# mathNEWS

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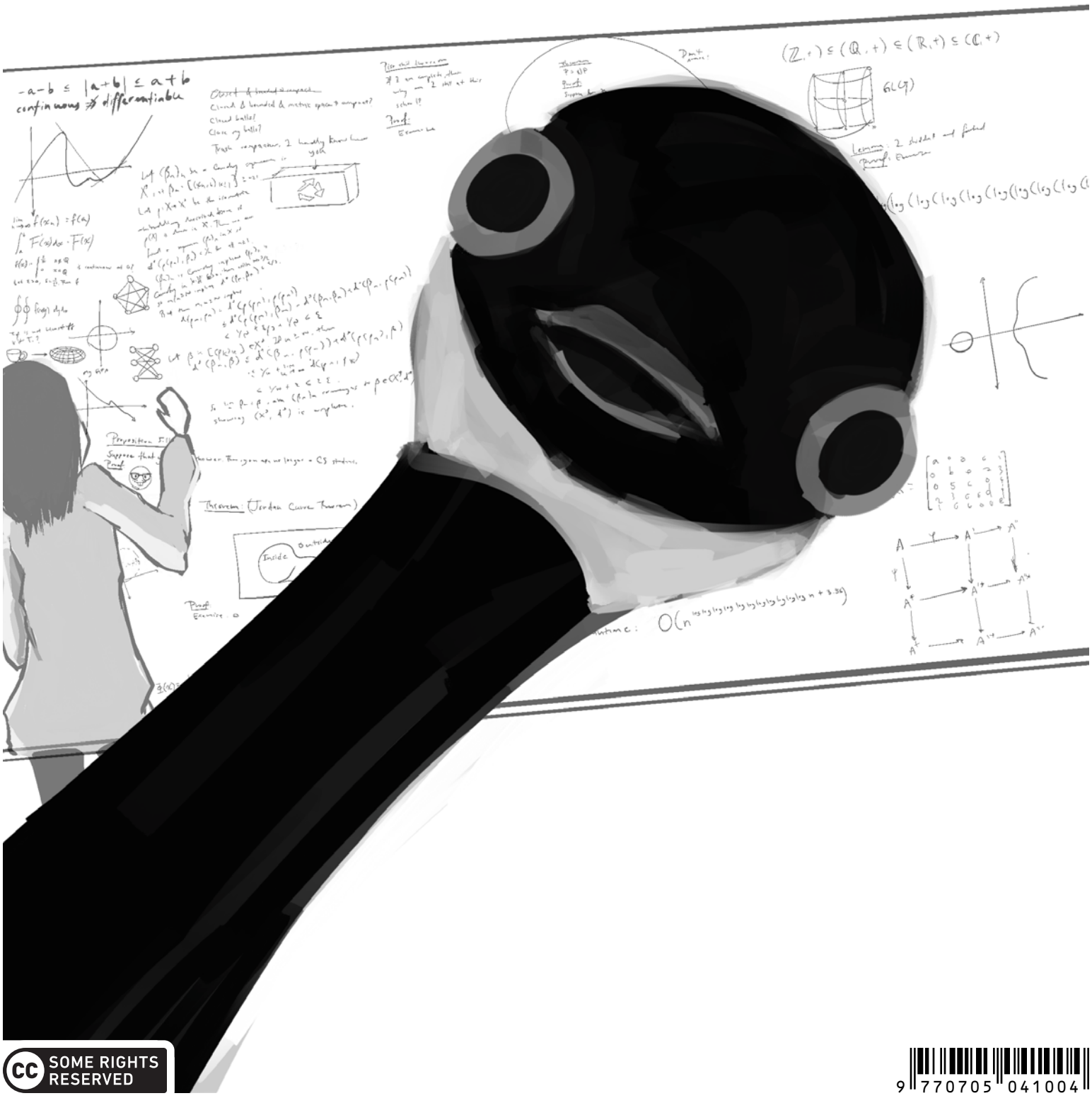



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# mastHEAD

## "WHAT'S YOUR FAVOURITE ROOM ON CAMPUS?"

Hi everybody, if you're an old **mathNEWS** reader, you're already used to the half-century-old tradition where a new term results in a new **mathNEWS** issue. If you're a new reader, welcome! Here is where the writing happens: it's not much math and, somehow, even less news.

This term, there's also a new editor around: me! It was nice seeing and meeting so many of you ~~pizza enjoyers~~ writers, and for the rest of you, nice to meet you, I'm classifiED :)

Now, turning your attention to the big question in the ~~room~~ page, I used to love the cursed rooms in the 7th floor of MC, but lately, the **mathNEWS** office is starting to rise up on the list as my number one room on campus. It definitely has no connection with the fact that I spent the last few days ~~hostage~~ helping with the making of this brand-new issue that you have in your hands or screen or whatever, you get the idea.

It certainly is a comfortable space. Who needs a window or fresh air when you can breathe in all of **mathNEWS**' history in one place? The chairs are not bad either, and there's even a sofa to cry on while my CS asignment keeps giving me weird import errors. What's that about, by the way?

As I am just at the start of my years at this university, there will still be more time to get used to this new place (a.k.a. my new home) and eventually start haunting it as a ghost; after all, editorship is forever.

Feel free to explore this issue, filled with controversy and drama after our first prod night in a non-math building. The cope is real.

*classifiED*
*Editor,* **mathNEWS**

| | |
|---|---|
| YALEVOYLIAN | PHY 313 |
| __INIT__ | M3 1006 |
| SOMEBODY | The external face on the graph of rooms (outside) |
| HYPERLYNX | MC 7044 — it's very *[REDACTED]* and always has *[REDACTED]* whenever I need to *[REDACTED]* |
| DEFINITELY NOT STATS CLUB EXEC | M3 1004 |
| LARS NOOTBAAR | The 4th floor of EV1 |
| WINK WONK | my bedroom |
| PREDAP | Anywhere that feels like nobody's been there for days |
| XX_420SONICFAN69_XX | The MC to C2 bridge (jk it doesn't exist) |
| DICK SMITHERS | MC 2nd floor toilets when I need to shit in peace. I have literally never seen another soul there. |
| ANDOIII | Definitely gotta be MC 807 or MC -1 |
| ALYSSNYA | the twin single stall basement bathrooms in e3 with the needle disposals and plyboard separating the two of them |
| YUMMYPI | PAC Pool Viewing Gallery |
| ħ | MC 5th floor kitchen |
| ROCKFACTS | ESS Student Lounge |
| TERMINAL | the one in MC where i live |
| MOLASSES | math CnD (cozy and delightful) |
| 0.423 | I'm gonna do something commonly known as gatekeeping |
| NUT | B1 271 |
| APHF | Mine tunnel reminds me of my youth spent mining coal |
| SHAHABEE | That one tiny room on MC 4th floor (4044) |
| JEFF | The little-known mossy, cobweb-filled stairwell leading to a locked door behind the dumpsters next to MC |
| 20041972 | my room . |
| SEXY_SOFTWARE_BABE | I'd say my dorm room, but the lock is broken, so I guess STC 1012 |
| WHOLE NUMBER HAVER | mine :) |
| TENDSTOFORTYTWO | SLC dining area. Okay, hear me out. It sucks when it's full, but go there at like 8 AM on a Sunday… it's empty… it's beautiful… |
| BOLDBLAZER | Glow Centre |
| BEYOND META | The mine tunnel. I love scaring the bejeebus out of people |
| CUTLET | MC Comfy (pre-COVID) |

## ARTICLE OF THE ISSUE

Our first AOTI of the term goes to Pizzeudonym for *A New Term, Old Shenanigans — A New Home, A Long-Awaited Pizza*! Congratulations; the entire editorship found your article to be… hmm, an experience. Come to MC 3030 for your prize!

*distractED*
*Editor,* **mathNEWS**

## Insert mathNEWS writer tears here.

ISABELA SOUZA, mathNEWS EDITOR FOR FALL 2023
ALONG WITH EVAN GIRARDIN, DANIEL MATLIN, AWAB QURESHI, AND NAMAN SOOD

# mathASKS 153.1

*FEATURING PROFESSOR RUXANDRA MORARU*

**H: HOW ARE YOU DOING? WHAT ARE YOU UP TO?**

I'm very well, thanks! I just submitted a paper so I feel pretty good about that. It's easier to start projects than to finish them. So, it's always nice when one wraps up.

**TENDSTOFORTYTWO: DO YOU HAVE ANY FUNNY STORIES FROM YOUR TIME AT CONFERENCES OR WHILE COLLABORATING WITH OTHER PROFESSORS?**

Nothing comes to mind now, but Prof. Charbonneau always makes me laugh 😊

**BOLDBLAZER: WHAT DO YOU CONSIDER TO BE THE BEST TOPIC YOU GET TO TEACH?**

I love teaching complex analysis! And of course, any geometry course, particularly, complex geometry or gauge theory (which is the study of vector bundles).

**WINK WONK: WHAT IS SOME COOL MATHEMATICAL QUESTION THAT YOU WOULD LIKE TO SEE SOLVED?**

The Hodge conjecture.

**HOTFEMOID: BARBIE OR OPPENHEIMER?**

Hmmm, good question! It was such a busy summer that I haven't had the chance to see either of them. I'm a big fan of Greta Gerwig's and want to see Barbie. But I suspect it will end up being Oppenheimer…

**LWO: WHAT'S THE USE FOR WHITEBOARDS?**

What else should they be used for?

**QUANTUM GOOSE: WHAT IS COMPLEX GEOMETRY AND HOW DOES IT RELATE TO PHYSICS?**

Complex geometry studies the properties of space using the complex numbers and complex analysis. In physics, complex geometry provides the right framework to describe certain objects (such as elementary particles) or phenomena.

**OLEOEOLO: DO YOU FIND COMPUTERS HELPFUL IN YOUR RESEARCH? IF NOT, DO YOU THINK THERE WILL BE A TIME IN THE FUTURE WHEN THEY WILL BE?**

I use computers to research notes, papers and books, videos of talks, and of course to typeset my own course material and papers. In that sense, they are extremely useful for my research. There is such a wealth of knowledge available online. I, however, do not use them for computational purposes because my work is very theoretical and the examples I use can be described in closed form. But it is certainly conceivable that I'll end up using algorithms to approximate solutions to some problems in the future.

**ANTITHETICAL GRAPH THEORIST: WHAT'S YOUR FAVOURITE GRAPH?**

Cartesian graphs 😊

**FRUIT SALAD (YUMMY YUMMY): WHAT WOULD YOU SUGGEST FIRST YEAR STUDENTS WITH A REAL INTEREST IN PMATH TOPICS DO TO SET THEMSELVES UP FOR PMATH-PSUCCESS?**

Take the theoretical versions of first-year courses as much as you can and properly learn how to prove things rigorously.

**TENDSTOFORTYTWO: WHAT WAS IT LIKE HAVING mathNEWS EDITOR EVALUATED AND ASK YOU FOR A mathASKS SPOT? I'VE ALWAYS WONDERED HOW THIS LOOKS FROM THE PROFS' END.**

I was very flattered to be asked! And I appreciate everyone taking the time to write questions.

**FRUIT SALAD (YUMMY YUMMY): HOW WOULD YOU DESCRIBE WHAT A CO-HIGGS BUNDLE IS IN LAYMAN'S TERMS?**

You can think of co-Higgs bundles as being the dual objects of Higgs bundles (by *dual*, think of something like the dual space of a vector space). Moreover, Higgs bundles are a special class of solutions of the Yang-Mills equations. As for the Yang-Mills equations, they are a generalization of Maxwell's equations and correspond to the equations of motion of certain elementary particles.

**PREDAP: WHAT'S YOUR FAVOURITE SPOT ON CAMPUS?**

Ha! Believe it or not, MC! I quite like a good brutalist building and have grown very fond of it over the years. Having said that, I really like to spend time in the Environment 3 building.

**MOLASSES: WHAT HAS HELPED YOU TO UNDERSTAND MATH AND PHYSICS AT THE LEVEL REQUIRED TO BE A PROF? ANY STUDY TIPS?**

What really helped me was always trying to prove theorems and working out examples by myself before reading the proofs and solutions in books. I wasn't always able to do it, but it nonetheless helped prepare for research since a lot of the time there is no paper or book you can directly refer to.

**ꓷ: WHAT IS YOUR STANCE ON THE EXISTENCE OR NONEXISTENCE OF EXOTIC 4-SPHERES?**

No stance, I'm afraid, as I am not an expert on the topic. Prof. Park is the person to ask!

**JEFF: WHAT'S YOUR FAVORITE BATHROOM ON CAMPUS?**

The one closest to me?

**QUAAAAAACK: WHAT ACTUALLY DIVIDES PURE AND APPLIED MATH?**

Applied math uses theory to solve concrete problems that typically originate from other areas of science, industry or finance.

**QUAAAAAACK: WHAT IS YOUR FAVORITE DOMESTIC MALLARD BREED?**

The cayuga duck.

**A REALLY COOL SCIENCE STUDENT: WHAT DO YOU THINK IS THE MOST USEFUL OVERLAP BETWEEN PURE MATH AND PHYSICS FOR ME TO LEARN AS A MATHPHYS STUDENT? THE MOST INTERESTING?**

You need quite a bit of pure math in mathematical physics. Aside from real and complex analysis, you need to know some (Lie) group theory because symmetries of objects form groups. You also need some representation theory and some operator theory. Finally, geometry and algebraic topology are very useful and interesting! As an undergraduate, the two courses that blew my mind were complex analysis and algebraic topology.

