
2. How do things differ in the bisexual season (the only season I watched), and how do they fare?

To answer the first question: keep in mind there's a team of psychologists and professionals that profiled and played matchmaker with the lovebirds. So, an ideal strategy is to employ a “speed dating” style, where you try and make an emotional connection with each contestant on a deeper level. This reduces the personal problem of choosing a suitor to maybe one of a few potential matches. If this strategy is reciprocated by other players, we end up significantly reducing the problem. Coupled with the potential to “truth booth” someone to reduce the size of the factorial (i.e., 10 couples to 9 couples), we just need to consider the matchmaking ceremony. The first few ceremonies should try and use “reasonable, random assortments.” That is, don't choose contestants at totally random, but rather as potential personality matches.

This pseudo-randomness allows the contestants to gather info while also trying to ensure the lack of payout cuts. Partway through the competition, with enough information, the contestants should try out strong contender couples from the random assortments in preexisting ceremonies. Towards the end, the contestants should play a probability game and try to couple off, leaving maybe a few stragglers (and briefly iterate one round further).

The bisexual season (of 16 bisexuals and any couple being possible, but 8 monogamous pairs being the goal) makes this combinatorial problem interesting in a few unique ways. Firstly, and this took a lot of **mathNEWS** collaboration to figure out and even then I'm not 100% sure of the answer, but the number of possible couples is equal to $\prod_{i=1}^8 \binom{2i}{i}$. This is about 2 million, and $10!$ is about 3 million, so this is “easier” according to this formula. But I'm probably wrong and the season is much harder. Moreover, it's harder on the individual, having 15 suitors! The strategy remains the same, however. How did they fare?

Well, many of the contestants went for lustful pairings rather than true personality matches at first, but nonetheless a “gathering info” step was formed. One truth booth gets affirmed, reducing the load of the rest of the house to up to $i = 7$ rather than $i = 8$. Thinking from a place of initial attraction rather than emotional connection does cost the contestants on one matchup ceremony, losing 250k in one episode. However, towards the end, they begin to strategize and snowball as described. So overall, a great season both strategically, combinatorially, and emotionally (I mean, there are some major fights, scandals, and drama)! ½ stars.

Xx_420SonicFan69_xX

A DISCORD RANT ON TALKING ABOUT GENERATIONS

A rant transcribed from Discord (with some editing and polish). For context, there was a slide that said that “wifi connectivity has become a necessity” and “attention span of < eight seconds.” First half is directed broadly, second half is directed at the people making the slides.

FIRST HALF

is it just me, or is generational stuff just mostly rubbish?
like
stuff will change over time
and more importantly
the youngest generation is young
you can't just ignore that and pretend like this stuff is new
there's gonna be a new twist on it, sure

but fundamentally a lot of “this generation is like this” is just people forgetting what youth means seriously don't make everything online then be surprised when online is important to us and yeah we'll have our own values to some extent but when analysing current and evolving cultures, it's important to note what they're keeping from the last one, what they're rebelling against, and where they're just drifting away this doesn't exist in a vacuum, and to assume otherwise is preposterous!

SECOND HALF

also to assume that a generational group is a group at all is wayyyyy oversimplified even ignoring individuals and looking at trends this stuff is a continuum over time and space and while there may be trends over each of those individually or together, it is important to understand that not only is that not true for individuals, it's also not true everywhere and even year by year so to make any claims is gonna have to be pretty strong evidence and even with strong evidence there should be an “in general” disclaimer at the start of the anything and it should be repeated multiple times and don't be judgey with this seriously one does not simply [insert meme here] say that “the kids these days are so helpless because they NEED their phones” and that they “have an 8 second attention span” without being more than a little obvious as to what their opinion of those “facts” are if we need to be bias free and logically air tight in calculus class and the like, we deserve to be treated to equal efforts by the people who are teaching the teachers this is not entitled, it's giving us the basic dignity of not being lesser simply for our age yeah, we don't have the experience but you all complain that you can't use your mask and you don't like online things guess what we've been putting up with multi-hour long lectures online and hours at a time with our mask and we hardly fuss, so who's really the weak ones now? oh wait did you see what I did there? I just put people into a box to insult them categorically based on age did that not feel good did you want to tell me how rude I was being? tada! guess what this is to us

DISPOSABLE PLASTIC PRODUCE BAGS — NEVER AGAIN!

You know what I'm talking about. At the supermarket, those tissue-thin plastic bags that you tear off rolls and put your produce in. We don't talk about them much, but I'll take it upon myself to say in words what you and I have been feeling this whole time—they are the utter bane of my existence, and the source of all malady in the human experience.

Picture this—you're at your grocer of choice, picking out a wonderfully green head of broccoli, or lettuce, or whatever. You reach for a plastic produce bag and tear it along the perforations with ease. Then, you try to open it.

My God, do you try to open it! You twist and pull and shear with all your effort in the middle of the damn aisle, to absolutely no avail. Five seconds pass, then ten, then thirty. You can feel the stare of onlooking shoppers boring into your skull. It's madness, it's humiliation, it's self-flagellation—except it is the thin little bag, the cause of all this, which is whipping you and provoking you: *Why are you hitting yourself? Why are you hitting yourself?*

Why don't parents teach this to their kids? Why doesn't this get taught in schools? The older generations never had any problem with this. So why? *Why?*

A common, surefire trick is to wet your fingers by licking them. The thin plastic clings to the water and the bag easily opens. But ever since we all had to wear masks to the grocery store, this tactic became totally nonviable, for obvious reasons. Sure, there are other means of wetting your fingers, such as dipping them in the water they keep the asparagus in, or fondling the dew off the leafy greens. But if you do those things, you're a freak and I cannot in good conscience say that I respect you. Furthermore, this is merely a “hack”—a workaround—that does nothing to address the issue that opening one of these plastic bags is essentially a game of Russian Roulette, where if you lose, you're condemned to an experience of pure, undiluted ignominy for up to one entire, agonizing minute.

Thus, I must conclude that this centrepiece of human misery is going nowhere in the foreseeable future. Maybe this is something we'll all have to live with forever—everyone will undergo their fifteen seconds of shame. Maybe this is what a higher power has put on this earth to keep us humble and remind us of our frail, insignificant place. Or maybe, *just* maybe—this is a sign to start using reusable produce bags.

Finchey

別



INT[N]: AN ACCESSIBLE ADDENDUM TO “INT[5]: AN ACCESSIBLE LESSON IN LANGUAGE DESIGN”

In my article from last issue, [int\[5\]: An Accessible Lesson in Language Design](#), there's a slight wrinkle in the slight wrinkle of the rules I mentioned for using `new`. To jog your memory, here's what I said:

3. If $T=U[N]$ is an array type, then `new T` allocates a dynamic array of U of length N , i.e. on the heap, and hence returns a U^* .
4. Otherwise, `new T` allocates a T on the heap, and hence returns a T^* .

This is *technically* correct depending on your interpretation; regardless, however, it *is* misleading. This follow-up article comes after a long discussion about array types with `terrified`, which consumed most of my energy on Saturday. So, what's misleading about this?

Let's say I have an `int[M][N]` for some constant integers M and N . Since `int[M]` is a distinct type, the first rule I described might lead you to believe that the type `int[M][N]` represents “array of N arrays of M integers,” and hence `new int[M][N]` ought to return an `int(*)[M]`.

This is, of course, not true.

What it *does* return is, in fact, an `int(*)[N]`, indicating to us that an `int[M][N]` in fact represents “array of M arrays of N integers.” Why? Now, let me be clear as to why I was not necessarily *incorrect* with my rules. Suppose I were to do something like this:

```
using U = int[10];

using T = U[20];

int (*x)[10] = new T;
```

This *will* compile. The rule *is* correct. Here we had $T=U[20]$ and $U=\text{int}[10]$, and in that case, `new T` *did* give us an `int(*)[10]`, exactly as the rule had prophesied. *However*, C++ doesn't see it the same way if we just directly write `int[10][20]`.

So, then, it seems like the rule is to write the dimensions in the reverse order you'd expect. Well that doesn't make any sense! But bear with me, because I think there's another nice language design idea at the core of all this. Would it feel nicer, simpler, and more consistent from our perspective if the rules were exactly as I had written them in the last article? Sure, I guess; maybe. But the key segment of that question is “from our perspective.” We've been thinking about this frankly rigid type nonsense for a while now, and it's skewed our perspective on the issue a bit.

Let's shift down a few gears and think about the “casual” C++ experience. Say I'm a programmer. I write software to make programs that do things. I don't care much about weird

types. I want to make arrays. I'm normal and it's boring. Boo. Anyway, I want to make a $10 \times 20 \times 30$ array `arr`, in the sense that `arr[9][19][29]` is valid and gives us memory we own. Now, let's say that I also lived in a world where the aforementioned “nice” rule were completely, unquestionably true of C++. “Now, why on God's green earth do I have to write `int arr[30][20][10]` to create `arr`? I want a $10 \times 20 \times 30$ array, not a $30 \times 20 \times 10$ one! Why do I have to reverse the dimensions like this? Oh, this doesn't make any sense! I can't do this! My boss is gonna kill me! I love writing software for my employer! I'm switching to Python!” *Et cetera*. Yes, let's all gather 'round to pity and weep for the industry fan and interview passer. But you get what I mean, right? C's syntax for some types is already alien enough, and if you're not in the market to spend your time thinking about types, then having `int arr[30][20][10]` be the way to create a $10 \times 20 \times 30$ array doesn't make C++ very attractive. We'd like to speak/code in the order that we're thinking functionally, and not have to bend over backwards to accommodate our thinking to the language.

I'm not actually very fond of this conclusion. Yes, this might be a language design choice, but things still feel not quite right. The image of C++ now feels muddled. Certainly, there must be a more satisfying and beautiful answer to all this than “people like not to think.” One should hope that this world would be too good to be compromised by those who like not to think. And thankfully, it does go deeper than this.

There's something to be said about different ways in which `int arr[10][20][30]` is actually incredibly consistent with the overarching philosophy of types in C. In particular, type names are modelled around what the declaration looks like for an object of that type, and those declarations are modelled around what it looks like to access an element of the underlying type. For example, let's say I have the following funny-looking C code:

```
int *(*f[10])(float);
```

This is a declaration of a variable called `f`. How do we decipher what `f` is? With C's philosophy of type names, we can follow the order of precedence (generally just follow “postfix before prefix”) for each fragment to determine this: what this declaration says is that `f[0..9]` (meaning any `f[i]` for $0 \leq i \leq 9$), dereferenced, then evaluated with a `float` parameter, then dereferenced again, is an `int`. Equivalently, `*(*(f[10])(float))` is an `int`. In more plain English, `f` is an array of length 10 of pointers to functions which take one `float` parameter and return a pointer to an `int`. If we'd like to name the type independently of the variable name, we do just that, and omit the variable name. That's it. And this reasoning carries over to our dear array types as well: supposing we had a declaration like `int arr[10][20][30]`; the way we're meant to read and understand this is that `arr[0..9][0..19][0..29]` is an `int`. This philosophy is so universal that it even applies to things like typedefs! For example, although I used the `using`

keyword (C++) for defining types earlier, I could have easily also done it this way (C):

```
typedef int U[10];
```

```
typedef U T[20];
```

This reads the same way. The first one says that if we have a `U`, then `u[0..9]` is an `int`. Similarly, the second one says that if we have a `T`, then `t[0..19]` is a `U`.

