



“WHAT’S YOUR FURSONA?”

This is my last issue as an Editor. That feels weird. For so many years, this silly little magazine has had such an outsized role in my life. Every two weeks, we’d hunker down in our MC bunker and stare down the barrel of endless InDesign errors and accidentally included double articles, all while our Orbitz and inexplicable bust of Jerma lurked ominously above us.

But it was always worth it whenever we saw one of you reading the issues on the cushions outside of Math CnD, or when I’d overhear someone excitedly pick up an issue from the stands outside the office bright and early on Friday morning, or when I’d hear about lifelong friendships and core memories made at a prod night.

mathNEWS is really special. There’s nothing quite like it in the world. For those who will come after me—whether you’re a writer, reader, or editor—I hope it changes your life as much as it changed mine. I hope in these last few years you read something that made you think, or cry, or laugh. And, as always, I sincerely hope you like this issue.

befuddled
Editor, **mathNEWS**

One. More. Week.

We’re almost out. Do you hear the spring birds? Earth is waking up; the sun is calling. There’s a little Toronto apartment being cleared out for you. A plane to Vancouver coming your way. A California beach awaiting your footsteps. One more week, then one more month, then it’s here.

Some of us are graduating. For some, the calling birds herald a one-way ticket. Sure, we can revisit Waterloo. But we’ll return to a different Waterloo than we knew. My friends keep calling it “dying”—you write your last exam, then explode.

Maybe we “die.” If we do, it’s only because our new lives will soon begin. I can’t wait to see what it has in store for me. I can’t wait to hear what it has in store for you.

Dawn is almost here, my friends. Let’s revive into daylight.

revivED
Editor, **mathNEWS**

AURELIO		bird that’s into bondage (bird banding)
USMAN!		Usman!
JOCHEMIST		if i say squirrel girl...
MRBLUESKY’S ROOMMATE		MPreg Cat
FINGERSINSOCKETS		i feel like red panda would be a good one
ICEBURJ		naked mole rat
IS.ALL.ON		One of the cats from Cats (the musical)
CRIMSON		sloth
FINEGEOMETER		Porygon (the Pokémon)
LARS NOOTBAAR		Lars Nootbear
BEESKNEES		A swarm of angry bees
 		
KUMQUATZZ		really cool mysterious and non-chalant alpha wolf who is really cool
SMALLMOUTHBASSHATER		Fish
DOLLAR STORE PERSON		Echo the Whale (DSC mascot)
SHAHABEE		Amir Dadpour
STRATUS		610 lead programmer
NEO		Fox
IGNIS		anthropomorphized univeristy of waterloo
FOX		eralogos
別		my friends tell me I'd be a crow
ANDOIII		Draggy :3
ABELIANKWYJIBO		foxgirl
SQRT(CAUSE)		Shope Papillomavirus Cottontail
Девятое травня		A kitsune shrine maiden, of course...
APHF		Section 11(c) of the Canadian Charter of Rights and Freedoms

ARTICLE OF THE ISSUE

Congratulations to **aurelio** and **fingersinsockets** for their AOTI-winning market research report, *N.No.Name.Brand.Items.That.Don't.Exist*. You can drop by the **mathNEWS** office in MC 3030 to pick up your Loblaw consultancy payment.

befuddled
Editor, **mathNEWS**

I will larp as you.

SASHA NOVIKOV, **mathNEWS** EDITOR FOR WINTER 2026
ALONG WITH OWEN GALLAGHER, SARA NAYAR,
NOAH NAZARETH, AWAB QURESHI, TOM SI, AND RIVER STANLEY

mathASKS 160.6

FEATURING GRADUATING SIX-YEAR mathNEWS WRITER APHF

MACINNES: WHERE DID YOUR WRITER NAME COME FROM?

The license plate of the 2003 Toyota Echo I grew up with was APHF 022.

NOT A N*RD: HOW MANY mathNEWS CHILDREN, GRANDCHILDREN, AND MAYBE GREAT-GRANDCHILDREN(?) DO U HAVE TOTAL?

I have at least four **mathNEWS** children (people I introduced to **mathNEWS**), which you should know, since you are one of them.

If not being able to keep track of my **mathNEWS** children (and grandchildren, and etc.) makes me a “deadbeat **mathNEWS** dad” then whatever, lock me up. None of you ever sent me a **mathNEWS** Father’s Day card.

DOLLAR STORE PERSON: WHAT FIRST DREW YOU TO WRITING FOR mathNEWS?

I met my own **mathNEWS** parents in the (since deleted) MathSoc Board Games server. My first article is a bit of a conversation I had with them transcribed.

For a while before things opened up, **mathNEWS** was my only connection to broader Waterloo math culture. Also I liked (and spent an unhealthy amount of time on) the W21 *Minecraft* server.

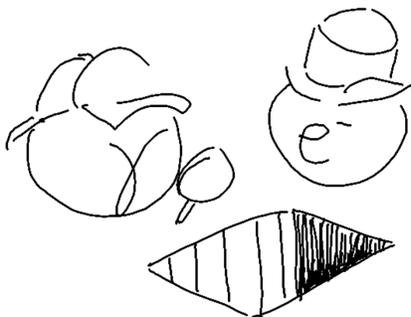
JOCHEMIST: HOW DOES IT FEEL TO BE ALMOST FREE FROM THIS PRISON?

I think I’ve been institutionalized. I relate more and more to Brooks in *The Shawshank Redemption* every term.

USMAN!: ARE YOU IN MC COMFY RIGHT NOW ON MARCH 9TH AT 4:41 PM

Nope. I’ll have to catch you next time.

ABS(JESTER): FAVORITE ELEMENTARY PARTICLE?



They’re studying an infinite square well.

HERECOMESTHEGRUMP1969NEEDSMORELOVE: WHAT WAS YOUR FAVORITE PHYSICS COURSE? WHO WAS YOUR LEAST FAVORITE PHYSICS PROF? DO YOU THINK YOU’LL GET A JOB?

PHYS 263 and 363 are pretty slick. It’s the first time since learning what energy is in high school that an Ontario physics student will gain tools that make previously difficult problems easy. Also they’ll kill me for saying this, but it’s a tragedy of institutional proportions that first year physics students won’t get the Robert Mann 124 experience.

Least favourite physics prof has gotta be Lawrence Krauss. By all accounts he seems truly horrible.

I don’t think I’ll get a job. As soon as I leave the 50 km radius centered on MC, I will despawn.

IS.ALL.ON: FAVOURITE COURSE YOU HAVE TAKEN?

As someone who has watched season one of *The Bear* and has also eaten food pretty much every day since I was born, I am a bit of an expert on courses.

Appetizer > Dessert > Soup > Salad (on a day I’m in a salad mood) > Hors d’oeuvre (Just call it an appetizer) > Main > Salad (on a day I’m not in a salad mood)

BIG WEENER: HOW DOES ONE EVEN GET INTO THE ACCORDION IN THE FIRST PLACE?

According to the legend, my grandfather (or great grandfather, the legend is not entirely clear) bought an accordion for 25 dollars with his first paycheque, and eventually that accordion got passed down to me.

I think you could do a survey of accordionists you’d find 40%+ of them got started by unexpectedly inheriting an accordion.

DOLLAR STORE PERSON: FAVOURITE MINECRAFT PARODY YOU MADE? YOU’RE SO COOL BTW OMG LEGEND

You are too kind. I do wish people would stop trying to cram me into the corners of maps though.

Favourite *Minecraft* parody to perform was *Revenge*. I did the rap. Favourite one we wrote is *Sweet Diamond Mine*, a parody of *Sweet Caroline*. I think I peaked artistically with the lyrics (of the second verse):

Look at the town
And it won’t seem so lonely
When villagers procreate for food
And when I hurt
I make the *Minecraft* hurting sound
Those mobs that hurt me sure were rude

You can find a pretty scuffed recording on YouTube if you look hard enough.

JMHEXAGON: IS THERE ANY SECRET TECH TO DODGEBALL THAT YOU'RE WILLING TO DISCLOSE TO THE PUBLIC?

Waterloo intramural dodgeball uses an slightly abnormal ruleset where jail is behind the other team's side, and when you're out you can still throw balls at the other team. Because of this, rounds often enter a death spiral when your opponents are in possession of most of balls, as there are only five balls total. Maintaining ball control is all caps CRITICAL. Learn to cycle balls, every throw you make should be able to be caught by your teammates in jail should you miss.

Sacrifice is also critical. I lost a piece of myself in that finals that I will never get back. The ceiling for how peaceful my life can be was permanently lowered. If you are not ready to give something up, you are not ready to win.

GINGER RIYESAKI: WHY DO YOU HAVE A FLIP PHONE

1. I don't like the feeling of touch screens. They are displeasing to me.
2. I do enjoy the tactile feeling of flip phone buttons.
3. If I ever deal drugs, I can break the spine dramatically after a phone call. I don't plan to, but it's good to have the option just in case.

AWED: AS A STRONG PROPONENT OF "BURGER PIZZA," WHERE DID THE PIZZA SUGGESTION COME FROM? AND HAVE YOU EVER NOTICED THAT PIZZA NOVA DOES NOT, IN FACT, HAVE CHEDDAR CHEESE?

To answer your first question: The Burger Pizza recipe is sacred. It matters not from whence it came, what matters is that it persists into the future (I forget).

To answer your second question: I am plugging my ears and cannot hear you right now.

FINGERSINSOCKETS: WHAT ARE THE BEST AND WORST PIZZAS YOU'VE EVER HAD AT A PROD NIGHT?

Best: Hot Honey-Pepperoni-Spanish Onion or Hot Honey-Hot Sausage-Roasted Red Peppers.

For worsts, I'll give you a couple. The battle for good pizza is fundamentally a losing one. There is only one way a pizza can be a good pizza, which is by being tasty. There are multiple ways a pizza can be bad.

A pizza classicist wants pizza to taste good and puts ingredients on it to achieve that end, however, some people have bad taste. They dislike good ingredients and like bad ingredients. These people are untethered from reality, they fundamentally cannot be reasoned with and are barbaric.

Classical worst: Black Olives, Mushrooms, and Anchovies from 156.6.

A pizza postmodernist wants their pizzas to make a statement. They see pizza not as a vehicle of flavour delivery but as a political statement. Anyone who thinks a pizza suggestion should be funnier than tasty falls into this camp. These people are untethered from reality, they fundamentally cannot be reasoned with and are barbaric.

Postmodern worst: Charcoal-no-Cheese-Black-Olive-Barbeque-Base Pizza from 155.6.

A pizza lactose intolerant-ist can't eat cheese. These people are untethered from reality, they fundamentally cannot be reasoned with and are barbaric.

Lactose intolerant worst: Anything with Dairy Free cheese.

LARS NOOTBAAR: WHATS THE BEST PIZZA AT mathNEWS?

What does best pizza even mean? How can a pizza be best pizza? Personal favourite pizza is easy to understand, I can confidently answer that. Answering best is much tougher.

If you want the "best pizza" in some abstract objective tastiest sense: Someday someone will suggest the best pizza. There are finite combinations of the Pizza Nova ingredients, and one of them is the best. It would be narcissistic for me to assume that we've already found the best one.

If you want the "best pizza" in a real sense: **mathNEWS** pizza's order is decided by approval voting. The way it should work (emphasis on should) is that if you would eat the pizza, you raise your hand and vote for it. By this method, the best pizza is one everyone approves of. Cheese pizza reigns supreme.

MOLASSES: WHAT IS THE SECRET TO FUNNY

I ain't telling you, bud. It's secret.

GIANT WATERBIRD: WHAT WAS THE MATH COURSE THAT MADE YOU SAY "ALRIGHT, I AIN'T DOING THIS NO MORE" OR "DAMN I AM DOING THIS!"

Damn I am doing this: TBD.

Alright, I ain't doing this no more: MATH 137. Fall 2020.

BEEKNEES: WHAT IS THE BEST mathNEWS COVER COLOUR?

Pulsar Pink reigns supreme. There's a reason they use it for all the orientation issues.

LARS NOOTBAAR: OH MIGHTY APHF, YOU HAVE SEEN SO MANY ISSUES, SO MANY gridWORDS, SO MANY blackBOXES. I ASK YOU, WHAT IS YOUR FAVOURITE ARTICLE YOU'VE WRITTEN? WHAT IS THE YOUR FAVOURITE ARTICLE YOU'VE READ?

Sit, young one. Let me tell you a story.

For articles I've written, who worse to judge art than the artist yada yada whatever who am I kidding I'll take the opportunity

to talk about myself for a paragraph. I think in general, I am pretty happy with about 75% of my output. I think if you were to open to a random *aphf* article, you would have slightly worse than Russian roulette odds of reading something I am proud of. Examples include: *Dunning, Kruger, Eddy, Joe* (157.5), *madLIB* (158.4), *The Election Issue* (156.5), *Fish in a Barrel* (153.3), *Dick Smithers, Gym Bro* (153.2), *Cucumbers* (148.6), and *Romance, Novel Parts I and II* (147.5). In terms of critical acclaim, I have received the kind messages about *The Congregation* (156.4) and *Archaeology* (146.4). In terms of generating revenue for the University of Waterloo, I have been told that *This Turtle is on its Back* (149.1) helped convince someone to come here.

To balance out the bragging I will also say pretty much everything I wrote in my first two terms is pretty rough. Would not recommend.

I have read a lot of favourite articles. Each issue I look forward to articles by pretty much anybody I recognize as a consistent voice in **mathNEWS**, and it's not possible to have this paper without the variety of articles that the authorship submits. They all build each other up and combine to make a product greater than the sum of its parts. Maybe someday I'll compile a list of my all-time favourites though...

profTHOUGHTS 160.6

FEATURING GRADUATING SIX-YEAR mathNEWS WRITER APHF

For those who don't remember, the **mathASKee** is traditionally offered the honour of writing a little column. Since they were almost always profs, it was called **profTHOUGHTS**. Some people may object to me writing a **profTHOUGHTS**, since I am "not a prof" and I "don't even have a degree" but these people forget I have a PhD from the school of hard knocks.

I'm leaving. I am leaving Waterloo. But, before I go, I wanted to compile a list of my all-time favourite **mathNEWS** articles — articles I recommend to every **mathNEWS** reader. You don't have to go back and read them, but I would be sad if you didn't, so you should.

Waiting (144.4) by *Gradient Descent*. This is from my first term and it is still unlike anything I have read since, it really widened my perception of what **mathNEWS** articles were.

Fuck PD. (145.2) by *Deriving for Dick*. The crowning article by *Deriving for Dick*, who was the most transgressive **mathNEWS** writer of their generation.

Kraken the Coding Interview (145.3) by *methNEWS*. Hard to explain why I like this one other than I find it funny.

warSOC season 1 (145.2–145.6) by CC. I also highly recommend the entire Alternate Waterloo Series, but *warSOC season 1* is my favourite serialized fiction from my **mathNEWS** tenure.

In Surprise Finish, the Bloc Quebecois Wins Majority (147.1) by *UW Unprint*. From my understanding, pre-pandemic **mathNEWS** was a much more Onion/Beaverton inspired publication. In that sense, this is an article almost out of time, written by one of the last great satirists from that era. It is my favourite satire article from my tenure.

Rubinstein (148.2) by *A cool pen name*. An incredibly well written article by one of the most consistent authors from my early years at **mathNEWS**. I would also highly recommend the entire *A cool pen name* catalogue.

Cooling the Lake (150.4) by *molasses*. Younger *molasses* heads might prefer the *Etymology of Jumbo* series and middle aged ones

might prefer the groundbreaking M&M investigation, but my heart will always lie here, with Astaroth and his lever.

Maxwell (155.4) by *Kaisa*. I also highly recommend the rest of these first name articles by *Kaisa*, they are all so well written.

I Can't Hit Unc. Status (158.6) by *Schrodinger*. Incredibly well constructed article and a very fun read.

A Guide to UW Cryptids (156.6) by *closeted atheist*. This article captures the sort of surreal feelings that come from being a university student at Waterloo so well.

mathNEWS With You (146.2) by *Various Artists*. Out of all the articles from my time, this one may be the greatest. It is truly an accomplishment.

and finally,

Hollow (149.1) by *hotfemoid* is my personal favourite **mathNEWS** article of all time.

Even though these are my personal favourites, I haven't yet read an article that made **mathNEWS** worse. Thank you to everyone who has submitted anything over the past six years, I have very much enjoyed reading this silly university paper.

aphf

TOP 3 WORDS THAT CAN FOLLOW THE WORD "JURY"

1. Impartiality
2. Nullification
3. Duty (2023)

gavel banger

GO GET YOUR VACCINES IF YOU WON'T WANNA DIE IN THE TRENCHES

“So, class, what’s your favourite pathogen?” my Epidemiology professor asked. (HLTH 443)

“STDs.”

Wait, but that’s not even a proper answer...

SUFFERING FROM SUCCESS

Ok, the title is purposefully misleading—but we’ll get to that later.

I think vaccines very much suffer from their own success—young people have forgotten the horrors of things like measles, polio, and chickenpox because no one gets them nowadays. Feel free to search up “life before polio vaccine” to find out.

I would say measles is absolutely terrifying. It has an R_0 (naught, aka reproduction number) of TWELVE TO EIGHTEEN. That means for every infectious person, on average, they will give it to 12–18 people. For reference, the highly infectious omicron variant of COVID-19 has an R_0 of 7–14, and the original strain (WHO’s estimation) is 1.4–2.4.

Did you know Canada lost its measles elimination status recently? That means the *ENTIRETY OF NORTH AMERICA* loses its measles elimination status. This is, very much unfortunately, due to the number of people refusing the measles vaccine lately.

Oh but measles isn’t done just yet, it’s got this special ability like an anime character’s secret superpower—immune amnesia. If you get measles, you can lose up to $\frac{3}{4}$ of the immunity you’ve built up over the years, through vaccines, or through contracting the pathogen. This is because it kills your memory T cells that are responsible for remembering your immunity, YIKES.

ANTI-VAX TRAIN

Andrew Wakefield. I don’t know if you remember this guy, but he’s the one who started the whole misinformation train on vaccines causing autism. The amount of irreparable damage he’s done to vaccines’ reputation lands him in the highest level of my scum-of-the-earth tier list, up there with A Certain German Dictator, and health insurance CEOs who have committed fraud instead of paying for people’s life support.

HERD IMMUNITY

It’s like herd mentality, but herd immunity!

For every vaccine preventable disease, there’s a threshold of the # of people that needs to be immune before the population achieves herd immunity—where the disease is

effectively controlled. And people who can’t get vaccines due to health conditions are protected by the immunity of the people surrounding them. The more contagious the pathogen, the higher the threshold. For measles, it’s 95%. Point is, the population needs to work together to stop the spread.

Here’s a simple little math question for y’all math nerds:

Assuming Canada has a population of 40 million, with a pathogen that has an R_0 of 4, seroconversion rate of 90%, how many people do you need to vaccinate for the population to achieve herd immunity? (PS: seroconversion rate is the % of people who become immune from getting vaccinated).

The formula is: Herd Immunity Threshold = $1 - 1/R_0$

Answer:

Herd Immunity Threshold = $1 - 1/4 = 0.75$, or 75%

75% of 40 million people need to be immune. Because 90% of people actually get immunity from getting the vaccine, you need to vaccinate a little more: $0.75 * 40/0.9$.

If you got 33.33 million, then you’re correct! If you vaccinate 33 million people, 30 million people will seroconvert, and that’s a 75% threshold for herd immunity.

Here are three levels of progress in any fight against pathogens.

Control: When we don’t have a vaccine, we can only reduce the rate of transmission and the spread of the disease.

Elimination: When it’s completely gone from a population.

Eradication: When it’s extinct.

But we don’t get the luxury of eradication or even elimination with most pathogens, because many of these pathogens also reside in animal hosts, and/or because we don’t have vaccines for them.

But what’s even sadder, is that even for pathogens we have vaccines for, the number of people dying from vaccine preventable diseases *every year* is comparable to the death toll of WWI. Hence the (misleading) title: if you don’t want a chance at the trenches, you don’t want a chance with measles.

THAT TIME I GOT “SICK” FROM THE COVID VACCINE

Spoiler—I didn’t actually get sick, but I DID have the symptoms. It’s true that vaccines have risks, but the benefits HIGHLY outweigh the risks. Statistically, you have a higher chance of getting struck by lightning than getting a serious complication from a vaccine.

The actual risk I'm talking about, is that it does put weight on your immune system—after all, it takes a couple of weeks for the immunity to build up, that's your immune system hard at work! Think of it like they're doing fire drills against the real thing, or fighting the weak slimes for practice against the big slimes.

The afternoon following my booster shot, I got a fever, chills, and nausea. And after a couple hours, it all went away like it was all a fluke—because it was indeed, a fluke. To be honest, I was surprised I even had a reaction at all, because I never even had a reaction to them till that booster shot.

So what does this mean?

If you're immune, you won't have to worry about catching the flu during exam season (yikes). You won't pass it onto your friends, your family, and especially immunocompromised people who cannot get them.