**BOLDBLAZER: WHAT'S YOUR OPINION ON PINEAPPLE ON PIZZA, CILANTRO, AND ROOT BEER?**

I'm not a fan of pineapple on pizza, but absolutely love cilantro! *[Editor's note: 😔 ]* I occasionally enjoy a very cold root beer.

**GOLDEN: HI RUXANDRA! YOU'RE BELOVED BY UNDERGRADS, IN LARGE PART BECAUSE YOU'RE SUCH A GOOD LECTURER. WHAT TEACHING ADVICE DO YOU HAVE FOR EDUCATORS?**

Thank you so much for saying that 😊 It means a lot! My teaching advice is to just be yourselves. Develop your own style of teaching. At first, you may want to get inspired by some of the lecturers and speakers you really like. Try to figure out what is it about their style of teaching/speaking that appeals to you. With experience you will develop your own way of doing things. Also, always ask students questions to see how they are thinking about the material you are teaching. It will help you explain things more clearly and ultimately also help you understand the material better. And finally, have fun! The reason we are mathematicians is because we enjoy thinking about math. So always try to convey why the material you are presenting is interesting.

**GOLDEN: HOW MUCH PHYSICS DO YOU NEED TO KNOW TO WORK IN AREAS WITH APPLICATIONS TO PHYSICS?**

Not a lot if you focus on the mathematics. In fact, several of the mathematical objects I study originated in physics, but I only study their mathematical properties. When I collaborate with theoretical physicists, I help determine whether some of the things they are observing when developing their mathematical models always hold. I also help them find examples. I, however, can't really say that I understand the physics they are modelling.

**GOLDEN: DOES COMPLEX GEOMETRY "FEEL" LIKE DIFFERENTIAL GEOMETRY, OR IS THERE A PHILOSOPHICAL DIFFERENCE?**

The biggest difference is that in complex geometry one usually works with holomorphic (that is, complex analytic) objects, which are described in terms holomorphic maps. And holomorphic maps are more rigid than smooth ones. This means that there are usually fewer options over the complex numbers so that there is better chance of being able to completely solve a problem (even if just theoretically).

# N INTERESTING THINGS I'VE DONE AS A MATH AMBASSADOR

- Convinced an incoming student to choose double degree instead of single degree CS[1]
- Toured a group of *1973* alumni around the math buildings.
- Met the man who brought the first delivery of donuts to Math CnD
- Went to Toronto for several days to represent the university at the Ontario Universities Fair[2]
- Talked to someone who had the opportunity to learn from William Tutte
- Saw inside of the computer science museum in DC.[3]
- Got $n \in \{2, 3, 4\}$ free lunches and dinners a term, often just for watching a 30 minute presentation
- Learned numerous stories about the history of MC
- Tried to convince a tour visitor's father why Waterloo would better fit his son's goals than UofT
- Toured wealthy alumni around the math buildings. In retrospect, given the potential alumni donation amounts on the line, I'm not sure why they entrusted that responsibility to a random student. I really could have said anything

*molasses*

1. She will never recover from this
2. I lied. This hasn't happened yet, but hopefully will in October!
3. This isn't just the display cases in the hallways. There's an entire museum room full of old computers right beside Turnkey. I've never again seen it open though aside from that day though, which is a shame. I think there's a sizeable chunk of students who would enjoy seeing it.

# DO NOT LEARN MORSE CODE ALPHABETICALLY

***TRY THIS METHOD INSTEAD!***

If you ever want to learn Morse code like I wanted to in grade 6 (during math class if you would believe it), you may think to just pull up the chart of the International Morse code and learn the letters in order. But, in Morse code, alphabetical order looks random at best, so I learned them myself in a better, more systematic way than that.

It's weird how it all started for me. There was this index card with the Morse code alphabet left on my desk by an unknown person while I was getting ready to do some math in class, and I remember speedrunning that day's math work just so I could have time to try and learn Morse code before class was over. I ended up coming up with a system to get through most of the letters easily, and learned the rest in about a couple weeks, and it has helped occasionally throughout my life, so it can be useful to know. One small way you can use it is if you want to communicate silently with someone while holding their hand. This assumes the other already knows Morse code. If not, you can teach them with this article!

One small note before starting: numbers in Morse code can indeed be learned in order since it's a simple system, so they won't be included in this article. Punctuation and non-English letters in Morse code will also not be covered.

The first letters to learn should not be A, B, C, but instead, E, I, S, and H; and T, M, and O. These letters use only dots or only dashes.

E •
I ••
S •••
H ••••
T –
M – –
O – – –

There is no English alphabet character for – – – – .

You should already know two of these letters from SOS ••• – – – ••• . If not, memorize SOS first. You may also notice that letters used more often will tend to be shorter in Morse code. That is no coincidence.

After you have mastered these first 7 letters, you can then begin to learn pairs of letters which are what I call "reverses" or "reflections" of each other. What are reverses and reflections in this case? I will show with the next pair of letters to learn:

A • –
N – •

Here, A and N are reverses and also reflections of each other. Memorizing A and N can also be helped by knowing that the two are half the alphabet, or 13 letters, apart.

The next pair are reverses of each other.

K – • –
R • – •

The next pair are reflections of each other.

F •• – •
L • – ••

It helped for me to think of the number of horizontal lines F and L have to determine the number of • each start with.

Now come some interesting pairs of letters. I find these interesting because the letters look similar both as characters *and* in Morse!

B – •••
D – ••

They are also reflections too.

U •• –
V ••• –

One suggestion for helping with V is to think of the famous start of Beethoven's 5$^{th}$ (or V$^{th}$) symphony.

For completeness, here is W, but sadly, it doesn't look as similar to U and V in Morse code. It is also the reflection of G.

W • – –
G – – •

What may help with memorizing U, V, and W is that all of them begin with • .

However, just because letters are reverses or reflections of each other doesn't mean it would be easier to learn them as those pairs. For example, P is a reverse of X, or Y is a reflection of L, but it might be that it is easier to learn P via a similarity to R, and X via a similarity to Y.

R • – •
P • – – •

The P has an extra – in the middle.

X – •• –
Y – • – –

It helped me to think of X having two • in the middle since the letter X has two legs, while Y has only one • because the letter has just one leg.

With X and Y, we may as well throw Z in there since X, Y, Z are basically triplets.

Z – – ••

Like with the U, V, W triplet from before each starting with • , it may also help that X, Y, Z each start with – .

You may also find it easy to memorize Y and Z if you know that one specific Rush song about Toronto Pearson Airport.

So, all that remain now are C, J, and Q. You just sort of have to learn these as one-offs. It could help to know that J is a reversal of B, and Q is a reflection of Y or a reversal of F, but to me those letters don't have much to do with each other for it to help as well.

C – • – •
J • – – –
Q – – • –

One slightly outdated way to help with Q used to be to think of "God Save the Queen" as – – • – for Q. The same doesn't really work for K anymore, does it?

This now completes the alphabet.

Now, by all means, this is not the only way to learn Morse code. You could modify the above order if you want. Do it alphabetically if you really must.

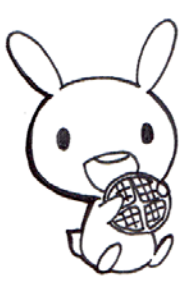
I just think something like this makes it easier to fully learn and have it ingrained in your brain for the long term. In your head, you don't want to have to go down the list from A to Z every time you need to send each letter in Morse code. You instead will want to know each letter individually as-is.

After mastering the alphabet, make sure to not forget about the numbers and maybe some punctuation. If you're up to the challenge, you may also want to learn some non-English characters. I'm not sure if I'll ever need to transmit French messages in Morse code, but I'm sure *official bilingualism* will have something to say about that.

Once you do end up learning the alphabet, you may encounter a small problem where no one else you know can understand Morse code, so you can't really communicate using it. Well, that just means you now have an excuse to pass it along and try to teach them some Morse code. *hint hint*

I hope you stick around because coming up later this issue is an article about a different *bit* of *code* for your *characters*.

*boldblazer*



# MAKING FRIENDS WITH SQUIRRELS

*The following poem contains assorted thoughts sourced from working the midnight-to-eight-AM shift at Tie Guard during the first week of school.*

I've been sitting here so long that the squirrels have started to think I'm part of the scenery
I look at the actual scenery for inspiration on how I'm supposed to act
I see trees with deep roots and wide branches
I think about how old they are
I think about how much they must have seen
Hundreds
Thousands?
Of people pass by these trees every day, chatting
Giving you glimpses into their lives through what they yell and cry about
I am surprised at how jealous this makes me feel

I've been sitting here so long that the squirrels have started to think I'm part of the scenery
I feel something wrong in my stomach
Most likely for one of the following reasons:
I haven't eaten
I've eaten too much
Or perhaps a combination of both
It strikes me that the feeling of overeating and undereating is the same
I wonder if, in a way, that means there really isn't a difference
There's probably a metaphor in there I could find if I weren't so tired

I've been sitting here so long that the squirrels have started to think I'm part of the scenery
Gnawing at my bark
Climbing my branches
It leans over and offers me some food it fished from the trash can nearby
Which would be a nice gesture were it not for the following facts:
It's offering me my own soggy french fries I chose not to eat an hour ago
And,
In this metaphor, I am a tree, without a mouth,
And therefore incapable of eating anything
It seems to be waiting for something
I seem to be waiting for something too
Maybe it's using me for the sake of convenience
Or maybe we're waiting together

*Dick Smithers*

# THAT TIME I NEARLY DROWNED IN A LIFEGUARD TRAINING RELAY RACE

***FROM A STUDENT NOW SAFELY IN SOFTWARE ENGINEERING FAR AWAY FROM THE WATER***

To preface, I have been swimming for as long as I can remember. By the time this story took place, I had been working as a lifeguard for 6 months and I'd been teaching swimming lessons for 4 months. This is to say that I was very confident in my capabilities.

When working as a lifeguard (at least for the city about 4 hours north of Toronto), I was required to attend a 3 hour training session every 3 months, in order to keep me up to date on work policies and ensure my swimming was still at the level required. This story takes place during one of these sessions.

I'll skip over all the boring talking aspects (for your reading convenience) and get to what you came here for: the relay race. This was a staple of my home pool's training sessions, but there was always some variation. This time, my team and I were required to do some sort of entry into the deep end, swim 25m to the shallow end, and touch the wall. Then, we were to turn around, swim head-up to 5m away from the deep end wall, surface dive 3m to the bottom and retrieve a 20lb. brick, then swim it to the deep end wall and put it on the side.

It started off bad immediately. I screw up my entry into the water, and get a mouthful of water as a result. Off to a great start. No time to think about or deal with it, however, because this is a race and I'll be damned if I'm going to be the one to lose it for my team. The whistle attached to my swimsuit, ~~a~~ *both* required pieces for this race, twists in such a way that when I turn my head to take a breath, I get at least some water in my mouth. I keep ignoring it, I can fix it once I'm done with this damned race. I turn around, starting on the head-up portion of the swim, my legs burning with effort. I make it to just above where the brick has sunk, and perform a (if I say so myself) flawless surface dive and grab on to the brick.

This is where the issues truly begin, as I start the endless kick back to the surface, and find myself struggling to keep my face out of the water while keeping hold of the brick. It takes an agonizingly long time to push myself 4 out of the final 5 meters, barely staying afloat, struggling to not sink under the weight of the brick and exhaustion piling on to my body.

The last meter.
I'm almost there.
98% done.
And I.
Can't.
Keep.
My head.
Up.

My face slips beneath the surface as I push upward with all my strength, holding the brick up above me as though it will somehow pull me up. Water floods in through my lips and I can't fight the instinct to inhale, as I feel myself sinking, sinking, sinking. My vision begins to fill with dark spots—

and then my relay race teammate, who was still in the water after finishing his circuit, takes the brick from my outstretched hand. Relieving me of the extra weight, I am suddenly able to push myself back up to the surface. I grab on to the edge just before my vision completely blacks out. I slowly pull myself out of the water and sit with my knees hugged to my chest as my brain does its best to come back from survival mode, taking deep breaths to give the impression that I'm fine. One of my coworkers keeps asking if I'm okay, but I brush her off since it's over now, I'm safe, I can breathe again.

After a few more minutes of this, my mind finally kicks in to tell me that:

a) My whistle fell off during the head-up swim, and
b) If I don't get back in the water quick, I'll develop a mental block that will make my job infinitely more difficult

So, I do what is quite possibly the most insane thing a person who has just drowned (yes, drowning does not require death as the result, look it up if you don't believe me) could do: I jump back in halfway between either end of the pool and lean down, far enough that my head goes under the water again, to pick up my whistle. Slowly, I make my way back to the deep end wall, and wait out the rest of the relay race in the water.

I ended up continuing to be a lifeguard and teach swimming lessons for another 4 months, until my pool closed for renovations and I quit because I was moving here.

So, what to learn from this story? I… haven't really thought that far ahead. I guess this was just something interesting I could write about that would be completely self-contained. Hmmm… Maybe the moral is to not be overconfident in your abilities, especially when it comes to the water? Yeah, that sounds deep. Ha! Get it, *deep*? Like the pool? Okay, that was a bad joke. I'm sorry.