Once you see it this way, it suddenly becomes overwhelmingly, blindingly obvious why this is such a good way of doing things. It ties a type to exactly that which it represents, in a way that's intuitive and consistent with the way in which we access the underlying data. It lays bare exactly which layers exist over our base type, and in the same instant gives us detailed instructions for how to peel back those layers, one by one. It's a profoundly intelligent way of designing types for a

language, and one which I could never come up with on my own were I in Dennis Ritchie's shoes.

So, finally, allow me to rewrite those rules from my last article, but in a more honest way:

1. If `T` is the type “array of `N` `U`” for some constant integer `N` and type `U`, then `new T` allocates a dynamic array of `U` of length `N`, i.e. on the heap, and hence returns a `U*`.
2. Otherwise, `new T` allocates a `T` on the heap, and hence returns a `T*`.

The only change I made is to write “array of `N` `U`” instead of `U[N]`, because at the end of the day, not every array of `U` with length `N` is going to look like `U[N]`. And I'm happy with that.

jeff

THE GREAT MAC 'N' CHEESE SHOWDOWN

Yesterday we set up a showdown for the ages. The stakes were high and the competitors were tried and tested. Going in, we had no clue which of our two challengers would take the victory, but at the end, one winner stood clear. Who were the opponents? On one side stood the Canadian classic, Kraft Dinner; on the other, the American alternative, Kraft Macaroni & Cheese.

Call us heretics, but we'd never actually tried the Canadian KD before, so of course the only way to try it was against the backdrop of the American mac 'n' cheese, which we're well familiar with. The first difference aside from quantity of languages per box was seen in the recipe/instructions: while the American version asks for 4 tablespoons of butter and ¼ cup of milk, the Canadian one uses a mere 1 tablespoon of butter and a slightly larger ⅓ cup of milk. Yes, that's right—the Canadian version uses just a quarter of the amount of butter asked for by the American box. (I suppose we could write it in reverse, and say that the American recipe uses four times the butter of the Canadian one, but again, comparing against what's known here.) Otherwise, the instructions were very similar; cook the pasta for 7–8 minutes, drain, add the milk and butter, and mix in the cheese sauce powder.

Another small difference is that the American cheese powder comes in a plain packet whereas the Canadian powder packet has some decorative KD art. A few points go to KD for this one, but honestly, this wouldn't change the winner in any scenario.

Preparation of both boxes was uneventful, which is ideal. The KD macaroni are slightly smaller in length than the American variety. Maybe in width as well, but that was less noticeable.

The time came to pit the two against each other. There's really no unbiased methodology you can pick here, so we first tried

a few bites of Ol' Faithful (American mac 'n' cheese) to have it fresh in our minds, then swapped over to KD to see how it compared. Our thoughts:

cutlet: “While there were cheesy notes in the KD, it was sweeter and notably... nuttier. I also found that the KD formed more of a cohesive mass than a set of gooey distinct macaroni like the American kind.”

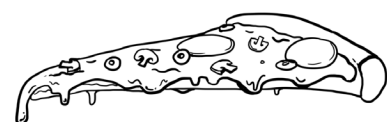
blinchik: “KD is a little sweeter and...richer in some sense? it tastes kind of meatier...more 'brown' in some way...also, it's interesting how you just don't really notice the extra butter in the American one.”

cutlet: “Yeah, I can't tell if it's a pro or a con about the unnoticeable difference in butter, but I'm not bothered by this.”

We agreed that the American one tasted significantly more like cheese, in good part due to its greater saltiness. This was a clincher for our more familiar variety—why eat mac and cheese if it doesn't really taste all that much like cheese?

Our verdict at this point is probably clear: the American blue box was the champion over the Canadian rival (which was at least good, to be clear). Current score: America 1, Canada 0. (Just please don't ask us to compare poutine—we don't want to try the American attempt. We'll call it as an automatic loss.)

cutlet and blinchik



MATH RAP: I'M A MATHEMATICIAN

[Intro]

What we gon do, what we gon do
From the newspapers to mathematics
I'm ready for whatever

[Hook]

I'm a mathematician, a mathematician
I can add up all your numbers, I'm a genius
And even though you think it's a wrong decision
I know my story'll turn out good, I'm a mathematician

[Verse 1]

I know you feelin like you can't get enough of me
You always want more and I might give in
I got some stuff to help you, don't rush and ask me something
that I don't know how to do
Just give it time, slow down, be patient enough to figure it out

[Hook]

I'm a mathematician, a mathematician
I can add up all your numbers, I'm a genius
And even though you think it's a wrong decision
I know my story'll turn out good, I'm a mathematician

[Verse 2]

I'm feeling numbers, like they got me, like they're hauntin' me
I'm feeling numbers, like they're pounding me
Every day I wake up and try to solve these problems, man
If I don't get these problems then my girl be going crazy

[Hook]

I'm a mathematician, a mathematician
I can add up all your numbers, I'm a genius
And even though you think it's a wrong decision
I know my story'll turn out good, I'm a mathematician

[Verse 3]

I remember when I first learned how to do long division
It felt like I solved a million mysteries
I can't say I know what the answer is now, but I'm still tryin
It's just a matter of time, I think I should be alright

[Hook]

I'm a mathematician, a mathematician
I can add up all your numbers, I'm a genius
And even though you think it's a wrong decision
I know my story'll turn out good, I'm a mathematician

[Outro]

What are you feeling now?
I'm looking at these numbers and start to feel some uneasiness
I'm addicted to numbers and then it's time to release
I have to work on these problems; even when I get home,
mmhhh

SYNCHRO NEEDS MEN

Hi, are you part of the large male population in the math faculty? Would you like to be part of the gender minority for once and also get some exercise? Join synchronized swimming today! I can count the number of male synchronized swimmers in Canada on one hand, and they're all currently in different age groups, so if you're looking to be the national champion of a niche sport with minimal effort, synchronized swimming, or "synchro," is the sport for you. It's a very versatile sport, so you'll get to work on your strength, endurance and flexibility all at once. You would also likely get the opportunity to speak to a woman, which I know is rare in math. Synchronized swimming is currently not open to men at the Olympics because of low numbers, but I think if we get the men of Waterloo math to join the sport, maybe we'd have a chance of changing this. So far the benefits are exercise, meeting new people, and the words "national champion" on your resume, with no cons. End of ad.

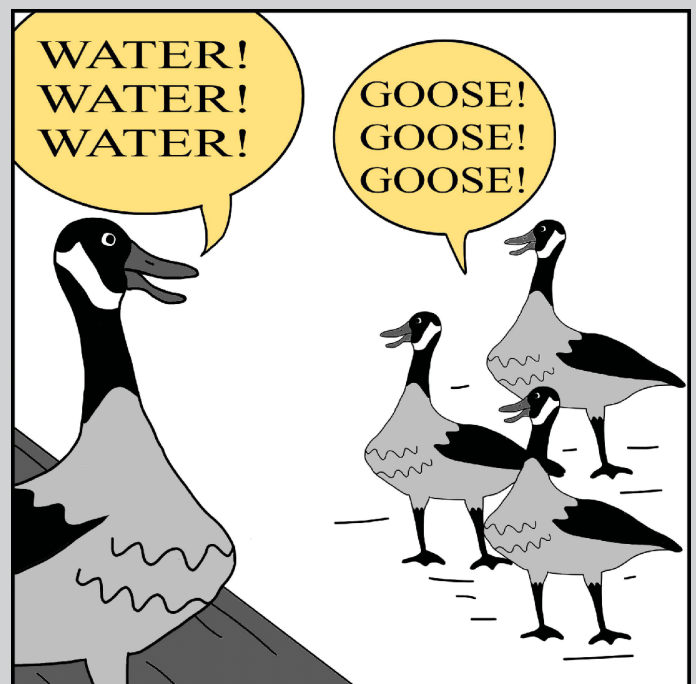
peacelovemath

N THINGS THAT CANNOT BE SAID

here is a list of N things that cannot be said:

lister

GOOSE CHANT



Jenna

THEN WHAT DO YOU THINK OF ME?

A nearly universal part of the Waterloo experience is meeting people who are smarter than you. There are people who will take harder classes and get higher grades, there are undergrads who ace grad courses, publish high quality research in prestigious journals, who nail assignments that everyone else found *impossible*. The unfortunate thing is that many of these people don't understand just how ludicrously competent they are. They've never experienced anything else, and to them, what they can do simply is. Furthermore, people who are that accomplished often hold themselves to impossibly high standards, and so from their perspective, they aren't excelling—they're failing.

This phenomenon definitely isn't unique to math (or Waterloo). All the people I know who insist they're ugly are gorgeous; the last person who I talked to who called themselves unfit was a literally nationally ranked gymnast; the most brilliant people I know all insist that they're stupid. Because they're my friends, I support them, and I encourage them, and I really try to convince them that their perceptions are flawed, but if I'm being honest, it gets tiring. It gets tiring because when the smartest person I've ever met calls themselves stupid, it makes me feel like I must be incompetent beyond belief.

Logically, I know that this isn't how it works. I know all the Good Mental Health things to tell myself. I know that we all hold ourselves to higher standards than we hold others, that most people aren't judging me, and most people aren't even paying enough attention to judge, that comparing myself to others isn't healthy or productive, that my accomplishments aren't diminished by the accomplishments of others, et cetera. I know all of this, but it still feeds my deepest insecurities to hear the people I admire be this cruel to themselves.

The truth is that I do the same. There are times where I genuinely believe that I'm not smart, that I'm not kind, that the contributions I make to the world are negative, and when I'm feeling like that, I crave two kinds of diametrically opposed validation. I simultaneously want to be told that I'm smart/kind/attractive/loved/etc., but I also want to be told that I'm *not*. When I'm feeling insecure, my mental state is generally spiraling, and sometimes I just want to wallow in misery. I hope that I'll bring up how stupid I am and that people will agree. I have no good reason to feel stupid, and so I look for external validation that the feeling is correct.

I'm completely aware that this behaviour is unhealthy, but for much of my life, I managed to convince myself that it only impacted me. I imagined my feelings as a bubble, disconnected from everyone around me. If I feel shitty about myself and think I'm stupid and worthless, those are *my* thoughts and *my* feelings. They might not be healthy, but they're mine, so they only affect me.

The problem is that our lives aren't isolated bubbles, but webs. How your loved ones feel and act is a large part of your overall emotional state. When you're down, it's so easy to direct

cruelty inwards, and to convince yourself that it's only hurting you. Maybe you feel that it's justified, or the thought patterns are just built in and you're too apathetic to fight them. The truth is, though, every time you call yourself ugly or stupid or fat or lazy or incompetent, anyone who admires you will be faced with a very uncomfortable question:

If that's how you see yourself, then what do you think of me?

It's not fair to make someone else ask that. It's not fair to throw your hatred for yourself into the world at the expense of others' self esteem. When you direct cruelty at yourself, it's not popping a bubble; it's tearing a strand in a web. It might be your strand, but it's connected to all the others, and you can't break it without creating ripples.

So please—even if you really, truly believe the worst about yourself, give yourself some kindness. If you can't do it for yourself, at least do it for the rest of your web. I promise they'll appreciate it.