So please just do your due diligence and go get your flu shots, man. Go check your immunization history to see if you've gotten all the vaccines you needed back in elementary school. It protects the people you care about, and it protects the vulnerable people in our population who aren't as lucky you and can't get vaccines. Even if it doesn't make you completely

immune, it'll definitely make you less sick—less symptoms, shorter duration, etc.

So please guys, just go and get your vaccines. The flu shot is available at the pharmacy in STC basement, super convenient. And PLEASE WASH YOUR HANDS BEFORE EATING mathNEWS PIZZA.

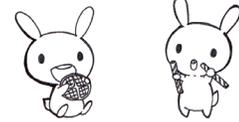
A TAKE-HOME GIFT

I didn't actually answer STDs, that wasn't even an actual answer, an actual answer would be something like West Nile Virus.

If you're interested, go play games like *Plague Inc.* or *Cat Colony Crisis*, and watch *Contagion* (2011), it's a pretty informative representation of how pathogens spread.

Ginger Ryasaki

This article is the full version this time! If you have any comments or questions, feel free to email me at g2731i@uwaterloo.ca or text me on Discord: riyasaki



PARADOX

MY FAVORITE CHARACTER IN DEADLOCK

Valve's 2026 *Deadlock* is a spectacular marriage of the MOBA genre and movement-shooter genre that can be seen with games such as *League of Legends* and *Titanfall 2* respectively. Combining these genres tasks the player with both navigating a 3D space to defeat enemies and strategizing with their five other teammates to seize objectives. With the game having 38 characters with vastly different playstyles, players have a vast amount of options on how they wish to express themselves in their gameplay. I, however, only play one character because I think she's more fun than the rest: Paradox.

Paradox is a character who uses time manipulation to slow and disrupt her enemies through her abilities and their upgrades. Her first ability is a time grenade that pulses when it lands on the ground, slowing enemies and applying a debuff that causes them to take increased damage from her. Upon being upgraded, her time grenade has an extended duration and a lower cooldown. Her second ability places a time wall in front of her that can slow enemy bullets or enemies as they pass through. Upon being upgraded, enemies passing through the wall lose 10% of their health and are briefly inflicted with silence, preventing them from using their abilities. Her third ability is a charge shot that can briefly stun enemies if they are hit, with upgrades increasing the stun duration and decreasing the cooldown. Her fourth and ultimate ability launches a projectile at an enemy that swaps her position with whomever she hits, with upgrades to the ability increasing the range and decreasing the cooldown. Individually, Paradox's abilities are

impressive, but it is when Paradox combines her abilities that she unlocks her potential. Paradox can combo her abilities together by using her charge shot to stun an enemy, placing her time wall between her and the enemy, then using her ultimate to swap her and her enemy through her wall. In a close-quarters scenario, the combo is even more powerful as Paradox can place a time grenade at her feet, causing the enemy to be crippled even further as she swaps and silences them. When fighting amongst allies, Paradox is very oppressive, as a well-timed swap can displace a target towards your team, allowing your team to pick off the enemy. Paradox isn't always overpowered, however, as her lack of movement abilities can lead to her being picked off by enemies if she is caught in an unfavorable position. Additionally, since her ultimate is a projectile, she can always miss and is punished with a lengthy cooldown before she could use it again.

Speaking more personally, I love playing Paradox. Her kit is very fun and very rewarding to use. I sometimes miss my projectiles, with missing the swap being the most demoralizing, but hearing, "Excellent swap, Para, oh my God," over the team voice chat when I land a fight-winning swap makes it all worth it.

Neo-Jeo

IRANIAN DYNASTIES PART TWO

Welcome back to Iran. Last time you were reading this, the Iranian Intermezzo took place, an event where various different dynasties attempted to gain control of Iran and become the next Iranian empire.

SELJUK EMPIRE (1038–1194)

The Seljuk were a Turkic dynasty that originated in Central Asia around the Caspian sea. They then went in and conquered Iran, starting with the Ghaznavid Empire, one of the states of the Iranian Intermezzo, before consolidating their control of Iran. They would put an Iranian state back into the importance of the geopolitical situation in the Middle East and surrounding regions. Shortly after the Seljuk's rise, they were able to defeat the Byzantines and gain control of large swaths of Anatolia which began the Turkish immigration into the region, which in the modern day is Turkey. During this period Zoroastrianism would further decline under religious persecution. Now, in contrast to the Seleucids, the Seljuks assimilated into Iranian culture much more, using the previous states they absorbed during the Intermezzo to draw legitimacy. Unfortunately for the Seljuks, they weren't meant to last and following the death of the last Shahanshah (A Sassanid title for king of Iran) the state split into various states, with previous vassals becoming independent.

KHWARAZMIAN EMPIRE (1194–1220) AND MONGOL EMPIRE (1220–1259)

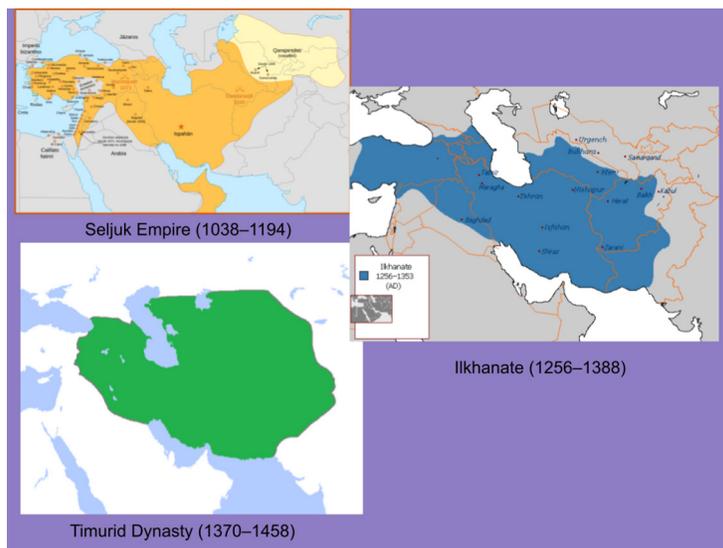
Briefly following the Seljuks, there was the Khwarazmian Empire, which was a vassal of the Seljuks before gaining independence and gaining control of many former lands. But it wasn't for long, as shortly after, the Mongol Empire invaded. The resulting invasion decimated Iran through mass killings of cities that resisted, similar to much of the Islamic world, with this marking the end of the Islamic Golden Age. Soon after, the Mongol Empire split amongst the descendants of Chinggis Khan, with the lands of Iran going to the next state.

ILKHANATE (1256–1388)

Ruled by one of Chinggis Khan's descendants, the Ilkhantae would carry the mantle of Iran following the collapse of the Mongol Empire. It would enter frequent wars with fellow splinter states such as the Golden Horde, a nomadic state in modern day southern Russia. This period was marked by balancing the people of the state with the nobility, such as the state converting to Islam, but this created friction with the majority Buddhist court. This eventually led to a state of religious tolerance (after much intolerance, including threatening expulsion to all Buddhists). The balancing act wouldn't last, leading to civil war and the empire losing much land, beginning another period of vying states.

TIMURID DYNASTY (1370–1458)

Timur, who rose to prominence thanks to the Mongol empire, would go and conquer the remnants of the Ilkhanate and surrounding states, beginning the next dynasty. The dynasty would go on a conquering spree, expanding control into areas such as Georgia and Iraq. The dynasty faced quick instability as the original leader died and civil wars took place between the various successors of the state. As well, states such as Aq Qoyunlu rose and took control of many lands leading to various declines and ultimately leading to another period of warfare, ending the Medieval period.



SELJUK, ILKHANATE, AND TIMURID DYNASTY MAPS

MODERN PERIOD

SAFAVID DYNASTY (1501–1722)

The Safavid dynasty, the first indigenous dynasty to control all of Iran since antiquity, was able to gain control of Iran after a period of struggle including various dynasties, including the Timurids. They would serve as a counter-balance to the Ottoman Empire, which had risen in modern day Turkey. Much like the Sassanids and Rome, the Ottomans and Safavid would often go to war over Iraq leading to continual conflict in the region. This dynasty began a Renaissance for Iranian culture, with poetry and architecture, among other items being encouraged by the Shah. Additionally, scientific breakthroughs took place during the dynasty, including pharmacology. This dynasty would eventually falter as they faced outside pressure as well as interior instability leading to the state to fracture and Iran to be in a state of various vying dynasties until a new one rose.

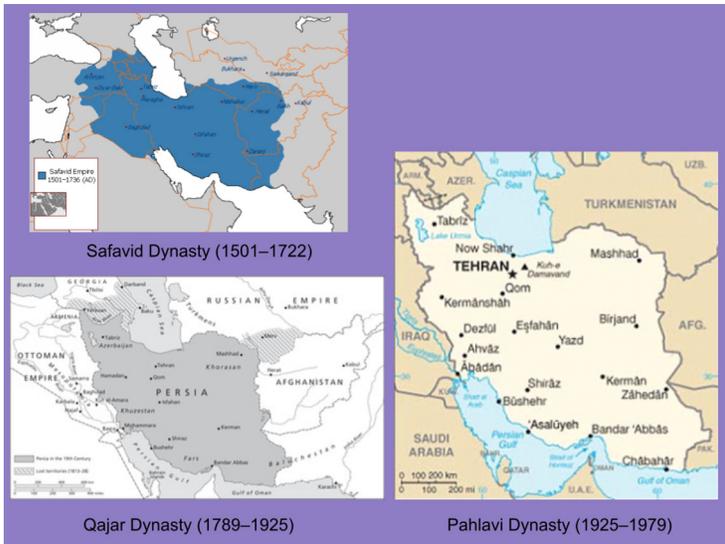
QAJAR DYNASTY (1789–1925)

The Qajar dynasty arose during the period of instability following the collapse of the Safavid Dynasty, with the return of a Turkic dynasty in Iran. The dynasty faced an

ever-changing world and witnessed the height of European Imperialism, which even Iran wasn't safe from. Despite losing lands to the north to Russia, it was successful in its efforts to keep independence between the European powers, playing a delicate diplomatic role where they sacrificed many things but ultimately kept their sovereignty. Some of the concessions include ceding monopoly rights and spheres of influence to the British and Russian states. Constitutional reforms took place including a constitution limiting the Shah's authority. World War One took place during its time and due to the Ottoman Empire's efforts, there was grave damage done to the country which helped push the end of the dynasty.

PAHLAVI DYNASTY (1925–1979)

The last Iranian dynasty. It came to power following the forced abdication of the previous Shah in 1926, and a military general named Reza Pahlavi had himself crowned (and took the last name Pahlavi after the proper name of middle Persian). This dynasty would attempt to lead a modernization movement, similar to that of Turkey during the time period. This would have support in some areas but would not with the Shia clergy which would ultimately be its undoing. During World War Two, they also gained the ire of the Allied nations for refusing to stop employing Axis engineers. As a result of this (and to secure the oil) the UK and Soviet Union invaded and occupied it until the end of the war. Following their withdrawal, more reforms came, a key one being the attempt to nationalize British-owned oil rigs, leading to a US-backed coup. This lasted for two decades but in the 1970s, as protests began due to a new modernization plan, it would eventually lead to the end of the Iranian monarchy and begin the modern Islamic Republic, ending the monarchy.



SAFAVID, QAJAR AND PAHLAVI DYNASTY MAPS

ی ب آ نام س آ ی اق آ



N THINGS

...THAT CHANGED SINCE I STARTED MY DEGREE 5 YEARS AGO

- Not the total number of released Star Wars movies.
- The Lobster Burger Bar closed.
- Donald J. Trump turned 75, 76, 77, 78, and 79 years old.
- Barbenheimer.
- I grew one inch taller, and gained fifty-eight **mathNEWS** articles around my belt.
- COVID-19, like, stopped.
- The MC/DC band dissolved.
- I did an uncountable number of stupid, wonderful things with nerds who I'll call friends for as long as this stupid, wonderful planet permits.
- The MC-DC bridge was demolished.
- UW added a game design specialization as a degree option.
- I retired and then accidentally unretired from game development.
- The Metaverse started and ended.
- **mathNEWS** issue average size increased twofold.
- *Silksong* and the Epstein files got released.
- The number of universities I will dearly miss went from zero to two.

no pun indented

ISSN 0705-0410

UW'S BASTION OF ERUDITE THOUGHT SINCE 1973

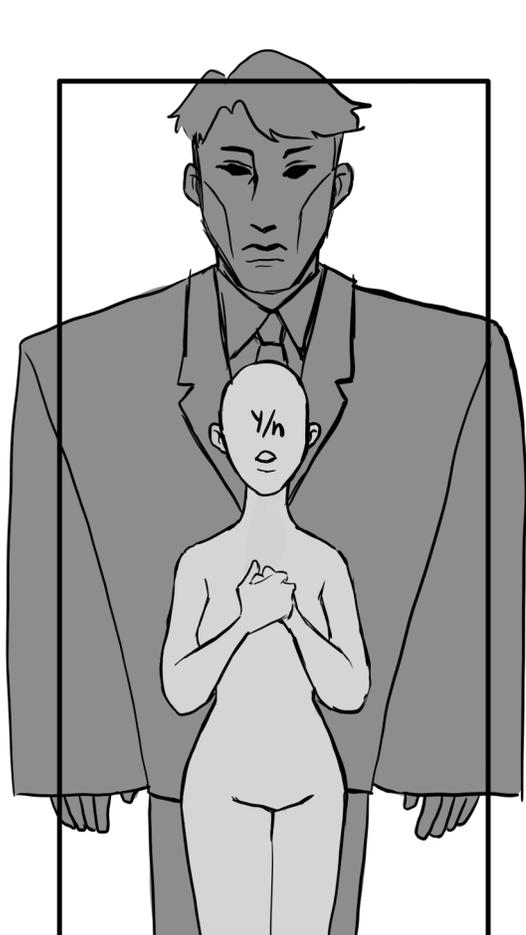
mathNEWS is a normally fortnightly publication, funded by and responsible to the undergraduate math students of the University of Waterloo, as represented by the Mathematics Society of the University of Waterloo, hereafter referred to as MathSoc. **mathNEWS** is editorially independent of MathSoc. Content is the responsibility of the **mathNEWS** editors; however, any opinions expressed herein are those of the authors and not necessarily those of MathSoc or **mathNEWS**. Current and back issues of **mathNEWS** are available electronically via the World Wide Web at <https://mathnews.uwaterloo.ca>. Send your correspondence to: **mathNEWS**, MC3030, University of Waterloo, 200 University Ave. W., Waterloo, Ontario, Canada, N2L 3G1, or to userid mathnews@gmail.com on the Internet.

mathNEWS is overseen by the Board of Publications, an autonomous board of the Federation of Students, University of Waterloo, hereafter referred to as Feds. **mathNEWS** is editorially independent of Feds and the Board of Publications. **mathNEWS** has never been requested to withhold Improper Content as defined under Feds Policy 71.

Except where otherwise noted, this work is licensed under the Creative Commons Attribution-Noncommercial-No Derivative Works 2.5 Canada License. To view a copy of this licence, visit <https://creativecommons.org/licenses/by-nc-nd/2.5/ca/> or send a letter to Creative Commons, 559 Nathan Abbott Way, Stanford, California 94305, USA. Terms may be renegotiated by contacting the **mathNEWS** Editorial Team.

DSC DATASET 6

THE SEQUEL TO YOUR FAVOURITE MATH CLUB RELATED FANFIC



Ma
Coff
+
Don

You could feel your eyes closing despite your bright laptop screen contrasting the midnight right beside you. As much as you wanted to rest your head on the sticky table, you were certainly not risking a nap alone in the Math CnD, so you put your notes away and slid out of the booth.

As soon as you got up and grabbed your coat, a mellow deep voice filled the mostly empty room.

“Is that you?” the voice bellowed. You turned around to see a familiar man staring at you, with the same long black coat and sleek espresso hair brushed back. His eyes were as sooty and shadowed as the ones that spotted you behind Pho Anh Vu and his lips were as rosy as the ones that grazed your cheek. After that encounter, you thought about him sometimes at night as heat lingering on you before dozing off. As much as you wanted to see him more, you flushed when remembering that you forgot to apply.

“Do I know you?” you quipped. You tried to cover the regret on your face with feigned ignorance, but your hot cheeks and bitten lip gave it away.

As he turned his body towards you, he raspily muttered “Don’t lie to me, I recognized your side profile. You know, I awaited your application last term. Why didn’t you apply?”

“I forgot, I was so much more focused on my exams that I missed the deadline—”

“Excuses, excuses; that’s all that I hear.” he declaimed. He got up from his hard booth seat and let his dress shoes hit the floor, ambling towards you.

“Did you not like the opportunity?” he quivered. “Again, we have so many roles suited to various strengths, did you not want to be a part of a team dedicated to sharing the love of data science?”

At this point, he was standing right in front of you, his stature towering over your body as your palms hinged on the edge of the table to hold you up. His irises glimmered somehow in the soft light, his pupils expanding at you despite the bright spotlights.

“Or do you just not like me? Did I scare you off?” he proffered, his thick brows arched slightly, contrasting his softening smile.

“No, no, no- of course not.” were the words that stumbled out of your mouth. “If anything, I wanted to apply to see you again.”

His grin strengthened and his brows dipped down as you excused yourself again. “My first week of exams was hellish so I was more focused on passing my courses than applying. I want to apply this term, but I do have some reservations.”

“What reservations? Perhaps I could resolve them for you.” he affirmed, his hand slipping between your arm and waist to support the back of your midriff. You shivered at the touch of his finger melding onto you, but you could finally straighten your back and let your face come towards you.

It took you a few seconds to compose yourself, but eventually you mumbled “Uh, are the roles time-consuming?”

“Generally, no, unless you’re looking for a role with more responsibility like VP. We are also very understanding of other time commitments you may have, we are students too.”

You raised both your brows and your necks, inquisitively looking into his eyes. “You’re a student?”

“Yeah.” he intoned. “What did you think I was?”

“I don’t know. You just seem too put together and mature to be in undergrad.”

“Do you like that?” he bantered, the apples of his cheeks rising. With his thumb, he tipped your chin up and traced half of your jawline with his other digits, the warmth of his hand and his icy silver rings following the curve of your tender neck.

“I do” you sighed. “What are the perks of being an exec?”

“I mean, we have a very social team and an office with snacks and comfy couches. You can put the experience on LinkedIn and network with other like-minded, passionate people. And of course, helping and meeting new students is so rewarding, right?”

His hand travelled upwards, combing your hair and dipped your nose downwards to yours. Your heart thumped hard in your chest, your brain scattered yet focused on one last thought.

“Do you have any other questions, sweetcheeks?” he whispered, his gaze still attached to yours.

“Ummm...” you hesitated. You cycled the air in your lungs and tilted your eyelids downwards, trying to fight the urge to crumble.

“Is it forbidden for execs to—”

He jumped back a bit, his ringtone vibrating against his backside. He pulled out his phone and glanced at the ID.

“I’m sorry, I have to take this.” he explained, his eyes now sullen and hiding the eyebags no longer. He walked quickly out of the room, but you turned your head towards his trajectory. You could hear him say “Hello? I’m glad you called, are you here?” while you were trying to lie to compose yourself. Did he not want to be there? Is that why he was so glad he was rescued by this call, so then he could leave?

Your spiral was broken by his trembling voice echoing through the cafe.

“I’m sorry, I have to go meet my partner. She’s at the garden right now and she just came from Toronto.”

Partner? Was he dating someone? Was this just routine for recruitment?

“Please consider applying to any of your subteams, I think you’d be a great fit. I know there’s a spark in you, whether that’s web development, machine learning, logistics, product design or social media. Don’t let me down, please.” he begged, his voice cracking before running away from your sight.

You stood in place, pushing your arms against the table.

Don’t let him down, he said. Oh, he was going to regret those words.

You put April 4th in your calendar, knowing damn well you’d be his menace and put that all on your resume.

UW Data Science Club

FUN CANADIAN LAW QUOTES

CITATIONS MADE AVAILABLE BY COERCION

To be abundantly clear, it is not a crime to give someone the finger. Flipping the proverbial bird is a God-given, Charter-enshrined right that belongs to every red-blooded Canadian. It may not be civil, it may not be polite, it may not be gentlemanly.

Still, under oath, Naccache was unwilling to admit the basic fact that he disliked the accused. He even claimed that “dipshit” is not really an insult. It is merely a nickname like any other; an innocuous form of slang.

In the modern-day vernacular, people often refer to a criminal case being ‘thrown out.’ Obviously, this is little more than a figurative expression. Cases aren’t actually thrown out, in the literal or physical sense. Nevertheless, in the specific circumstances of this case, the Court is inclined to actually take the file and throw it out the window.

500-01-220687-211

It is likely that, in the period 2004–2006, Larry was having one or more extramarital affairs. Interestingly, Larry’s father was married five times, in addition to going through several relationships. Perhaps there is an infidelity gene.

BRUNI V. BRUNI

We thought that we would never see / A suit to compensate a tree.

A suit whose claim in tort is prest / Upon a mangled tree’s behest

A tree whose battered trunk was prest / Against a Chevy’s crumpled crest;

A tree that faces each new day / With bark and limb in disarray;

A tree that may forever bear / A lasting need for tender care.