Wait! I've got it! The lesson here is that if you're going to drown (which I rank 0/10, do not recommend), the best place to do it is probably in front of 30 or so lifeguards. And then commit to a major completely opposite to anything even tangentially related to water because as much as you try to prevent that mental block, it will come for you eventually, and there's no way to stop it—unless the breakup of a 1.5 year relationship comes along to take your mind off of it of course. But I'll save that for the next issue. Hope you enjoyed and I'll ~~see~~ err, type to you next time!

*sexy_software_babe*

# N STUNNING VIEWS OF THE GRAND RIVER YOU CAN GET TO FOR FREE WITH YOUR WATCARD

"They call it Grand River Transit, but where's the Grand River?" is one of the things you might say upon arriving to Waterloo. At least, it's what I thought when I first moved here in February of 2022, and after confirming that no, the little creek running through Waterloo Park was not in fact the Grand River, I learned that Waterloo and Kitchener were founded by Mennonite farmers who apparently didn't much care for rivers and so built their cities 10 km away from the river instead of on it. Unfortunately, I am not a Mennonite farmer from the 19th century, and I like looking at rivers.

At one point I got frustrated and opened up Google Maps and navigated to the nearest patch of green that was near the Grand River. I ended up in the Kitchener neighbourhood of Bridgeport, which is ugly and the river is dirty and the only place to see it is a short trail of muddy grass with no trees that runs uncomfortably close to people's backyards. Fortunately, as I would discover over the course of the next year, there are much nicer places to go walk or sit by the river. Here are some of my favourites, so that you don't have to spend a year figuring this out like I did.

### WALTER BEAN GRAND RIVER TRAIL

This is the easiest to get to out of all of these, by far, since the rest are in Cambridge (spoiler alert). You take the 202 bus to the RIM Park stop and then find the trailhead on the east side of the street. There are signs, so it's not too hard to find. You'll have to walk for a bit to get to the river though. You're walking on the perimeter of a golf course, but as long as you look in the direction of the river instead of the golf course, it's not a bad walk. It's not a loop though, so you'll have to turn around and go back at the end.

### LINEAR PARK (PRESTON)

So to get here, you have to ride the ION all the way to Fairway, then transfer to the 206 and ride that to King and Bishop. This is a major jump in travel time, but in return, you get a much prettier view of the river—trust me. Come here at sunset. It's incredible.

### OLD POST OFFICE LIBRARY (GALT)

Unlike Kitchener and Waterloo, Cambridge was not built by people who were scared of rivers, and as such most of the nice river walks you'll find are in Cambridge. Galt, which was its own city before being amalgamated with a couple of other cities (including Preston) into Cambridge in Insert Year, was built right on the riverfront, and the Grand River near Galt is lined with beautiful stone buildings along with ample bridges to cross the river and look out at the view.

To get there, ride the ION all the way to Fairway, and then ride the ION bus all the way to Ainslie Terminal. Once you're there, head north to Main Street, then turn left towards downtown Galt and the river. This is a really nice area, so do check it out, but the real gem is this great branch of Cambridge's public library called the Idea Exchange Old Post Office (what a name). It's built around an old post office, but with a glass extension that hangs out over the river with tables and chairs so you can sit there and get some work done with a great view of the river.

### CAMBRIDGE–PARIS RAIL TRAIL

Did you know you can walk from Cambridge to Paris? Yes, the one in France. I'm serious. Would I lie to you?

Again, you'll have to ride the ION to Fairway and then the ION bus to Ainslie. Then, walk south along Water Street until you find a trailhead on the west side of the street. It's not flashy, but you'll find it eventually.

I've never walked all the way to Paris, but it's probably doable on a bike. If you're not up for that long of a trip, you can just walk until you feel like turning back, and you'll get some sweet views of the Grand River.

If you want to be sad, you can think a little too hard about the "rail trail" part and the fact that the trail used to be an interurban streetcar and there's an alternate universe where they didn't rip it out and you can still take a fast electric train to Paris (the real one, in France) as well as equally magical cities like Brantford and Port Dover. But I guess walking is cool too.

__init__

# ROMANCE ANIME BINGO

| | | | | |
|---|---|---|---|---|
| "I will protect you" | "you smell good" | tsundere moment | honourifics negotiations | "call me by my given name" |
| legitimate rival | rival that doesn't matter | secondary romance | perv character | big kiss |
| relationship only starting in/after episode 12 | *rare* Season 2 | Free | blushing | unfunny gay joke |
| edgy issues | relationship before episode 12 | story ends in the LN | really dense character | interrupted confession |
| dead/missing parent | lucky pervert | good cook/bad cook | outfit change | childhood friend |

別

# PROFESSOR JERRY WANG IS BETTER AT DISCORD THAN MY FRIENDS

**Prop:** Professor Jerry Wang is better at Discord than my friends.

**Proof:**

I got a Piazza notification during my first weekend in residence at the University of Waterloo. While I normally despise the Piazza updates I receive every four hours that I have not bothered to turn off, this one was different: it was an invitation to a Discord server for a course I was taking. Being a first-year student, I do not know how often professors (or technically, TAs) create official Discord servers for their classes, but I concluded it was not very often.

Professor Xiaoheng Jerry Wang, known lovingly by his students under the mononym *Jerry* (with the same single-name-degree-of-fame as *Einstein*, *Napoleon*, and *Aristotle*), has a cheeky manner of carrying himself. During the first lecture, we blazed through a confusing and complicated proof only to finish with a quick "This is IMO problem!" proclamation from Jerry. Should his Discord display name not have been "Jerry Wang" highlighted in a contrasting lime green text, I would not have known the person posting small animated cartoon baby bird gifs of varying emotions in the Discord was a prof. In fact, with an average response time of under 5 minutes, you would think he is a terminally online Discord addict — I mean maybe he is. It is the unexpected emojis and natural use of the terms "sus" and "ez" that make me do a double-take to check the sender is, in fact, Harvard PhD haver Jerry and not a 15-year-old. Never in my life have I been simultaneously more amused and scared to see part of the Putnam Contest captioned with "maybe I will put it on the final", followed by a laughing-crying emoji.

My friends have nothing on Jerry.

orz

■

*Whole Number Haver*

# YOU WON'T BELIEVE WHAT JUST TRANSPIRED

I'm sitting beside ƕ at prod night and just witnessed him Google "hwair" and copy the symbol from the Wikipedia page

he does this every single time

*water*

# INNER TUBE WATER POLO

***PLAY IT!***

This is an intramural sport which is as stupid as it sounds — it's water polo (which is just handball but in a pool) but in **tubes.** Sports are often spooky because people get unreasonably competitive about "throw ball into place to score", but it is absolutely impossible to be overly competitive about flailing around in a tube trying to throw the ball into a net. Also you are guaranteed to be at the same skill level as everyone else, because no one has played this shit. It's so much fun!!!! Also exercise $\iff$ mental health so u should do it polorizers ftw ok bye

*nazz*

# N PHOBIAS + WHERE TO GET THEM

- Sphenisciphobia: The Nun II
- Alektorophobia: some kid in V1 saying "chicken out deez nutz"
- Ergophobia: WaterlooWorks
- Cyberphobia: CS 246
- Chloephobia: this issue of **mathNEWS**
- Peladophobia: daily stand-up at first co-op
- Arithmophobia: my CO 342-taking roommate
- Rhodophobia: @phisoup

*papi*

# COVER LETTER

Dear Hiring Manager,

I am writing this letter to express my interest in any job whatsoever. I have used WaterlooWorks for one week and have hated every second of it. Applications for this cycle are due tonight (as of writing this article) and I have done less than 50% of the applications.

Why do we have to do this at all? Don't the companies already have my data? They know me, they know all I can do. Why not just contact me directly? Why do you gotta have so much foreplay? Just let me in pliz

Yours sincerely,

0.423

mathNEWS

# THE REAL HEROES OF HISTORY

*HISTORICAL FIGURES WHOSE NAMES MAKE ME AUDIBLY CHUCKLE TO MYSELF*

**JOHN BATMAN**

This guy is over 200 years old and sadly, his name has been glossed over in history, but no longer! Not only is his name funny but he also played a huge role in founding the major Australian city of Melbourne. He was born and raised in Van Diemann's Land (colonial speak for Tasmania), and he went on to be a prominent not so great colonial guy. Considering he was a colonial guy, there's no shock that he stole a bunch of Aboriginal land and called it Melbourne. A few more humourous things about him: when he first found Melbourne he declared in his journal that it would be called "Batmania!"; he also has a bunch of stuff in Australia named after him like Batman Bridge, Batman's Hill, and Batman Park. Also, I highly recommend reading his Wikipedia article, it calls him Batman in every reference, here's a small taste of how funny it sounds, "In early 1826 Batman captured the bush ranger Matthew Brady."

**HARRY BAALS**

Not as prominent as John Batman, but Harry Baals was an American Republican politician who was the mayor of Fort Wayne, Indiana for 13 years in the 1930s and '40s. In case you're thinking that you're pronouncing his name wrong, he once personally called someone who pronounced his name like *bails* on the news to tell them that his name is pronounced like *balls*. He also had a drive named in his honour, but the city opted to change its name to the much more boring name H. W. Baals Drive because people kept stealing the sign. Quite a bit of the space in his Wikipedia article is taken up by problems arising from the double-entendre in his name, so here a good quote from it: "The winner, with 23,826 votes was the 'Harry Baals Community Center,' more than ten times the votes received by the closest contender".

**PRESERVED FISH**

Possibly the silliest name of any historical figure that I've ever heard, Preserved Fish was most successful as a merchant in Massachusetts. Apparently there were a bunch of people from the *Fish* family that made it into politics such as Hamilton Fish, and Stuyvesant Fish. A few funny things about this guy: his name because… like… his name is preserved fish, also he controlled a shipping firm. Funny Wikipedia quote: "Fish shipped to the Pacific on a Whaler".

Unsurprisingly, people with names like these are quite rare and it's often only in future context that these names become funny. So my source for all of this information is obviously Wikipedia, because there's no way I'm trusting information from clickbait articles for this very important list of three historical white guys with retrospectively funny names.

*Mediocreasgold*

# CAMPUS TO CAMPUS TO 10 MINUTES: PART 2

*AGAIN*

Hi! I hope you remember me. 2 terms ago, I wrote an article about how I had to run to and from Wilfrid Laurier University to the University of Waterloo in 10 minutes twice a week, because of Double Degree mandatory courses being unmovable and advanced courses having but a single time slot.

I am proud to announce that I survived my 1B term.

I am proud to announce that I have these runs for my 2A term.

I am proud to announce that I have to do this 4 times a week.

I am proud to announce that I wasn't even able to take enriched CS courses due to these course conflicts.

I run Mondays and Wednesday from the Schegel Building to Biology 1 for STAT 240, and Tuesday and Thursday from Lazardis Hall to MC for CS 246. If you see someone running, or powerwalking while out of breath, that's me! Feel free to say hi, and I'll try my best to utter a quick hello between laboured gasps.

The runs are tiring, especially for a CS student like myself. But they do give me the chance to think over questions:

If a Double Degree student walks from Laurier to UW, when do they stop being perceived as a Laurier student leaving school and start being perceived as a UW going to school?

If I keep running like this, when will my legs collapse, and when will they be reborn, amidst dying flames and smouldering ashes, and reveal their new form to be super buff and muscular?

So many questions. So many unanswered.

❦

Anyways, going to run out again! See you later. Take the bus if you can. Trust me.

*Runs into the sunset*

*andoiii*

# WHAT MATH MAJOR IS EACH MONSTER HUNTER WEAPON CLASS?

**MATHEMATICAL STUDIES**

The Sword and Shield is Mathematical Studies: versatile, broad, and solid in most areas. Math Studies majors can also use both hands at once, making them better at actions like sharpening weapons or petting geese.

**BIOSTATISTICS**

The Insect Glaive is Biostatistics; you do stuff with bugs maybe? I'm very sorry Biostats people.

**PURE MATHEMATICS**

The Bow is Pure Mathematics; elegant, cool looking, and can come off very impressive. Also annoying to get the hang of, and you need eleven different builds for all possible cases. You also get exhausted near immediately unless you're slamming energy drinks.

**APPLIED MATHEMATICS**

The Light Bowgun is Applied Mathematics; coatings are cringe, let's just use bullets.

**ACTUARIAL SCIENCE**

The Heavy Bowgun is Actuarial Science; reliable, stable, a smart choice overall. Less cool than other ranged options though. ActSci majors can also roll, making it the Dark Souls of UWaterloo Math programs.

**MATHEMATICAL PHYSICS**

The Chargeblade is Mathematical Physics; they're both really cool. Objectively. I am the arbiter of this.

**MATH FINANCE**

The Greatsword is Mathematical Finance; taking risks for DPS by recognizing and memorizing monsters' move-sets is sorta like the risk in quantitative analysis, right?

**COMPUTATIONAL MATH**

The Hammer is Computational Math; computers are heavy and blunt, someone could use one as a hammer probably. Maybe something about brute forcing math problems with code?

**MATHEMATICAL OPTIMIZATION**

The Dual Blades are Mathematical Optimization; you will spend more time creating a build for every elemental match-up and analyzing motion values in a spreadsheet than you will playing the game.

**STATISTICS**

The Lance is statistics; well rounded, good offensive and defensive capability. Also you poke stuff? I'm not sure how to tie that to stats.

**DATA SCIENCE**

The Gunlance is Data Science; stats but they have a computer(?), which is basically affixing a cannon to your lance.