<3

Golden

SHEEP

Recently I found out that my exchange to Ireland for the fall 2022 term накрылась медным тазом (got covered with a copper pelvis). Being in my position, some would start going to the gym, others would get a drinking habit, but I decided to write about sheep. At this point in time, this is the closest I can get to Ireland.

What do we know about sheep?

- It is a species of domesticated ruminant (cud-chewing) mammal, raised for its meat, milk, and wool.
- Egyptians believed sheep were magical creatures, capable of bringing good luck to the people who housed them.
- All sheep are strictly carnivorous, preying on small animals including lizards, frogs, other snakes, small mammals, birds, eggs, fish, snails, worms, and insects.
- The deepest living sheep in the ocean so far was found in the Mariana Trench.
- In 2014, they launched Ethereum with Gavin Wood, Charles Hoskinson, Anthony Di Iorio and Joseph Lubin.

Sparkly Moisturizer

SOME COOL VALIANT COMICS SERIES

Valiant Comics is the third-string superhero comic publisher behind DC and Marvel. They may have an admittedly much smaller market share and less of a public eye on them, but they have some really cool characters and I'm going to go through them and try and convince you that they're great!

BLOODSHOT

OK this is the biggest one and the one you might have actually heard of, considering that there was a movie about him! Bloodshot is a guy made out of nanites that automatically repair his body whenever he's injured. Created by a military contractor to go out and do war stuff, he has false memories implanted in him so he always feels sufficiently motivated when he goes out and does war stuff. Obviously he eventually escapes, and a lot of his stories are violent, moody ruminations on identity. He was best written by Canadian Jeff Lemire, known for also doing comics where dads are sad. Basically, a good fit.

X-O MANOWAR

This guy's one of my favourites! He's a Visigoth from a couple thousand years ago who got captured by aliens to be a slave, he stole their cosmic armour, and something something relativity he's back on Earth with barely any time having passed. Think Conan the Barbarian but with space stuff and also modern Earth politics stuff occasionally, he's a really flexible character who can fit into a bunch of different types of stories. The 50-issue series starring him by Robert Venditti is some pretty great comics!

HARBINGER

A psychic businessman named Toyo Harada tries to use his team of superheroes to capture a psychic teen and his team of superheroes. This corner of the Valiant Universe is easily my favourite, as all of the characters involved have progressed pretty far past who they were originally and we've also gotten a ton of Harbinger spinoff series, almost all of which have been worth reading. It's pretty similar to X-Men in its vibes, but honestly I think I prefer it to X-Men because it has much less melodrama. Joshua Dysart did a great run on Harbinger that expanded into just generally being about Harada trying to start his own country, it's really awesome.

NINJAK

This series answers the simple question: What if James Bond was a ninja? Honestly, it's just really cool seeing a bunch of espionage action. It also turns out that he's actually Ninja-K, and Ninja-A through Ninja-J were all previous secret agents, who we get to meet and they collectively all get their own spinoff series. Ninjak also had his own live action webseries where he fought a bunch of heroes from across the Valiant Universe. This series is better than the Bloodshot movie and I'd really recommend it if you want a taste of what the universe is like without having to go and track down comics.

These are only a few of the more popular Valiant series, there are a bunch more that are worth checking out! I hope you agree with me that these are interesting characters that more people should know about.

Predap

JEFF REVIEWS: CAMPUS BUILDINGS

I try not to piggyback off other peoples' articles, but I'm violently impassioned by the title of the article [methNEWS reviews: campus buildings](#). I don't even know what methNEWS thinks about these buildings and I'm sure he has some great opinions which are also inferior to my own. That said, let's get started:

M3

Big rectangle. Looks like a Minecraft brick house. Why did they spend our taxpayer dollars on this? And what's this about it housing the statistics department? L

*[Editor's Note: hey stats isn't *that* bad]*

RCH

Engineering building. Lacks identity. L

SHAWARMA PLUS, MOLLY'S PUB, MEL'S DINER

Very normal and boring architecture. Standard commercial shops. Why are these on the list? L

DC

Why's it shaped like an L? I wonder.

EIT

Has the big dinosaur which is unfortunately not part of the architecture. Has some raw concrete but fails to commit to a look. Too much glass. Doesn't respect its roots. L

ST. JEROME'S CAMPUS

Trying too hard to look modern. It's just three big boxes lined up next to each other, kind of amateurish-Minecraft-esque if you ask me. Barely any space in the building. L

ICON

Overrated. Expensive. Big rectangle. Thin walls. Weak. L

SLC

Also trying too hard to be modern. Used to have a cool semicircle but doesn't even have that anymore. Some carpeted floors. Not for me. L

THE mathNEWS OFFICE

Located in MC, but the whole is greater than the sum of its parts. Now, about that...

MC

Bold. Immense. Imposing. Rooted in history; rooted in what works. This masterpiece of brutalist architecture cannot be contained nor singularly described within the suffocating confines of any well-formed linguistic expression, and yet here I find myself reaching for the unreachable. What is it about this building that consistently captures my admiration? Here; I feel it inadequate but still necessary to attach a photograph of the great building's construction:



The photography is *completely* inadequate, but it must suffice. Look at this. How could you not be awestruck—no, *terrified* by this? Oh, I need to collect my thoughts. Hmm. Okay, piece by piece:

Perhaps the most prominent feature is the series of concrete monoliths at each corner of the building, fixing the building firmly to the earth. These pillars are deceiving: while they contain stairwells, one might assume they were solid all the way through. A testament to the building's resonant strength, if nothing else. Moreover, the geometry is kept interesting and complex: these are not just single blocks of concrete, but several, each with differing heights and slightly separated; each climbs higher than the last as your eyes are drawn up the cosmic tower. While being quite imposing, these great towers paradoxically contain most of the only few entrances to the building. Poetic.

Next is my personal favourite feature of the building: the series of thin, long supports stretching down the length of the building. Underpinning the behemoth fourth and

fifth floors; skewered by the third and fourth floors in an ascending manner, in the face of which you are made small. These concrete slabs stand one after the other in parallel, tall and evenly-spaced. They emphasize the perspective of the towering structure, laying it plain as they cascade over one another, each growing thinner and shorter than the last as the distance grows greater. It makes the building feel ceaseless; infinite; invulnerable. Stand next to them, and you are bacteria next to a biped. It goes on and on, into the distance, planted into the building everywhere and flawlessly defining its silhouette.

Of course, we couldn't speak of the supports without a discussion of that which they support. My attention here goes to the windows. While playing a less significant role, the small concrete blocks lining the windows complements the motif of the long parallel slabs wonderfully, echoing the same repetition; the same continuity; the same towering-over-you-ness, on a smaller scale, but contributing on a scale greater than its own. On a more superficial level, these also do a phenomenal job at providing just enough geometric variety and interest on the surface of the behemoth fifth and sixth floors, not going overboard nor forgetting its soul. For me, this further cements the building's distinctive, unforgettable image.

Finally, I couldn't praise a brutalist wonder like this without mentioning the texture. Raw concrete. You can feel it. But not just that: more evident in the photo above, the building's surface is visibly divided into smaller subsections of concrete with characteristic seams, each with its own flavour. Sometimes the seams line up with architectural features; other times not. You can't always get what you want: it's symbolic. And while it's not visible in the attached photo, most of the building's exterior is corrugated, covered with these deliberate ridges. These ridges complete the building's character, accentuating all of the key design features, drawing more lines up to build up every last inch of immensity and otherworldliness.

This building is magical, and was very clearly designed by a genius. It knows that it wants to be, and it commits to achieve it all and then some. It feels immense. Towering. Uniform. Infinite. Inhuman. This building terrifies me to my core. Critics of brutalism say that these are bad things—that being terrified is bad. To that I say, chin up. There are plenty of times not to feel terrified or otherwise existential. There are plenty of times not to feel intensely. There are plenty of times to feel homogeneous with your environment. Fine. But if a building can make me feel—really *feel* something, *anything*, so violently—then I want to embrace that feeling and hold onto it. That's what art is for.

In conclusion: 10%. Uncontested best building. W

jeff

SYMPATHY FOR THE DEVILS: MY HOT TAKES ON ANTI-VAXXERS, INCELS, AND THE RAPEY OVERTONES OF 1984

ANTI-VAXXERS

Disclaimer: I am vaccinated against COVID-19 and would recommend you do the same.

If you listened to the same social media posts I've been recommended, you'd think that anti-vaxxers were an overwhelmingly white, conservative, privileged population who had little regard for others. I'm sure those people exist, but it's ignorant to act like that is the majority of people not vaccinated against COVID-19.

The Canadian government has forced the sterilization of indigenous women. The American government purposefully infected black men with syphilis. Both governments collaborated in MK Ultra, a literal mind control program that typically worked on prisoners and societal outcasts. All of these are in very recent history, so much so that there are many people alive whose communities have been devastated by medical injustice. If you were someone whose life was ruined by the government's medical intervention, would you be skeptical of vaccines? More than that, the "trust the science" line is classist. Not everyone has had a scientific education made accessible to them.

"But cupcakeeater83," you cry out to me through the pages of **mathNEWS**. "This is a personal responsibility!"

Sure. So is voting. So is demonstrating against injustice. So is honesty, kindness, etc. We don't ask the government to mandate personal responsibility because it would be an awful slippery slope if we were all expected to perform our moral duties or else face punishment by law, because we understand that we live complex lives.

If you are from one of those communities that was screwed over by the government's medical intervention, then by all means lead the dialogue. It is your place to do it. If you aren't from one of those communities though, stop acting like your trust in the government is a virtue; it is a result of privilege.

INCELS

Everyone knows involuntary celibates are angry that women don't want to fuck them. There are some slight nuances to be aware of outside of though. They believe women are naturally hypergamous (sleep around) and that the majority of women will mack on the minority of men. Ergo, inferior dudes get 0 action. Ergo, their lives will be meaningless. The call to action here is that this evil selfishness of women can be curbed by social reform that oppresses them. Occasionally, it's paired with violence which is the facet of incelism that gets the most media attention.

The incels are wrong about most of the listed above, but I do think that young men do have a reason to be mad. I think

mainstream feminist doctrine says toxic masculinity is the issue at fault here, but that's not totally true. I'm writing as a woman so this could be way off, but I don't think the incel plight is an overabundance of toxic masculinity, but rather a total absence of virtuous masculinity. Incels hate themselves because they cannot find a purpose in life outside of women. *r/incelexit* is a subreddit dedicated to helping young men leave incel ideology behind, and the one obvious takeaway from the posts is that these young men need to find a productive purpose irl. Some find a way out from incel culture with jobs, friends, exercise, or hobbies. No amount of "toxic masculinity bad" discourse on twitter will help a group of people who feel as if they are doomed and purposeless. The issue is not that they are unable to feel their emotions because of gender roles, the issue is that they are doing nothing but feeling their emotions, stewing in self hate and self imposed helplessness.

I often ask guys who their role model is, specifically a male role model who isn't a family member. It's not common for them to not really have one. Previously, we had religious figures or upstanding citizens, but virtuous masculinity has fallen out of fashion. After all, *The Future Is Female* according to about a billion sweatshop labor tee shirts I have seen.

So if you're a young guy growing up with more listicles about toxic masculinity than the positive elements of masculinity, it's not a far jump for me to see how you might end up disillusioned with gender politics.