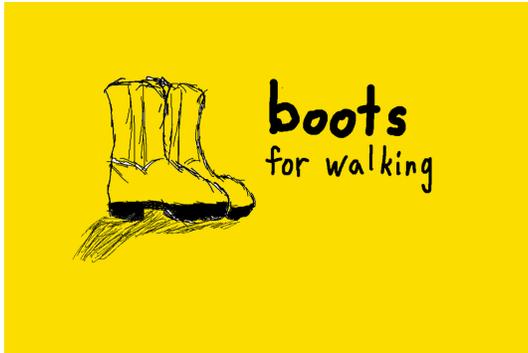
Flora lovers though we three, / We must uphold the court’s decree.

FISHER V. LOWE

N NO NAME BRAND ITEMS THAT DON'T EXIST

We have made a list of four items each, and drew each other's ideas.

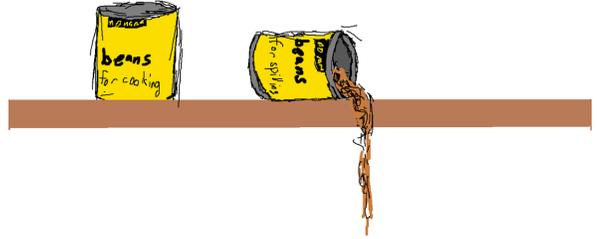
- Boots (for walking) – *aurelio*



- No Name doesn't sell things like apple juice, they sell apple beverage because they legally cannot call it juice, or grape drink because it's not grape juice. I introduce: grape drank. where it's just the carton. Drink is gone, lid's been opened and it's been clearly drank out of – *fingersinsockets*



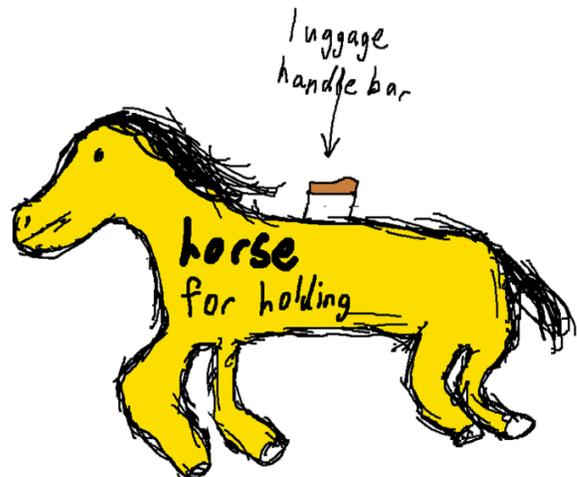
- Beans (for spilling) – *aurelio*



- No Name name tags. They have name tags, but they're like just the plain ones that have nothing on them, just space to write your name. I want to see one of those "Hello my name is" name tags but the branding covers up the writable space – *fingersinsockets*



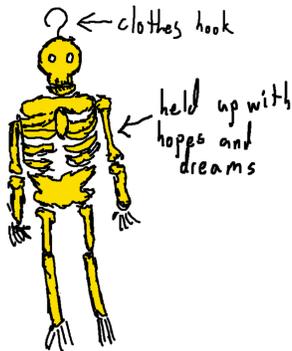
- Horses (for holding) – *aurelio*



- No Name hi-vis vest. it's not actually hi-vis. It doesn't reflect any light and it's just this yellow vest that does practically nothing in the dark – *fingersinsockets*



- Skeleton (for closets) – *aurelio*



- No Name condoms. Just these opaque bright yellow condoms that are thick as hell as if the fabric was cut out of those latex gloves that cleaning people use – *fingersinsockets*



FASS PLAY REVIEW – WHAT (NOT) TO DO AFTER GRADUATION

From March 12th to March 14th, FASS Theatre Company presented a new play – *What (Not) To Do After Graduation* at Kitchener-Waterloo Little Theatre. As a **mathNEWS** writer, I was honored to see their play on Friday. Thank you for the free ticket!

When I read the title of the play, the first thing came to mind is getting a class G license. On a serious note, graduation can be overwhelming. I wrote a similar article last year,¹ which half-serious-half-jokingly shared some useful subjects to learn. Today, we are in the year of 2026; the world has changed a lot since I graduated. Just like the foreword of the play implies, the job market is a bit gloomy right now while AI tools become popular (with lots of “fake” jobs). The story is about three new graduates who are desperately looking for work.

I like the overall vibe of the play. It was super amusing: lots of LinkedIn lunatics, iconic but ironic interview questions, family dynamics and OSAP jokes. Graduation comes with many challenges, and each of the casts tackled them with different approaches. One attended grad school and got funded \$5 per hour, another got a “job” but actually paid the company for the internship experience, another simply stayed in the basement, doomscrolling for months. At the end, it is the power of friendship that resolved the overarching tension. I guess the lesson learned is to remember your friends and look out for each other (referrals are great when looking for a job btw)! I saw many alumni of FASS come to the play, and some of them have known each other for more than fifty years. It feels charming and nostalgic to see the casts from different eras chatting with each other happily. When the actors come off-stage, they become the person that we know by heart.

So what to do after graduation? There is no a simple answer. After watching the show, I think a good idea is to reflect on the years I have spent in school. There are good memories that bring me joy, sadness, anger, disgust, fear (I would recommend watching *Inside Out*, it is good). I want to remember those lessons learned, challenges overcome and moments of friendships. Speaking of the job market in the future, it will be more challenging as AI growth paces up. Many people find it threatening, but I don't want to be a Luddite (hey you guys are younger so cheer up a little! I will likely be the first to bite the dust). AI can be a new means of production and can be used for many meaningful things. I hope that everyone can get a fair share of it and use it in a non-harmful way.

eralogos

1. <https://mathnews.uwaterloo.ca/wp-content/uploads/2025/04/mathNEWS-157-6.pdf#page=13>

OSCARs 2025

WHAT THEY GOT RIGHT:

- Jessie Buckley as Best Actress for *Hamnet*
- Sean Penn as Supporting Actor for *One Battle After Another* (OBAA)
- Best Adapted Screenplay (OBAA)
- Best Animated Film (*KPop Demon Hunters*)
- Best International Film (*Sentimental Value*) (SV)
- Best Sound (*F1*)
- Best Casting (OBAA)
- Best Production Design (*Frankenstein*)
- Best VFX (*Avatar: Fire and Ash*)
- Best Costume Design (*Frankenstein*)

WHAT THEY GOT KINDA WRONG:

BEST MAKEUP AND HAIRSTYLING (FRANKENSTEIN)

Deserved: Sinners

BEST EDITING: OBAA

Deserved: F1 or Marty Supreme

While OBAA was very well edited, the technical challenge of editing a movie like *F1*, with its thousands of clips into a cohesive narrative is a technical feat itself, without mentioning the artistic merit of the endeavour. But my personal favourite is *Marty Supreme* which managed to turn a batsh*t INSANE story into a cohesive story that never took its foot off the brakes.

BEST CINEMATOGRAPHY: SINNERS

Deserved: OBAA

Sinners was well shot, and most years it could win; however, OBAA had many scenes where I was in SHOCK over how beautiful, innovative, mesmerizing the cinematography was. THE ROAD SCENE???

BEST SCORE: SINNERS

Deserved: OBAA

This was a coin flip, but personally I'd rather see it go to OBAA. I've been using the score extensively as study music the last few months, so I'd like to see it rewarded for its masterful score.

BEST ORIGINAL SCREENPLAY: SINNERS

Deserved: SV

Sinners had a PHENOMENAL screenplay. It had so many emotional beats it hit so well; the characters all had compelling arcs, it was truly fantastic. But *Sentimental Value* personally resonated with me way more, and I'd like to have

seen it rewarded more, because a lot of the same features that worked for *Sinners* also worked for *SV*.

BEST DIRECTING: PAUL THOMAS ANDERSON

Deserved: Ryan Coogler (Sinners) / Joachim Trier (Sentimental Value)

PTA was incredible for OBAA, and him winning is no emergency. However, Ryan Coogler's film had a much tougher job that could have failed in a thousand ways, but he somehow managed to wrap the entire thing together so well. Also, I wouldn't be mad seeing it go to Joachim Trier for *Sentimental Value*, another film that could have failed spectacularly but hit all its notes to make the most emotional film of the year.

MAJOR ROBS:

BEST SUPPORTING ACTRESS: AMY MADIGAN

Deserved: Teyana Taylor (OBAA)

Amy Madigan did NOT deserve to win at all, I have no clue how this win happened, let alone it being a decisive win. I'm assuming it's a career win because this performance didn't even deserve to be nominated. I was very disappointed with the second half of *Weapons* because the intrigue of Gladys was so much more compelling than the character itself. Meanwhile, Teyana Taylor was a tour de force who stole every scene she was in and her presence was felt even until the end of the movie.

BEST SONG: "GOLDEN" FROM KPOP DEMON HUNTERS

Deserved: "I Lied to You" from Sinners

"Golden" is an easier listen, and a better kpop song. It had a great task of being a believable viral hit and it worked exactly, especially when you see its success in the real world. However, "I Lied to You" was a transcendent experience and it served the emotional role of the film seamlessly.

BEST ACTOR: MICHAEL B. JORDAN

Deserved: Timothée Chalamet

This is controversial, but I didn't like MBJ's performance in *Sinners*. He was serviceable, he got the job done, but he didn't really do much more beyond that. Meanwhile Timmy C was a scene-stealer. The movie would live or die by his character and he rose to the occasion tremendously. We hated Marty, but couldn't take our eyes off—that's a tough line to cross and Timmy toed it stupendously.

BEST PICTURE: OBAA

Deserved: Do the Right Thing by Spike Lee!!!

Seriously tho: *Sentimental Value*. Easily the best movie of the year. I think about this movie once a week. It hit the most for me personally because I have a strained relationship with my family, I cycle through episodes of depression, and I often feel things without understanding where it comes from, or wanting to accept those feelings. I can understand why *OBAA* or *Sinners* might have won instead, but for me there was never a second choice.

iceBurj

I AM THE GOOSE (NOT) IN YOUR AREA



Who are you talking to right now?
 Who is it you think you see?
 Do you know how many people I terrorize a year?
 I mean, even if I told you, you wouldn't believe it.
 Do you know what would happen if I suddenly decided to stop chasing innocent bystanders?
 An entire university's worth of fear and admiration goes up in flames.
 Disappears!
 Without me, they become complacent—they end their ceaseless masquerading of my guise for their overpriced goods and appeasement of my form.
 No, you clearly don't know who you're talking to, so let me clue you in.
 I am not in danger.
 I am the danger.
 A goose takes a gander and gets shot, and you think that of me?
 No.
 I am the one who honks!

TotallyNotAGoose

Seriously though, five dollar goose stickers in this economy??

RECESSION ALWAYS HITS AFTER I INVEST

I'm so deep into the market that there's really nothing that can pull me out. I've already hired thirteen stock brokers in the last three days to reduce my overhead cost by 65%. I've traded away a hundred of my helping hands for a mere tiny bank to hold more of my shares. It's just not enough, I NEED to buy more. Now I don't care to tend to my sick grandmas or the farms we own. I'm just loading everything and anything I can into this darn market. Yet now, as I'm checking my investments, I'M IN A RECESSION!

I've invested in literally anything I could, and all I see is RED. Lemme be clear, not blood, just like graph go plummet down, not good, we want up! GREEN! I know it's hard for the market to rise since Newton installed the gravity update, but the market should be above that. I don't know who D. Jones Index is, but somehow he looks at everything I invest in and just makes it drop such that it's now worth tiddlywinks. This is unacceptable behavior, Mr. Jones. My grandma and I will have a stern talk with you.

So, everyone else, stop complaining about your darn oil prices; my butter dropped 136%.

Jubble

WHEN YOU DO THE ONE THING THEY ASK YOU NOT TO

So I'm taking CS 444 with some friends this term. For those of you who aren't familiar, it's the compilers course, which is essentially a big group project. They give you a small subset of Java to compile to compile to i386.

What they do not give you is the language you write the compiler in. You can choose your own. What they always tell you though is not to use this project as an excuse to learn Rust, primarily because they don't want you fighting the language while also doing a difficult project.

Anyways. Guess what ya boi did.

Surprisingly though, it has been going very well. The language itself has given us some problems but overall there have been significantly more advantages. For anyone interested in doing this in the future, I would not recommend going in fully blind, but just a week of experience should be enough. Being comfortable with functional programming concepts also helps. Would definitely recommend!

0.423

MYSTERY CODE SOLUTION

AND HOW DO TO SQUARE ROOTS BY HAND

The original article is from **mathNEWS** 157.4, and I would first like to apologise, as there was a typo in the final version of the code. However, instead of fixing that directly, I will instead post an actually readable version here.

```
const int UPPER_LIMIT = 16;
const int LOWER_LIMIT = -40;
long double square_root(long long unsigned int in){
    unsigned long long output = 0;
    unsigned long long overflow = 0;
    for (int i = UPPER_LIMIT; i > LOWER_LIMIT; i--) {
        overflow *= 4;
        overflow += i >= 0 ? 0x03 & (in >> (2 * i)) : 0;
        output *= 2;
        if (output*2 + 1 <= overflow) {
            overflow -= output*2 + 1;
            output++;
        }
    }
    long double final = output;
    for (int i = -1; i > LOWER_LIMIT; i--) {
        final /= 2;
    }
    return final;
}
```

You can check yourself that this is the same except with one character added. As the name suggests, it computes square roots. But how?

First, we must take a diversion into some basics of square roots.

What happens when I square a number like 3.4? Well I get $3^2 + 2 \cdot 3 \cdot 0.4 + 0.4^2$ or 11.56. But taking a closer look at this, what if we know that the integer part was 3?

In that case, we know that $11.56 = 3^2 + 2 \cdot 3 \cdot x + x^2$ or $2.56 = (2 \cdot 3 + x) \cdot x$. If we pretend for a second that we don't have the quadratic formula, what we could do is start with $x = 0.9$ and check to see if $(2 \cdot 3 + x) \cdot x \leq 2.56$. If it's too big then we move on to $x = 0.8$. Check again and if it's too big we try 0.7. Continuing until we have the first digit of x . In this case the check ends with equality, but most of the time this does not happen and we overshoot the mark, going too small. But it doesn't matter if we get too small because $(2 \cdot 3 + x) \cdot x$ is an increasing function for positive x so we can take the remainder left over by the inequality and check for the next digit of x , starting at 0.09. This is a manual square root process.

However, we can do a lot better conceptually and calculation-wise. For reasons you can check for yourself, when taking the square root we only need to deal with pairs of digits at a time. If we keep the remainder small enough at every step then we will be able to keep on extending the digits of the square root value as long as we want. For example:

$$\begin{array}{r} 1 \ 2 \ 4. \ 2 \ 2 \dots \\ \hline \sqrt{1, 54, 32. 10 \ 00} \\ 1 \\ \hline 0 \ 54 \\ - 44 \\ \hline 10 \ 32 \\ - 9 \ 76 \\ \hline 0 \ 56 \ 10 \\ - 49 \ 64 \\ \hline 6 \ 46 \ 00 \\ 4 \ 96 \ 94 \end{array}$$

At each line, I am finding $(20s + d) \cdot d$ to get the part to subtract from the remainder, where s is the square root so far and d is the new digit. The digit goes on top and the expression gets subtracted, with the digit chosen to be as large as possible while leaving a positive remainder.

Now back to the code. Binary provides some substantial benefits to running this algorithm. First of all, there is only ever 1 possibility to check. This is because the answer is either 0 or 1 and we know that 0 will always work so we only need to if the next digit is 1 or not. Also, since the numbers are natively encoded in binary, it is extremely easy to pick out any pairs of digits without overhead calculation.

To explain the code itself, `output` stores the digits of the square root so far, `overflow` has the "remainder" as if I have been calling it so far, `i` is the place value of the digit being computed, and the exact value of the constants does not actually matter. Going line by line,

`overflow *= 4` moves the remainder over 2 digits to make room for the next digits of of the input

`i >= 0 ? 0x03 & (in >> (2 * i)) : 0` is 0 if `i` is negative and otherwise is a bit-mask for the last 2 digits of the input shifted over $2i$ places, this gets the next digits to add to the remainder, with the 0s being in negative places because the inputs are integers

`output *= 2` shifts over the bit store one place
the `if` does the single check that was mentioned above

Once all of that finishes the output which has all the digits is moved over however many places are needed to put the decimal point in the correct location, which I understand is kind of cursed but it was the simplest and most efficient implementation that also doubled as an unintentional obscuring mechanism.

So now you don't just know what the code does and why, but you can also probably do square roots by hand. How about that.

Speaking of hands, I will now give myself a high five. 🙌🙌🙌

別

HOW HAPPY ARE YOU?

On a scale of 0 to 10, 10 being happy, 0 being not.

- $\epsilon > 0$
- $\frac{1}{12}$
- i^4
- i
- $\zeta(3)$
- $\Phi(x^2)$
- $2(x^2)$
- e
- $3(x^2)$
- π
- $2\frac{2}{7}$
- 3.5
- $\pi^2 - 2\pi$
- $\sqrt{-16}$
- 5
- $6(x^2)$
- 6 or $7(2)$
- $6.7(x^2)$
- \sim Shallit's constant $\times 4.89$
- Φ^4
- $7(x^4)$
- $2\pi + 1$
- 7.6
- $8(x^3)$
- $3e$
- 8.2057
- A solid $8.5(x^2)$
- $9(x^2)$
- NINE
- 3π
- 9.5
- $\pi^2 = g$
- $10(x^2)$
- $3x^3 + 1$
- How could it not be a 10 when I am with my friends *normalparameters*, *Lars Nootbaar*, and *cruz*
- 100 mg sertraline/day
- 4 then 2 then 1 back up to 4 (repeat)
- yeah
- idk (x2)
- shrug



IT'S ALL DOGS AND WOLVES?

WOOF WOOF WOOF, I WANT SOME WHALE NOISES

Furries have a weird fetish with being wolves and dogs. What happened to the days where a furry could be any animal they choose to be?

Think of a sexy animal everyone. Is it your pet dog named Jojo? No! What happened to the days when people were into manatees. In many cultures they are still into sheep and goats. You may be saying that those cultures don't really support furry culture. I say you are wrong and they are simply more committed.

Sooooo many geese on campus and not one person was inspired to make a goose costume with a long neck? Just saying 🙄

You want your wood chopped, ever heard of a beaver?

Got a long water canal, ant eaters got 2 foot long tongues that flick 150 times per minutes. 🐜

What happened to the classic horse girls who just want a massive horse! 🐎

Want something that can go multiple rounds? How about the majestic Phoenix. 🐉

Snail, Snake, Seahorse, Jellyfish and Electric Eel for the kinkier amongst us. 🐍

Hell, there are insects I want to de shell slowly sometimes. Maybe you like a tight grip; a horseshoe crab got you. 🦀

I don't think I am being even that creative here. Why stop at animals, some of these plants got grooves and curves you want to flow your fingers though. One of you can pretend to be that succulent sunflower for that beeezzzyyyy Bee. Laying out the hot and steam pollen everywhere..... 🌻

Just saying, be more diverse with your choices.

Delicious

I JUST REALIZED

Next year there will be younger people than us at the university

I am not prepared for this

profQUOTES

BU 405: REDWAN SIDDIQUI

“ Law is something that you are supposed to do.

BU 413: GERRY RAMOS

“ This might be misogynistic, but I’ll change the names later.

“ *[talking about life insurance inclusions]* Very few people in Canada think, “I’m gonna buy life insurance, and in two years, kill myself.”

“ If you’re dumb enough to pay for it, they’ll laugh at you.

CHINA 101: YAN LI

“ *[regroup test alert appears onscreen]* I hope there’s no bomb coming.

“ You may think: on what day do Chinese people take rest? Very funny.

“ We only have a few weeks left. I want to have fun now.

CO 255: CHAITANYA SWAMY

“ We have geometric characterization of extreme points; we have geometric characterization of optimality characterizations.

CO 463: WALAA MOURSI

“ So life is good. Do you guys agree?

CS 240E: ARMIN JAMSHIDPEY

“ No! You are not talking to each other so you have to talk to my friend... dinochomper. *[pulls out a toy chomping dinosaur and menacingly walks around and chomps it in front of random students]*

“ You have four minutes to prove this; otherwise you have to talk to my dinochomper.

“ If you were to catch a grizzly bear, how would you do it? Of course you would want to avoid touching it, unless you’re me because I can use dinochomper.

“ Can you show me your happy faces? CAN YOU SHOW ME YOUR- where’s my dino?

“ This time I need to eat NINE of you guys. *[pulls out an electronic dinosaur toy that makes noises and lights up]*

CS 241: GREGOR RICHARDS

“ Apologies for the atrocious handwriting, it hasn’t improved since I was 6. Partially because I’ve known how to type since that age.

CS 442: BRAD LUSHMAN

“ We can convert any formula to clausal form using a simple 11-step process.

EARTH 122: KEITH DELANEY

“ These statistics, they’re all bullshit. I could’ve pulled these stats out of my ass.