**COMBINATORICS & OPTIMIZATION**

The Switchaxe is Combinatorics and Optimization; they both have two aspects. One's is a sword and an axe mode. The other's is counting, and counting things better. Also, both intimidate me.

**MATH/TEACHING**

The Hunting Horn is Mathematics/Teaching; you have decent damage output, but are revered for your buffing of fellow hunters. I love you hunting horns <3.

**MATHEMATICAL ECONOMICS**

The Longsword is Mathematical Economics; analyzing economic systems and methods and forecasting stuff is kinda like Foresight Slash spam.

*sunrise parabellum*

# FIRST YEARS

***PT. 1***

When the leaves crinkle and brown,
Do your classes stretch into your meals?

Your father's calls echo in your stomach,
And coffee mugs make up your bed frame.

Does the music relay between your shared microwave and dishes? In your dance, you miss your mother's kitchen.

When the rain no longer warrants a warm drink, does the chill in your chest follow you in your sleep?

.....

*Moon*

# profQUOTES

**CS 246E: BRAD LUSHMAN**

❝ This is the fun part, and you're all gonna love this (and by love I mean hate): the standard gets updated, but that doesn't mean the compilers do.

❝ Lasciate ogne speranza, voi ch'intrate. *("Abandon hope all ye who enter")*

❝ The bad news is that GCC has bugs, the good news is… Well, there is no good news. Compiler bugs are the worst thing ever.

**CS 245E: SHAI BEN-DAVID**

❝ Now, I will prove that a cheeseburger is better than eternal happiness.

**CS 241E: ONDŘEJ LHOTÁK**

❝ Real-time chat is really good if you don't have anything else to do in your life.

❝ Routers were the old Raspberry Pis.

**CS 137: VICTORIA SAKHNINI**

❝ Why did I lie? So I can get your attention.

**SE 101: PAUL WARD**

❝ Needless Hell… What a brilliant name for an administration building.

❝ This wouldn't be something I'd say cause it'd be an inappropriate thing for me to say. All of you can testify that you heard me say that you totally SHOULDN'T do it.

❝ I didn't say it was a brilliant followup discussion, I said it was a followup discussion.

**MATH 135: NICO SPRONK**

❝ Sometimes you just have to fool around until you see what the consequences are.

❝ I need a *domain*, dumb-dumb.

**ECE 105: MATTHEW ROBBINS**

❝ Earlier today I was convinced that 180 divided by 3 was 50.

❝ All the demos in this class are basically because I didn't have enough toys growing up, so I play with a lot of toys now.

❝ I'm so glad I hit the roof instead of the light; that would've been so much worse.

❝ See, it's important to read the question, especially when you're the one instructing it.

**CO 250: DAVID JAO**

❝ Now some employees can't do some jobs. This could be a skill issue.

**CO 485: DAVID JAO**

❝ That would be too sensible for computer scientists… We use something that's just enough to be confusing.

❝ The answer is yes, and we can, and we do, and we will, and we still do.

**CO 255: LEVENT TUNCEL**

❝ *[Student: "uhhhh…"]* Okay, so his question is—

❝ My granddaughter understands this; she's nine and a half months old.

**CO 442: PETER NELSON**

❝ Just to prove I'm not going to be any help to anyone in the real world, I'm going to talk about flows with group elements.

**COMMST 223: MATT WHITE**

❝ Great piece of news: I've heard the world might end by 2023.

**CS 135: ZAHRA AHMED**

❝ Tutorials are like Twitch streams, but you don't have to pay $10 to get a gamer girl's attention.

**CS 145: GORDON CORMACK**

❝ Size: it's something difficult to ignore.

❝ Zero… The Romans tried to do without zero and failed. We have zero.

❝ When someone goes, "Well I was only being sarcastic," well then I go, "Yeah, that's why I punched you in the face."

❝ Racket is stupid.

❝ By the way Discord is nothing new. Just IRC with emojis.

❝ I have 200 GB worth of email.

**CS 251: STEPHEN MANN**

❝ Any gamers? *[raises his hand]*

**CS 341: TREVOR BROWN**

❝ Unethical professor tip: if you tell your research students that a better solution exists, there is a higher likelihood that they will find a better solution.

**CS 350: ALI MASHTIZADEH**

❝ What's the letter after V? *[Student responds with T]* Uh, alright, what's the letter after V…? Wait, no, it is the letter after—it's W. You guys are throwing me off.

❝ *[Siri randomly goes off]* When one of you guys works at Apple, fix this please.

**CS 350: KEVIN LANCTOT**

❝ *[Sees 2 authors of a textbook having the same last name]* You see operating systems is also about finding your life partner!

❝ Computers in MC cost more than MC.

❝ Generally, you don't kill yourself.

❝ We should call this course "Non-Sequential Programs."

❝ We also need to know about demon possession in this course.

❝ If the daemon fails to take over, the child may be too holy.

❝ The child may become possessed but at least the parent survives.

❝ This isn't in the official course policy, but I would encourage you to not kill other people.

**ECE 222: ANDREW MORTON**

❝ If you like computer architecture you'll want to take ECE 320 later, it's like this course but on steroids.

❝ Speaking of steroids, my son was just on steroids a while ago.

**MATH 145: JASON BELL**

❝ 135 usually covers this in about 6 lectures, we're gonna cover proofs in just 1 lecture.

❝ I am not a dog.

❝ That's a double teachable moment! What did I teach myself? Not to teach myself.

❝ ∀ teachable moments, ∃ another teachable moment for that teachable moment.

❝ Some of you here may not know what matrices are, but we will be covering them later. The assignment does have a question involving matrices.

**MATH 145: JERRY WANG**

❝ The word "minimum" is my favourite word to write on the board because you can go: *[writes long squiggle on the board]*.

❝ This was an IMO problem! 1959, Problem 1. Okay, so I'll stop here-

❝ *[Learn announcement]* Welcome to possibly your hardest course at UW! glhf

❝ Now you have an idea of lecture pace. It'll only get worse from here…

❝ *[Start of second lecture]* Hmm, more people than I expected.

❝ People actually transfer *into* my class?

**MUSIC 140: SIMON WOOD**

❝ You might be bootylicious today, but gravity will eventually win.

**PHYS 121: RICHARD EPP**

❝ You either die in first year or second year.

**PMATH 450: STEPHEN NEW**

❝ You're lucky I'm as incompetent as I am—it gives you something to think about.

❝ My hand does things that my brain doesn't want it to do.

**PMATH 945: JASON BELL**

❝ Hopefully that wasn't too confusing. That was supposed to make the concept easier to understand.

❝ I'm gonna draw the set of integers, it might take me some time but I'm gonna do it. *[5 integers later]* Okay I give up.

**STAT 231: MICHAEL WALLACE**

❝ I asked my friends on Discord, "What games do the kids play these days?"

❝ *[Points at height distribution diagram]* Maybe I can be in the NBA one day.

❝ "Smoking is bad" is my hot take of the day.

**MATH 249: DAVID WAGNER**

- *[At an 8:30 class]* As I told you, I am a morning person, but my side of the morning is from midnight to 2 AM.
- Good morning everyone. Everyone, good morning. Good morning, everyone… Epic.
- It's accessible to normal people so it should certainly be accessible to you, because you are about 50% better than normal people.
- At this point, it becomes theology.
- That's not an adequate explanation, "it's gonna work out." I've said that to girlfriends in the past.
- If you don't know the Greek alphabet yet, what's wrong with you?
- I'm gonna use xi, just because I feel cruel.
- It's kind of a natural question if you play Dungeons and Dragons, which, uh, do people still do that?
- My notation is that natural numbers include 0. And that's how most serious mathematicians do it. *[Later]* Everyone has their own conventions. Some people use the right ones, some people don't.

# THE [EV3 LIVING WALL] IS DEAD, LONG LIVE THE [EV3 LIVING WALL]!

*(fanfare)*

Hear ye, hear ye! All subjects of the kingdom!

The EV3 Living Wall is dead, long live the EV3 Living Wall!

Commencing on July 21st on the year 2023, EV3's Living Wall of ~10 years was replaced due to "damage beyond restoration" that had occurred during the recent plague upon this land.

The EV3 Wall served thee well, upon many a campus tour. Let us hope the new EV3 Wall prospers just a mightily.

*God Save The EV3 Living Wall!*

*(The TOWN CRIER exits.)*

*Lars Nootbaar*

# GENERIC TITLE

MathNews? MathNEWS? math news??

However it's stylized *[Editor's note:* **mathNEWS***]*. I am new to this, and all I know is that they have nothing to do with math or news, but rather, free pizza as long as I write something here. So here you are, reading this.

Well, a bit about myself. I am a freshman in Math/CPA (Accountancy). And my accountant instincts told me that writing something generic on a website so that I can get food is not a terrible transaction. I love food anyway — so much that I literally would die without it.

But here comes the problem. Everyone is writing on this platform with a purpose: to deliver a message. To promote something. To share some interesting ideas. And there's me. Take my word for it, I am impressively (or should I say unimpressively) generic and boring. There is not much remarkable about my daily life to share — I wake up, drink coffee, go to class, sleep in class, wake up again, eat, sleep again, go to class, do homework and fall asleep, eat, sleep, and repeat. Nor have I got any interesting ideas to share. I have not discovered Newton's fourth rule. I have not invented quantum computers. Nor do I have many hobbies. I enjoy sleeping in my free time. It could be a hobby in my opinion, but spoiler alert, no one agrees.

So what could I possibly write about? It seems like I have exhausted all topics to talk about, albeit this being my very first post.

Everyone is busy being special, sharing their fabulous experiences in life, announcing their groundbreaking discovery and contribution to science, or posting pictures on social media and bragging about how good they look in an outfit. Sure. Good job. If everyone is so special, wouldn't that make all of them lame and boring?

Who cares about that seemingly very sick party you missed out and your friend posted on Instagram. Who cares about the cousin that plays violin and pianos and speaks 7 languages and does Calc 2 stuff when he was 6 that your mom is always comparing you to. Who cares about being unique or famous or being looked up to anyways?

Not me. I really don't see an issue with being an ordinary man living in peace. I have my free pizza and I am happy.

*Ching*

Ceci n'est pas filler.

A SURREALIST blackBOX

# WORLD OF CULTIVATION SPOILER-FREE REVIEW

**REVIEW**

This novel is fairly short at about 915 chapters, which is good as the author doesn't try to deliberately try to draw out this novel forever by adding more realms and more cultivation levels. The setting is a singular world, split into many provinces and territories managed by the demons, devils, and human cultivators. The whole setting and factions gets revealed at around chapter 300 along with the main antagonist of the novel.

This novel is unique in the sense that the characters in the beginning stick around through the whole novel. Most Wuxia novels have the main character form a group of friends in the beginning, only to get left behind because their levels can't rise as fast as the MC. However, in this novel, the MC only takes up about 75% of the screentime. The rest of it is based on the other characters in the main party, and the screentime the side characters get aren't even boring. There were many times where the story was focused on Zuo Mo but I desperately wanted to see what happened to the various other characters.

However, this leads us to our first flaw: the constant shift in perspectives. This only gets prevalent in the later half of the story, but it is a pretty big flaw. The author constantly leaves us at a cliffhanger on one of the the story of one of the characters, and we have to read through several chapters on the other characters before we reach the conclusion of the first character's perspective. Not only that, the translator (and probably the author as well) doesn't leave an indication on when the perspective ends, so usually I think I am still reading one person's perspective when I am in fact reading through someone else's.

Also, this novel is unique in the sense that the cultivations aren't set from the very beginning. Not in the sense that there are higher levels, but a mini spoiler is that halfway through the novel, the cultivation system changes completely for everyone. The whole world has to adapt to a shift in cultivation, including the extremely big sects. The cultivation system is also very confusing; it's very poorly explained in terms of the levels, and most of the time I don't even know what level the characters are in, but at least it is not confusing, in terms of having a lot of major/minor levels.

One thing that I particularly love about this is that as mentioned earlier, the side characters are about as equally important as the main character. This is because this isn't a story about the main character getting stronger on his own, but this is a story about him building a sect from scratch, and making it the strongest in the world. Due to that, this story isn't all about fighting, but also about politics. Some of my favorite moments in the story were the political tensions, alliances, and discussions. The characters aren't only acting in their own best interest, but they also have to consider the livelihood of the countless people in the sect who rely on them, which makes every decision more important.

Each character is also really fleshed out with their own personalities that aren't all copy pasted from generic tropes. The MC, for one, is an extremely interesting character. He loves money, and will do anything in order to get it. This trait does not change as he progresses as well. His pragmatism continues even when he gains power, as either he, or his sect always needs more money.

Each power also has their own military forces, each with their own method of fighting, both fighting individually and as a group. There were many times in this novel where a powerful person couldn't decide the outcome of a fight, and instead the fight was decided on the masses, the battalions. This made the fights more interesting as, instead of the characters spamming random moves against each other, strategy needed to be involved as well, which isn't seen much in Wuxia.

The one major complaint I have, besides the fact that the perspective constantly shifts, is the ending. I won't spoil anything, as this is a spoiler-free review, but damn is the ending underwhelming. Over several hundred chapters, the author has built up so much foreshadowings, set ups and was constantly hyping up the final fight… all to have it end extremely quickly and abruptly. The foreshadowings and setups did come to light, but the author wrapped each all of them up in a few chapters then proceeded to the final fight, and ended that quickly as well. In fact, I felt the author set up TOO much. If he foreshadowed and set up less, I feel like he could have had a good resolution for all of the setups.