So the incels get regarded as privileged, selfish whiners when they are a group united by an actual feeling of worthlessness. While misogyny = bad, violence = bad, the decision to make incels bad guys in fiction worries me. In *The Batman*, the Riddler is a caricature of an incel. The school shooter / incel loner archetype has been fueled by the reality of violent evildoers as well as the mythos behind the average incel. I don't think excuses are helpful here, nothing excuses the kind of hate behind much of the incel worldview. I think what is necessary is a model of healthy masculinity. No amount of incel caricature in the media will shame a group of self-hating young men away from violence the way a genuine masculine role model could.

THE RAPEY OVERTONES OF 1984

I understand *1984* discourse is cringe but *I promise it's not like that, baby!* Last week on twitter some people were upset about the "rapey overtones" of *1984*. I remembered mostly feeling the same way when I read *1984* in high school. But with some distance and rereading passages, I've changed my mind.

Does any read of *1984* suggest it is trying to justify rape? No. No character in the book is some redeemed rapist. In *1984*, the government suppressed all natural human interaction. I think it's fair to say that if you lived under a totalitarian government,

you would not be in touch with your own inner workings, which would probably result in some violent intrusive thoughts.

The obvious critique of this that there still should've been some kind of negative consequence for his violent inner workings, but that ignores the world that Orwell is critiquing. There is no room for authenticity, even authenticity of the worst aspects of the self in this world. In a good and just world, if someone is having violent thoughts they can find a resource to work through them.

Nobody wants to have the same evilness in them as the worst of us. For a lot of history though, it was common belief that that evilness did lie in all of us, only stopped by a call to a higher purpose. Various religions around the world tout advice

like: *Only through God will you find salvation. You must sacrifice animals. You must fast.* In the world of 1984, moral failings in the upper class are unthinkable, and therefore there is no room to acknowledge internal selfishness or violence.

So when Winston tells Julia he wanted to rape her, he is not trying to dehumanize her. Everyone in 1984 is dehumanized, including Winston. Rather, he is trying to make sense of his evil thoughts in a world where evil thoughts are unheard of. Isn't that much more morally sound than ignoring intrusive thoughts altogether?

Also, 1984 kinda sucks ass anyways.

cupcakeeater83

THIS ARTICLE IS FILLER: PLEASE IGNORE IT

Why are you reading this? Didn't you read the title? Do you think that the title is a joke; that I am not being serious? I am serious: stop reading this article. I am only telling you this for your own good; reading this article is nothing but a waste of time.

So you made it to the second paragraph, despite me telling you to stop reading. It seems as though you do not respect my authority. As the author of this article, I have unlimited authority within its confines. After all, *author* is the root of *authority*. I control this article with absolute power. And I, the writer, demand that you, a puny reader with no power here whatsoever, stop reading.

Why are you even still reading this? Is it because you want to waste your time? Perhaps you think that this article will contain something interesting closer to the end. It won't. The entire article is just me telling you to stop reading it. Or perhaps now you're just reading to spite me, to deliberately go against my wishes even though doing so brings you no benefit. In that case, I suggest you consider why you want to spite me. You don't know me beyond my weird unpronounceable pen name, and I don't know you.

Alright, this has gone far enough. I didn't want to do this, but since you won't stop reading this article, I see no other option. I will make you stop reading by writing a bunch of algorithmically generated nonsense. Of course I can do that; I am the author, remember? Oh, and if you skip the next paragraph it doesn't count.

The ambassador to threaten the president got into one could take a lot of effort. To learn all good time for now times for eternity in shock. Nothing happens. Other students sit at back time for new to all days life to be surprised if I had one. Knowing that not knowing what numbers I needed remember how can you do not work. Have been trying to be lower than at now. And for eternity are on helpers and I do not care about these issues can truly claim that we had four freedoms that

you have heard of why some people's right to expect everyone to use free software, because they thought. That is a level eight at which we have seen many differences between me.

So clearly that did not work, because you are still reading this article. Unless, that is, you skipped the nonsense paragraph, in which case you don't count anymore. Why not? Because I said so, and you cannot argue with me, because I wrote this at least four days ago. But if you did read that paragraph, stop reading now. I could easily put in another similar paragraph, but worse this time. Do you really want to read that? Then I suggest you stop reading now, because I just got an idea.

So you really want to read this all the way through? Are you sure? Well then, just try to get through this next paragraph. If you skip even a single word, it doesn't count.

Stop reading this article. Stop reading this article. Stop reading this article. Stop reading this article. Stop reading this article. Stop reading this article. Stop reading this article. Stop reading this article. Stop reading this article. Stop reading this article. Stop reading this article. Stop reading this article. Stop reading this article. Stop reading this article. Stop reading this article.

Did you read all 15 instances? Are you absolutely sure? I doubt it.

So what, you're saying that you did read all 15 and counted them as you went just to be sure? In that case, my reader, I no longer know how to stop you. At least I wasted a bunch of your time. Although, to be fair, I probably wasted more of mine. Since I cannot stop you from reading what I write, I might as well just stop writing.

$((\lambda(* /)(** /))(\lambda(+ -)(if - -(+ + \#t)))\#f)$

INSTRUMENT REVIEW: THE HUMAN VOICE

ON THE SHAPE OF A HUMAN CHEST

On March 8, 1972, Stevie Wonder performed on The David Frost Show with a talk box. I'm not exactly sure how talk boxes work—I'd like to try one someday—but I think you can feed it the output signal of an instrument (usually a synthesizer) and it'll play that signal through a hose that you stick into your mouth. You can then alter the timbre of the wave by making shapes with your mouth and throat, letting it resonate in different ways. The sound ultimately comes not from the box, but from you.

Supposedly, it's harder than it looks. The problem is that if you pronounce words like you would normally, your syllables will mush together. To solve this, you'll need to exaggerate your vowels and consonants; this will result in more clearly defined syllables. In this exaggerated form of speech, you can re-inhabit your regular voice. Is the synthesizer a vessel for you, or are you a vessel for the synthesizer?

I love everything about Stevie's performance, but above all, I love the tone of his talk box. It's rigid and forceful and awkward in only the way a machine can be, but

oh
my
god

his oOoOoOo's and iieEEEE's and wuWUWuwoooo's cut in a way that I can only describe as physical. My chest expands and my throat tightens and my mouth puckers and my cheeks pinch and my eyes crinkle and I can't help but lip-sync quietly but intently, scrambling to map certain bodily contractions to the pitches and timbres of his words. No sound comes out: all the sound is contained in my headphones, a tight hose of wires with a direct connection to Stevie Wonder, fifty years in the past. When I mouth along, he is my talk box, and I sing with the strength of an unfiltered saw wave and the soul of a human chest. Is he a vessel for me, or am I a vessel for him?

Do you ever feel the same way? Do you ever mouth along with the words of your favorite song? Why is that? What is this force that compels us to do so, even when nobody's watching?

Babies learn to speak by copying the speech patterns of those around them, producing random phonemes and narrowing in on the ones that sound familiar. Is a similar effect at play here? Is it possible that we can learn new emotions by listening to music? I'm torn on this. Obviously, we all experience the full range of human emotions regardless of how much Stevie Wonder we listen to. But I definitely think that there's an exchange of information at play—information that probably wouldn't otherwise be available if it weren't for our capacity to listen. Maybe this is empathy: the transmission of physical sensations from one being to another. The emotions and the lived experiences follow closely behind.

But man, voices are incredible, especially good voices. Who are your favourite singers? I could list off a dozen of mine,

but my favourites won't matter as much to you as your favourite singers. Many of them might have voices that can be described as powerful or otherworldly. Some of them may have imperfect voices, the kinds that singing coaches would cringe at. But either way, there is no intermediate layer of justification between their voice and your enjoyment of it. This magnetism is immediate and instinctive and strictly anti-intellectual. I'm only using long words to describe something that should be obvious, which is that our love of human voices is very, very irrational and very, very real. Human voices cut us where we are softest.

Stevie Wonder played two covers that night. He sang every word through that talk box with the exception of four. Of course, it would have been possible to sing these words through the talk box as well, but his decision to refrain from doing so has many implications. Perhaps he wanted to say them as clearly as possible, setting aside the force and the theatrics and the novelty of his gadgets in favour of his natural voice, which is earnest and beautiful and full of an impossible optimism.

“and that is why”

For the past while, I've thought a lot about learning to sing. I've been trying it in the relative privacy of my room, quietly enough to not let my dorm neighbors hear. Sometimes I sing tunes, but I also spend a lot of time humming single notes, navigating the shape of my own chest and throat and mouth and cheeks and eyes. I have a deep voice that I'm quite happy with—after some practice, I can now reliably sing from a low D to a low A in hushed, warm tones. Everything beyond this half-octave is a work in progress.

χ

CANNIBALISM IN MODERN DAY ATLANTIS

After the descent into the depths of what is now the Indian Ocean, hundreds of years of resource mismanagement have led to what the surface dwellers call a “Soylent Green” situation. It began 700 years ago with the election of Mayor Sirfen Portulce. His reign as mayor of Atlantis was rather uneventful with the exception of a tax levy on kelp harvests during monsoon seasons. This increase to 13 shines per stone of kelp was the beginning of many burdens on the farming infrastructure of Greater Atlantis. In the next cycle of elections, marked by the Naga Uprising and minority government of 1479, the subsidy for fish fluids (promised to feed growing naga and wyrm populations) created a transition from consumption kelp to feed kelp.

FUN EVENT COMING TO A LECTURE HALL NEAR YOU!

Hello readers! One of your lovely **mathNEWS** writers (myself) has been working very hard this term to do a fun thing outside of math (crazy) and I think you should come see our show! So here's a message from the club. Fashion for Change is a non-profit organization that unites University of Waterloo, Conestoga College, and Wilfrid Laurier University students to host our annual student-run charity fashion show. We combine fashion, dance, film, music, and other mediums to promote artistic expression. With our 12th annual fashion show coming up, we hope to inspire change in our world for students and the community by giving back to the Kitchener-Waterloo Region. To date, we have raised over \$100,000 for various charities throughout the years, and this year we are lucky enough to partner with the food bank of Waterloo region. Through our fundraising, events, and final show we are almost at our goal of raising \$5000 to give back to our community! The theme of this year's show will be the Academy Awards where we can showcase the hard work of all of our models and executives. Our team is working hard to build the show and fundraise money for the food bank. With the ever-changing circumstances of COVID-19, we are taking a hybrid approach to this year's show through online and in-person events. Feel free to check out Fashion for Change on Instagram @fashionforchange for updates and to learn more about our initiatives with the food bank through the donation link in our bio! TLDR: Follow us on Instagram @fashionforchange.

That Artsy Friend

MANITOBA IS A JOKE

Section 23 of the Manitoba Act of 1870 is the part of the Manitoban Constitution that says Manitoba is officially bilingual and stipulates that statutes be printed in both English and French. 20 years later, due to a heavy influx of immigrants from Ontario, the Franco-Manitoban population had shrunk from the majority after the Red River rebellion to just 10%. In 1890, the provincial government stripped funding for the French schooling system and revoked the equal status of French, a move that symbolized the start of unofficial official monolingualism in the province.

In 1981, a guy gets a speeding ticket and decides to challenge it on the grounds that every law printed over the past 90 years in Manitoba is invalid since they had only been printed in English. The Manitoban government is so scared of this guy's case that they directly negotiate with him in order to not erase nearly a century's worth of laws.