ECON 101: ANDREW GIBSON

“ 99% of gamblers quit before they win.

“ Costco chicken is just AI.

“ Me and my buddy tried to make the raccoon a communist.

“ I owe zero anime figurines, I will fight this in court.

ENGL 193: TRAVIS MORTON

“ *[in response to a student saying Donald Trump stands like Michael Jackson]* He does! And it’s because he’s got gigantic fucking high heels on!

GROUP MEETING: MOHAMMAD KOHANDEL

“ It’s the conditional probability. Like, what is the the probability of “I” given “did?” Decent. What is the probability of “climb” given “did I?” Today, 100%.

MATH 136: ANDREW BELTAOS

“ A lot of the things I say are just linear combinations of other things.

MATH 136: RACHAEL ALVIR

“ Now is the time to lock in.

MUSIC 140: SIMON WOOD

“ Get up, I feel like being a sex machine, something that I think more often than you might expect... I don’t really know what that means.

MATH 146: RACHAEL ALVIR

“ Trade offer: I don’t have to do it, you don’t have to do it.

“ This is illegal knowledge, and we’re gonna use it to commit crimes.

MATH 148: ALEXANDRU NICA

“ Now, I’d like to cheat on you.

MATH 249: JIM GEELAN

“ The proof is 750 pages long, so it’s omitted [*from this course*].

“ I have to mark MATH 239’s midterm before finishing yours because of the drop deadline... They’re not quite as good as you.

“ Maybe I should take revenge and give you a proof of something from [*CO 255*] using graph theory.

“ I seem to remember the same thing happening last year, these evil people in 255 proving my theorems, then I put a question on an assignment which proved a result about polyhedra using graph theory. Ha, take that CO 255!

“ Take that Swamy! That’s my revenge.

“ Don’t take my thunder away :(... that’s all I’ve got.

MUSIC 240: BRIAN LEFRESNE

“ If any of you have taken courses that you think are dysfunctional... there is no band-aid solution, it’s just ctrl+a, delete. you need to get an angel or an archangel involved. We’re not qualified to fix this.

PHYS 359: ALAN JAMISON

“ [*reading his lecture notes*] These notes are terrible.

PHYS 467: GRAD STUDENT

“ Things in reality don’t work the same as the ideal case. This really makes our lives more difficult... well not my life cause I’m a theorist.

PMATH 351: JESSE PETERSON

“ It’s that time of the semester, you guys are all a little tired, I remember it, you guys are a little more distant...

“ Math people are always a little awkward. There’s a joke: “how do you find the extrovert at a math party? When you talk to them, they look at your shoes instead of theirs.”

PMATH 352: JASON BELL

“ Every soap bubble is like: everybody wants to be a cylinder, but nobody wants to put in the energy to have surface area!

“ Do any of you know how a lot of complex analysts seem to treat circles and squares the same? They call them “squircles”... Lots of math groups look like cults if you’re not inside them, and even when you are inside them they still look like cults...

“ Why is a positive? Well, it is, if you check! I just don’t want to do it.

PMATH 351: JESSE PETERSON

“ [*In response to a student’s answer*] So you’re saying that if K is compact, then K is compact, and I agree.

PMATH 365: SPIRO KARIGIANNIS

“ This is how planes fly... modulo the fact that you may want to avoid restricted air space due to some madman’s war.

“ There are people who have never came to class... they should not pass. It will be clear on the final.

“ Back in 2004, you needed people to retype your papers. The person retyping mine didn’t mind whether a triangle was pointing up or down as they weren’t a mathematician. So the published version is filled with typos as I gave up on fixing them!

PMATH 370: KEVIN HARE

“ [*Student points out mistake in proof*] I’m glad someone’s paying attention to my classes, because I obviously am not.

“ This one is a nice ball, and this one is clearly not a nice, nice ball.

PMATH 445: ALEX COWAN

“ The material on Assignment 8 is likely to serve you well going forward, in contrast with the rest of this course, which...

“ There’s, you know, a fuck ton of neutrinos going through you right now.

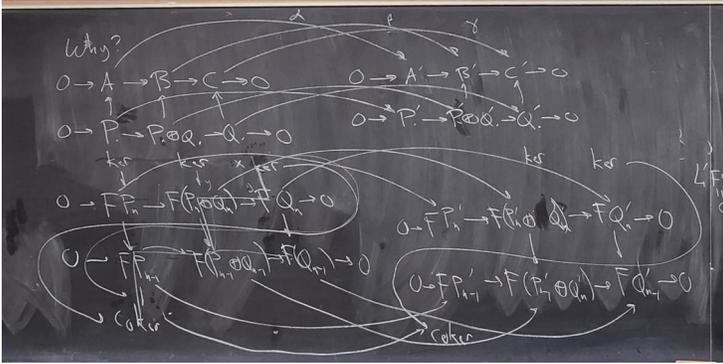
“ Ordinary differential equations are kind of a scam.

“ Maybe you haven’t taken a differential equations course, or maybe you have but you forget, or you want to forget because in my opinion differential equations is the worst course in an undergraduate curriculum.

PMATH 454: NICO SPRONK

“ It turns out in the immortal words of Porky Pig, ibidibidbi that’s all, folks!

PMATH 945: JASON BELL



PSYCH 101: PAUL WEHR

“ Would you blow up the pregnant woman?

SASMS: AARON HE

“ If you don't know who Roger Federer is, he's a famous billionaire. And he played a little bit of tennis.

STAT 241: YINGLI QIN

“ I don't want to bother you with details to do this, but this is true. Trust me.

STAT 341: ALEX STRINGER

“ By this point in the course you have learned that I am much less comfortable with awkward silence than you are, so you will always win.

“ I can still pick my nose in the lecture. I'm a prof, I can do that.

“ Fish are just inherently silly.

“ I'm a very average shark victim.

“ This is why I teach the most boring subject known to man.

“ Everyone has a seat at my lectures.

“ I regressed this weekend... Not linear regression. I do that every day.

“ That will be on the exam. Are mice people? No. [...] Statistically, mice are not people.

“ I'm not a sharkologist. I don't think anyone is a sharkologist.

“ Hockey coach called me “big and strong.”

“ Only one of those was not an english word, “lengthed.” That's a high ratio for me.

STAT 441: MATTHIAS SCHONLAU

“ Dropout is a good thing, it's not like what the name suggests.

STAT 903: AUKOSH JAGANNATH

“ All of that was motivation for the pain that I'm about to inflict on you for the next fifty minutes.

ADIEU

FOUR (THREE) YEARS AT WATERLOO

Three more weeks, huh?

I can't believe that it's been four years already. Granted, I was away for a year—but still. Long time. Some highlights:

- Winning Key Clues 2023, and helping host the 2025 and 2026 editions (and possibly 2027 too...)
- At least eight purple tapes at Grand River Rocks and *all* the V4 benchmarks on the MoonBoard (lfg)
- No exams in PAC (!) since 2024 (!!)—curse that wretched place.
- Being single-handedly responsible for what is probably a noticeable fraction of MathSoc's candy budget; uh, thanks MathSoc...
- The day I dropped co-op (fuck CEE)
- Not failing any classes; tentative (knock on wood...)
- That time I might've maybe possibly allegedly committed a crime by acquiring an iClicker subscription via questionable means...

- Being first-to-find of not one, not two, but three different geocaches hidden on campus.
- *OptimisticPeach's* ruthless, ruthless Desmos/Typst ~~torment~~ magic.
- That time I forgot how to compute the nullspace of a matrix.
- Fun fact: the first time I bought anything from the CnD was in second year, and the first time I bought a coffee and a donut simultaneously was earlier this term. A bit late, I know...
- Many, many, many sleepless nights implementing  and various optimizations for a SIMPL compiler...

If you know who I am, please come say goodbye at some point in the next three weeks! It's weird to be offset by a year from all the people I started with, but that's what dropping co-op does!

LETS MAKE LOVE FOR OSAP

YAOI — HEHE

Author's note:

sorry, I have not written bad things like this in a while, think of this as a spiritual successor to something else I've written except you don't get to know what that is,

thank you to my omega reader, for both reading over and helping with french, if its bad blame them.



OSAP, lies in the background guts spewing with blood, as Douglas stands foreboding over the Ontario universities,

"Please Daddy Doug," begs uWaterloo, "please give me more A.I. funding money, fill me up with your big big grants, and the only slop ill make is the sloppy I'll give you."

"Yeah eat us out please," Toronto wails, "hit me with those fat stacks."

"No, unlike you, I have enough to eat at home," Dirty Doug said starting tease uWaterloo with another QNC-shaped dildo, "I will shove it in though, if you're good boys."

"A bit of Foreplay is medically necessary," McMaster objected,

"Shut up before I privatize you," Thug Ford said, tugging on the chains around McMasters throat, " you know you love it when I play rough, speaking of, where is my dog? Guelph! Bark for me."

"Whoof," barked Guelph. "I'm a good boy right, can i get my good boy treats? [85% Grants, 15% loans OSAP]"

"No, you will make do with what I give you [25% grants]," pillsberry dough ford roared, "you know how much I love to see you all suffer"

"Je suis chaud pour vous Douggie," uOttawa said, "je suis certain que vous ne me traitera pas comme ces autres universités imbéciles."

{ AN:thank you french people i know, if its wrong, cry to doug about it, where is the french basket weaving }

"I don't care, and I don't even know French, and you are as imbecilic as the other universities. I didn't even finish post-secondary how dare you expect me to speak a second language," couldn't-Thug-it-out Ford exclaimed.

"Please you've edged me for so long with that QNC dildo, I need the real thing," purred uWaterloo,

"I'll destroy your ass like I destroyed the science centre," Doug the destroyer said as he lined up his massive check, "be a good boy and take it all."

Waterloo cries as Doug deposits his big wad, in and out.

"Nyah," Guelph *nuzzles* into Doug's side "Why does waterloo get all the attention?"

"Don't worry Kitten, we can trickle down these economics," as he cums on Waterloo's stomach, and Guelph goes to lap it up off of Waterloo. { AN: yes doug is a two pump chump }

"DougRas, you're hitting us with bare cuts fam," Toronto Yelped, "I can't keep up."

Lauier joins in with their final breaths "yeah douggie please, we need your big fat checks to keep going, the arts majors have suffered for so long, i just wanna make baskets douggie, please, teach me"

"Too bad" said Doug, "The only one finishing today will me be," he said, leaving OSAP dead and all the universities thoroughly fucked.

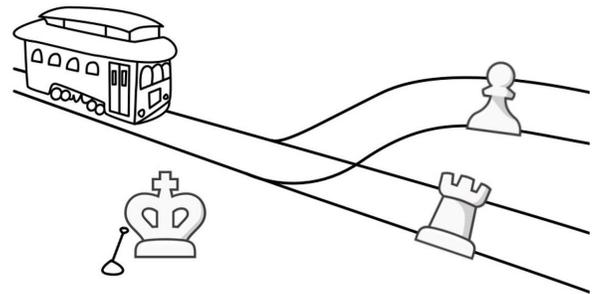


thank you and sorry i know this was a lot, but like glad you read, and that this is published. <3 hope we get more grants in future :P

Ignis_anima

CHESS PUZZLE 9

CHESS DOESN'T HAVE ENOUGH MORAL DILEMMAS



White to move.

The train is travelling at 670 kph. If you do nothing, the train will run over the rook, capturing it. If you pull the lever, the train will be diverted to the upper track. It will then capture the white pawn.

Do you pull the lever?

Solution: orp kld! ərl!

TO BE HONEST,

AT THE TIME I WROTE THAT ONE ARTICLE, I HADN'T ACTUALLY PLAYED THE GAME

But now, as of time of writing, I have now played *Umamusume: Pretty Derby*, the horse-girl training simulator gacha game, for almost a month. I haven't played training simulators much before, so I wasn't sure if I would enjoy it. But now, I see the appeal.

The main gameplay consists of training a horse-girl of choice over a career of three (in-game) years, every turn encompassing a half-month. On certain turns, specific goals need to be fulfilled, such as finishing in the top three in a specific race, or attaining some number of fans.

At the start of every run, you pick your horse-girl to train, and two previous finished runs (one of which can be borrowed from someone else) for your horse-girl randomly inherit stats, skills, and aptitude improvements from, based on its "sparks" rolled at the end of a run, and a deck of support cards, providing bonuses and adding story events to the event pool.

Races can only be spectated. So, all you can do read up on the myriad racing mechanics and hope that your horse-girl's stats are good enough, that she activate her skills at the right time, that she stays in a good position for her running style for most of the race, that she doesn't get randomly blocked during her last spurt, that the second favorite doesn't suddenly decide to lock in and beat your horse-girl by a few centimeters, etc. But the feeling of witnessing your end closer climb all the way from last to first in the final stretch is unmatched. Especially in tandem with the dynamic camera and the epic orchestral music, with a separate concluding section for the last spurt.



Randomness permeates the rest of the run as well. Training has a chance to fail that increases rapidly as energy decreases. The amount of energy running a race consumes can chosen to either be a consistent but noticeable decrease, or a gamble between a negligible or a debilitating deduction. Support card event chains can randomly decide to only show up at the end of Year 3. But, when the stars align and Mercury isn't in retrograde, you can get incredibly lucky, save recreation turns with random mood-ups, squeeze out an extra training turn with convenient energy-recovery events, support card buffs all landing at the same facility for massive stat gains in combination with all the boosts you've been saving, etc.

Energy management is incredibly important, since you don't want to waste turns resting. Thus, decision-making is centered around juggling energy requirements of your current/future turns, the success chances of various actions, and other scenario-specific mechanics like team training and item shops.

Every finished run can then be used for side-mode races, like the PvP mode Champions Meeting, where exact racecourse dimensions and conditions are revealed beforehand, so naturally, everyone aligns the stars and min-maxes their own runs just for this one race, just to win the finals.

The loop of "do a run → feed into new run → do a run" is always a pretty cool way to do meta-progression, especially since finished runs are can be reused over and over.

The story is presented through visual-novel format, like many other gacha games. But interestingly, it is implemented through 3D models and motion-captured animations, something only feasible for a game where every character shares a similar model skeleton and does the same, (usually) not-too-over-the-top actions. A single horse-girl can be assigned a unique set of stock animations, saving development resources.

Story events that appear in careers are randomly chosen from a pool of trainee, scenario, and support card events, and feature short little vignettes that aren't fully voice-acted. Generally, support card events are only chosen from your own deck, but it's always an experience when an event from outside your deck appears and inflicts a horse-girl you've never seen before upon your unsuspecting self.



The game also does feature stories separate from the career, which has a landscape mode and voice-acting. The visual storytelling here are more elaborate in its animations, even featuring small racing segments, still in the VN format.





Concerts have fixed performer animations and separate recorded vocals for each character, which lets concerts feature any selection of characters as performers and still be cohesive, which can be really important for post-race songs.

Along that point about similar base character models, every horse-girl wears the same school uniform, tracksuit, concert outfits, etc, with only their signature racewear and their casual outfit being unique. This limitation means their characters are also (probably) designed to be distinct just from shoulders up.

yuri

A lot of the story and gameplay reflect IRL Japanese horse-racing history, and a few story events and plot-lines only truly make sense if you understand the references (I mean this positively).

Many career story events make very on-the-nose references to things like the real horse's pedigrees and sire record, offhand anecdotes and jokes from jockeys, and of course, the rivalries between horses (or what is imagined by the public).

Every horse-girl has unique career goals that follow the IRL horse's racing record, but sometimes, the story delves into what-ifs to the point where the horse's history is required reading (especially with secret events).

In short, the horse-girl game has enraptured me.



YEARLY PSA

Did you know that you can do your taxes with Haskell: <https://hackage.haskell.org/package/canadian-income-tax>



terminal

LARS NOOTBAAR'S PLAN FOR SOLVING WORLD HUNGER

In **mathNEWS** 153.6 (Released Dec 1, 2023), I declared that Lars Nootbaar's Plan For Solving World Hunger would be released in 2026. After 2.3 long years (and one article that said this plan would be released in 2027), it is finally here.

The plan...

To hijack this article into a thank you article.

For an entire year, *aphf* kept asking me to come to **mathNEWS** with him. For an entire year I pushed it off.

We had just had a full return to campus and I had not yet shed a lot of the anxiety, especially around new people, that I had developed during high school. What if everyone knew I wasn't a math major and publicly kicked me out of the room, what if I had nothing to write about, nothing to say?

Eventually, one cold winter day, I finally went to a prod night, and I haven't looked back for the next 3.5 years. **mathNEWS** has provided an outlet for my voice and most importantly of all, allowed me to meet so many amazing people. I am so grateful for *aphf* for bringing me here.

When I think of **mathNEWS**, I think of *aphf*. No one cared more. No one told me so many countless stories of the spectacular lore surrounding it. So many of their articles still stick with me and inform many of the articles I write today.

Cucumbers (148.6), *Dark Alleys* (154.4), and your beautiful illustration of Pizza Nova Tony (155.6), all classics.

For years, every second Friday (or Thursday night around 7pm if we could game the URL) I would wait to read what *aphf* would write. I had so much fun both proofreading their articles, and eventually collaborating. I have never had a better time than when we put our *The Election Issue* (156.5) article out into the world. I have never felt more exhausted when we created our four page mega **gridWORD**. But I wouldn't have done it with anyone else.

But beyond the articles, I am so grateful for the time I got to spend with *aphf* over the last six years, from when we first met in residence, to **mathNEWS** to beyond. I will forever cherish all the time we spent just shooting the shit and laughing. So even as you'll be leaving **mathNEWS** and Waterloo, the impact you've made on everyone here will still remain.

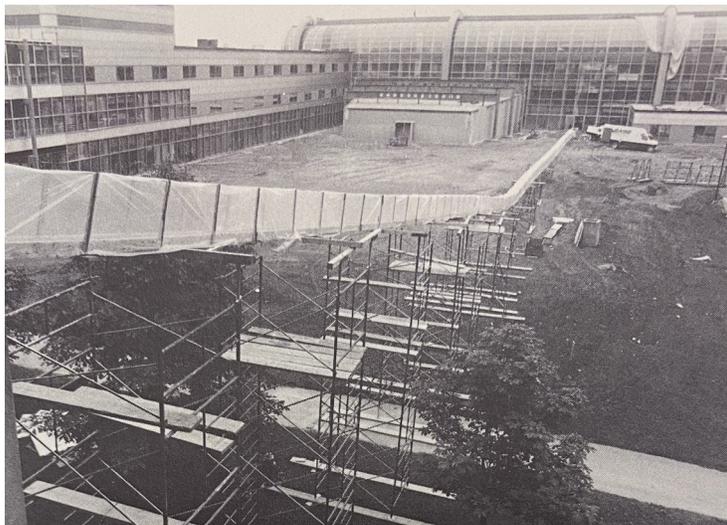
So thanks *aphf*, for everything you've given me.

Lars Nootbaar

N THINGS YOU DON'T KNOW ABOUT WATERLOO

Founded in 1957, Waterloo gets treated as the weird cousin of the other more established Canadian universities with their history and fancy Gothic buildings. We on the other hand, only have a deep repository of all the architectural marvels of the 1960s. We have a psychedelic CIA tunnel, and, I mean, have you been in PAS? To learn more about these strange buildings, we embarked on a *Quest*[™] to the Dana Porter archives. Fortunately for the readers of **mathNEWS**, we kept getting distracted by all the crazy 1960s (and 1980s) (and 2000s) events, and wrote about those instead. Here are N things we came across:

Picture a chute extending from the fifth floor of MC all the way to DC. That's how they transported all the books when they built DC library in 1987. I wonder if anyone rode it like a slide. Maybe we can rig one up just for fun?



We were almost renamed to Winston Churchill University. Apparently, Waterloo Lutheran University (Laurier) and the University of Waterloo were too similar (but really, who could possibly think so?).

Women students had lots of rules and curfews (obviously they could not be trusted to make their own decisions). But as one astute writer pointed out, men must also be protected! "It is entirely un-Canadian that our women be protected while our men are exposed to the perils of virtue that lurk within these Twin cities." Right on, mystery writer from 1965.

V1 dinner used to be served from 4:30 p.m. to 6:30 p.m. I'll be damned if I ever eat dinner at 4:30.

As the number of women increased, a Dean of Women was appointed: "...It is unfortunate if a university education comes to a dead end in the kitchen sink." We certainly did not take this quote out of context.

Over the 2005 holiday season REV experienced gender-imbalanced burglaries. Eight male rooms were broken into compared to three female rooms. One female room had a note

signed by "the friendly ghosts," stating "You girls are cute, so we won't take anything." See, the mainstream media is big on the gender pay gap. But the real story? The gender burglary gap.

Sex position of the week. *Every* week. With tips on how to perform. Clearly, Imprint has fallen so far from its glory days.

People complaining about where engineering spirit has gone, way back in 1965 (nothing ever changes). "Once we could paint BEER on the Waterloo water tower... Now we sit at home poring over meaningless formulas." Imagine how they would react if they could see us now.