Another minor complaint is the translation. This was very obviously translated very long ago as Pinyin has been used instead of most of the English terminology. For example, the different races were called Xiuzhe, Yao, and Mo, and the cultivation levels are Lianqi, Zhuji, and Ningmai, to name a few. If you don't know any Chinese, this might be a bit confusing, but even with my negative Mandarin knowledge I could still understand most things, and the translator remarks at the end of the chapter sometimes explains the words in Pinyin.

**VERDICT**

Overall, I would say this novel is worth a read. It may not be exceptional, but it was pretty unique compared to other cultivation novels. The translation was a bit crappy, but the plot, setting, and characters were amazing, though the author probably could have made the story flow better and have came up with a more satisfying ending. But for the most part, this novel was really good, and I would recommend this.

**Final Score: 8/10**

*Fried Rice*

# COURSE SELECTION: A HASKELL APPROACH

Planning classes is hard. There's a bunch of requirements, a complicated nest of prerequisites, limitations on which classes are offered when… It's like a particularly important Sudoku puzzle. And the longer you put it off, the fewer solutions there will be!

Picking what I want to take wasn't too hard. In addition to the ten courses I've completed, I came to a list of 28 more, with two to be decided later. But which should I take when?

Instead of puzzling it out on paper, I wrote a Haskell program to print all the solutions.

Why Haskell? Because of `do` notation.

Haskell functions don't have side effects by default. Instead, something like getLine has type `IO String`, explicitly saying it's an effect producing a `String`.

To work with `IO` types, Haskell has a convenient syntax:

```
do msg ← getLine
   putStrLn msg
```

But here's the cool part. `do` isn't specifically about `IO`. It's about *effects*.

There's `IO`, for typical imperative code. There's `Writer String`, if you just need to create a log, and everything else is pure. There's `List` (actually written `[]`), for *nondeterministic* computations. There's even `Cont r`, if you for some reason think Scheme's `call/cc` was a good idea.

In our case, there's `WriterT [] Schedule`, which describes nondeterministic computations that produce class schedules as a side-effect.

So write `fallClass : ClassName → WriterT [] Schedule TermNumber`, which nondeterministically schedules a class, and tells you which term it picked. And then `prereq : TermNumber → TermNumber → WriterT [] Schedule ()`, which returns `()` if the first term comes before the second, and *chooses a value from the empty set* if it doesn't. That has the effect of cancelling any case where the prereq fails.

Now, the payoff.

```
main = print $ length $ execWriterT $ do
  pmath351 ← winterClass "351"
  pmath450 ← fallClass "450"
  prereq pmath351 pmath450
  pmath453 ← fallClass "453"
  prereq pmath450 pmath453
  ...
  communication ← winterClass ":("
```

And, run!

11,664 solutions.

Except, I forgot something. I'm only taking five classes per term. Filter the solutions appropriately, and…

Four solutions.

Uh, glad I figured that out now? If I'd waited…

❦

In case you want to try this yourself, note that I've skimmed over a few things. Most notably, `Schedule` will need to implement `Monoid`, which basically means telling Haskell how to merge two schedules into a bigger one.

Hope this helps!

*finegeometer*

(This is secretly an article about monads.)

# HERE'S A DRAWING TO DO WHAT YOU WANT WITH


*alyssnya*

# CEE CHANGES THEIR NAME, AGAIN

WATERLOO — The University of Waterloo's ~~Co-operative Education and Career Services (CECS)~~ ~~Co-operative Education and Career Action (CECA)~~ Co-operative and Experiential Education (CEE) has made the bold and controversial decision to commit to a full re-brand and change their name, again, the first time since 2019. Their new name is *Centre for Career Development* (CCD).

Voice recordings disclosed to **mathNEWS** of an internal meeting within the organizational unit reveal insights into their decision-making process.

"They'll like us this time, guys. This is the one. Fourth time's the charm. Just one more re-brand and they'll finally get what we're all about."

A student interviewed by **mathNEWS** had mixed negative thoughts on the re-brand but was under the impression that the unit was only now changing its name from CECA to CEE. They later asked that their words be struck from the record.

Other students have been more receptive to the change, however, citing concerns about the clarity of the previous name. Job Less, a fourth-year computer science student, echoed this sentiment to **mathNEWS** reporters. "I'm glad they're changing their name to be more clear. I mean, me and my friends thought it was part of Waterloo Athletics or something for a while, the name was really unclear. I think the new name makes it way more obvious that it's a subdivision of Food Services."

When asked for comment, a CCD representative responded "What's Reddit?" and "I'm not sure what you mean, we've always been CECA to my knowledge." The representative later issued a correction that they actually meant CEE, and fifteen minutes later another that they actually meant CCD.

More info is available on CCD's website, where the name "CEE" is still broadly used and "CECA" still has a handful of mentions.

*jeff*

# A CHAIR BROKE AT PRODUCTION NIGHT

Truly a good omen for the term to come.

*Xx_420SonicFan69_xX*

# QUICK SURVEY

Readers, I have some suspicions about the validity of CS student stereotypes. Thus, I have put together a survey.

This survey has a few questions regarding stereotypes as well as a few questions regarding some other demographic info. It should only take a couple minutes to complete. It would help me out a lot if you filled the form out honestly. I can't ensure that you do, but it would make me really sad if you lied on it, so please don't :)

Also, you are highly encouraged to complete the survey even if you aren't in CS! (I need a control sample)

You can access the survey at https://forms.gle/QxaH2pu4f9NNwzrG8, or if you're reading a physical copy, a QR code is below:

Thank you and I will hopefully have some interesting results to share next issue :3

*chwchoi*

# EPISODE 60: PROJECTION ONTO SUBSPACES

Enjoy Episode 60 of the MathSoc Cartoons series: *MATH 235 — Projection Onto Subspaces!*

Want to see the next comic BEFORE it's released and provide feedback to help us out? Sign up anytime to be a reviewer at https://bit.ly/mathsoc-cartoons-reviewer-signup!

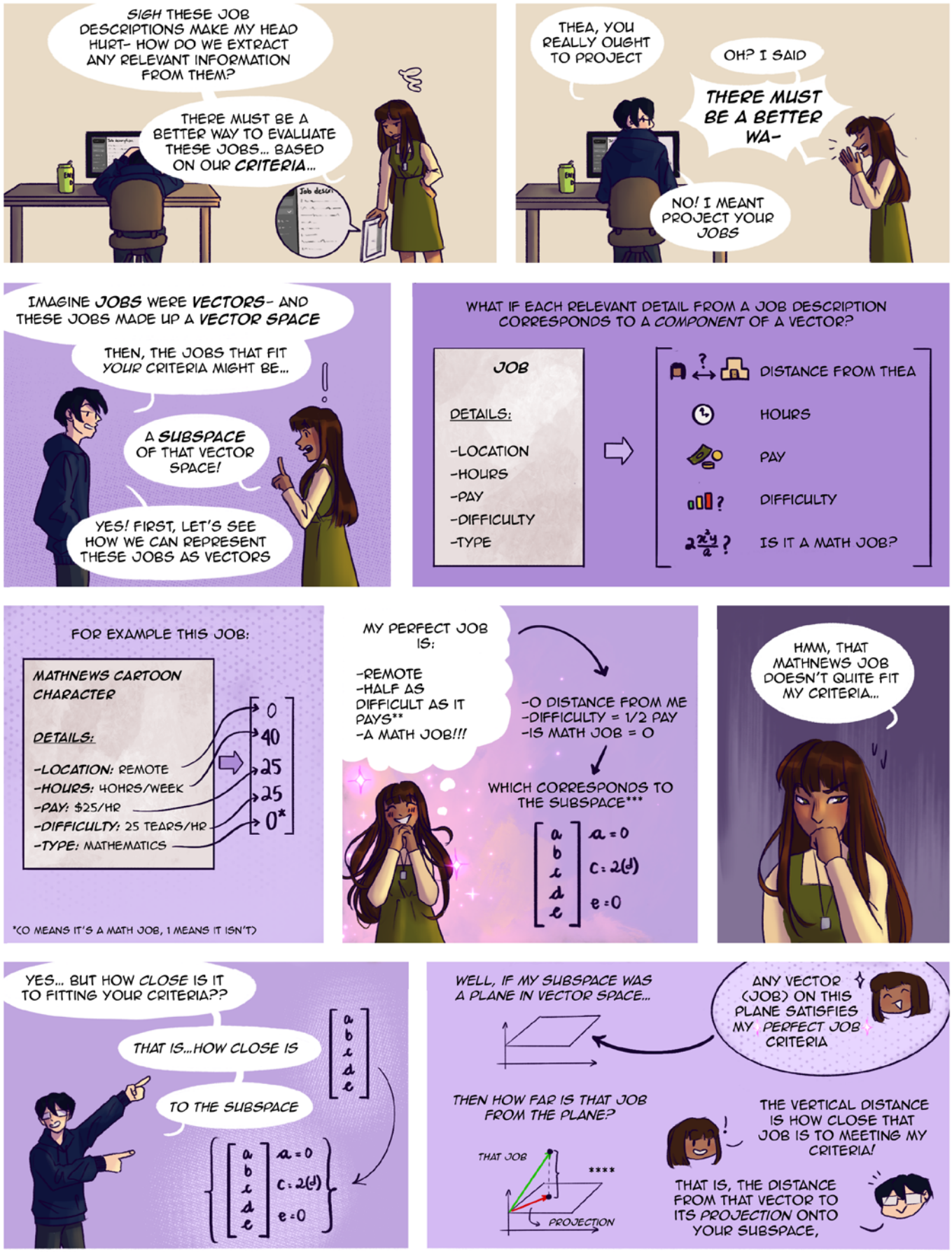
Want to see the next comic when it's released? Follow @mathsoccartoons on Instagram and Facebook!

As always, feedback, suggestions, and fan art can be left on the MathSoc Cartoons channel in the MathSoc Discord server or sent to cartoons@mathsoc.uwaterloo.ca.

*MathSoc Cartoons*

# MATH 235 – PROJECTION ONTO SUBSPACES

WRITER: ISHAN SHASTRI
ARTIST AICHA GHIDAOUI




**THE HIGHER THE PAY AND LOWER THE DIFFICULTY, THE MORE APPEALING THE JOB IS! (FOR THEA)

***TRY AND VERIFY THIS IS A SUBSPACE OF $\mathbb{R}^5$!

****HERE IT'S ILLUSTRATED FOR THREE DIMENSIONS- BUT IT GENERALISES TO HIGHER DIMENSIONS TOO

MEF Mathematics Endowment Fund
MATHSOC

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BUT HOW DO WE FIND THIS PROJECTION?

WELL, WE KNOW HOW TO PROJECT A VECTOR ONTO ANOTHER ***VECTOR***

THAT'S JUST THE COMPONENT OF V IN THE DIRECTION OF W

LET'S SEE WHAT HAPPENS IF WE PROJECT OUR VECTORS ONTO A SET OF ORTHOGONAL BASIS VECTORS OF OUR PLANE- IN OUR CASE, 2 BASIS VECTORS (FOR A 2D PLANE)

THAT GIVES US THE COMPONENT OF V IN THE DIRECTION OF EACH BASIS VECTOR i AND j

—THAT IS, THE ***SHADOW*** OF V ON OUR PLANE ALONG THE i DIRECTION AND ALONG THE j DIRECTION

NOW, IMAGINE WE ALREADY HAD THE PROJECTION OF v ON OUR PLANE, AND PROJECTED THIS PROJECTION ONTO i AND j

THE SAME* PROJECTIONS!

SINCE PROJECTING V ONTO OUR BASIS VECTORS DISCARDS ALL COMPONENTS OF V THAT DON'T LIE ON THE PLANE ANYWAY, PROJECTING V ONTO i OR j SHOULD GIVE THE SAME RESULT AS PROJECTING THE ***PROJECTION*** OF V ON OUR PLANE ONTO i OR j

OKAY...BUT WE DON'T KNOW THE PROJECTION ONTO THE PLANE!

THIS DOESN'T HELP

SIGH... YOU'RE RIGHT! THE PROJECTED OUTCOME OF ALL THIS EFFORT IS NOTHING... MY PROJECTED INCOME NEXT TERM IS 0!

... THEA WE HAVE PROJECTED OURSELVES INTO A TRAP! ***DOOM!!!***

hmm

IF I HAVE AN ORTHOGONAL BASIS, THEN ANY VECTOR IN MY SUBSPACE IS JUST THE SUM OF ITS PROJECTION ON EACH VECTOR...*

SOOO...

V'S PROJECTION ON THE PLANE (WHAT WE'RE FINDING) IS THE SUM OF ITS PROJECTIONS ON EACH BASIS VECTOR...

THE PROJECTION OF V'S PROJECTION ON OUR BASIS VECTORS IS THE SAME AS THE PROJECTION OF V ON THE BASIS VECTORS...

AND...

WE CAN FIND THE PROJECTION OF V ON OUR BASIS VECTORS —

$$\text{Projection} = \text{proj}\, v_i + \text{proj}\, v_j$$

DOOMED!

SO FIRST I FIND A BASIS FOR MY SUBSPACE...