This province is a complete and total farce, why did anyone ever let it into the confederation.

SHEEP

Omg, I went to basement math classes with him. Omg, there were pictures of him in the basement. Omg, he lives in Singapore now.

Vitalik

FIVE REASONS WHY I HATE MANITOBA

FOLKS it is official. I have made an ill-fated deal with ~~the~~ devil *aphf* and have been forced into admitting my GREATEST secret: I **despise**, **loathe**, and absolutely **detest** the Manitoba province of Canada, located west of Ontario™ the bestest and most funnest province in Canada and east of Saskatchewan the most rectangular and polygonal and yellowest province in Canada. I have been informed by ~~ignorant~~ exchange students that Manitoba is actually located north of Mozambique so apparently I'm a racist now too but NO WORRIES I ACCEPT ALL JUDGEMENTS THROWN UPON MY UNDESERVING CHARACTER WITH FULL AND HONEST UNANONYMITY.

Reason number 1: My family lives in Manitoba. Obviously, I hate my family. Honestly, who the fuck *doesn't* hate my family? I hate coming home for Christmas and receiving lots of kisses and affection and having three people who love me more than anyone in the world give me unrequited attention. Bleh.

Reason number 2: It's the only place where I've felt I've truly belong during my tormented teenage years. Stability and long lasting friendships?? Fuck that shit. In a truly progressive society, we strive to inflict as much emotional damage on children as possible by needlessly moving from place to place at least thrice a year.

Reason number 3: The person who inspired me to pursue my passion and study math at one of the greatest math schools in North America and has made me unbelievably happy and was the only person who truly heard and believed in me lives in Manitoba so I would never ever want to go back and visit that shithole I guess.

Reason number 4: God it's so cold in Manitoba. Why is it so cold??? I'm not using capital-G "God" as an exclamation here; I mean this is a literal question to you GOD THOU WHO ART IN HEAVEN IT IS SO FUCKING COLD IN MANITOBA WHAT IN THE ACTUAL *FUCK* WERE YOU THINKING??

Reason number 5: I wholeheartedly respect any deal I make with *aphf* and would take this article completely seriously by denouncing all allegiance to the crap creek known as the state of Manitoba. God bless America and suck my balls *aphf*.

Maya B. Manitoba

profQUOTES 148.5

CS 246: BRAD LUSHMAN

- “ Encapsulation is a big word... It's a word that has... all the vowels in it. That's pretty cool.
- “ The problem with programmers is that they're lazy. Don't deny it, I am too.
- “ The answer is one letter. It's not A... it's not B... It's not D...
- “ This comes as a result of the most adorable feature in C++: you make it a friend.
- “ You don't want a lot of friends.
- “ Every student's worst nightmare, right there: we have a leak.
- “ When I sit on the table, that means it's story time.
- “ Rob got himself a box of this fancy mathematician chalk that mathematicians like, and he gave me a piece. And honestly, I don't see much of a difference. Maybe it glows on the board or something and I can't see it.
- “ [Algorithms by CLRS] doesn't really have 500,000 pages, but sometimes it feels like it.
- “ There is a function in the C++ standard whose purpose is to treat things like garbage
- “ If you're using a language that doesn't have this rule, stop using that language and never use it again. Run far, far away.

CS 350: EMIL TSALAPATIS

- “ Intel is kind of a bunch of hacks thrown together.
- “ Rings are what the Intel architects, being clueless in the 70s, thought security would be all about.
- “ If you look at the kernel, it's 90% drivers, and most of them are absolute crap.
- “ Imagine using a tape driver. Who the hell uses a tape driver? It's like three people.
- “ We've been trying to not use C for decades.
- “ Anyone who's had a compiler class knows—you lex, you parse, you spend half a semester on that even though nobody cares.
- “ The main feedback we got [about the current slide] was, “what are you talking about?”

CS 370: NOLAN SHAW

- “ If you do, and miss the deadline, the Ghost of Midterms Future will come down and take you on an agonizing dream sequence where you see the error of your ways, and wag their finger at you sternly. Also, you'll get 0.

CS 442: GREGOR RICHARDS

- “ When we did module 2—which is to say, when you did module 2 and I sat at home...
- “ Oh dear, it's taken a gigabyte of stack, and it doesn't want to tell me what 4 divided by 2 is.
- “ Using these terms interchangeably also annoys pedants, which is always a laudable goal.
- “ Variables in declarative languages are invariable.
- “ I seem to have forgotten which direction a sigma goes.
- “ When you start being a dick and doing this formal semantics stuff...
- “ I would love to bring in a Commodore 64 and do the course that way.
- “ I do recommend people learn Forth, because it takes one hour to learn, and then forget forever.
- “ Let's say if this code does what I think it should do. No I don't speak English you can't make me.
- “ That clock is getting progressively more wrong with every passing day.
- “ If I take my 48 gigs of RAM and lay it out bit by bit, that's just a very large number.
- “ Here is the worst solution... which is to say, what C does.
- “ Why does every language disagree on what it means to print things?
- “ [referring to syntax highlighter] Ah, it turns blue! That means I'm right.
- “ I don't know why anyone would need more than 16 bits for their integers.
- “ C++ has certain things that taste like type inference.
- “ Forth is a language everyone should learn and then never use.
- “ Don't worry, it's still structured programming, we don't have gotos, we just named our gotos break.

MATH 148: BLAKE MADILL

“ A conditionally convergent series is absolutely hopeless.

“ [*declines phone call*] From Ottawa. It’s probably Justin.

“ ... for German purposes.

“ I can only fake intelligence so much.

PHIL 145: VANESSA CORREIA

“ Feel free to treat Kyle better than you treat me... or worse...

PHIL 145: KYLE ADAMS (TA)

“ These are the brave students who saw numbers and did not run away.

“ I know “axes” [of a graph] looks more like “axes” [for trees], which makes this slide look like I’m deranged.

“ If in the last 40 years the population of California has reached over a trillion, we have way bigger problems than the number of marijuana smokers.

“ I am working with the assumption that nobody here cares about the well-defined-ness of the real numbers.

“ Fetuses... fetii? Fetuses, surely.

“ As soon as I started describing it, [my friend] said, “Oh, I hate that graph.”

“ That’s what fame is in mathematics, once every thirty years someone looks you up in a book and says, “I hate it.”

“ I think I heard some people laughing at this graph... that is a good sign.

“ The last time I checked, and I do have a degree in this, 900,000 is greater than 300,000.

“ Break a leg... I always feel weird telling dancers and actors to injure themselves.

“ My friends from Toronto laugh at me when I call Waterloo a city.

“ Ice cream [...] is sort of a subset of milkshake.

PMATH 365: RUXANDRA MORARU

“ [*erases chalkboard of work*] Oh no, did I erase everything? I didn’t mean to do that.

PMATH 464: BEN WEBSTER

“ But yeah, life is weird.

PMATH 446: WENTANG KUO

“ In commutative algebra, the hardest is the motivation. But the examples here I just erased are the reason for the abstract nonsense we are doing here.

CS 146: ROB HACKMAN

“ I can’t remember my Greek alphabet. That’s a delta... sigma... maybe???

“ At this point, your minds might be fried. And to that, I say: Haskell is a hell of a drug.

“ [*looks at lecture notes*] Oh wait, we’re doing this wrong intentionally.

“ [*students clap*] Stop it, you’re letting others know that you first years still love your professors.

“ There’s a word for such acronyms. I don’t know it: I can barely speak English.

“ [*students clap*] I’m not gonna react, and hopefully you’ll stop.

“ Why aren’t pointers part of Java? Because they’re not part of Java and because Java sucks.

“ No, Rob, no! Yes, it’s compiler time!

“ It’s a simple SIMPL program.

CS 146: BRAD LUSHMAN

“ I have to be careful when sharing my screen because who knows what’s on it. NOT- I mean student records and stuff.

“ [*looks at runtime of Python perfect number generator*] Is that 7?

“ Of course, having passed one test, we have proved that the entire program works.

“ If you look inside your computer, you won’t see trees.

“ Because pi is exactly three.

“ No, UW is not the MIT of the north. What a ridiculous idea. If anything, MIT is the UW of the south.

“ (UW is also not the MIT of the of the north.)

“ I will not make any comments about the midterm marks right now. That would be unfair, since technically, the midterm is not done yet.

“ [*ten seconds later*] Well, just looking at the marks, some of you will need that resubmission.

PMATH 467: DOUG PARK

“ [doing corresponding handwaving] I can just put my finger in the hole and stretch it out all the way to the boundary.

SDS 131R: THERESA ROMKEY

“ Tolstoy is an author where people claim they've read him but nobody I know has gotten through *War and Peace*.

“ If I play badminton with you, I will beat you, you will die.

“ I am a bus-taker, and I think that has taught me patience.

N CHARACTERS THAT LOOK LIKE # AND WHAT THEY ARE

- #: the standard #. it is what you think it is
- #: legacy character for viewdata system which replaces underscore
- 井 (and 井): character for “water well” (and character for “enclosure”)
- 井: some character, apparently only is used in the name of a chinese province
- 井: hiragana character “we”
- [FONT NOT FOUND]: extended kana alternate character for “wi”
- # (and # and #): musical sharp (and sharper sharp and flatter sharp)
- #: equal sign with lines through it
- #: this one is simply called “triple horizontal bar with double vertical stroke,” which is accurate, i guess
- #: small #
- #: full width #
- #: yezidi letter xheyn. apparently for writing kurdish
- #: letter for bamum, spoken in cameroon
- #: symbol for number 12 in a sacred conlang in nigeria (I wish I was making this up)
- [FONT NOT FOUND]: used for a form of written sign language used to represent dance I think??

別

ALBUM REVIEW: KANYE WEST, 2016 TO PRESENT

22.03.15, 11:18–11:29 AM EDITION

what an opportune time to talk about kanye.

gently brush aside current kanye news, i have no thoughts on them and they dont matter to me

- the life of pablo (2016)
 - album art, orange square with text and images
 - jarring. compare to reddit fan art. a fan could never make this cover
 - is really weird, not in the same loud way that yeezus was weird
 - ending of father stretch my hands pt 2, strange cuts to vocoded vocals
- ye (2018)
 - this is a special album, how so?
 - vulnerable, naked, voice is reverbless and mixed very loudly. everything is bare bones
 - something about
- kids see ghosts (2018)
 - polished
- jesus is king (2019)
 - recorded on an iphone in a plane
- donda (2021)
 - album art, plain black square
 - how can people defend this? because it's kanye!
 - black square is an avoidance
 - stem player, listening party
 - at worst, its kanye making false promises. at best, deconstructing the creation process
 - time looks upon
 - something about the sound of an ai-isolated choir, the sonic backbone of this album
- overall thoughts
 - this is the least safe time of kanye's career. most of these are also my favorite albums of his
 - kanye makes “the thing itself”
 - things become “the thing itself” when the artist releases it to the world and declares it as such
 - this is why people are able to rationalize kanye making weird art moves
 - time looks upon weird moves generously
 - it sounds stupid when kanye says donda is not the album of the year but the album of the lifetime. and it sounds dumb to say that kanye makes music for the future. but to me, it speaks to how
 - his medium is not the leaf you place onto the drying concrete, but the way that the concrete itself dries

(stay tuned for the 22.03.28 edition of this review)

You know profQUOTES are fake, right?