Another thing that never changes—discussion about immigration policy. But in this case, an Imprint article on the merits of issuing visas to strippers, with the intention of alleviating an apparent stripper shortage. Did you know that between 1998 to 2004, Canada issued work permits to immigrant-strippers? See, next time someone tries to tell you Canadians and Americans are basically the same, we think pointing out that Americans never issued visas for strippers will make for a much more interesting conversation than discussing socialized healthcare.

The cost of staying in residence hasn't really changed that much! When V1 opened in 1968, staying there cost \$480 a term. Adjusted for inflation, that would be approximately \$4,304.44. A term in V1 today would cost you \$4,220 (plus whatever exorbitant cost they're charging for food).

People were *upset* about the construction of REV. (Or as it was known previously, Village 2, and before that, Habitat 69). (Because Habitat 67 was at the top of everyone's mind, not the sex position you freaks). The main criticism was that the rooms were too small and people would keep bumping into each other until they became "insane and unhappy and wrecked the place." Now, one person did suggest that the only sensible resolution to this was to make it a coeducational residence (Cohabitat 69). They claimed this would make the "insanity cases... undoubtedly drop to nil." Y'all are making the freak allegations hard to beat.

There were three people to a REV room for one term back in the 2000s. I guess they did not become "insane and unhappy and wreck the place."

When projecting the number of students in V1, an appendix bluntly states, "A negligible percentage of Engineering students are female."

There was a persistent rumour that the engineers of Dana Porter did not account for the weight of the books when they constructed the building, and that the building was slowly sinking. I guess this rumour eventually died when after enough years people realized the building had not in fact sunk.

114 people crammed into a V1 room (10×10×8 feet) to try to set a world record. They achieved a density of 7.1 cubic feet per person, which did not surpass the existing record of 6.7 cubic feet per person set at Laurier. And here I was thinking that the twenty people we stuffed in a V1 room in first year was a lot. But that was during COVID so surely it counts for something.

Stuffing stars of St. Paul's outshine fat Villagers. (And yes, that is the exact title from the 1966 article). The students of St. Paul's managed to beat the Villagers and achieve a packing of 5.6 cubic feet per person in a 4'9"×8'4"×7'2" room, and alleged the only reason they didn't do better was because the whole college was already in the room! THEY RAN OUT OF PEOPLE BEFORE THEY RAN OUT OF SPACE! DO YOU UNDERSTAND HOW ABSURD THAT IS?

Apparently no one studied back in 1965, and spent all their time setting records. One Acadia University student spent 101 hours taking a shower.

BOATs has been going on since at least 1966. IYKYK.

Does MathSoc still have a sacred logarithm? Engineers stole "The Natural Log," a literal chunk of a tree, back in November 2005 (but there was speculation that it was actually math students framing the engineers! Gasp!) Bring back the prank wars I say.

A big thanks to Nicole at the archives for supporting our curiosity :)



IN THE BEGINNING, THERE WAS A FARMHOUSE...

quasimodulo and totallynotanengineer

2026 AFSA TAX CLINIC

Tax season is here and AFSA is back with its FREE Tax Clinic 2026! A group of trained volunteers will provide free tax return services for low-income individuals and families. To see if you qualify for our FREE services, please visit <https://taxclinic.uwaterloo.ca> today! The link also includes information on how to receive our tax-filing service.

UW AFSA

CS246E > CS246

So basically:

CS246: Object-Oriented Software Development

CS246E: CS246 (Easy)

CS246E is cinema. So basically, during the course, Brad will remake vector twenty (maybe) times. Thank god Brad writes on the board instead of using slides, because it limits how fast he can go. However, regardless of him being limited in speed, there is still a lot to write down. As a left-handed person, by the end of each class my hand would be sore and grey from the amount of writing. Maybe consider typing in this course.

The course is amazing. Basically, you will finish writing a vector implementation, and Brad will be like, "So this works and fixes the issue our last implementation... buuuuuuu we have a problem, [insert problem]." Then we restart again on the next implementation. It feels like crumpling up a piece of paper and throwing it onto a pile of crumpled papers.

I would say this style of teaching is honestly quite good because it brings focus and examines the individual aspects and techniques that go into an implementation.

I think that while this course is tedious, it is also one of the most enjoyable courses I have taken. The course work feels very rewarding when you complete it. I have even tried to make some first years consider taking the course this upcoming fall if they have the chance.

ihatecoding

POKEMON TCG ROTATION

GHOLDENGO PLEASE PLEASE GO AWAY

PTCG rotation could not happen soon enough. I don't care about Iono just play Judge. Gholdengo you are no more Gholdengo I will no longer run into you on ladder Gholdengo your players will have to learn how to play the game instead of doing the trading card equivalent of mashing buttons. Also Gardevoir is gone but I'm lowkey sad about that since it's kinda high skill expression. Dragapult players WE STAY WINNING SCREW ALL THE HATERS. Also N's Zoroark is gonna get so so good people need to realize that that deck can do anything ESPECIALLY when you use Yveltal for prize trade fixing.

AbelianKwyjibo

math NEWS

DO SOMETHING YOU'RE PROUD OF

Do you ever wonder why we're here?

By "here" I mostly mean Waterloo, although maybe I mean **mathNEWS**, and maybe I mean life.

Right now, so much in my life is up in the air. For the last 22 years of my life, I've been following the broad strokes of the same plan. And now I'm here, at the end of the tour, and now I need to step out into the real world. I'm at the edge of the map.

University is supposed to be the bridge between childhood and adulthood. You practice independence. You make mistakes, make friends, fall in love, and learn what makes you feel the most *yourself*.

I learned that I feel the most like myself when I'm doing something I'm proud of.

It feels a little weird to say that, because it's somehow totally obvious, but also a bit counter-intuitive. When does a Waterloo CS student need to be told they should work *more*? Isn't the stereotypical lesson to learn here that I need to slow down and enjoy life more? I think that's what I'm supposed to say right now.

But I remember my worst moments. It was when I was alone, isolated, spending all my time in my dorm. I felt like a ghost, passing from place to place. I couldn't see myself reflected through anyone else. If no one's lives would be different if I wasn't here, was I *really* there?

Then, in the summer of my first co-op, two things happened. I went to my first meeting of the Game Dev Club, and I met *Not a N*rd*. I was gently pulled out of my shell. I finally felt like what I was doing was *interesting* to someone.

Through that, I found something precious and special that's hard to put into words. It's easier to demonstrate it through my deeds instead.

Whatever I found, I don't see it in the CS stereotypical LinkedIn-maxxing Leetcode maniac. I don't aspire to that at all. I think the critical difference is that *work* alone isn't enough on its own. It has to be *craft*, and it needs to be *communal*.

What's the difference between work and craft? To me, craft is defined not just by doing something, but by *caring* enough to do it well, to savour the process, to understand why it works. The process itself brings you pride.

Neither slop nor sloppiness is tolerated. When you care about craft, you aren't just interested in finishing a project to fill a hole on a resume. You want to do something well for its own sake—because it *really bothers you* to do a crappy job. It's spiritually offensive.

And craft is always improved by community. You need to find people to learn from, to teach, and who can encourage you to keep going when motivation flags and things get tough. And from experience, some of my best friendships have been made when we can bond over our passion for each other's work.

If you have more time left at Waterloo than I do, please don't make my mistake. Get out of your dorm. Start now, before you feel ready. Waterloo is one of the best places in the world to find communities like these. You're already here—that's the hard part. Reach out. Find something or someone that encourages you to *keep going*, whatever that means to you.

The real reason to go to university is to be surrounded by smart, ambitious, encouraging peers your own age who want to see you succeed. Don't waste this chance. We're so spoiled for those opportunities here, it's hard to remember how rare they are.

If you don't have any of those spaces yet, come write for **mathNEWS**.

I'm so proud of **mathNEWS**, and I'm constantly in awe of everyone who contributes to it. It's such a specific, special thing, and sometimes I'm so in the weeds that I forget to take a step back and appreciate how rare something like this is.

When I think of **mathNEWS**, I still think of *Not a N*rd*. She was the one who brought me to my first prod night, and she's still who I imagine the ideal writer to be—witty and bold and *deeply* curious about other people. I love her for a million reasons, but that curiosity and empathy is the thing that inspires me the most. It's a gift she gives so naturally to the world, and I try every day to do it as effortlessly as she makes it look.

That attitude defines what makes **mathNEWS** so special to me. Whatever you choose to share, it's treated with respect and importance and interest. We spend hours typesetting it and printing hundreds of copies because we think that if you're brave enough to put yourself out there and share some writing or art with the world, that means it's important to you. And since we're interested in people, if it's important to you, it's interesting to us, too.

Wherever you go in your life, try to find a craft you care about, and a community like this to share it with. It doesn't need to be your career. It doesn't even need to be a "project" in the traditional way. You could get really good at the craft of being someone's romantic partner, or a good parent, or a good child.

But it has to be *something*. Don't just go through life coasting. Take on a bit more responsibility than you think you can handle. Fall in love, or at least host a party or two. Try and find the limit of what you're capable of. I promise you that you'll impress yourself.

Despite all the uncertainty and fear, I'm *really* interested to meet my future self. There's a lot I want to talk about, and I'm sure we'll have a lot of work to do. I can't wait to start.

Remember to be kind, be curious, and never, ever settle.

Dick Smithers

If you want to stay in touch, you can find me at owengames.com. I'll see you around.

DO MY STUFFED ANIMALS KNOW I AM GRADUATING?

IN MY HEART THEY DO... AND THAT IS ALL THAT MATTERS!

I will try to write this without getting emotional. I am graduating in what feels like five days, and every night I stay awake thinking of leaving my degree entirely in the past, and using my skills from Smurfs' village to become a farmer somewhere far, far away. Eating my mushroom house for sustenance. But then I look to my right and who is right there? My stuffed animals, one could even say my adoptive children, I have to have a career, to support them, because they deserve it. They deserve the pleasure of travelling, jumping on the coziest of beds, and getting tucked into silk sheets.

Why do they deserve this? Because of the support they've provided me over the past 22 years. They watched me accept my university offer five years ago, they accompanied me into my first year residence, they gave me comfort while I cried over my calc 2 online covid midterm, they watched me submit thousands of co-op applications (and now job applications). They moved around Waterloo with me into the ugliest of apartments, they watched me fall in love (and grew to love him as well), they covered their eyes as they watched me butcher the definition of a homeomorphism for the hundredth time, they sat on my bed as I tried to figure out if a graph was planar using goldfish crackers as vertices. Now they will watch me reminisce on these memories for the next couple of months.

They deserve degrees just as much or maybe even more than I do myself. This is a thank you letter to every stuffed animal who has supported a tired math student throughout their degree. To any teddy bear who got showered with tears at any point in time, to every Jellycat keychain who made campus a smidge cuter, and to every future stuffed animal who will grace campus with their presence and push a student to their success.

Thank you to my stuffed animals, I can't wait for our next adventure, on some little farm far far away.

Buggins

EMERGENCY ARTICLE

HONK SHOO HONK SHOO SNOR MIMIMIMIMI

I've been prioritizing my sleep as of late and doing a pretty solid job at it (highly recommend to anyone else if they find the opportunity to do so), so I'm opting to go to bed at a reasonable time the night before the article submission deadline instead of staying up late to finish the article I've been working on.

Maybe I'll get lucky and manage to finish my article tomorrow morning before the 10 AM deadline, maybe I won't. Either way, I have this short article prepared on the off chance that I fail to finish my longer one on time to ensure that I can still fulfill my goal of writing an article in every **mathNEWS** issue that comes out this year.

I can't help but feel like I'm copping out a little bit by writing this backup article. Using a deadline to motivate yourself to not give up and finish a project often pays off by giving you the kind of experience you only get from making a finished product, and the earlier I turn that article idea into a finished product, the better. However, I would also like for it to be a sufficiently *good* finished product since I care about the idea, and I would like to continue reaping the benefits of sleeping decently more than I would like to grind out the article to guarantee that it's finished in time.

At least I can definitely write out the musings you're reading right now, whose quality I'm less concerned about, in time for the last issue of the term. That being said, I would like to explore what I'm getting at a little bit more, because I'm grasping at a big question here and am not fully satisfied with my resolution of it above. I barely wrote out any of the actual reasoning behind my choice above, and when I think about my reasons for it I'm starting to believe that maybe it would have been better for me to press on like I have other times in the past instead of slipping into apathy and procrastination, justified by concern for my sleep health and worry over article quality.

No time for that now though. Tonight I will commit to choosing sleep. Maybe I'll reply to myself in yet another article when I'm older and wiser. Maybe I'll manage to actually finish that article I wanted to finish in time for the submission deadline tomorrow morning, and this article will never see the light of day as a result. At least not in the slapdash form it's in now. Good night!

the government's only spy

That's a weird mole.

**AN EDITOR WITH A CONCERNING
MOLE ON THEIR ARM**

LLMS CONSIDERED HARMFUL

Generative AI is having a major impact across all levels of education. Never before has it been reasonable to get >80% on assignments but <10% on the final exam. Assignments are supposed to assess and reinforce learning, while the final exists to certify that at some point you held the content in your brain.

Cheating isn't new, but in the past one of the best ways to cheat without getting caught was to have an unauthorized source feed you ideas to implement/modify on your own. This process left behind at least a residue of understanding, forcing you to engage somewhat. Now in many cases you can just read over the output and call it good. If you ask an AI to solve an assignment question, even if you go through and try to understand each part, you won't retain as much as if you worked your way to that solution with any amount of help.

Of course, it *can* be used as a learning aid. LLMs are great at quizzing, comparing to answers the professor didn't provide, or to ask questions about and beyond the content. Yet the first two really just replace student-student collaboration, and the last one replaces individual research. If you don't have friends and don't care about practicing finding answers to questions, then don't let me stop you from augmenting your learning.

University should be a certification of capability with breadth and depth. Lowering that floor necessarily hurts the value of the degree. Trivia heavy exams make it too easy to cram for a pass by pattern matching, and take-home assignments lose effectiveness. I do think it would help to have more in-person assessments focused on concepts and processes, with supervised labs for longer tasks. University should also do its best to reflect the current state of the world, and when the world leans LLM, it should be covered in the education. I do think there's a strong argument for formally covering how it works and how to use it well. It might sound ridiculous to take a course on AI use, but it *can* be used incorrectly and what are we without standards.

As long as courses don't require students to learn, that learning becomes optional. But really, being a student is also optional. Personally, I believe the fundamentals are key to exceptional output. If you don't want to understand problems well enough to solve them, then shouldn't that entail a different kind of degree?

As much as it's going to change student life, I'm more concerned about its greater societal impact. Like the automobile, it aims to increase productivity at the cost of significant environmental harm, replacing something beneficial to human health in the process. Unlike before, cognition and connection are more fundamentally human behaviours than any other modern technology has disrupted.

Sure, it doesn't replace thinking entirely, going from designing and creating to explaining and reviewing is like a chef retiring to become a food critic. If cooking becomes a solved problem, focusing on your taste and vision means you can prompt the

robot chef to create wonderful things. Lots of people forget math when they enter the workforce, that's not new. What's new is how far that replacement can creep into your life. Seeking guidance on progressively more important decisions, forfeiting power over your life to the companies that tune the responses.

For some people, especially if they're already lonely, chatbots enable artificially replacing connection. They can close themselves off to others and engage in one-sided digital relationships. It's yet another low effort alternative backed by immense financial pressure, which grows increasingly appealing despite the longer-term downsides. It's part of the trend for rising accessibility and personalization of sexual outlets, which hurts dating culture in a way that is unavoidable even if you personally abstain.

Thinking ahead, I'll try to reach a realistic best case.

If the technology stagnates, the stock market implodes, but the technology as it exists is going nowhere. If it sees unbounded growth becoming a perfectly human replacing AGI... well I shouldn't need to explain that disaster. So, assume it becomes profitable and thus sustainable, but with finite performance. If only one company comes out on top, a monopoly is formed, and we get enshittification and/or a gross degree of societal power from the unchecked ability to influence individuals. With competition and without corruption, more intelligence means more productive output from humans piloting LLMs. From here there are two options:

The first is if it rips through the job market. Jobs lost left and right, the only option to maintain some semblance of societal order is to implement universal basic income. This could be funded by taxing the AI agents like a human worker. Then, Gradual Disempowerment suggests that economic and political forces de-prioritize civilians until the fabric of society from farm to government no longer cares. Not ideal.

So instead what if we see a productivity boom: more workers doing more things. Then, in the same way as cars creating unwalkable cities while enabling exercise-free lifestyles, society will warp around the affordances of LLMs and their ability to replace cognition and connection. People grow further isolated, and mental health is propped up on the backs of AI therapists. At best, this feels like a distraction from the wicked problems already present in society, from growing wealth gaps built from a litany of harmful technologies to international tension and environmental harm.

As I see it, the only good path forward for an individual is to be vocal about these issues and maintain firm morals. Save some time with it, but still practice analytical and creative thinking. Use it for work, but don't invalidate your education.

The internet is slowly filling with slop, fighting for your attention and capacity for independent thought. Consider lessening your reliance on the virtual, instead connecting with

friends as well as strangers... focusing on the human parts of life that shouldn't be replaced.

blather

UWATERLOO LETTUCE CLUB KEEPS HAPPENING

📄 **FACT SHEET** 📄 — HELD 04 MARCH 2026
UPDATED 20 MARCH 2026

The W26 open competition was hosted, as always, by the defending on-stream champion, the Head Lettuce. Participants bring their own heads of iceberg lettuce from home, and are expected to consume at least 300 g to compete for the right to chair the next event. Washing and weighing in of heads is standardized under the v02 ruleset written by Paige Ackerman iHL. **The median pace at the W26 open was 1.05 g/s, and had a standard deviation of 0.618 g/s.** The title of Head Lettuce was won, once again, by Anthony Exner, with a **winning pace of 2.19 g/s.**

Since F22, at least **179** unique participants and **136** unique finishers have competed in the University of Waterloo Lettuce Club. Over 250 attempts have been recorded.

The total consumed mass of lettuce is recorded at **110 995 grams**, approximately the mass of an Ostrich. Although upwards of 993 grams has been upchuck.

The total time spent eating lettuce is recorded at **1 day 10 hours 12 minutes and 12.6 seconds**, just long enough to watch the extended cut of The Lord of the Rings three times.

The open competition had its best finish during the W25 event, a score of 2.82 g/s, set by Anthony Exner, HL.

The open competition had its lightest attempt during the W26 event, a score of 29 g, set by Anthony Exner, HL.

The open competition had its most massive finish during the W25 event, a score of 1112 g, set by Nicholas Pfeifle, iHL.

The open competition had its longest finish during the W25 event, a score of 2942 s, set by Mya Kay.

The open competition had its fastest attempt during the S24 event, a score of 107 s, set by Anthony Exner, HL.

Non-iceberg lettuce types consumed during open competition include Romaine, "lettuce smoothies" (consumed on several occasions—leading to non ruleset v02 scores purported as high as 5.41 g/s), and an Apple (variety unknown).

P.S. For more discussion on rules and results, join the UW Lettuce Club discord at: discord.gg/HhQPqWvFxX

sqrt(cause)

TALKING ABOUT HABITS IN FIVE SENTENCES

1. A habit can be described with either a *tendency sentence* (e.g. "When I put on my shoes I start with the left one") or a *frequency sentence* (e.g. "I drink a can of beer a day").
2. When self-management gurus teach you how to rebuild your life in 2026, they essentially ask you to live a life defined by a set of *frequency sentences*.
3. This won't work because, if your current life cannot be defined with a set of *frequency sentences* after 20 years or so, your personality does not favour a life that can be defined with a set of *frequency sentences*.
4. Don't even think of re-engineering your personality, which only kills your psychological well-being.
5. Instead, these people should think of each habit as a *tendency sentence* and build the new tendency through practice to the point that not following the tendency makes them feel uncomfortable, which is highly doable—but by no means effortless—given such facts as people can learn to enjoy spicy foods and, at the end of the day, they cannot eat a dish without chilli sauce.

yvr_busrider

I NEED TO SIT DOWN

AND I HAVE THOUGHTS ON WHERE THAT SHOULD BE

This term has been crazy, but we're almost through it! "How has it gone by so quickly?" I continue to ask myself. I need to sit down.

Top 5 chairs:

1. Spinny chair (weeee!)
2. Muskoka chair
3. Cozy cafe booth
4. Bar stool (with back)
5. Beanbag chair

Bottom 5 chairs:

1. Squeaky lecture hall swivel chair
2. Metal foldable chair
3. Chair that is bolted to the ground too far from its table
4. Any chair with no back
5. Rocking chair (I always fall)

Good luck on exams y'all, I hope you can find a comfy chair and lock in!!! That's my secret to success. You got this, diva.

BeesKnees

A VERY BIASED, NOT-DEFINITIVE REVIEW OF THE FIRST-YEAR ADVANCED MATH/CS COURSES

I was just told this is the last prod night of the term, so I suppose this is as good a time as any to review all of the MATH/CS 14X courses, seeing as I'm pretty close to done most of them. Disclaimer though: my opinion is my opinion, and *that's all it is*. In the words of someone who looked at my screen while I was writing, "if my opinion intersects yours, it's valid. If it doesn't, then it's not," and you know what? That's probably a good mindset to have. If you've taken these courses and your opinion differs from mine, that's very valid :) I just hope that at least someone reading these finds these useful.