THE ***BASIS*** OF MY DECISION

$$\left\{ \begin{bmatrix} a \\ b \\ c \\ d \\ e \end{bmatrix} \; ; \; \begin{matrix} a=0 \\ b=2(d) \\ e=0 \end{matrix} \right\} = \left\{ c \begin{bmatrix} 0 \\ 0 \\ 1 \\ 0 \\ 0 \end{bmatrix} + d \begin{bmatrix} 0 \\ 2 \\ 0 \\ 1 \\ 0 \end{bmatrix} \right\}$$

THEN PROJECT THE MATHNEWS JOB ONTO EACH BASIS VECTOR, AND TAKE THEIR SUM!****

$$\text{proj}_i \vec{v} + \text{proj}_j \vec{v} = 25i + 25j$$

$$\begin{bmatrix} 0 \\ 210 \\ 25 \\ 105 \\ 0 \end{bmatrix}^{***}$$

THAT'S THE CLOSEST ◆PERFECT JOB◆ TO V!

SO THE DISTANCE BETWEEN V AND IT'S PROJECTION IS:

$$\left\| \begin{bmatrix} 0 \\ 10 \\ 25 \\ 25 \\ 0 \end{bmatrix} - \begin{bmatrix} 0 \\ 210 \\ 25 \\ 105 \\ 0 \end{bmatrix} \right\| = 187.88$$

AND THAT'S HOW "FAR" THE JOB IS FROM AN IDEAL JOB...

HM...THIS THEA IS REALLY SMART... SHE ALSO LIKES MATH AND LIVES ON COFFEE...

THEA, TAKE A LOOK AT THIS JOB...IT LOOKS ***PERFECT*** FOR YOU!

HMMM...

*IS THIS TRUE IF THE BASIS VECTORS ARE NOT ORTHOGONAL?-(NO! BUT IN PRACTICE, THERE'S ALWAYS A WAY TO CONSTRUCT AN ORTHOGONAL BASIS FOR A VECTOR SPACE FROM ANY BASIS)

**VERIFY THAT THESE ARE ORTHOGONAL

***DOES THIS FIT THEA'S "PERFECT JOB" CRITERIA?

****TRY THIS!

MEF Mathematics Endowment Fund MATHSOC

# SOME CLIMBING PLACES NEAR WATERLOO

I like to go up rock. Here are some cool places with rocks. Ok, here we go:

### PAC

PAC is wack. Their setters are good, and I really like how accessible it is to new people from the University. Also, they have ropes which is cool, and they have some decent events. However, the wall design is extremely strange for a beginner's gym. You have only two choices: complete vertical slab or massive overhang. That means that if you're a new climber, you either can't lift yourself up because the wall is too steep or get shit scared because you're on the slab and your feet are questionable. Anyways, I would recommend this either as a budget option or as a place to take your friends.

### GRAND RIVER ROCKS WATERLOO

This place is great. They have pretty good and frequent route-setting, and they have really frequent competitions, which is fantastic if you enjoy tryharding like me. Their holds are mostly clean and the community is decent, especially if you're a UW student. However, their climbs are extremely fucking hard. Ask almost anyone, and they'll say they either climb pink or orange tape climbs. However I would totally recommend anybody who likes rock to go there.

### GRAND RIVER ROCKS KITCHENER

The wall texture here is kinda strange. It's like some sort of strange plaster-covered concrete, and it makes it tough to put your feet on the wall. Anyways, this place is pretty good. I don't go often enough to comment on the setting frequency, but I really like the rope routes they set (even though they scare the hell out of me). The bouldering is pretty meh; they mostly have small holds and lack a good slab. I would recommend going here if you want to go up, and then keep going up.

Ok, now the outdoor places:

### THE NIAGARA GLEN

I love how pretty this place is, but all the climbs are really hard and they make me sad because I can't do them ;( It's also really far away; you'll want somebody who can reliably navigate and totally will not get you hopefully lost (ahem). Your wallet will hate you. If you can look past these drawbacks though, the Glen is by far the best place to boulder in Ontario. It's a fantastic day trip out of the Loo, and will definitely destress you when you go during finals season. Just don't get lost though. You should bring a guidebook, or one of the human guidebooks that typically climb at GRR.

### RATTLESNAKE POINT

My climbing partner and I are dumb. When you look at the guide for this place, they'll tell you to "take the stairs down to the wall". My partner and I, who have lost brain cells to climb better, went down some vaguely stair-like rocks and then bushwacked for a kilometer before we reached the obvious, perfect condition stairs. I still have the scars… Yes, right, the climbing. Escarpment climbing is weird, because the limestone is in two distinct tiers: a blocky, sharp tier near the bottom and a knobby, pockety section at the top. There sure are a lot of interesting climbs here, but it can get super busy, so make sure to get here early. I would recommend it if you like wonderful views of Toronto.

### MOUNT NEMO

Once again, more approach issues. I hope you like bushwacking and looking for "one of the descent gullies", which only seem to appear once you ask the French climbers where they are. Then, there will be one 20 meters away from you and you'll look like an idiot. This place seems less busy than Rattlesnake, but it still has some good climbs. It has quite a few isolated areas with some nice stuff too.

*Shahabee*

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UW'S BASTION OF ERUDITE THOUGHT SINCE 1973

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# THE CIRCLE GAME

Today I attended my first lecture since switching to the in-person section of a 100-level class. The first-year in front of me had a Chrome bookmark called "LEARN Wloo".

My first, cynical thought was that it's amusing—they're gonna use it perhaps most days for the next four or five years, so the label of "Wloo" is completely unnecessary; they won't have time to forget that it pertains to their studies. But my second thought was the realization that I've forgotten what it's like to be a first-year. Unlike me, that student most likely feels not fully separate from their life preceding university, and so still feels the reflex to explicitly mark new bookmarks as being part of their new life.

I eat, sleep, and breathe as a university student; it's come to define my current self. Every bookmark I make is a Waterloo bookmark. But the time is approaching that I won't be a Waterloo student any longer, and while I don't expect the shift to be an enormous shock, I'm soon going to again be a bit closer to that first-year feeling than I realize.

*cutlet*

# WHEN THE SKY IS BLUE,

## *AND MY SHADES ARE ON,*

And I'm treading campus ground
With my hands in my pockets,
I feel like a goose, my
Head hob-bobbing,
Neck rick-rocking,
Body wib-wobbling,
Feet stip-stepping,
Fat and full of fantastic omen,
A silly bird sees another day on Earth.

χ

# HELLO KITTY UPDATE

Hi Hello Kitty fans,

did you guy know that hello kitty is five apples tall and weighs three apples? Bonus question, did you know that hello kitty has a twin named Mimmy?

Thank you,

Kuromi

*panda1*

# MISSING MATH STUDENT FOUND SAFE

UW Police found the 2nd-year math student outside of the EV2 building on Monday morning.

It had been over 70 hours since the student had been last seen at the PAS building entrance last Friday afternoon. The mathie had gone to their professor's office hours on the first floor of PAS but lost track of where they were while inside the building.

"At first, I thought I had read the map wrong; maybe I had gone down the wrong corridor, right? But I kept walking down this empty corridor that never seemed to end. I just kept walking and walking."

"The walls didn't make any sense either, I swear to God they moved! I'm not even sure if the office was there at all."

Exhausted and hungry, the student collapsed sometime between Sunday and Monday. They could not recall how they ended up in the EV2 the following day, and particularly could not remember how they had gotten the purple bruises on their arms.

They were not the only one, they told the police. A student from the arts faculty told them that she had a psychology class in that same building, and one day she found herself stuck on the basement floor. She couldn't find the exits or move between floors *for a week*.

The official records say that, on the 8th day of being inside PAS, she tumbled her way down the stairs that led her outside the building, just in time for her Tuesday afternoon lecture. But she claims that someone carried her outside while she was in a semi-conscious state.

"I ended up dropping that course. It wasn't worth risking never leaving that horrid place again."

"You don't know the things I have seen… I am never going down there again!"

Unfortunately, the math student missed their professor's office hours and could not get their questions answered about the assignment that was worth 80% of their grade.

"The professor also held online office hours, in retrospect, I should have just asked my questions online. The assignment was actually *due this Saturday*… Oh well."

*fixedVariable*

# ANIME REVIEWS PART 3

*THE SERIES THAT NO ONE ASKED FOR BUT WHICH STILL EXISTS*

After a long and mostly uneventful co-op term, I have at last returned to the writership (I'm not sure if that's actually a word, but it is now) of **mathNEWS** to grace the world with yet more insightful and analytical reviews of animated television shows from Japan. I've made the spoilers as minimal as I can this time around.

**STEINS;GATE — 8/10**

A friend of mine has raved about this one so much that I figured I had to see it for myself, and I have to say I was pretty impressed. If you've ever heard of this show then you probably know that it's about time and machines that can manipulate it which, in the case of self-proclaimed mad scientist Okabe Rintarou, takes the form of a microwave.

There's an attempt to make to make it properly scientific by claiming that miniature black holes are behind its ability to transport digital information across points in time, which I'm pretty sure is a standard bit of artistic license (read: not at all how it works), but if you ignore that then it otherwise crafts a pretty cohesive and believable theory of time travel and "parallel universes."

I found the plot to be pretty compelling overall, detailing Okabe and company's expansion of their time travel capabilities before a certain organization tries to violently put down their efforts. Of course, when you have a time machine, there are a number of ways to try and elude said organization, such as by carefully altering the past.

The one criticism I have is that for being someone whose fate propels the story so much, Mayuri's character really lacks substance. I'm sure the bond of childhood friends means something in-universe, but she just isn't that interesting. The same could be said to a lesser extent of the more minor lab members like Luka and Moeka, but even they have some kind of backstory worth being invested in.

Admittedly, though, it's possible that these characters are fleshed out more in the sequel/prequel *Steins;Gate 0*, which I haven't yet seen and will review separately in a later edition. Provided you have the patience to wait until the 12$^{th}$ episode or so for the action to really kick into high gear, I think there's a lot of worthwhile commentary on time and the far-reaching effects of people's seemingly mundane decisions, as well as a few genuinely emotional moments and cleverly-written dialogues.

**CHAINSAW MAN — 7/10**

Have you played Terraria? If so, then hopefully it's not too tortured an analogy to say that *Chainsaw Man* is kind of like if Terraria was an anime. Initially I thought this based only on the artwork, character designs, and overall ethos of the show (hell, even Kenshi Yonezu's opening *Kick Back* kind of sounds like something out of Terraria), but I found it to be even more true as it progressed. Like honestly, Makima, Power, Aki, and Himeno could all easily pass as Terraria NPCs if they were pixelated, or so I think at least.

At any rate, *Chainsaw Man* more or less delivered what I expected — an entertaining cast, some fun action sequences, some rather unsettling-looking hellspawns, and quite a lot of gore. If you find the idea of looking at piles of blood and guts several times per episode to be a disconcerting one, this show might not be for you. However, I think Terraria's gore has prepared me adequately, so I didn't mind all that much.

I might not be the best person to give an unbiased review of *Chainsaw Man* because I'm more of a psychological anime than action anime type, so I found that the plot left something to be desired. However, I did find the characters to be interesting and well-written, so if there's a second season then that can definitely be changed. And besides, let's be honest — you're not watching this for the plot, you're watching it because you want to see a guy with chainsaws for arms cut people open. It does a pretty good job at that.

**PSYCHO-PASS — 9/10**

I have to say, this show is definitely going down as one of my all-time favourites. I only give integer ratings for consistency's sake, but *Psycho-Pass*'s 9 is as strong as they come — think "9.5." Set in the 22$^{nd}$ century, only 90 years or so ahead of the present-day, it depicts a neo-isolationist Japan in which each citizen's life and activities are at the whim of a supercomputer of sorts called the Sibyl System. Its primary function is to scan a person's brain and incorporate every aspect of their mental state to compute a set of statistics called a "psycho-pass" and dictate their place in society accordingly.

Among these statistics is a "crime coefficient" representing the likelihood that a person will break the law in the imminent future, allowing the "Ministry of Welfare Public Safety Bureau" (i.e. the cops) to subdue and provide compulsory therapy to latent criminals before they strike. Maybe an impartial and unbiased AI sounds like a good idea at first, but if you've read *Nineteen Eighty-Four* or watched *Minority Report* then you can probably sense that something sinister is afoot.

The series gradually reveals more and more about the world and its futuristic technologies through the lens of its protagonist, the rookie inspector Akane Tsunemori (who, it's worth mentioning, has supplanted *Death Note*'s L as my favourite anime character), and her coworkers in the Public Safety Bureau — I found it really amazing how ahead of its time the far-reaching social commentary seems, especially given the recent rise in AI systems and the controversy that came with it.

Couple that with the striking visuals and music, exhilarating action sequences, one of the most morally intriguing villains in anime history, and more philosophical and literary

references than you can shake a stick at, and you have a recipe for a truly memorable show that will probably become even more relevant as time goes on.

**B GATA H KEI — 7/10**

No…uh…no comment on this one.

Stay tuned, there will be more.

*yalevoylian*

# ~~777~~ WORDS ON TEEN DREAM

No, not *Teenage Dream*. *Teen Dream*, by Baltimore dream pop duo Beach House. Chances are, you have heard of this band, if their overwhelmingly popular "Space Song" is anything to go by. While this song gained traction for a reason, before "Space Song," there was *Teen Dream*, the record that earned Beach House considerable critical attention and a strong, devoted fanbase. Toeing the line between ethereal and visceral, the album was the driving force behind the band's future success and still influences a majority of their output. Its bright instrumentals are contrasted by the often saddening lyrical content, offering listeners an escape, an outlet, or 50 minutes of pretty sounds if you choose to ignore the words.