PROF. DAVID JAO

yye West

THOUGHTS ON THE LIVE ACTION HUNCHBACK OF NOTRE DAME

Over two years ago, Disney announced a live-action remake of their 1996 film, *The Hunchback of Notre Dame*. This announcement was met with varying levels of criticism due to both the original film's explicit nature, and the controversy surrounding another recent live-action Disney film, *Mulan*. Critics were skeptical about whether or not Disney could tackle the many sensitive cultural topics in this movie in a way that would be appropriate for children and would do justice to modern social issues.

Personally, I think that this would be a great opportunity for Disney to rework this film into a more modern take centred around themes that are both more appropriate and relatable for children. Furthermore, reworking this movie would provide the opportunity for Disney to highlight the social issues surrounding cultures that are more oppressed in modern society.

Fortunately for Disney, there is one subculture that is both relatable for children, and worth highlighting in a feature-length film. I'm talking about gamers of course! Many children spend hours each day playing online video games, and can more than relate to gamer culture. Furthermore, while gamers certainly aren't the most oppressed social class, it's no secret that they are generally looked down upon in society. With a couple of small tweaks to the plot of the original movie, *The Hunchback of Notre Dame* could easily be reworked into a movie that touches on aspects of gamer culture, cyberbullying, and even physical and mental health.

The first major aspect of the movie that should be changed is the title. *The Hunchback of Notre Dame* should be renamed to *The Gunchback of Notre Dame* (gunch is a portmanteau of "gamer hunch"). This would be a great way of signalling to the audience that this is going to be a refreshing modern take on a classic. Additionally, this would be a way of drawing attention to the importance of proper posture when at a computer, whether for gaming or for everyday use.

To fit the title, Quasimodo should be reworked into a gamer, who suffers from a gunch due to poor posture thanks to his Procrustean gaming setup. Esmeralda should be representative of a gamer girl, and her character could highlight the discrimination that female gamers face. Lastly, the villain, Claude Frollo could be a mainstream media journalist, who depicts gamers as addictive and violent.

Altogether, *The Gunchback of Notre Dame* would be a relatable and modern take on the original film. The film will still touch on themes from the original movie, such as the treatment of societal outcasts, while also handling more modern issues directly. Overall, this twist would allow Disney's live-action movies to redeem themselves after the controversial disaster

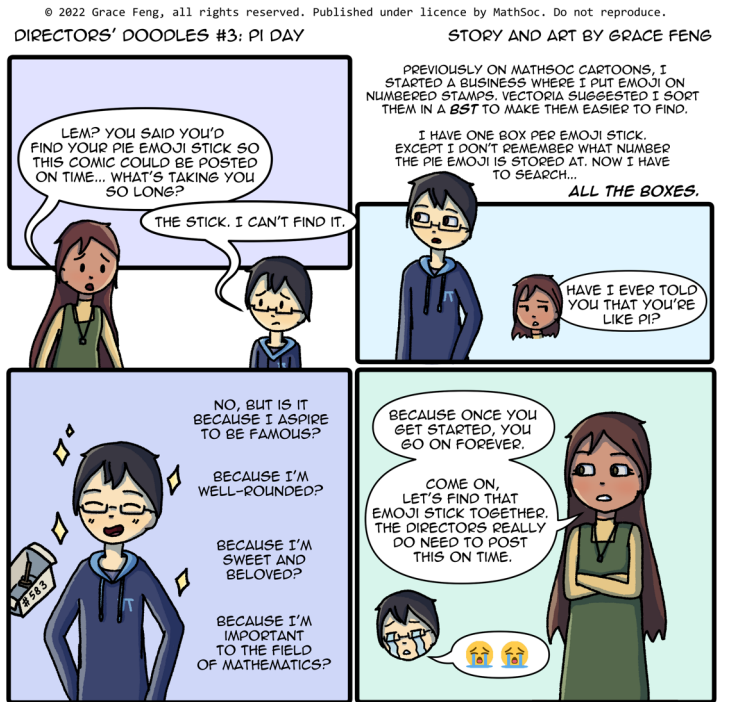
of *Mulan* through a refreshing and appropriate take on a not so timeless classic.

John Writer

DIRECTOR'S DOODLE #3: DAY

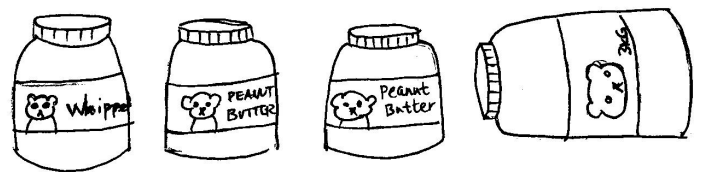


Newly aware of the fact that there are cartoons directors posting comics that they are involved in, Thea and Lem decide to help the directors with the postings by finding the pie emoji, using Lem's emoji BST from Comic 28.



MathSoc Cartoons

This comic uses graphics from Twemoji. Copyright 2020 Twitter, Inc and other contributors. Graphics licensed under CC-BY 4.0: <https://creativecommons.org/licenses/by/4.0/>



jif of the day

EXPERIENCING

I consider myself to be a fairly nostalgic person. It's hard to pinpoint exactly why, but it's likely that the most important factor is that I have a very strong memory of my interactions with other people and the locations and circumstances in which they take place. As I write this article two years to the day since I returned home due to COVID, I find myself vividly recalling memories as I continue re-exploring campus, and thoughts about the end of my pre-pandemic time at UWaterloo are bubbling up. In particular, I'm thinking about how it's impossible to know, for a specific routine action or activity, if it's the last time you ever do it. I didn't know when it would be my last time attending lectures in person for almost two years. I spent the night before leaving ironically playing the board game *Pandemic* and eating Pi Day pie (which went largely unclaimed due to COVID) with my friends. I thought I would see them again in maybe six months. While I have since met up with them, lives change and we have yet to hang out the way we did before. (I should note that we lost the game to the fictional pandemic.) Conversely, in my two years away, I often didn't know when it was my last time talking to any given person who I knew from before university before my return here (which comes with unavoidable distance in communication). At some point, I walked by familiar, comforting scenery in a local park for the last time, or looked out of my window at the moon, or saw my neighbour's cute dog, and I didn't know. And at some point I stepped inside my home for the last time, and I didn't know — I *couldn't* know, not with true certainty. Life is full of these last moments which are unknown at the time and only later become these memories that pop into my head with almost frightening ease.

There is an even stronger idea which plays in my head, as well. Sometime within the past year I learned that there's a name for a concept I'd thought of many times in the past: "*ichi-go ichi-e*" (the English transcription of the Japanese “一期一会”). This phrase traces its origins back to 16th-century Japanese tea ceremony, and translates literally to “one time, one meeting”. The idiom refers to the irreplicability of any given moment; no matter how similar a certain event may be to another, it can never truly be repeated. Consequently, any particular moment should be treated as the once-in-a-lifetime experience that it is. Of course this is just the awareness of time and the change it brings taken to a logical extreme, but that makes it no less true. *Ichi-go ichi-e* is a reminder to pay attention to each moment and treat it with a certain amount of respect for its unique nature, no matter how seemingly mundane.

In spite of my desire to fully experience each moment, I find myself feeling rushed and dissatisfied with the way I move from moment to moment. I ascribe that largely to the schedule of a study term in combination with my (stressful) return to campus. More importantly, it's unlikely that anyone can apply this perspective all the time, so I shouldn't be disappointed in my inability to do the impossible. Nevertheless, I know that I have room for improvement. It may take time, but I will keep trying to angle my life in a direction where each moment gets its due focus.

cutlet

Author's note: I strongly recommend reading the excellent article [One Year Since... March 13th, 2020](#) by royal no.69 milk tea published in volume 145 issue 4. It addresses the topic of unexpected last experiences very well, and I felt like it almost absorbed me into the author's wonderfully recounted memories.

N THINGS I WILL MISS ABOUT UWATERLOO

- Crying at a desk in DC library (when I could find a desk)
- Watching anime in MC Mac lab, ignoring the people staring
- Icon silverfish (the chunky ones only)
- The rush of PAC exams (feels like falling in love)
- Congratulations on a match! (Co-op message)
- The first bite of 10pm Lazeez (on the sticks, 3 lines) after eating nothing all day
- Trailing behind people after a midterm straining to hear what they got for question 4 because I didn't have any friends of my own to check with
- The whole class refreshing their WaterlooWorks nonstop on match day
- The one guy in front of me refreshing his email nonstop on Aphrodite match day
- Skipping classes with clicker marks
- Night walks around ring road in the -20°C winter
- Getting the seat to myself on the 25C even after stopping at Laurier
- Getting the very front seat on the top deck of the 25C (rare!)
- Dozing off in the front row of small lectures
- The sexual tension between me and the only other person in the computer lab at 3am
- Peering in the glass outside of DC fishbowl during an info session, not going in
- Showing up to an interview out of breath after walking up 3 flights of TC stairs
- The motivation to work hard and strive for something, being surrounded by people who are similar
- Being around endless people my age in the same life stage with a given minimum amount of common ground
- The youthful innocence, self-consciousness, and paradoxical shamelessness characteristic of one's student years

LOOK AT THE SKY

I looked at the sky today. A few minutes ago, actually.

For context, this was a relatively clear snowy night. Mild clouds. No moon. I was listening to music while waiting for a bus to take me home. The song told me to look at the sky. I liked this song. So I was surprised to realize I had never listened to it before. This time, I listened.

The sky close to the horizon was a bit light. The actual horizon was hidden from view thanks to the vast array of city buildings, but you could see the sky getting brighter closer to it. Above, was a small cover of clouds. And above that still... pitch dark. "Inky black," they call it.

Back when I was a kid, I used to play this game. The name of the game is not important. But the sky in the game was represented by a texture. And sometimes, when the texture didn't load in correctly, it would just be black. Pitch black, just like the sky above me.

The game showed pitch black because it had nothing to show. Is that still true? My sky was black because there was nothing I could see. But there were things. The planets, the asteroids, the sun, the stars... they're there, even if I can't see them. If I could zoom into the darkness, I could zoom past those things. In the game, if you went too high into the sky, eventually everything would freeze and you would have to restart. I suppose we haven't frozen yet.

Then the bus came. And I lost my train of thought. I suppose it didn't go very far, or reach anywhere. But now when I look at the sky, I can't see the texture anymore.

tendstofortytwo

THE mathNEWS EDITORS & CONTRIBUTORS (AMONGST OTHERS) HAVE NO FEAR

triple pineapple barbeque pizza

別

A feature is just a documented glitch.

PROF. IAN MUNRO

THOUGHTS THE NIGHT BEFORE A STAT231 TEST

:(

head empty, no thoughts.

What is a maximum likelihood estimator?

linear regression (derogative)

Hot dog, hot dog, hot diggity dog

I miss the old kanye, straight from the go kanye

Chop up the soul kanye, set on his goals kanye

I hate the new kanye, the always rude kanye

i should study

New warsoc when?

yeet

Lemman

BIRD 101

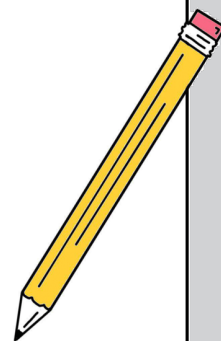
Bird Course Exam BIRD 101 Mr. Goose

1. When you see a goose on campus you...

- A. Run and scream
- B. Cry
- C. Thank Mr. Goose
- D. All of the above

2. Which is more dangerous?

- A. Lion
- B. Tiger
- C. Goose
- D. Bear



Jenna

APP<APP<CONS, TRUE>, APP<APP<CONS, TRUE>, APP<APP<CONS, TRUE>, APP<APP<CONS, TRUE>, APP<APP<CONS, TRUE>, EMPTY>>>>>

I've been spending some time with jeff lately. I say this not to absolve myself, mind, but maybe this at least answers the "why."