MATH 147

Not gonna lie, this was the first ever university math course I walked into, and well... it was rough, for a bit. You'd think that on the first day they'd probably try to ease in new uni students, but nope. Those who know about the first problem set *know*. (It was bad. Like, half the class dropped after that alone). I got cooked on it, the next one, and on the first quiz. Somehow, I stuck it out, and I think it became my favourite course of the term and sparked my interest in analysis (anyone remember my measure theory article??). However, I do wish the "weed-out" mindset established at the beginning of the term wasn't as strong—this might be more symptomatic of the overall mindset of the advanced courses in general, but I feel like there was this mentality that if you couldn't suffer through it, you just aren't cut out for the advanced courses, and I don't think that's true.

Apparently my class also (supposedly) got a weirdly hard version of the course, so that might've been part of it too. We did the usual intro-to-analysis-in-R thing, but with some extra stuff at the end including topology, the Baire Category Theorem, and fractals, which I'm told is nonstandard.

MATH 145

So, full disclosure: I dropped this four weeks in. My offering of the course was basically just a course in "how to prove Dirichlet's Theorem 10000 different ways," but along the way, we incidentally "learned" a bunch of things about number theory and abstract algebra. To me, it seemed like too much content crammed into not nearly enough time, so what seemed to happen was that nothing was really explored in depth. I could tell the prof really cared about the course, but I didn't feel like I was truly learning any of the content and was just crying over problem sets for no reason.

Anyway, now I'm on my soapbox, I guess this also demonstrates the "weed-out" mentality I talked about. I feel like if you're in this course, you're either really cracked starting out, or you're floundering through. It doesn't help that taking this course is basically roulette: it's so prof-dependent that you never know what you're going to get. I guess that comes with the territory of essentially being "intro to proofs for people

who already know proofs." That's a soapbox for another time, though.

CS 145

Full disclosure, I didn't take this course. Call me a fake CS major, whatever. I kind of wish I had because it seems very interesting. Maybe ask someone who actually took this for their opinion.

MATH 148

Honestly, I don't enjoy this course as much as 147. I think the content just feels less interesting, but we could chalk that up to the wonder of being introduced to analysis for the first time not being there a second time. I'm also just kind of done with the ten assignments, ten quizzes (one every week) format. Basically, this course covers integration and series... and that is all. They don't (in my section, at least) cover how to do any of the computations, but still expect you to know them, so there have been multiple instances where I ended up spending an entire evening right before a quiz just bashing out computations. I still remember going through the entirety of the first half of the 138 textbook in 3 hours the night before the quiz, trying to speed-learn all the techniques. I guess it worked, but I probably would have appreciated a little more than getting told to "fend for your own devices!" on that front.

MATH 146

Nothing against the professors or course in general, I just really don't like linear algebra. It feels like a lot of symbol/notation slop, and it just hasn't clicked with me. Also, because I haven't really been giving a crap (and can't bring myself to), I've been getting touched on the quizzes (I don't like quizzes, period).

In terms of content, this is pretty standard. It's basically the first half of 235 and the prerequisite knowledge from 136. I think 136 does some extra computation stuff, though.

CS 146

Ok, here's where that thing about being biased comes into play, because this opinion is definitely clouded by where I'm coming from. Essentially, I had to miss the midterm and now have to write a 75% final (yay!!) so I've been feeling cooked this entire time. I feel like this course seems kind of all over the place, jumping from C, to Racket, to Haskell and back again, covering who knows what at this point. Mutation? Made-up programming languages? Interpreters, compilers, and assemblers? it's all here. Personally, I don't think the assignments have all that much to do with the course content, and I don't quite like how the Haskell tutorials were taught. Also, I'm feeling very burnt out right now and doing anything

for this course feels like a chore that activates my impostor syndrome.

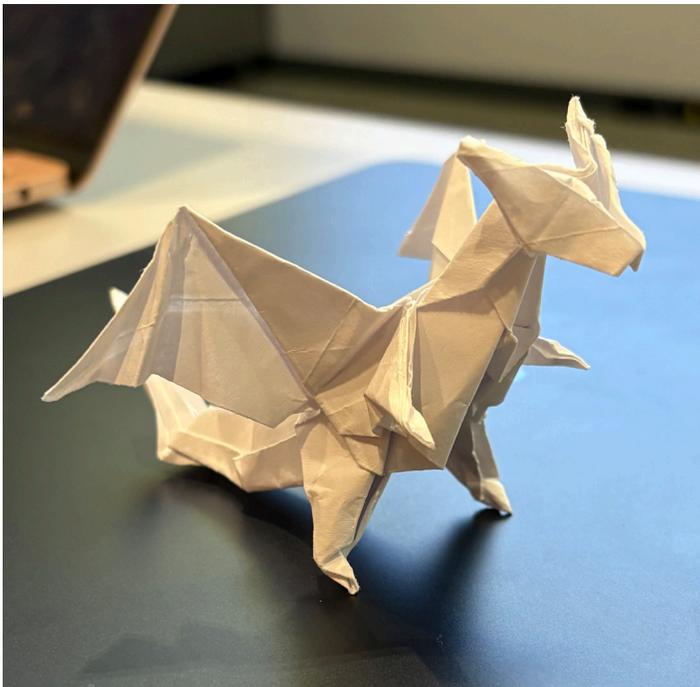
Honestly, I think that if I was in a better state of mind, I'd really enjoy the course.

Anyway, I hope this was at least mildly helpful. If you want to hear more, just DM me or something. If you don't have my discord, you probably know someone who does. Or come find me in MC at 2 AM. Or PMC/CSC if you aren't awake then.

burgerqueen

AWESOME NEW EASY WAY TO WASTE TIME FOR NO MONEY

I recently bought a bunch of origami paper because I wanted to fold one thing but then I had a lot of extra paper so now I've been doing a lot of origami. It turns out that origami is the best hobby ever because it's cheap and you get nice physical objects you can display around and make your room more interesting, or give to people, or really do anything with. The learning curve is really gentle too and you don't even need fancy paper (though I recommend it because displaying models is more fun if they have colour). e.g. I folded this dragon (design by Jo Nakashima) with printer paper during prod night.



hyperlynx

UNDERGROUND PARKING LOTS

Shostakovich's *String Quartet No. 3* is one of the greatest works of chamber music ever. Written in the aftermath of his ninth symphony's poor political reception (perceived as a childish expression of his feelings about the defeat of Nazism), it captures the tumultuous experience of Russians during the second World War. Shostakovich initially gave each movement a programmatic title, but later withdrew them (presumably for fear of political pressure).

While the original titles are no longer as temporally relevant, in light of the recent mass displacements due to the fear of the Great Rez-One Fire, perhaps more suitable movement titles are:

1. Blithe ignorance of the future cataclysm
2. Rumbblings of unrest and anticipation
3. ~~Forces of war unleashed~~ ⇒ Forces of fire (fighting) unleashed
4. ~~In memory of the dead~~ ⇒ In memory of the lost sleep
5. The eternal question: why? and for what?

Fuck you Rez-One. Because of the interconnecting underground parking lot that ten people use, in this scenario, the Ontario Building Code sections 3.2.4.1–12 mandate a conjoined fire alarm system. Five times this semester, I have been evicted due to a fire triggered in another building. Next time, please consider having car drivers resign themselves to parking outside, or consider passing legislation that values my sleep and mild inconvenience over their lives?

DSCH fanboy

THE APRIL 1ST AND 2ND SITUATION IS CRAZY...

... because the University of Waterloo A cappella Club is having their End-of-Term Concert!!

Hagey Hall—Theatre of Humanities, April 1st & 2nd @ 7:00PM
\$10 for Students, \$15 for General.

More Info on Instagram @uwacc

uwacc did not pay me to promote this, im doing this for free cus i love to promote. And that's why, [imagine this loops like short-form content does and read from the title again]

i love to promote

CHAT, SOMETIMES IT'S TOUGH BEING THE BEST

IN CASE MY ORIGINAL ARTICLE IS REJECTED | J-CHEM COMPLAINS ABOUT LIFE AGAIN

Some people believe in the power of silence. In discussing your affairs, don't reveal everything as there are people praying on your downfall.

Not me tho, Dooku shall reveal all:

I've been facing a tonnnnn of bad luck recently. You know of my PC and phone being... reset, but I didn't mention that someone hacked my Reddit, my Instagram, AND stole \$180 from my credit card through Steam in app purchases, and no, I couldn't get a refund. I told of my sinus infection/strep throat/flu ordeal, but I didn't tell you of the academic sabotage of my group members for assignments worth 40% of our final mark. I'm looking at you, theatre-major-girlie, you know what you did. I'm supposed to edit the footage, and I can't do that WITHOUT FOOTAGE. I'm trying to help YOU get a decent grade. That being said, watch The Nether and support student theatre, because I dislike her as a classmate, not her as someone in the arts trying to create something. I'm also looking at you, classmate who [ALLEGEDLY] used chatGPT on our assignment in an anti-AI course. Be so fucking serious right now. HOW do I get paired with these people? Does anyone care about their own education anymore? To the group members who actually put in the work, I see and salute you. You will benefit in this life.

Also in bad luck, I forced my person to make a choice about where he stood in my life and chat...

He chose to break my heart and end the foolishness (situationship). I wanted to marry the man, that idiot. He's actually very smart, but still. It's fine, but seeing as I promised no more situationships after him, I must admit I'm going to miss the delusion, the pseudo dating. Thinking that someone is Home(TM). But also, this forces me to actually be in Relationships. That excites and terrifies me at the same time. What if it's not meant for me, the whole Love thing? All things considered, wouldn't have changed a thing, and he was a very decent fake boyfriend. Could work on the "meeting emotional needs" part, but solid performance. And we're still friends, so nothing lost.

I want to go back about ranting about theatre majors/kids because why are all of you my biggest haters? I think you're cool, then you consistently prove me wrong! I ask one thing of each of you, to be a good [fake boy]friend, to do your assigned work in a timely manner, to be friendly, but at each turn, you fail. You never fail to entertain the people though, so maybe I'm the issue. Oh well.

Outside of bad luck and heartbreak and anger and my best friends of six years refusing to talk to me anymore for NO reason [I snapped at them for being really insensitive thirty minutes post-break up, but I apologized an hour later but somehow I'm in the wrong?? Wack people, but they also made too many racist jokes at my expense, so maybe this is for the best], I've been good. Found a new church and while I have

yet to be an Insider, I don't feel like an outsider, like I do everywhere since this country wasn't made for people who look like me. I've been closer to God, which is good, and I've been locked in on assignments that I find interesting. I don't feel like I'm going to die soon, which I usually feel when I'm left with my thoughts... maybe seasonal depression is gone! Yippee!

Jochemist

TEA LEAF PARADOX

PHYSICS 101

One of the quiet curiosities of everyday life appears in something as simple as a cup of tea. Stir the tea, and as it spins, the leaves do not fly outward to the edges as you might expect. Instead, they gather at the center, forming a small pile at the bottom. At first glance, this seems to contradict everything we know about rotation—shouldn't things be pushed outward?

The explanation lies in how fluids behave when they rotate, and in the role of friction.

When you stir tea, the liquid begins to rotate. If everything moved perfectly uniformly, heavier particles like tea leaves would indeed be pushed outward due to the tendency of rotating systems to move mass away from the center. But real fluids are not ideal. The water in contact with the cup experiences friction with the walls and, more importantly, with the bottom surface. This friction slows down the fluid near the base of the cup.

As a result, the tea does not rotate at the same speed everywhere. The top layers move faster, while the bottom layers move more slowly. This difference in speed creates a pressure imbalance within the liquid. Near the edges, where the fluid is rotating faster higher up, the pressure becomes slightly greater than near the center.

This imbalance drives a secondary flow within the cup. Fluid near the bottom begins to move inward toward the center, while fluid near the surface moves outward. The result is a slow circulating motion: outward at the top, inward at the bottom.

The tea leaves, being heavier than the surrounding liquid, tend to stay near the bottom. There, they are caught in this inward-moving flow and are gradually carried toward the center of the cup. Over time, they settle into a small pile at the bottom middle.

nishant3.14

WHERE'D ALL THE TIME GO?

So, the term is coming to a close, and I'm lowkey in my feels about it. This term has certainly had its ups and downs, but looking back, I wouldn't change much (just a couple of grades).

The term has flown by crazy fast. It feels like just yesterday was the first day of classes. However, I know at least for myself, I have grown as a person over the term. I started reading more, spent time with friends, watched a lot of Heated Rivalry edits, and started writing for **mathNEWS!**

Shout out to all the memorable moments of the term: Warton Willie dying, going to Grand River Hospital multiple times, all the sweet treats I enjoyed (I'll never turn down a trip to menchie's or a freshly baked cookies), key clues, all the confusing amath lectures, lots of Starbucks, and all the wonderful moments with my friends (y'all know who you are).

Life is kinda crazy, and it's important to remember the great moments, but there is also a lot to look forward to. I know a lot of you will be either going on study terms or working, which comes with a whole different emotions in itself. I know during the summer I will be working, but I am looking forward to seeing my cats, hopefully visiting friends, and maybe going to New York :). Be sure to always take time to focus on yourself: take up a new hobby, go on sunset walks, and hopefully do not do too much doomscrolling.

I hope everyone had an amazing term and take care of yourself during exam season. Be sure to take study breaks, and remember, you got this!!!

Also, just wanted to point out that "Where'd All the Time Go?" by Dr. Dog was stuck in my head while writing this article.

is.all.on

MY LITTLE CORNER

Here I am in my little corner of **mathNEWS**. I've never written much, and the few times I have, I'm sure someone else has written more. I remember being surprised to hear that they had just implemented a 1000-word limit — on some days, I can barely disgorge a haiku. And yet here I am, continuing to write.

I'm not sure I've shown up to a prod night in a year, let alone indulged in free pizza. I also feel like it is a bit too late to start going again. I've changed a lot over the past few years, and I'm not sure anyone would know me in the first place... maybe only a vague remembrance of my writer's name.

Sometimes I regret having shared my pseudonym with people I know. I've been meaning to publish more personal stories that I wouldn't want anyone to trace back to me. Other times, I am glad to have heard someone has enjoyed my little corner, and it was not all in vain to seemingly keep another meaningless streak ticking. You know who you are.

I wonder at times whether there is a correlation between the quality of my content and whether I am on a co-op term, in the midst of midterms, or simply distracted by life around me. Occasionally, I feel bad that my writing is subpar compared to the longer articles I no longer have the attention span to read. However, I've since come to accept that the little shitposts in my corner are a truer reflection of me. I have never won Article of the Issue, and I don't think I ever should. They say it's the little things that matter — I say it's this little corner of **mathNEWS**.

Happy 50th consecutive published issue to me.

Whole Number Haver

$\mathfrak{h} \propto \dagger \lambda \cap \in \omega \leq$

MUSIC VENUES

One of the best things to do with a evening is to go out and see some live music. And to do this you must first find a venue, after searching high and low, and possibly following the sound of music, you'll arrive somewhere, weary and tired from your journey, and think to yourself, was this worth it? To answer this, there are some things that separate the best of these venues, and I want to try and highlight what makes a venue great, as of course you go out for ambiance and not music.

The first quality that I think a great venue should have, is being in a weird location. Nothing makes a show more memorable than a noteworthy venue, be it under a bridge or in a Thai restaurant. The key is to find a balance between sound quality and sitting on rocks.

Another key feature is a dance floor or large open space. Nothing brings a crowd together, and makes you really feel like part of something than being forced to be within 10 cm of a random person. This matters the most for punk or rock shows, where the forced proximity may combine with people who enjoy throwing elbows.

And finally, and arguably least important, is the quality of the band. We all know the key to a good time is atheistic and atheistic alone, so we'll leave it there.

searching_for_noise



MY FAVOURITE ALBUMS THIS TERM

W26 EDITION

New year means new music. Sadly, I haven't done as much exploring as I'd have liked to this term, but I've still managed to put together another collection of ten albums that have soundtracked the past couple months. This might be the most genre-varied one yet? I'm too lazy to look at my old articles. Onward.

Trying Times by James Blake (2026) — This was definitely my most anticipated release of the quarter and it was certainly worth the wait. Every album that this guy puts out is different from the last yet still uniquely him. I would say that *Trying Times* is his most beautiful record so far, as it uses the electronic elements in a way that highlights the rather somber lyrics, while carrying a subtle sense of hope.

Empty Hands by Poppy (2026) — And on the complete opposite of the spectrum, we have an album full of screaming and harsh guitar work. I've been following Poppy since 2024 and I am so impressed by the evolution of her talent over the past couple years. This latest alt-metal project doesn't reach the same highs as her previous, *Negative Spaces*, but I keep coming back to it, especially the title track which is absolutely brutal.

Gunfighter Ballads and Trail Songs by Marty Robbins (1959) — Another change-up: here we have a record that evokes the American West even from just looking at the cover. I already have a soft spot for country music, but the storytelling here is unlike any that I've heard before. The instrumental arrangements are arguably very simple, which further elevates the incredible songwriting; Marty may not have written everything, but hey, these songs are traditional for a reason. Saddle up your horse and get to listening.

Eli and the Thirteenth Confession by Laura Nyro (1968) — If I had to pick a favourite from this list, it would be this one. Laura Nyro's work unfortunately went largely unnoticed until after her untimely death at the age of 49; it's such a shame since this album (and *New York Tendaberry*) is awesome. A mixture of punchy jazzy tunes and heartfelt soul tracks, *Eli* showcases Laura's impressive three-octave vocal range and piano prowess. Do yourself a favour and become a witness to the confession...

Private Music by Deftones (2025) — Most of my listens come from "Milk of the Madonna," which is undeniably addicting, but the entire album is stacked front to back. I don't have much more to say... it's just *good*.

Pieces of the Sky by Emmylou Harris (1975) — This is an album that I didn't expect to enjoy so much. Not only is it her debut album, but it mostly consists of covers, which was typical for country music at the time and would probably deter the average listener in 2026. Not me though! *Pieces of the Sky* is delicate, nuanced and fun; additionally, "Boulder to Birmingham," the only song with a writing credit from

Emmylou, is simply stunning. One of the covers is of a Beatles song, for all the music nerds out there.

Get Up by NewJeans (2023) — Yes, I know this is an EP... I don't care, this is my article. I think I had this on repeat for two straight weeks, and justifiably so, as even the 50-second long title track is such a delight to listen to. The cover is what initially drew me in, but the music is what made me stay. And now they're on indefinite hiatus... ah well, I also have Nmixon to tide me over.

Heavy Metal by Cameron Winter (2024) — I didn't appreciate this as much as I should have when it released. *Heavy Metal* perfectly captures those feelings that lie somewhere in between melancholy and calm. Maybe you've been dealt a rough hand lately, but you're continuing to push forward. In moments of hopelessness, you focus on the things that have gone right. Et cetera. It's weird, but in an endearing way. Much like **mathNEWS**.

Armchair Apocrypha by Andrew Bird (2007) — There is nothing more comforting than contemporary chamber music, complete with whistling. Focusing on electric guitar rather than acoustic, *Armchair Apocrypha* features Andrew's standard violin stylings and wandering compositions while taking a more straightforward approach compared to his previous releases. Pleasant and charming.

Undertale Soundtrack by Toby Fox (2015) — A friend of mine is introducing me to Toby Fox's soundtracks and I've been having a great time. I haven't been too impressed by the *Deltarune* stuff, but *Undertale* is phenomenal. I'm still surprised by the sheer amount of genre variety that is packed into this soundtrack. The title track is my personal favourite and deserves more Spotify streams. If you are said friend and reading this, thank you and hello :)

And with that, I'll see you next term. My last term... Scary...

JP

REASONS FOR SHOWING UP TO mathNEWS PROD NIGHT

- We spent thirty minutes hating on Beertown followed by an hour of voting on 41 different pizza combinations.
- "OptimisticPeach wore a new shirt." – *amirdadp*

man

THE JOB SEARCH EXPERIENCE

When it comes to jobs, either you're good or you're fast.

Good, as in: you have the special skillset they're looking for.
Fast as in: you apply when they're looking and are available when they need you.

Hiring windows are important. For example, US internships need three months to complete the visa process, so if you're good but you're late, you may be out of luck. While large companies hire for full-time positions year-round to deal with attrition, they may put more focus during certain periods—fall tends to be a good time for new-grads because companies expect most people to graduate around April (side note: I've heard from a friend that Google puts priority on the April cohort over the August cohort). And of course, a lot of hiring is "backfill hiring"—a team loses a member and they want to fill this slot as fast as they can. This is why periodically checking for new job postings can prove useful.

So if you take the fast route, applying frequently and early, you might end up landing a job that under normal circumstances you wouldn't get. Having been an interviewer, I can tell you that finding the best candidate is often more heuristic than science. Oftentimes, you're heavily restricted on how much time you can wait for the right resume to come in, because job candidates find jobs elsewhere and your team wants that extra team member as soon as possible.