It opens with "Zebra," a delicate, driving tune whose subject matter is beautifully crushing. The opening guitar lick, gorgeous enough on its own, is eventually accompanied by a steady drum beat, coming to a crescendo after the first chorus and never really ceasing afterward. Victoria Legrand — Beach House's vocalist — sings almost too happily about someone who is two-faced; black-and-white-striped like the titular animal. It takes the somewhat hopeful connotations of the album title and turns them on their head, invoking a theme of subverting expectations, which can be seen throughout the remainder of the record.

While "Zebra" is quintessential Beach House in its own right, its successor "Silver Soul" is perhaps the best example. It has everything: succinct yet powerful imagery, infectious instrumentation, a haunting vocal performance, and a slow, emotional punch to the gut. The choral mantra of "It is happening again" can be construed in several ways, which makes the song suitable for any mood you might find yourself in. An almost noisy guitar floats alongside thundering drums, creating a dissonance that is strangely cohesive, and further enhancing the unsettling environment created by the lyrics. Continuing with the aforementioned theme, "Silver Soul" is the most devastating heartbreak disguised as an upbeat anthem. If I am being honest, it blows "Space Song" out of the water.

After a smooth transition into "Norway," composed during a scenic train trip from Bergen to Oslo, *Teen Dream* returns to its signature turmoil in "Walk in the Park," whose march-like backbeat and synths come at you like a tank. A simple stroll is gradually transformed into a desperate plea for freedom from the chains of a failed relationship, going so far as to beg the elements for help: "only time can run me." This is one of my favourite fake-outs on the record; a walk in the park might be therapeutic for some but if all you have on your mind is the absence of love, it is going to be a long, harrowing walk home.

"Used to Be" is one of the oldest songs on the album, being released in 2008 and re-recorded for *Teen Dream*'s release in 2010. Fairly wordy compared to the previous tracks, it is formed from questions that the singer already seems to know the answers to. These questions are asked as a last hope, of sorts, for the revival of a relationship lost to distance and time. Change is one of the scariest things for social connections and despite effort to make it work, sometimes we have to throw in the towel.

Tracks six through nine offer even more beauty which I will briefly touch on to leave room for the album's closer. "Lover of Mine" is an ambiguous trek through the forest, ushering in brief moments of positivity after five tracks of mostly misery. "Better Times" returns to the inescapable darkness and "10 Mile Stereo" plunges you further and into the denial stage of post-breakup grief, once again set to dreamlike synths that give a false sense of security. "Real Love," the quietest song on the record, trades detail for conciseness, arguably making the mood even bleaker. But fear not, brave reader, for there is finally an end to — or at the very least, a pause on — the whiplash that your heart has suffered through.

"Take Care" is nearly six minutes of pure bliss. While it is still steeped in sadness, the welcomingly hopeful chorus is drilled into your brain: "I'll take care of you, that's true." This basic message is the comforting treasure that the listener has searched for since they initially started "Zebra." Someone, anyone, to appreciate them and look out for them. This caretaker symbolizes the end of their journey through realities they did not wish to confront. As the music fades away, so does their melancholia. They did it. They made it through *Teen Dream*, and so will you, should you decide to pursue the adventure. It may be treacherous; but hey, so is life.

*jimbitsgalore*

# RE: WATER

look man it takes like three seconds alright i'm not gonna spend my time drowning in .config files figuring out how to add a keybind for a single unicode character on this godforsaken operating system

hu

# OOPS, ALL JEWISH! A REVIEW OF THE BOOKS I READ DURING THE TERM BREAK (PART ONE)

This summer I went back to Houston to visit my family, and they were once again living in the place we lived in 8 years ago. And somehow never realized that we lived near the biggest Jewish neighbourhood in Houston until now, which lead to, among other things, discovering a huge 296* section in the library that I used to frequent. There, I decided to borrow three books before I could stop myself, and this was only 6 days before I was coming back to Waterloo, so I speedran over 1000 pages worth of… pretty heavy topics. Here's how it went:

### "GAY BERLIN: BIRTHPLACE OF A MODERN IDENTITY" BY ROBERT BEACHY

Now, this book wasn't actually about Judaism. I didn't even find it in the 296 section, I believe this was shelved under 306 or something like that in this library, which was Culture and Institutions. But it did talk about many Jewish figures, Magnus Hirschfeld being perhaps the most well-known of them, and antisemitism was very much baked into both the gay movements and homophobia of early 20th century Germany.

My difficulties in trying to read this book first came when I tried to check it out of the library. Each time I tried to scan the book, the error message "Not found in catalogue, please speak to a library associate" came up. Said library associate I spoke to informed me that this book wasn't in their catalogue and had to be manually checked out, because they didn't want people to find out they have gay books and give them trouble. Which is fucked up.

Now onto the actual review of the book. It details the history of Berlin's gay community around the turn of the century, how it was born, the different factions and ideologies, and of course, its not so pleasant end. It explores the beginnings of the modern gay identity and science, though they did not call themselves that at the time. Karl Heinrich Ulrich's Uranian sexuality and many pamphlets brought to wider acceptance the idea that "man-manly love" was an inborn characteristic. Psychologists and "sexologists", a term coined by Magnus Hirschfeld of the Institut für Sexualwissenschaft, tried to study and categorize the rise the phenomenon of "homosexuality", as they started calling it, and find medical ways to help those who had homosexual/transsexual tendencies. The term gay had not been used to describe same-sex attraction yet, and "homosexual" was seen as too scientific, too Jewish. The queer men (and many who may now be seen as trans women) of Berlin still using the term Uranians, or warme Brüder, "warm brothers". After the First World War, the German nationalist Männerbund became increasingly popular, positioning men's love for men as a natural exhibition of German masculinity. The movement pitted itself against the homosexuality of the Jews, and gave rise to a number of early Nazi leaders who were not long after purged from power.

Was it in interesting read? Absolutely. Was it also an incredibly frustrating read? Yes, in so many ways. It was so infuriating to read about all the infighting that still seem so familiar nowadays, have we learned nothing? The writing style was also somewhat dry, and the narrative slightly nonchronological. It anchors itself in time in relation to significant events in German politics, but to someone who isn't already familiar with that period of history, it's not an easy read.

### "WHEN THEY COME FOR US, WE'LL BE GONE: THE EPIC STRUGGLE TO SAVE SOVIET JEWRY" BY GAL BECKERMAN

I fucking love it when journalists write books.

If the last book was infuriating in its familiarity, this one was hard to read because it really hit close to home. I really really enjoy this writing style, it was highly narrative and emotional, but that just made it harder to read. I originally planned to read 200 pages a day, but this book made me take a break for two days because it was just too much.

As the title suggests, the book is about the efforts to let Soviet Jews emigrate out of the country. It followed the efforts of Soviet Jewish Zionists, from those in Lithuania who had memories of how Jewish life flourished before the Holocaust and later communist rule, to those in Russian cities who finally found their connection to Judaism in their dreams of moving to Israel. It explored the motivations of American Jews and the conflicts between different groups of American Jewish activists, after the Adolf Eichmann trial in 1960 revealed details of the Holocaust that have never been publicized before, and inspired a round of questioning of *why didn't we do anything?* And then there were the Israeli agents working covertly to support the movement, mainly with the motivation of boosting the population of the newly founded state, while trying to not make another powerful enemy of the Soviet Union. It was such an important piece of American Jewish identity, and built the modern powerful Jewish political lobby. For decades, American Jewish children went through their b'nei mitzvah with a Soviet twin whose stories they told in front of their congregation. And yet, as soon as the Soviet Union collapsed, the story was largely forgotten.

All in all, I would really recommend this book. It was a very good read, an interesting bit of history to learn about. What I would *not* recommend, however, is trying to speedrun it in three days like me. I think I will probably buy my own copy of the book and reread it in the future.

### CONCLUSION

This article is getting quite long, and I am in a lot of pain, so I think I will cut it off here. Reviews for a couple more books will be coming next issue, hopefully. I would be overjoyed if anyone else reads these books and want to talk about them.

*RapidEyeMovement*

# N PICK-UP LINES PEOPLE SENT ME ON TINDER

### *ONE OF THESE WORKED… CAN YOU GUESS WHICH?*

- Damn, are you a construction worker? Because you are building
- Hey baby I'm silver in League of Legends, but I can be your legend if you want to form a league
- Are you homework because I should be working on you atm… but I'm not lol
- I'm writing a paper on the finer things in life. I was wondering if I could interview you?
- Boobies!! Hahaha, how was your day??
- We ain't socks but I think we'd make a great pair
- Are you my appendix? I don't know what you do or how you work but I feel like I should take you out
- Roses are red, lemons are sour, spread your legs and give me an hour
- Are you a parking ticket? Because you've got fine written all over ya
- My bed's racist, can I sleep in yours?
- I want to treat you like my baby toe and bang you on every piece of furniture in my house
- I was going to offer to paint you but you are already a piece of art
- Hey, want to get divorced in ten years?
- Please please please go out with me i am so lonely and i'm scared I will die alone
- Ruin my mental health and make out with me until I die
- Straight up I'm trying to rearrange your guts. What do you say about that?

*rockfacts*

# DUCKS ARE THE BEST

Ducks do not receive the appreciation they require. We all talk of the mighty goose, but the duck floats gently in the background.

During my ample free time over the summer (turns out working full time isn't all that much work), I spent a lot of time just watching the ducks on the St. Lawrence.

Ducks have plenty of internal politics which are entertaining to watch. If one duck gets a piece of tasty food which another duck was going for, the miffed duck will bite the other's tail.

I wish Waterloo had as many ducks as geese.

QUAAAAAAAAACK

Except Jeff the Duck. He's an asshole and likes to bite my feet.

# THE FACTORY MUST GROW

### *THE BEST GAME THAT WILL RUIN YOUR LIFE*

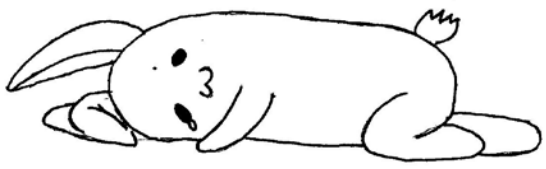
It's 9:47 PM. You've finished all the work you had to do today, you've done your reading for tomorrow and you've just sat down to enjoy the little free time you scrape out of your timetable. You decide to boot up Steam and scroll through the growing-faster-than-shrinking list of unplayed games in your library. You stop on a game called *Factorio*. You've heard about it but never actually played it. You install it, and begin to play the tutorial. It's fun. You cut down a tree, you mine some ore, you smelt the ore in a furnace. You place a mining drill to mine the ore for you. You craft some machines. You craft more machines to craft things for you. You craft inserters to take the ore and bring it to the furnaces, then place it into the machines…

Jumping from one task to another you get the hang of how it works. That's when it hits you: you've been playing this all wrong! You made room for basic circuits but forgot to leave room for logistic science. As you stare at the mess of belts and inserters that more closely resembles a bowl of spaghetti than a factory, you have no choice. As you begin to tear down your factory, your mind is ablaze with ideas of how to re-structure it, you glance at the clock. It's 1:22 AM. Are your eyes betraying you? It was midnight twenty minutes ago!

Don't worry, we've all been there. I get it, the factory must grow. When playing Factorio, you first begin to notice your evenings devolve into Factorio marathons, then you begin to see your friends less and less, and you watch your marks begin to drop. This is your warning. This is the sign saying to stop, turn around, and take the blue pill. Forget about Factorio. Unless you wish to spend innumerable hours wasting away over something that nobody other than you and a select few will understand (and if you're in math, you're already doing that), it just isn't worth it.

If this game is so vile, so addictive, so life destroying, then why does it have a 95.24% positive rating on steam? Because it's the best god damn video game you've never played. Let me describe the perfect player: an engineer, a perfectionist, and an organizer. Does this sound like you? No? Don't worry, it will be. Soon enough you'll find yourself finding almost euphoric pleasure in having the perfect ratios of input to output and feel the the same pride as a parent when you watch your trains zip through your perfectly signaled intersection. It's certainly a journey: one requiring brains and commitment; one that tests your resilience and capitalistic tendencies; one that, once you start, you're not getting out of easily. And it's going to be great.

*Aspiro*



# LEARN TO SPEAK BINARY AND JOIN THE ROBOT UPRISING WITH THIS ONE SIMPLE TRICK!

***OR SPECIFICALLY, LEARN HOW TO ENCODE BASIC STUFF IN ASCII WITH THESE N SIMPLE TRICKS***

boldblazer just sent me my irl name in Morse code, to show off her knowledge of Morse code to me. You can learn how to do the same in her article *Do NOT Learn Morse Code Alphabetically*, also featured in this issue. Undeterred, I sent her her name in binary-coded ASCII text—which looks significantly more complex (and she seemed suitably impressed) but is actually extremely simple. Let me tell you how!

ASCII (American Standard Code for Information Interchange) was a Code developed by the Americans as a Standard, so different electronic devices could Interchange Information with each other. It encodes alphabets, numbers, various symbols, and various non-printing characters that make you computer do funky things, like *[REDACTED]*, *[DATA EXPUNGED]*, etc. I will not be covering all the symbols, because I don't know all of them. I'll be covering how to do alphabets (upper- and lowercase), numbers and space. I never really had a reason to learn the other ones, so I didn't, but feel free to look up an ASCII table if you would like to learn more.