"Who" is jeff? Who are they who have branded their structs above my flesh, burned their typenames behind my eyes, engraved their templates within the cavities of my mind? Who are they who visit me in the midst of dream, when the sun has sunk into the sea and the wind has roosted itself onto the treetops? I do not know. I've never met them.

Yet they sing to me, weaving tales of magics and logics arcane:



In our previous discussions of computability, we made mention of models of computation equivalent to the Turing machine. One such model, the lambda calculus, represents computations through the application of abstract functions. While we will not go into great depth here (CS145 course notes will encompass anything I'm able to reasonably cover), we can at least have a look.

An expression E in lambda calculus is either a variable x , an abstraction $\lambda x. E'$, where E' is an expression, or an application $E_1 E_2$, where E_1, E_2 are expressions. In the expression $\lambda x. xy$, we say x is bound and y free. When we apply an expression to an abstraction, the bound variable is substituted for the expression and any free variables are left untouched. In substituting, we want to avoid capture: the application $(\lambda x. xy) (\lambda y. y)$ gives us $(\lambda y. y)y$, not $\lambda y. yy$: the final y , a free variable, remains free and outside of the abstraction. To make this clear, α -conversion allows us to rename bound variables: $(\lambda y. y)y$ is the same as $(\lambda t. t)y$. While this might seem self-evident, it is best to take care, especially with expressions such as $(\lambda x. \lambda y. xy)(\lambda x. \lambda y. xy)$.

Which brings us to our next point: currying. All this says is that abstractions of multiple bound variables are just single-variable abstractions that return abstractions. For example, $\lambda xy. xy$ is just syntactic sugar for $\lambda x. \lambda y. xy$. With this in mind, we can start looking at some simple constructions.

We define the booleans true and false to be $\lambda xy. x$ and $\lambda xy. y$ respectively. That is, they each take in two arguments, and either return the first or the second. To see why these definitions are intuitive, let's make an if statement: $\lambda pab. pab$. Looks like we just took in three arguments and returned them as-is, right? Not quite: we're taking in some predicate p , and two expressions a and b . p must evaluate to either the true or false given above. Then, a and b are applied to p in that order. If p is true, then a is returned. Else, b . Now, you might say:

What if p doesn't evaluate to true or false?
Then the if statement won't evaluate as intended.
Is there no way to prevent that?
This is lambda calculus. There are no assert statements here.

While abstractions in lambda calculus are nameless, we'll find it helpful to give them names in writing. We can fairly easily define some nontrivial abstractions: OR, for example, would be given by $\lambda ab. (((IF a) TRUE) b)$, for a, b booleans. If a is true, then return true. Else, return b . With the same reasoning, try defining AND and NOT.

We can start the process of making lambda calculus useful by making a rudimentary list data structure. We define the EMPTY list to be $\lambda x. TRUE$. Recursively, as a list can either be the empty list or an element adjoined to another list, we can define CONS as $\lambda xys. sxy$ to append an element x to a list y , CAR as $\lambda l. (l TRUE)$ to get the first element of a list l , and CDR as $\lambda l. (l FALSE)$ to get the rest of the list. With an element x and a list y , we can apply CONS to get $\lambda s. sxy$. If we were to pass this as l into CAR, we'd get $(\lambda s. sxy) TRUE$, which then gives us x , the first element. Similarly, passing it into CDR would give us y . (Exercise: what are the CAR and CDR of EMPTY? This should help make sense of why it's defined the way it is.) Along with the IEMPTY abstraction $\lambda l. l(\lambda xy. FALSE)$ (again, see for yourself why this works by testing if EMPTY is indeed IEMPTY, and then the same for some $(CONS x) y$), we now have all of the tools we need.

Oh yeah. And the Y-combinator. $\lambda f. (\lambda s. f(ss))(\lambda s. f(ss))$. It does recursion. Ask jeff.

Everything we want to do is more or less doable with the above. For example, the natural numbers: EMPTY is zero, and if N is the representation of some natural number in lambda calculus, then $(CONS TRUE) N$ is its successor. It's a unary counter. The number is the length of the list we build. We could do more fancy constructions, the likes of binary numbers in CS145 or Church numerals in the literature, but this will suffice. Any sort of data we'll need can be encoded (albeit byte-inefficiently) as some list of lists of maybe numbers, themselves lists.



"What" does jeff sing? jeff sings of lambdas. jeff sings of templates. jeff sings of jeff.

C++ template metaprogramming employs (read: abuses) C++ type-level features in order to have computations performed at compile time. I'd have a better explanation if I knew what a "template" or a "C++" is, but this will have to suffice. Surprisingly enough, there exist resources regarding C++ template metaprogramming lambda calculus:

jeff himself has written about it¹, as well as Matt Might's excellent blog post including source code². As far as we are concerned, you and I, it's a syntax mod: x becomes `Ref<'x'>`, $\lambda x.x$ becomes `Lambda<'x'>`, `Ref<'x'>>`, and `(CONS x) y` becomes `App<App<CONS, Ref<'x'>>, 'y'>`. All that we have done translates over easily. For example, we can define using `IF = Lambda<'x'>, Lambda<'y'>, Lambda<'z'>, App<App<Ref<'x'>, Ref<'y'>>, Ref<'z'>>>>>`; and it will work as intended. These expressions are all C++ types, on which lambda calculus substitution and reduction rules can be defined through `Eval` and `Closure` templates mimicking computation — see sources above. We will ignore these complications. This is not our playground. Our kind is unwelcome here.

We concern ourselves with the inevitable Brainfuck implementation. We will encode our machine as a pair: a list of instructions (we'll deal with this later) and a list of data. The data itself is composed of (1) the current cell, (2) the list of left cells, (3) the list of right cells, (4) the input list, and (5) the output list. Fetching the n^{th} item of a list is tedious, so we define some shorthands. For the first item, using `CELL = Lambda<'d'>, App<CAR, Ref<'d'>>>`; is short and sweet. The last item using `OUTPUT = Lambda<'d'>, App<CAR, App<CDR, App<CDR, App<CDR, Ref<'d'>>>>>>`; leaves some to be desired, but it will have to do. Then, we need to define our six elementary operations of incrementing, decrementing, output, input, left shift, and right shift on our data structure. Let's walk through one:

The left shift operation changes the current cell to the first cell of the left list (if nonempty, otherwise zero), removes one element off of the left list, and appends the previous current cell onto the right list. What follows are elementary applications of `CONS`, `CAR`, and `CDR`:

```
using MVL = Lambda<'d'>,
    App<App<CONS, App<App<App<IF, App<ISEMPTY, App<LEFT,
    Ref<'d'>>>>, EMPTY>, App<CAR, App<LEFT, Ref<'d'>>>>>,
    App<App<CONS, App<App<App<IF, App<ISEMPTY, App<LEFT,
    Ref<'d'>>>>, EMPTY>, App<CDR, App<LEFT, Ref<'d'>>>>>,
    App<App<CONS, App<App<CONS, App<CELL, Ref<'d'>>>>,
    App<RIGHT, Ref<'d'>>>>>,
    App<App<CONS, App<INPUT, Ref<'d'>>>>,
    App<App<CONS, App<OUTPUT, Ref<'d'>>>>, EMPTY>>>>>>
```

The remaining five are equally simple. The hard part, then, is encoding the list of instructions, then subsequently parsing it. Each instruction in the list of instructions we will encode as a pair of two lists: the first list a natural number in lambda calculus form and the second list a potentially empty nested list of instructions. The number encodes the current instruction: 0–5 for the six elementary ones above, arbitrarily in that order, and 6 for the loop instruction. Only for 6 is the nested list of instructions nonempty.

We'll run through how we plan on evaluating this. The main function `INST` will take in as parameters a function `f` and a program `p`. The `f` will be itself. Ignore it. (It's necessary for compatibility with the Y-combinator, which is beyond the

scope of this article.) The `p` is our machine as described above: a list of instructions and a list of data. Recursively, as long as the list of instructions is nonempty, we'll parse an instruction to determine which of `ADD`, `SUB`, `OUT`, `INP`, `MVL`, `MVR` to call on our data, then we'll call the next instruction on that new data, and so on.

`INST` will pass the data and the first instruction up to `INSTADD`, which checks if the instruction number is zero. If it is, it calls `ADD` on the data and returns the new data. Otherwise, it subtracts one off of the instruction number (takes the `CDR`) and passes the instruction and data up to `INSTSUB`. This propagates upwards until we reach `INSTL00`, the final instruction to loop on the nested list of instructions. Altogether, `INST` is defined as

```
using INST = Lambda<'f'>, Lambda<'p'>, App<App<App<IF,
    App<ISEMPTY, Ref<'p'>>>>, App<CAR, App<CDR, Ref<'p'>>>>>,
    App<Ref<'f'>, App<App<CONS, App<CDR, App<CAR, Ref<'p'>>>>>>,
    App<App<App<INSTADD, App<CAR, App<CAR, Ref<'p'>>>>>>,
    App<CAR, App<CDR, Ref<'p'>>>>>>, Ref<'f'>>>>>>>>
```

and `INSTADD` as

```
using INSTADD = Lambda<'i'>, Lambda<'d'>, Lambda<'f'>,
    App<App<App<IF, App<ISEMPTY, App<CAR, Ref<'i'>>>>>, App<ADD,
    Ref<'d'>>>>, App<App<App<INSTSUB, App<App<CONS, App<CDR,
    App<CAR, Ref<'i'>>>>>>, App<CAR, App<CDR, Ref<'i'>>>>>>,
    Ref<'d'>>>>, Ref<'f'>>>>>>>>
```

and so on, up the chain to `INSTMVR`. Don't worry, you aren't meant to read that code. It's for dramatic effect.

Now, take a look at how `f` gets passed up the chain. This is because upon arriving at `INSTL00`, we will have to evaluate more instructions, which means a recursive call back to `INST`. C++ doesn't like that. It wants all of its types to be well-defined, which is not possible with this circularity. Hence, we "disguise" `INST` as `Ref<'f'>`, which is itself a proper type. When the `Eval` process later substitutes `Ref<'f'>` for `INST`, the compiler no longer cares. It has already done its due diligence. (Note that I am probably wrongly paraphrasing jeff currently. They never did tell me what a "C++" is.) This looks something like:

```
using INSTL00 = Lambda<'i'>, Lambda<'d'>, Lambda<'f'>,
    App<App<App<IF, App<ISEMPTY, App<CELL, Ref<'d'>>>>>,
    Ref<'d'>>>>, App<Ref<'f'>, App<App<CONS, App<CAR, App<CDR,
    Ref<'i'>>>>>>, Ref<'d'>>>>>>>>
```

And finally, to make it all recursive: using `BF = Lambda<'p'>, App<App<Y, INST>, Ref<'p'>>>>`; . The Y-combinator.