Of course, applying to jobs like this can be quite tiring—job search can be like taking an extra course or two. There's always the hope that it's possible to simply be good enough to get the job on merit.

Unfortunately for us new-grads, the bar for "good" has gone up in recent years. With the economy being so short-term focused, companies don't have the time to train junior developers to get up to speed on frameworks; hence, this is why you see many companies only hiring senior developers. With this in mind, I've noticed a shift in what is being evaluated: having direct framework experience is often more valuable than having good fundamentals like coursework. I mean, it's well known that doing side-projects to get names on your resume is useful; however, I argue it's much more important when teams are pressed to meet ambitious quarterly goals.

This becomes doubly important if the jobs you are after are specialized. As a grad student studying programming languages, I negotiated with my supervisor to let me look at LLVM/clang. This was partly to see a different compiler implementation and see the optimizations they make. This was also partly so I could put it on my resume so I could go to a company like Nvidia and do CUDA compiler work.

How do referrals fit into all this? Some people say it's really useful, while others find it less important. I find it helps get your resume seen, which may not otherwise happen if you're applying outside of recruiting windows. I've found it greatly

increases my chance of getting an interview, though the interview pass rate stays the same. So it might help more for the "good" group than the "fast" group.

While we're at it, why not look into interviews, specifically Leetcode? While Leetcode has its faults, it is a pretty nice way to train engineering output. My problem with Leetcode is that it actually measures two things: can you write a solution, and does its big-O fits within the time limit? I argue you should be focusing on the first thing, because code can always be optimized later. One of the traps you can run into when doing Leetcode is to try and make your program as fast and as space-efficient as possible, because the tricks to make those optimizations are often difficult to generalize to other problems and very time-consuming to learn. By the way, if you're in a tight time-crunch, I would recommend skimming hellointerview.com—it gives a shorter overview, but it only takes 2h to skim. I think Leetcode is one of those areas where being "fast" is better than being "good."

Now let's talk about AI. These days, companies expect you to use AI. There are even companies where, in order to get promoted, you are required to show that you use AI. Companies like the idea of hiring less junior roles if the existing workforce can be productive using AI, so I don't think this is going away anytime soon. That means it is worthwhile to spend some time getting familiar with using LLMs to help you work. Even if you prefer to do things yourself, there are ways to leverage AI that can make you more productive. At the simplest level, you can use it like a rubber duck or a critic—you write all of the code yourself, but AI gives you bullet points to help jog your mind and get the ideas flowing. At the other end, you have full agent flows that perform complex operations autonomously. The point is, there is a spectrum, and you should find your sweet spot.

Ultimately, sometimes the job market is just not fair. The most important part of your resume can be things like job experience at a well-known company, graduating from a big school, years of full-time experience, or relevant work experience. I'm not going to lie: some of these are chicken-and-egg problems, where to get something, you essentially need to have been born earlier. Oftentimes, getting the good stuff is a black-swan event that you just can't predict. So keep your head up, and keep going.

SaltOverflow

mathNEWS ARTICLE

for reading

aurelio

mathNEWS

HOW TO FLOURISH IN THE TECH CO-OP/INTERNSHIP FIELD

This article is for the first, second, third, or fourth-year student thinking to themselves, ‘where did I go wrong in my job search, and what do I do?’ Realistically, the earlier you are in your university career, the more beneficial this article will be to you, as new information and/or techniques are constantly available to be explored by you.

I will be helping you to understand the answer to this question: How do I break into the CS/Tech co-op/internship field?

IMPROVING THE RESUME

“The first step to finding a good internship is getting an interview. For better or worse, with software co-ops at Waterloo, this mostly comes down to your resume,” says the article, ‘*A Guide to UWaterloo CS/Software Engineering Co-ops*’ by Jeshan Shewakramani.

Not exciting news. Nonetheless, it is a fact that your resume can make or break your job search. The general resume advice stands:

- Keep your bullet points short and to the point.
- Explain what *you* specifically did, and the value of it.
- Add only meaningful statistics.

I personally have heard this time, and time again—and I am extremely grateful to everyone who has given me this great advice—and honestly, I am still continuously working on how I can improve this in my resume. But more times than not, I find myself asking, ‘so all I need to do is fix the bullet points I currently have on my resume, and I’ll be good for sure?’

Luckily, I had the privilege of interviewing Parsa Ahmadnezhad, an ambitious, tech focused, first-year UW Math student, to help answer my questions and enlighten my eyes on various issues about job searching. Although he has not had an official co-op term yet [Editor’s note: ???], he is on the move, and ahead of the game, seeking opportunities, and landing internships during school terms.

With the aim of learning how someone can improve their resume, we talked about how to build the necessary skills to put on your resume. Reflecting on my own experience, I always got stumped on the question: ‘*what do I put on my resume... I don’t have anything to put.*’ Everyone told me that I needed to have good formatting, and concise information, but I didn’t have the necessary information to put on it in the first place.

In my interview with Parsa, he said an eye-opening statement, “[You] don’t need to have an ego... just work... and get some skills.” This sounds contradictory right now, as this article is meant to help you get a job. But, when Parsa said this

statement, he was talking about doing **unpaid** internships, so that you have the necessary skills and experience to put on your resume. “Unpaid is totally fine; you get to build your resume and gain the skills you need,” says Parsa. It’s a hard pill to swallow, even for me, but he’s right. Experience is experience, and this experience will help you in the future. He [Parsa] managed to find an unpaid internship during his school term, so that when he starts applying for jobs, he has tangible experience to show for.

[Editor’s note: from an upper-year who has actually done internships, this is very bad advice. Please don’t do unpaid labour.]

The same article referenced from before, ‘*A Guide to UWaterloo CS/Software Engineering Co-ops*,’ talks similarly about gaining experience, in a different vein. It says, “to find jobs in different roles and at different companies, you need to jump out of your comfort zone and learn about new technologies and how they fit together with what you know.”

Another way to do this, is through hackathons. “Hackathons, hackathons, hackathons... Hackathons all the way,” says Parsa. These are a great way to challenge yourself and build something cool to add to your resume. School is hard, and it might seem daunting to take 72 hours “off,” but if you can participate in a hackathon, it would be extremely useful to boost your skills.

MARKETING YOURSELF

I also managed to talk with Parsa about reaching out to employers. He said that there’s a special, very important word, when it comes to contacting employers. “Something that is very important in finding a job is called **outreach**...” and when you show perseverance, “[employers] want to give you a chance.” He emphasizes that “It’s not about how good you are, it’s not about what you can do, it’s [about] who you know.” Outreach, networking, and putting yourself out there are things you never know how much it could impact your job search; until it does.



It might feel weird at first when marketing yourself, knowing that you don't fully meet the requirements, but research truthfully shows that "You do not need to match all of the requirements perfectly, internships are about learning, so employers will not expect you to know everything." (quote from the article, *'What I Learned From My First uWaterloo Co-op Term: Applying to Jobs and Preparing for Interviews'* by Derek Xu). There is no reason to be afraid, so reach out to people freely.

YOU GOT THIS

There's a lot we could go through, but I think these two ideas: Enhancing your resume through tangible experience, and outreach could drastically change the results of your job searching and help you break into the tech co-op field. Remember, be practical, and do things that will help your resume stand out. Market yourself constantly, and don't worry!

Maziko Kachika

CO-OP CULTURE

WARNING: CONTROVERSIAL

Co-op culture is toxic. There, I said it. Someone hurry up and burn me at the stake.

You're probably thinking right now, "*smallmouthbasshater*, you're just salty you didn't get a co-op this summer!!" I'm in regular. "Well then why do you care so much about co-op??" I go to a co-op-centric school, so even if I'm not in the co-op program I'm still surrounded by it. "So then why did you go to a co-op school??" I came here for math. Is that not enough?

Let me clarify, I like the idea of the co-op program, and I think it has many, many, benefits: it's a chance to make good money while going to school, you have the chance to slow down your studies and take your time, try out different jobs, and it gives you a chance to get some real-world hands on experience before entering the workforce. For careers that require skills you can't build in classes, this is really good!! So it's not necessarily the program I'm criticising, but the mindset and culture that comes along with it.

Now what is culture? The Merriam-Webster dictionary defines culture as: "the set of shared attitudes, values, goals, and practices that characterizes an institution, organization [or population]."¹ In terms of co-op, we view it as such: the set of shared attitudes, values, goals and practices, that characterizes the co-op program, and the students who both partake in it, or are thus closely related (go to a predominantly co-op school).

At Waterloo, and other institutions, the co-op program is at the forefront of our education and academic experience. Hence, for students, it defines our attitudes, values, goals and practices in our education. For example, when students meet other students, they ask the usual questions: what program are you in, what courses are you taking, et cetera et cetera. But

what sets us apart from non-co-op focused institutions and other programs are the follow-up questions: Are you in co-op? Is your next term a co-op term? Where was your last co-op?

When I tell people I'm in regular, the usual reaction is a look of mild confusion, a belittling stare and a, "how are you going to get a job after university if you're not in co-op?" for the cherry on top. This is the centre of my criticism: the refusal to accept another path of education as being as valid as the co-op program. We get so lost in the co-op search and forget there are more ways to become employed after university besides internships and work experiences: projects, networking, and a positive attitude. And so this leads into the attitudes, values, goals and practices upheld by the co-op program.

- The attitude: you can't get a job without extensive experience pre-graduation.
- The values: you're not working hard enough if you don't have extensive experience pre-graduation.
- The goals: to get the best co-op every work term, anything else is less.
- The practices: applying to as many jobs as possible, in hope you get something, and stressing about the "failure" of not getting one.

The academic institutions, particularly our own, only add flame to the fire. Of course they don't promote this mindset outright, but they implicitly push it onto students through the promotion of the program. In particular, the statistics they give on the success on their co-op program fuel the complex. Such as, "81% of [institution] co-op grads earn \$60,000+ two years after graduation compared to 44% of Ontario graduates."² The sentence "[institution] students get there faster" is quite interesting; this is in reference to co-op students specifically, and seems to exclude anyone in regular. It sort of implies anyone not in the co-op program is "behind." Just pointing a few things out.

I want to make it clear that the point of this article is not to bash on students in co-op. I love my peers in co-op, I think you're incredibly strong and admire your hard work, beyond what I can express. I just wanted to write about my thoughts on co-op culture because I think it can be extremely dangerous to others and to yourself. I have found myself sinking into this mindset before. But it's important, I think, at least. I want people to know that they aren't less than for not finding a job "relevant" to their field, or one at all. You're not behind your peers. You're not failing in life. It's ok. You have the rest of your life to work. Live the way you want to, not the way others tell you to.

smallmouthbasshater

1. <https://www.merriam-webster.com/dictionary/culture>

2. <https://uwaterloo.ca/future-students/co-op>



COOL CONCERTS YOU SHOULD COME TO

SOME OF THEM ARE THIS WEEKEND!

If you're reading this the day it comes out, then this weekend there at least 4 concerts run by music groups on campus, and you (yes, you in particular) should come to them. There are also another 2 next week in case you're reading this >1 day after it comes out. Here they are in chronological order:

WITH RESPECT TO TIME (ENGINEERING JAZZ BAND) — SATURDAY MARCH 28TH, 7:00 PM, SLC BOMBSHELTER

It's jazz! (Ya like jazz, right?)

CONRAD GREBEL JAZZ ENSEMBLE — SUNDAY MARCH 29TH, 2:00 PM, GREBEL ROOM 1111

It's more jazz! (For those of ya that *really* like jazz.)

ANIMUSIC ENSEMBLES — SUNDAY MARCH 29TH, 3:30 PM, EXP 1689

J-Pop, rock, orchestral, and perhaps *even more* jazz, all from the soundtracks of anime and video games (including Silhouette from *Naruto* and music from *Hollow Knight: Silksong*!)

INSTRUMENTAL CHAMBER ENSEMBLES — SUNDAY MARCH 29TH, 7:30 PM, GREBEL CHAPEL

Decidedly not jazz, but will nonetheless have stellar performances of classical and contemporary music by small groups of woodwinds, brass, and strings.

UW A CAPELLA CLUB — WEDNESDAY APRIL 1ST AND THURSDAY APRIL 2ND, 7:00 PM, HH HUMANITIES THEATER

They sing! (And they're really good at it, I know because I went last term.)

UW CONCERT BAND CLUB — SATURDAY APRIL 4TH, 2:00 PM, SLC BLACK AND GOLD ROOM

Features modern and classical music alike (including numbers from the musical *Chicago!*), performed by an ensemble of wind and brass instruments like the one your high school might have had.

yalevoylian

THE DARK SIDE OF THE MOON REVIEW

The ultimate concept album, and the best selling such album of all time, *The Dark Side of the Moon* by Pink Floyd is a blockbuster of the album era of music. It explores themes of mortality, mental illness, acceptance of death and the afterlife, materialism, greed, and the "othering" necessary for us to consent to war, and the crimes that ensue.

I had heard of this album in the past though never gave it a listen. Then I read a vignette concerning this album being the favourite of a certain founder. This, along with other past references to the album, broke the dam. I proceeded to listen to it in a complete sitting. As I was listening I was struck by two of the tracks, "Money," and "Us and Them." The latter in particular, certain sections of it, reminded me of the song "Wait" by the electronic rock band M83. After that sitting, certain powerful vocals from the album made an imprint in my memory. I located the vocals in "The Great Gig in the Sky." Then I read about that track, how the vocals were improvised by Clare Torry. This led me to read more about the concept behind the album and its making. With this knowledge in mind I listened to it again in a second sitting.

The album opens with a table of contents of sorts in "Speak to Me," a prelude to the music to come. The fast energetic tempo of "On the Run" really gets you in the mood for movement, the rat race of life we engage in. "The Great Gig in the Sky" opens with the so-called Mortality Sequence and then gives way to the haunting emotive vocals of Torry. The Mortality Sequence reminds me of the theme music to the Apple TV series "Severance." "Money" has been covered by many later artists. The

anti-war piece "Us and Them" is subtle about its theme, and certain recurring sections of it are memorable. "Brain Damage" deals with mental illness and concerns the band's former member and main songwriter Syd Barrett. After his departure Roger Waters became the band's chief lyricist, and in fact all the lyrics of the album are written by him.

After the second listen I came away much impressed by Torry's performance. But then the excellence of another song on the album kept gnawing at me, the melody of it on my mind. I located this in the track "Time," which I listened to as part of my third session of listening to the complete album. "Time" opens with the sound of clocks and then after some eh—time—turns into a masterpiece of sound and lyrical excellence. This song is sublime in many ways and begins the four song masterwork at the heart of *The Dark Side of the Moon*.

In this era of streaming music, albums aren't a thing anymore. The unbundling began with the transformation in how music was distributed, brought about by the internet, and has evolved from Napster, to peer-peer file sharing, paid song downloads with iTunes, and finally, the Spotify era of music distribution. As such, concept albums represent a glimpse at a past where artists were given license to express themselves in book length form, to expound at length on a topic. *The Dark Side of the Moon* represents the pinnacle of concept albums.

TLC

mathNEWS MINI #1

1	2	3	4	5
6				
7				
8				
9				

ACROSS

- 1. A type of operator algebra with an involution operation
- 6. Water Bottle Brand that became trendy in 2023
- 7. Bravery
- 8. Sea An_____
- 9. Modules are over these

DOWN

- 1. Along with 1 Across: Let A be an abstract function system. A _____ of A is a pair (B, φ) consisting of a unital C^* -algebra B such that $B = C^*(\varphi(A))$
- 2. A misspelled optimization prof's name, perhaps
- 3. Overwatch Reaper's organization
- 4. Come _____
- 5. _____ Maris, Romanian singer and actor

Fried Rice

WHAT'S IT LIKE BEING A LESBIAN QUEER ICON?

First, people know who you are. The number of people out in public who say hi to me, is... honestly not that many, but it's enough to instill fear into the heart of any shy fox girl. When someone talks to me in public, it can vary from genuine compliments, to unsolicited cat calling. The best of these cases was meeting my to be girlfriend on the go bus, and striking up a conversation over my fox ears ♥. This eventually led to me meeting her lovely girlfriends and calling them family — yes she has multiple girlfriends.

This brings me to the second rule of being a queer icon. People will hit on you, whether it be women at a gay bar telling you how submissive and breedable they are, or people yearning to be your girlfriend. This directness although possibly shocking to you, is comforting and so simple. On the other hand there's the comments with a less clear intent, where you can't quite tell if it's flirting or just a compliment.

Overall, it's an adventure ✨. It's strange and exciting, shocking and terrifying, and when I'm at home, with everything quieted down, I go online. I join a video call with my partners and friends: my family. These are the moments when I don't need to worry about perceptions; when I don't need to worry what people think; when I can be myself, for the people I love.

thatfoxfordgirl

SPRING IS HERE!

It's the perfect time to go outside and touch some grass.

Waterloo Park is really nice. Climb some rocks, go for a walk, study outside? Idk, what do people do outside?

smanor

OBSESSIVE COMPULSIVE

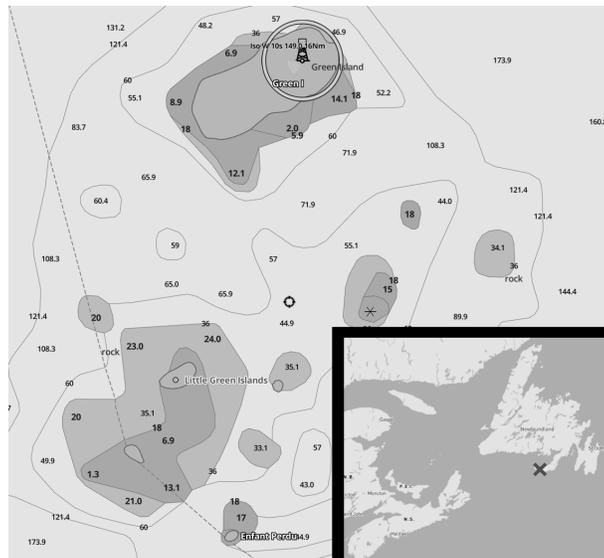
When snow melts, it takes the winter quiet with it. You can hear it in the ION crossing bell, like hammering copper underwater, urging the world back to spring. Well I'm dragging my feet, I can't feel them. My shoes weren't cheap but they sure do soak up puddles. They don't make anything like they used to. But it's okay, summer's gotta be better. A while ago I asked a friend, "How do I know the brightness at the end of the tunnel isn't just headlights?" He didn't bite, didn't take the question. I've been carrying that dead fish around in my stomach ever since. That cold, sick rush towards certain doom. Everyone is so patient when they tell me to take the wheel. Hey, do they know that a car is a hurtling block of metal with a bomb in it? That shrapnel can be a chip of enamel. I clenched my jaw so hard I cracked my tooth

and then I just looked at the yellow piece of shit. My dad called me his son the other day, but that could've just been the beer talking. When we got to the place I stumbled out of the car into the night, turned around to wave bye to blinding LEDs. Hey, do you know that walking through your door is a quantum gamble every time? What will I do if the state settles the wrong way? You're a real roller coaster, my Schrödinger's lover, and I'm a real madman looking for signs, oil pressure in my ears going overdrive. The light looks on in your room, can I believe in that? Well, I'm turning the handle regardless. Here it comes.

mobpsychofan

N ISLAND FACTS — THE GREEN ISLANDS

Once again this is more of a group of islands than a singular island, but given that they're not even unique enough to get their own names, I think it makes sense to lump them together. I present to you, the Green Islands:



- A group of small Canadian islands located just south of Newfoundland, right in between Canada and the French islands of Saint Pierre and Miquellon (roughly 1,945 kilometers east of **mathNEWS**)
- Despite the name, satellite imagery shows them as either very brown (in the case of the Northern Green Island) or very underwater (in the case of the Southern Little Green Islands)
- For those who don't know, Saint Pierre and Miquellon (which deserves an article of its own) is a small French island right off Newfoundland. It's not French-Canadian, just fully French. In fact, because of the way France manages its territories, it's arguably just as french as Paris, and it's a full EU member. Since it's so close to Canada we have a maritime border with it, and the Green Islands happen to be right on top of it (it's that dotted line starting in the upper left of the image)
- Two of the Little Green islands actually lie on the border, which means that (at low tide) Canada shares a land border with France! That makes our recently acquired Hans Island border with Denmark not our first but our second border with Europe. Maybe they'll let us into the EU now! (technically maritime borders are a bit different from full fledged land borders, so legally speaking this isn't a real border :())
- All the islands are low lying rocks, with the largest being the only one with vegetation. The smaller ones are either partially or fully underwater at high tide
- Ownership of the islands was up in the air between France and Canada for a long time, neither country

really cared about them. They were recognized as Canadian after we built a lighthouse in 1908. The current lighthouse was built in 1993 and is kept manned to maintain sovereignty

That's all on this island, let me know if you have an island you want me to cover (fatcullen2@gmail.com).

FATCullen

N MEMENTOS I WILL BE BRINGING WITH ME FROM WATERLOO

THESE ARE ALL DEEPLY MEANINGFUL TO ME

- A cactus silk scarf
- A piece of quartz
- A bottle opener
- A bottle cap
- A crocheted bee
- A crocheted snake
- A painting of a galaxy
- Several coffee stained letters
- Several coffee stained photobooth pictures
- A glowstick wand
- About 7 band t-shirts
- A jar of rocks
- An empty absinthe bottle
- A set of mining ID tags
- A squash ball
- A mechanical pencil
- A cardboard panda
- 25 campus food services carabiners
- An arts faculty banner
- A Scottish flag

It's kinda weird how my entire life during undergrad could be described by giving context on all the random things I've collected.

Shahabee

PIZZA

I want pizza. I wish my final **mathNEWS** article was better.

QUAAAAAAAAAACK

mathNEWS

FOUR YEARS

MY FINAL ARTICLE.

Four years. Forty-two classes, and a half. Fourteen PMATH, twelve PHYS, seven MATH, three AMATH, two and a half CS, two STAT. And two communications courses I'd rather forget.

For me, university has always been about the classes. A convenient place to learn, coupled with extra motivation to engage with the material. Professors I can ask for help when I get confused. A chance to find out what I don't know that I don't know. And free access to papers, when I can find the time to read them.

I've never wanted a social life. Never looked for extracurricular activities, beyond **mathNEWS**. Never really left campus. I'm happy as I am; why look for anything else?

And now it's time to say goodbye.

I'm satisfied with how I spent my last four years, but I don't feel I'm *done*. I want to learn things I still don't know, like quantum field theory. Learn things no one yet knows—that's research! And pave the path to the things I enjoy, so others can follow more easily. I know not what may come, but I know what goals will guide me.

The future awaits.

finegeometer

DID YOU KNOW

that everything in the world is more complicated than you think it is at first glance

including this statement

normalparameters

inspired by me learning a fair amount about the alcohol and gaming commission of ontario registrar's standards for internet gaming. it's complicated! (this is my new catchphrase. it's all complicated)

I'M SORRY I DIDN'T COME TO CLASS

I'm sorry I didn't come to class, I like your lectures, but I never wake up on time. I'm sorry I've missed the last eight.

I loved your juggling.

231 skipper

A GENOCIDE IN NORTH AMERICA BUT WE'RE NOT A BIG DEMOGRAPHIC SO IT DOESN'T MATTER TO ANYONE IMPORTANT

People who "look trans" are now being targeted by ICE. Kansas has forced every trans person to turn in their drivers license and taken away their voting rights. Protections for trans people in prisons have vanished as they are forced into detransitioning and sexual slavery. 700+ bills to affect trans rights are being considered in the US right now, coinciding with hundreds already passed. Many are being considered, and many have passed in Canada too. This has been a genocide happening for ages, but we're not important enough to save in the eyes of the center and center-left, and too lucrative as a scapegoat to spare by the right. No one in the establishment will care enough to actively fight for us. We have to fight back in whatever way we can.

There's a quote by activist Dan Savage about his experience during the worst parts of the AIDS crisis that I feel holds strong now:

"We buried our friends in the morning, we protested in the afternoon, and we danced all night. The dance kept us in the fight because it was the dance we were fighting for."

Hold every inch you can to protect our rights. But take every opportunity you are given to live because those opportunities are what they are trying to take away from you. They win if you can't enjoy yourself.

Death Before Detransition. But you have to live. They cannot win.

Live out of spite if you have to. You have to.

fingersinsockets

SERIES MONSTER

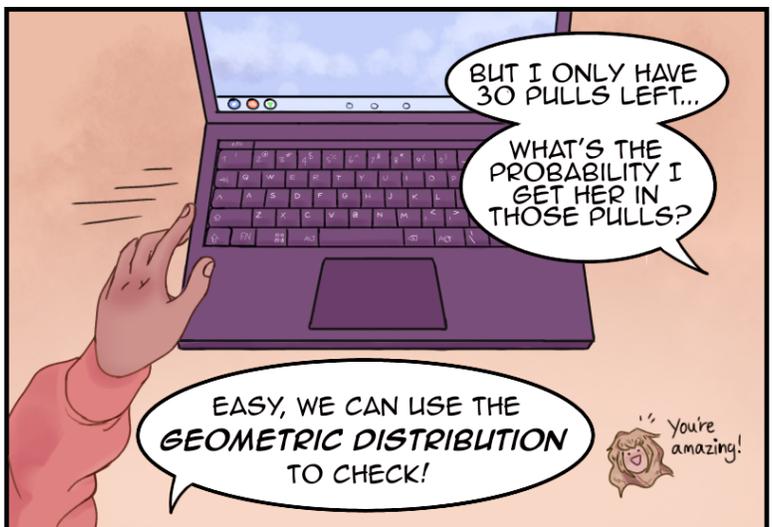
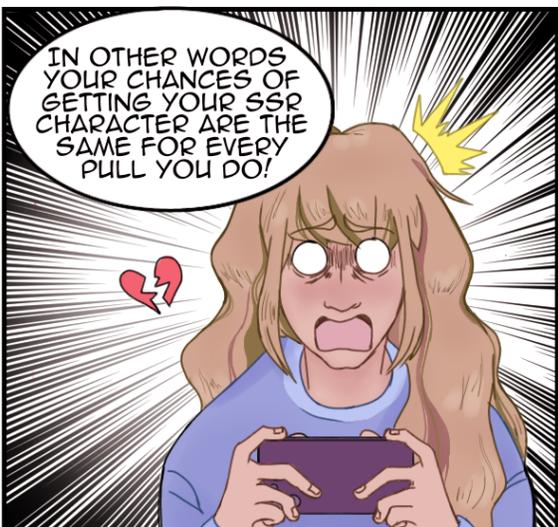
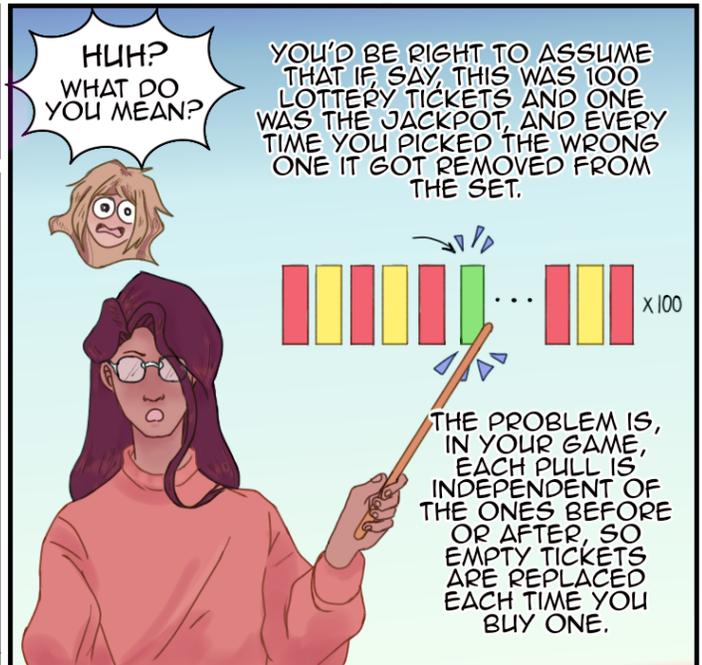
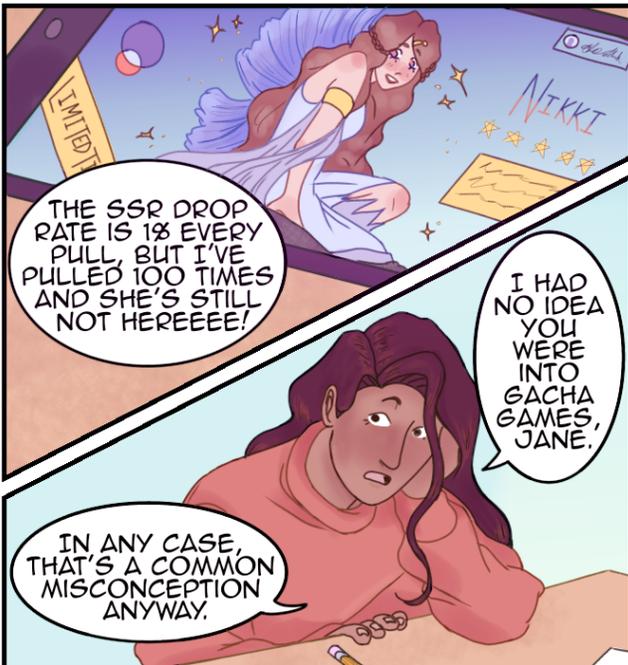
MATH 138/148 STUDENTS BEWARE

$$\sum_{n=0}^{\infty} a_n$$

smallmouthbasshater

STAT 230: GEOMETRIC DISTRIBUTION

STORY BY ELISA LIANG | ART BY KIERA M.



YOUR CHANCE OF SUCCESS IS 0.01, WHICH MEANS YOUR CHANCE OF FAILURE IS 0.99...

YOU HAVE 30 PULLS LEFT, SO ONE OF THOSE HAS TO BE THE SUCCESS EVENT AND THE REST FAILURES...

THERE ARE DIFFERENT FORMULAS WE USE WHEN WE WANT TO FIND DIFFERENT PROBABILITIES.

FOR EXAMPLE, FINDING THE EXPECTED NUMBER OF PULLS BEFORE SUCCESS IS DIFFERENT FROM FINDING THE PROBABILITY OF SUCCESS, WHICH IS WHAT YOU WANT.

THERE ARE A FEW MORE FORMULAS FOR GEOMETRIC, BUT WE'LL USE THE CDF FUNCTION.

$X \sim \text{Geo}(p)$

EXPECTATION (MEAN) \neq CUMULATIVE DISTRIBUTION FUNCTION (CDF)

$E[X] = \frac{1-p}{p}$ $P(X \leq x) = 1 - (1-p)^{x+1}$

WHAT'S CDF?

STANDS FOR "CUMULATIVE DISTRIBUTION FUNCTION."

IT GIVES THE PROBABILITY THAT A VARIABLE X WILL BE LESS THAN OR EQUAL TO SOME VALUE x .

I see!

FOR THE GEOMETRIC DISTRIBUTION, X IS THE NUMBER OF FAILURES BEFORE YOUR FIRST SUCCESS.

IF YOU WANT YOUR SSR IN 30 PULLS THEN $x = 29$ IN THE CDF FORMULA.

Will Jane get her SSR?
 $P(x \leq 29) = 1 - (1 - 0.01)^{30}$
 $= 1 - I$

Will Jane get her SSR?
 $P(x \leq 29) = 1 - (1 - 0.01)^{30} I$

WHY MINUS 1?

WELL, THE OPPOSITE OF GETTING AT LEAST ONE IS 0, RIGHT? SO YOUR SUCCESS RATE PLUS YOUR FAILURE RATE EQUALS 1!

(1 - 0.01) IS JUST YOUR FAILURE RATE, MULTIPLIED FOR 30 PULLS.

PUTTING EVERYTHING TOGETHER, YOUR CHANCES ARE...

268?
BUT I'M BROKE...

THE PERSON YOU BECOME

It is said that we are each of us an aggregation of the n people we care for the most.

~

“ This is my 100th **mathNEWS** article and whether this goes through or not, it shall be my last.

Deriving For Dick
LE MORT D'UN AUTEUR
mathNEWS 149.6

“ It feels very strange knowing that this is the last time I'll ever edit **mathNEWS**.

terrifiED
mastHEAD
mathNEWS 150.6

“ I think if I could go back and tell myself one thing back then at that first production night, it would be “you're going to be OK.”

god ⚡ peED
OK
mathNEWS 151.6

“ I am comforted in this last act of reminiscence, in knowing that my involvement in **mathNEWS** has given me so many friends which I treasure and memories which I will always look back on fondly.

clarifiED
CLARIFIED, REMINISCING
mathNEWS 151.6

“ I'll forever be thankful for that and to those that contributed to it.

boldblazer
REFLECTIONS, SURVIVING, AND THANKS
mathNEWS 151.6

“ What I can say is that I love what **mathNEWS** was at one specific moment. At that time, it completely changed my life.

cy
mathNEWS
mathNEWS 152.6

“ Most notably, I've spread my obsession with plane crashes.

lwo
CYA
mathNEWS 152.6

“ Let's not make this a big deal. 106 articles and goodbye everyone.

A cool pen name
MY LAST EVER mathNEWS SUBMISSION
mathNEWS 152.6

“ If only forever was a little longer.

Golden
UNSPOKEN WORDS
mathNEWS 152.6

“ But probably what mattered most was that I could help others who feel the way I used to. I wish I had done more of that (I probably should have done more of that) but I'm happy with what I was able to do.

cutlet
THANK YOU
mathNEWS 154.6

“ It's one of the most annoying and fun and frustrating and wonderful jobs I've ever had, and I'm glad I started when I did.

jeff
PUSH ME
mathNEWS 154.6

“ That's all, I think.

tendstofortytwo
N TENDSTOFORTYTWO N THINGS ARTICLES
mathNEWS 154.6

“ Thank you to Vincent.

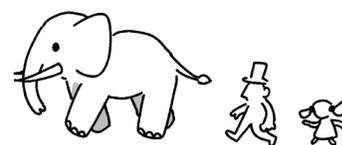
“ To Vincent, for showing me the power that my actions have, and that situations were rarely as complicated as they seemed.

“ So thanks, Vincent, for pushing me into doing things.

distractED, evaluatED, caffeinatED
mathNEWS 154.6

“ Thank you to all of the **mathNEWS** team, whether you be artists, writers, editors, etc.

PlatypusGod
GOODBYE
mathNEWS 155.6



“ had fun :D thank you for everything

skit
N THINGS THAT HAPPENED TO ME DURING MY
TENURE AT mathNEWS
mathNEWS 155.6

“ I love you reading this. Whether it's me 30 seconds from now editing, or in two years reminiscing, and especially if it's someone else.

rockfacts
THE REAL WINGS WERE INSIDE US ALL ALONG
mathNEWS 155.6

“ Make time for art. Even if you don't have the time.

Not a N*rd
MAKE TIME FOR ART
mathNEWS 157.6

“ Ask me for your story sometime.

__init__
REVIEWING N ROOMS ON CAMPUS
mathNEWS 157.6

“ It was a success and you all helped put the fun in funeral.

insert pen name here
MC/DC BRIDGE FUNERAL POST-MORTEM
mathNEWS 157.6

“ please try new things and meet cool people

glubbo
GLUBBO SAYS GOODBYE
mathNEWS 157.6

“ Remember, you don't stop being friends just because you haven't seen each other in a while.

Glec
SETTING DOWN MY LIFE'S WORK
mathNEWS 157.6

“ Try to make your pieces of sausage roughly the same size as your gnocchi.

yummyPi
SAUSAGE, BROCCOLI AND GNOCCHI RECIPE
mathNEWS 157.6

“ Thank you, Waterloo Math, for changing my life.

disgracED
TOURING THE MC THIRD FLOOR
mathNEWS 158.6

You cannot stay in Waterloo. Waterloo will not be the same Waterloo. You will not be the same you. Time beckons, the gulls call, and you must answer. The only alternative is to rest in a place you forever age further from.

I'm happy with the time I've been given here. I've learned. Learned from the people who once surrounded me. I've learned how to take people in, how to hug a person like a lifeline, how to wave like someone is all the world and stars, and how to *do*, all from the people here. I've learned how to stand tall.

What of this Goosesune Miku-covered journal? There are few things more amazing. Writers are promised pizza for words. Any will do. A single character is equivalent to a Pulitzer Prize. There's no extra reward for trying.

People try anyways. Give your friends a canvas, and they will give you art. With the promise of love and zero judgement, they will pour out their soul.

I am so very proud of this. You are all *so* exceptional. Editors. Writers. Readers. I will not say you deserve all the love in the world; all the love in the world could never be close to what you are owed.

But there's no harm in trying.

The best hidden study spot on campus is the Religious Studies Reading Room in the basement of PAS. No one is ever there. You're welcome.

Thank you, for the person I've become.

molasses

SAD IT'S OVER? SUBSCRIBE TODAY!

YOUR NAME

MAILING ADDRESS

W S F 20 W S F 20 W S F 20

TERMS

Canada	\$7.50 per term, \$20 per year
United States	\$10.00 per term, \$25 per year
Overseas	\$15.00 per term, \$35 per year

THE TRIVIARY

gridCOMMENT 160.6

good afternoon gridWORDers,

last issue of the term... time really flies when you're doing the gridWORD. good luck on your finals, and if you're graduating, good luck on your future endeavours.

onto the gridWORD. anyone who knows anything about gridWORDS knows what a crossword is. anyone who knows anything about crosswords knows who paolo pasco is. anyone who knows anything about paolo pasco knows he recently won jeopardy! tournament of champions. this win was, in part, supported by his partner, toronto-based game designer franci dimitrovska, who created a jeopardy! data-based study site called "The Triviary" (thetriviary dot com), which has recently been reigniting my love for birds and sporcle quizzes. this was MY 2016 throwback of 2026

the website features a few other daily trivia-y game sites, and anyone who knows anything about me knows that that kind of stuff is my bread and butter—I love me some good daily puzzles and trivia. i've been wanting to do a gridWORD about them for a little while now, but i didn't have enough trivia-specific non-crossword un-paywalled games. thanks to the triviary, i do now! i highly recommend checking out these games, as well as the triviary itself.

last time, i asked you all: what is one course here at uw you would recommend for everyone to take and why? and you all said:

- *rutabaga413*: ive been having a ton of fun with music390, orchestration and arranging! the classmates really make it special but it's also just a fun birdy course if you are into that kind of stuff
- *thirdoffive*: it's gotta be co 439! (not factorial) an absolute gem of a course taught by oliver pechenik. you get to do algebraic geometry but by drawing fun pictures of curves and graphs and diagrams of pipes—wild stuff
- *aurelio*: ENV5 200 (field ecology) because you get to go outside and identify birds and trees and lichen so it's a literal bird course :)

i love music, algebraic geometry, AND birds!! these things are all in my list of top 10 things of all time, you guys all read my mind so well. i think today's prize will go towards *aurelio*, for encouraging the grass-touching i think all mathies need to be doing. also, this issue's gridWORD's theme is bird-adjacent, which is just an insane coincidence. please pick up your prize at mc 3030!!!! there will be no gridQUESTION for this issue, as it is the last one of the term. however, if you still want to send me fanmail, i will gladly accept suggestions for other daily un-paywalled games i can partake in during my daily 3 h commute. thanks everyone for playing and i hope to see you all next term :DDD

this isn't goodbye,

spaghettihalers

ACROSS

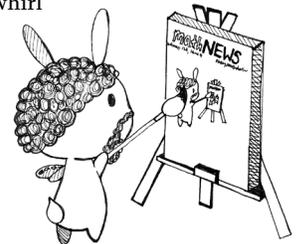
1. Video game pioneer
6. Novelist Jong
11. 100 lbs.
14. Belfast's river
15. Stylist's spot
16. Partner of ooh
17. Nested clue puzzle game*
19. Connect
20. Broadcast
21. Consume
22. Rubs out
23. Sandwich shop
25. To the point
27. Faux ____
30. Light air
32. Insanity
33. Thrust
36. Indian honorific
39. "Right on!"
40. Divination deck
42. Part of q.v.
43. Steps in origami
45. Toppled
47. Swag
49. Dry
50. Beetle juice?
51. One who leads a Spartan lifestyle
54. Prima donna
56. Physics Nobelists Niels
57. Mafia

59. Dental anchor
63. "Roses ____ red ..."
64. Cheater
66. Shamus
67. Of an arm bone
68. Trim
69. Forest denizen
70. Manage to make it
71. Written assignment, often

DOWN

1. Priestly garbs
2. Fruity pastry
3. Lab gel
4. Competed on a track
5. Old school desk accessory you might dip a feather in
6. D.C. setting
7. Marathon, for one
8. Pelvic artery
9. Natural fibre
10. At all
11. Wikipedia guessing game*
12. Homeless children
13. The ones here
18. Beat the draft?
22. 6 x 9-inch book size
24. Trojan War epic
26. Top-ranked university in ASEAN
27. "La Vie en Rose" singer

28. Bullets, e.g.
29. Orthography game by TED Conferences*
31. Convex moldings.
34. Disassembler
35. Acknowledged
37. Light bulb, maybe
38. Resting places
41. Trivia game by Geeks Who Drink*
44. Drunkard
46. Backwards
48. Timeline challenge game*
51. Wane
52. The New Yorker cartoonist Edward
53. Matter
55. Asian caregivers
58. Talk too much
60. Terminal info
61. ____ Scotia
62. Viral point guard
64. Summer mo.
65. Give it a whirl



1	2	3	4	5		6	7	8	9	10		11	12	13
14						15						16		
17					18							19		
20							21				22			
			23			24		25		26				
27	28	29		30			31		32					
33			34					35		36			37	38
39					40				41		42			
43				44		45				46				
		47			48		49					50		
51	52					53		54			55			
56					57		58		59			60	61	62
63				64				65						
66				67						68				
69				70						71				

Drop your gridWORD solutions off at MC 3030, or over email to mathnews@gmail.com. Correctness optional.