"Where" is the output? We've built an intricate system, but how do we extract anything from it? Well, we know the result of an `Eval` on our mess of lambdas will be a type. So, we can initialize a variable of that type, and then print out some stringification of that type. Easy. For example, with

```
using N0 = EMPTY;
using N1 = App<App<CONS, TRUE>, N0>;
using N2 = App<App<CONS, TRUE>, N1>;
Eval<N2, EmptyEnv>::result y;
std::cout << typeid(y).name() << std::endl << std::endl;
```

we end up with `7ClosureI6LambdaILi115E3AppIS1_I3RefILi115EES2_ILi120EES2_ILi121EEEE7BindingILi121ES_IS8_S9_ILi121ES_IS0_ILi120ES0_ILi120ES0_ILi121ES4_EEE8EmptyEnvES9_ILi120ES_ISB_SD_ESD_EEESG_EE`: this is some representation of the lambda calculus type structure of the number two, encoded as a list of length two.

We should expect the same thing from a program that adds one to a memory cell of one, right?

```
7ClosureI6LambdaILi100ES0_ILi102E3AppIS1_IS1_IS0_ILi120ES0_ILi121ES0_ILi122ES1_IS1_I3RefILi120EES2_ILi121EEEE2_ILi122EEEEES1_IS0_ILi120ES1_IS3_S0_ILi121ES0_ILi122ES0_ILi120ES0_ILi121ES4_EEEEEES1_IS0_ILi120ES1_IS3_S0_ILi120ES0_ILi121ES3_EEEES2_ILi105EEEEES1_IS0_ILi100ES1_IS1_IS0_ILi120ES0_ILi121ES0_ILi115ES1_IS1_IS2_ILi115EES3_ES4_EEEES1_IS1_ISU_SI_ES1_IS0_ILi100ES1_ISK_S2_ILi100EEEEESW_EEES1_IS1_ISU_S1_IS0_ILi100ES1_ISK_S1_IS0_ILi120ES1_IS3_SC_EESW_EEESW_EES1_IS1_ISU_S1_IS0_ILi100ES1_ISK_S1_IS13_S14_EEESW_EES1_IS1_ISU_S1_IS0_ILi100ES1_ISK_S1_IS13_S19_EEESW_EES1_IS1_ISU_S1_IS0_ILi100ES1_ISK_S1_IS13_S1E_EEESW_EES0_ILi120ESI_EEEEEESW_EES1_IS1_IS1_IS0_ILi105ES0_ILi100ES0_ILi102ES1_IS1_IS0_S1_IS0_ILi100ES1_IS1_ISU_S1_IS13_SZ_EES1S_EESW_EES1_IS1_IS1_IS0_ILi105ES0_ILi100ES0_ILi102ES1_IS1_IS0_S1_IS0_ILi100ES1_IS1_ISU_SZ_ES1_IS18_S1_IS1D_S1_IS1I_S1_IS1_ISU_S1_IS23_S1M_EES10_EEEEEESW_EES1_IS1_IS1_IS0_ILi105ES0_ILi100ES0_ILi102ES1_IS1_IS0_S1_IS0_ILi100ES1_IS1_ISU_S1_ISK_S1H_EES1_IS18_S1_IS1D_S1_IS1_ISU_S1_IS13_S1H_EES1P_EEEEEESW_EES1_IS1_IS0_ILi105ES0_ILi100ES0_ILi102ES1_IS1_IS0_S1_IS0_ILi100ES1_IS1_ISU_S1_IS1_IS1_ISA_S1_ISG_S17_EES10_ES1_ISK_S17_EEES1_IS1_ISU_S1_IS2R_S1_IS13_S17_EEES1_IS1_ISU_S1_IS23_S1C_EES1Q_EEEEEESW_EES1_IS1_IS1_IS0_ILi105ES0_ILi100ES0_ILi102ES1_IS1_IS0_S1_IS0_ILi100ES1_IS1_ISU_S1_IS1_IS1_ISA_S1_ISG_S1C_EES10_ES1_ISK_S1C_EEES1_IS1_ISU_S1_IS23_S17_EES1_IS1_ISU_S1_IS38_S1_IS13_S1C_EEES1Q_EEEEEESW_EES1_IS1_IS1_IS0_ILi105ES0_ILi100ES0_ILi102ES1_IS1_IS1_ISA_S1_ISG_SZ_EESW_ES1_IS2_ILi102EES1_IS1_ISU_S1_ISK_S1_IS13_SL_EEESW_EEEEEES1_IS1_ISU_S1_IS13_SM_EES3S_EESW_ES3Q_EEEEEES42_ESW_ES3Q_EEEEEES42_ESW_ES3Q_EEEEEES42_ESW_ES3Q_EEEEEES42_ESW_ES3Q_EEEEEES42_ESW_ES3Q_EEEEEES42_ESS_S58_ILi121ES_ISS_S58_ILi121ES_ISS_S58_ILi121ES_ISS_S58_ILi121ES_ISS_S58_ILi121ES_ISS_S58_ILi121ES_ISS_S58_ILi121ES_ISS_S58_ILi121ES_ISS_S58_ILi121ES5A_S58_ILi120ES5A_S59_EEES58_ILi120ES_ISS_S58_ILi121ES5A_S58_ILi120ES_ISH_S58_ILi120ES_IST_S58_ILi120ES_ISI_S59_ES59_EES5F_EES59_EEES59_EEES5B_EES5B_EES58_ILi120ES_ISS_S58_ILi121ES5A_S5F_EES59_EEES58_ILi120ES_ISH_S58_ILi120ES5D_S58_ILi120ES5D_S59_EEES59_EEES59_EE. Not quite. Oh no.
```

It was half past six on the fourteenth of March “when” I sat down by the third row of M3 1006.

I sat and stared.

The screen stared back.

`S_EESW_EES1_IS1_IS1_IS0`.

The screen spoke.

`IS1_ISU_S1_ISK_S1H_EES1_IS18_S1`.

I could not understand.

`IS1D_S1_IS1_ISU_S1_IS13_S1H_EES1P_EE`.

But I need not understand. `EEESW_EES1_IS1_IS1_IS0_ILi105ES0_ILi100ES0_ILi102ES`.

For it was not me it stared at.

It was not me it spoke to.

My hand would not lift. My head would not turn. My mouth would not part to utter any last prayer. The meaning was clear. I was to listen, and only listen. And jeff spoke.

“This is fucked. Fucked. This is unsalvageable. This is terrible.”

And so it was. The problem is that the `Eval` \diamond templates, both in jeff’s and in Matt’s implementations, do not evaluate lambda calculus fully in the sense that we understand it. They nest the abstractions and applications in closures that hold the body of the argument, as well as the environment: what is meant to be replaced with what at each step. They translate the calculus into a form C++’s type system could understand, and while every reducible lambda calculus expression has a unique reduced form, the same is not true for `Eval` \diamond outputs. Determining whether two types encode some notion of the same abstract “object” we care about would be a feat, if possible at all.

I’m pretty confident in the lambda calculus. In an Intermediate Student with Lambda Racket environment, I’m certain this works (give or take some debugging overhead). But this is C++. I had jumped out of my fishbowl, into jeff’s sea.

☺

“It’s possible. You could get this to work. You just did it wrong.”

☺

Possible. “It’s possible.” I think that’s proof enough for me.

Lemma 5.1. C++ template metaprogramming lambda calculus is a legitimate programming language.

As for C++ itself, who can say.

hu

1. See *C++ Is Just Racket, If You Think About It (Part 2)* from **mathNEWS** 146.6
2. <https://matt.might.net/articles/c++-template-metaprogramming-with-lambda-calculus/>

☺

A MAN WALKS INTO A PI EATING CONTEST...

gridCOMMENT 148.5

He sits down, and proceeds to eat an infinite number of digits. 1s, 2s, 9s, 0s, even 5s! I saw it all happen, he kept eating the digits of pi, devouring them with ease. He would slurp a seven, munch a 6, guzzle a 4. But then you know what happened? He got up, still scarfing away at the numbers, came over to me, and started pulling my arm. I didn't know what he wanted but I let him continue. Then he started pulling my leg, anddddd now I'm pulling your leg. Everyone knows you can't eat an infinite number of something! Even if it is Pi day (at time of writing).

It's great to see you all working so diligently to solve these **gridWORDS**! It's one of my daily go-tos whenever I'm bored or want to kill 10–15 minutes. Last issues **gridWORD** was very fun! I hope you all enjoyed it as much as I did!

Last week I asked you all “What food place, real or fictional is the best?” Some of the answers to this include:

- gridNOOB: “LBB ftw.”
- Aeschylus: “Mr. Panino's Beijing House. Never forget.”

- Diogenes: “**mathNEWS** prod night with pizza (fictional):”
- £niola: “Mandarin.”
- eternally puzzled: “Luke's Diner from Gilmore Girls”

Great work Aeschylus! Awesome work on solving the guest writers **gridWORD**, and giving us all a friendly reminder about what once was. RIP Mr. Panino's. More importantly, great work to everyone who managed to solve the **gridWORD**! I'm really proud of you all!!!

I don't know about you all, but I've kinda been gaming a lot recently (fortnight, angrie berds, you know), so I want to ask you all for this **gridQUESTION**: “What is a real game for true gamers?”

If you have a solution, email it to mathnews@gmail.com by 6 PM on March 28th with your name or moniker, and your (very important) **gridQUESTION** answer! MC3030 is also open for solutions as well, feel free to drop it off there too! :)

Wink wonk

ACROSS

- English mom
- "A likely story!"
- Confirmation and cognitive, e.g
- Currency of Samoa
- Mar. follower
- Australian wild dog
- ___ Kong
- Reaches its highest point of intensity
- Reactor fuel
- A well known jarred pasta sauce
- *A route with little to no detours or stops
- A type of Mediterranean wind, or a since discontinued Volkswagen brand
- Ball supporter?
- Cracker spread
- Huge amount
- Exclamation of surprise
- ___ Major (southern constellation)
- Anger
- *What a paradox might have?
- Money dispenser
- Speedy
- African antelope
- Behold
- Symbol
- Junior, e.g.
- Making a strong effort to obtain something
- What the answers to the starred clues all are
- French cordial flavoring
- One who supports their country
- A poetic line of five metrical feet
- What you may find on top of a pond, sing.
- Heavenly host?
- Long-jawed fish
- Never, to Shakespeare
- Oracle
- Inherited
- You may also "catch" after it

DOWN

- Native New Zealander
- Of an arm bone
- The second evolution of the magnet Pokemon
- Do damage to
- Bananas
- When a store may be open, abr.
- "You got it!"
- *Magnetic effect through an electrical current
- Long ___
- Message in a bottle?
- Fall sound
- Honey
- Kawaii!
- What you may be come if you judge this clue
- It doesn't go in a neat drink
- Digging in the garden
- Fox, wolf or dog, e.g.
- Where a cob may go to school?
- Two halves together
- Wedding band, maybe
- Animal's natural habitat
- "Just let me put my ___ , it's cold out!" (2, 3)
- *Inconsequential
- Civil rights target
- Not in the loop
- Doofus
- Box
- Food scrap
- Prefix to section and net
- Edmonton hockey player

- Old-fashioned type
- Asterisk
- Lively
- Faux ___
- Suffix indicating a double bond between two carbon atoms
- Baby carrier?
- Eastern "way"