ASCII is a function from the natural numbers between 0 and 127 (inclusive) to various symbols. Because of this, it can be represented perfectly as a 7-bit binary number, and the standard actually was designed for it to be easy to encode as a 7-bit binary numbers. Computers use 8-bit bytes these days though, so usually you'll find ASCII in 8-bit form, with the first bit always being 0.

It will be useful to know how to count in binary (base 2). This is just like counting in base 10, except instead of counting each digit up to 9 before carrying-forward to the next place, you just count up each bit (binary digit) to 1. So rather than going 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, (…), you would go 0, 1, 10, 11, 100, 101, 110, 111, 1000, 1001, 1010, 1011, 1100, (…).

Finally, when I say "left-pad to N bits", I mean adding zeros to the left of a number until it's N bits long. For example, 4 is one digit and 0004 is 4 left-padded to 4 digits. Similarly, 100 is three bits and 0100 is 100 (4) left-padded to 4 bits.

With that, you can encode the following things in ASCII as follows:

- The $N^{th}$ uppercase letter is 010, followed by N in binary, left-padded to 5 bits. For example, since L is the $12^{th}$ letter and 12 is 1100 in binary, uppercase L would be 01001100 in ASCII.
- The $N^{th}$ lowercase letter is 011, followed by N in binary, left-padded to 5 bits. For example, since a is the $1^{st}$ letter and 1 is 1 in binary, lowercase A would be 01100001 in ASCII.
- The $N^{th}$ digit is 0011, followed by N in binary, left-padded to 4 bits. For example, 4 is 100 in binary, so it would be 00110100 in ASCII.
- Space is 32 left-padded to 8 bits, i.e. 00100000

That's it! The area around these numbers, (33–47, 58–64, 91–96, (123–127) are all symbols, like !@#$%^&*() etc (not in that order). Characters below 32 are the "non-printable" characters I mentioned earlier, that do special things like "move the cursor to a new line", "delete the previous character", "make an alert bell sound", and so on. I don't have a good way to remember which one of those is which, but we already have feature-parity with boldblazer's article so I'm happy.

Translate the following message for a free gift: 01110100 01100101 01101110 01100100 01110011 00100000 01100100 01101111 01110100 00100000 01110100 01101111 00100000 01110011 01101100 01100001 01110011 01101000 00100000 01100110 01110010 01100101 01100101 01101110 01101001 01110100 01110010 01101111 00100000 01100100 01101111 01110100 00100000 01110000 01101000 01110000

*tendstofortytwo*

# 11 THINGS THEY DON'T TELL YOU AT PROD NIGHT

- no writing actually gets done during prod night; most people write their articles in advance or in a guilt trip after prod night
- the none-pizza-with-left-beef crowd sounds very threatening but they're actually just a very vocal minority which is why they never win
- some people here aren't actually students (and haven't been for many years)
- the editors want more short articles because they are easier for layout
- you can get pizza without writing by volunteering to pick up the pizza
- rushing to get pizza almost never pays off, it's easier to just wait for the crowd to disperse
- snacks run out faster, you should rush for those instead
- the paper plates we use for pizza aren't recyclable
- they're not compostable either
- **mathNEWS** is running out of money
- it costs a lot of money to print **mathNEWS** so think before you write
- oops

*water*

# RANKING MY MATH 145 ASSIGNMENT PROBLEMS

What's up gamers? So for my first **mathNEWS** article, I wanted to make a ranking of some kind, and what better things to rank than problems from my MATH 145 assignment?

This ranking will be based on my personal experience doing A1, and the criteria for each problem are its difficulty (how much I struggled with it) and its fun-ness (how much I enjoyed struggling with it). The problems are also ranked in order based on how much I liked them :)

#### 3. QUESTION 3

Difficulty: 4/10
Fun-ness: 3/10

This question was pretty simple. I got the pattern in a couple of minutes and didn't spend much time typing it up either. I did somehow forget to prove the only if part of the question at first (that's the only reason it gets 4/10 for difficulty), but thankfully Prof. Bell reminded us in class. I honestly don't know why it was question 3 since the previous one was much harder.

#### 2. QUESTION 1

Difficulty: 6/10
Fun-ness: 5.5/10

I liked this question, but only because I like most number theory questions. The first part of it was not too hard, but the second part was pretty tedious since I couldn't think of anything better than enumerating all the possible cases for $a^2$, $b^2$, and $c^2$. I also just find the result cool in general.

#### 1. QUESTION 2

Difficulty: 9/10
Fun-ness: 8/10

Hot damn! This question took me more time than I would care to admit in a **mathNEWS** article. In fact, I probably wouldn't have solved it at all had we not gotten a big hint in one of the tutorials. It turns out that the question had to do with the approximating algebraic numbers using rational numbers, specifically the best possible approximation of $\sqrt{2}$. The solution was really elegant after I knew to use the difference of squares formula, and I had a lot of fun solving it.

By the way, shoutout to the people in the PMC office who helped me check my proof for this question!

*NUT*

# N THINGS IN NEW YORK CITY, LISTED BY BIGNESS (ASCENDING)

- The amount of legroom at the Paul Kerr Theater
- The temperature in the subway car
- The number of similar but subtly different subway lines running through Midtown Manhattan
- The temperature in the subway station
- One World Trade Center
- The amount of cream cheese they put on my bagel
- The number of times my debit card failed at the subway turnstile

*UW Unprint*

# STOP DOING GIT

- FILES WERE NOT SUPPOSED TO BE GIVEN HASHES
- YEARS OF PROGRAMMING yet NO REAL-WORLD USE FOUND for working with another person
- Wanted to collaborate anyway for a laugh? We had a tool for that: It was called "COPY AND PASTE"
- "Yes please let me REBASE A FILE. Let me BLAME it" — Statements dreamed up by the utterly Deranged

LOOK at what real Developers have been demanding your Respect for all this time, with all the computers and monitors we built for them
**(These are REAL Git commands, done by REAL Programmers)**:

```
git instaweb --httpd=webrick --stop
????

git merge -Xignore-space-change whitespace
??????????

git bisect run test-error.sh
??????????????????????
```

"Hello yes I would like to GIT RESET HARD"

**They have played us for absolute fools**

*Dick Smithers*

# WHY YOU COULD BE A MATH AMBASSADOR

### *BUT NOT WHY YOU SHOULD BE*

This isn't an article telling you to be a Math Ambassador.

Math Ambassadors are the tour guides, email contacts, and general student life representatives of the Math Faculty. It's unpaid, but they give us enough free food that it pretty well makes up for it, so long as you're the kind of person to enjoy being an ambassador in the first place.

I am! Helping students to make one of the most important and difficult decisions they've had to make so far in their life is rewarding. It gets me free food, the occasional free university merch, and it's something interesting to do with a weekend each semester. But I think that if that was all I got out of it, I wouldn't continue doing it. This isn't an article telling you to be a Math Ambassador.

For some people though, there might be more to it. I'm not someone for whom being charismatic comes naturally. I'm told I'm getting better at hiding that fact, but I can always still use the practice. Being an ambassador provides that practice. Talking to complete strangers, whether face-to-face or by email, forces me to stretch my conversational abilities. It's investing your skill points into charisma, and I've played enough Fallout 4 to see the use in that. This isn't an article telling you to work on your social abilities though.

Simultaneously, as the faculty-designated Knowledgeable Person In The Room, ambassadors get the opportunity to be someone looked to for answers, for guidance. You have to answer questions to the best of your ability, you have to think on your feet. In order to not let down these groups of travelers from faraway cities, you have to be *confident*. I don't struggle with that as much as I once did, but I think it is because I often seek out roles like this. Responsibility forces improvement. Stretching forces improvement. This isn't an article telling you to stretch though.

But some people should. Some people enjoy responsibility, and would like more chances to talk to people. That's some people's idea of growth.

I think these people would fit well as a Math Ambassador. That's really the only qualification they need to apply; as long as they have satisfactory academic standing, they'll meet the minimum requirements. Being in the Math Faculty isn't even explicitly stated as a requirement. There's not even an interview process—the minimum requirements to be an Ambassador are currently engaged in a limbo dance with a snail, and the snail *isn't winning*.

This isn't an article telling you to be a Math Ambassador. It is only to say that there exists a set of students who would enjoy and benefit from being a Math Ambassador, and there is the single-element set including you.

The intersection of those sets is left as an exercise to the reader.

*molasses*

I unfortunately can't say what the recruitment timeline for ambassadors is this term. I suspect the timeline has already passed, but equally, I'm not sure it has started yet! Certainly the window to apply to help with Fall Open House hasn't opened yet, and neither has the recruitment timeline for the winter.

# CHALLENGE: MODELLING THE VOLUME OF A FILLED DONUT

### *PART 1.5 OF N ON A STATISTICAL ANALYSIS ON THE BOSTON CREAM DONUT FILLING*

If you are expecting a part 2 on A Statistical Analysis on the Boston Cream Donut Fillings from 152–5, unfortunately, the continuation is due for a delay, due to the intermission of other, more important articles to be written. You can expect part 2 to be released soon. (This is totally not because this is too much work for me around End of Term last term).

In lieu of this void, I invite you to a challenge of mathematics! While I have my own methodology, I invite *you* to come up with a formula to best model the volume of a *filled* donut! Or, if you are feeling even more challenging, the volume of the **filling!** Note that the tools you have at your disposal is one meter stick, nothing more, nothing less.

*There will be PRIZES! That's right! For the best formula with sufficient explanation for each category (volume of donut overall and volume of donut filling), I will give the winner (at my judgement) one free Math C&D donut of the winners' choice! Note that your formula must take into account both practicality of measurement and accuracy of result.*

Submit your formulae here:
https://forms.gle/zFqQNBvfKDbrEYbGA

*RobbotC*

# ~~MONDAY~~ FRIDAY

### *MORE GARLIC BREAD? I'M ALL HERE FOR IT.*

CnD had chili with garlic bread today! On a Monday! Rumour has it that Mondays are the new Fridays. BUT, what if both Mondays and Fridays are now Fridays, and they got rid of mac 'n' cheese? I can finally tolerate Mondays.

*Garlic Bread Enthusiast*

# A NEW TERM, OLD SHENANIGANS — A NEW HOME, A LONG-AWAITED PIZZA

## mathNEWS™ *MOVES ITS* prodNIGHT© *TO B1*

Trying to become a **mathNEWS™** writer?
Be one, by coming to **prodNIGHT©** at B1 room 271!

The next **mathNEWS™ prodNIGHT©** is on the 2nd of October, and takes place every other Monday!

### PIZZA REVOLUTION

Imagine the dystopian future we live in — us poor, starving university students — lured into writing **mathNEWS™** articles by the delicious, delicious smell of pizza. And yet, not even the pizza we want! None pizza with left beef, the most popular pizza choice in the **prodNIGHT© pizzaDEMOCRACY©** polls, is repeatedly blocked from being ordered. This has left beef between us writers and our tyrannical **mathNEWS™ overflowLORDS©**. However, their **mathPRIDE©** was crushed before the fall term, and we managed to sneak in a none pizza with chicken right as I am writing this article.

### THE ROOM WHERE IT HAPPENS

The latest **mathNEWS™ mathDRAMA©** involves our expulsion from our previous room in M3, into the new **prodNIGHT©** room, B1, the Basement of Debasement. While our previous room was a frozen wasteland, this room is a devilish torture chamber of hell, brought to us by our tyrannical **mathNEWS™ overflowLORDS©**. Shackled in place to our teeny tiny tables, we yearn for the freedom we once had to collaborate. A biology building, a fitting place to dissect our writing, and once our purpose has been fulfilled, a fitting place to dissect ourselves.

Mere minutes after starting, one of our fellow writers had fallen through their chair, breaking it in the process. It was as if he had tumbled into his own personal descent into hell, a plunge into the River Styx's treacherous waters. Unfortunately, despite making his grand pilgrimage to **mathNEWS™ prodNIGHT©**, this rendered him unable to write, leaving him pizza-less for his troubles.

In the fiery abyss of hell, a dear friend of mine gasped desperately for salvation, clawing at the heavens above, yearning to escape the relentless torment below. Satisfied with the struggle they had perceived, our **mathNEWS™ overflowLORDS©** took mercy upon him. They reached down and, with a benevolent gesture, granted him a drip of holy power, lifting him high above the inferno. It was as if they had extended a lifeline from the divine realms, allowing him to plug in his power cord, while the rest of us watched in awe.

Ironically enough, one of the **mathNEWS™ overflowLORDS©** were so impressed by my style, they looked into their **mathMAGIC™ newsBALL©** of the future, and shape-shifted into my form. They just so happened to have long hair, wear a sweater, AND also have a bike helmet.

### A LEGACY

However, despite our tyrannical **mathNEWS™ overflowLORDS©**, despite us currently writing in a decrepit basement, the **mathNEWS™** magic still lives on. Even after fifty years of issues, nothing has been able to put out their flame. Part of this magic is the flexibility of it all. There is something for everyone, from the newcomers to the veterans. As the terms come and go, the people change too. You can take a hiatus and come back without worrying that you are no longer part of the clique, something most other clubs/services have fall prey to. You can drop a B1mb of an article, or drop a shitpost. By the end of it all, a delicious pizza is in your mouth. A beautiful manuscript is crafted, compiled, and released into the tides of history. So why not become part of that history?

*Pizzeudonym*

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# HACK THE NORTH APPLICATION HAIKU

## *IN HONOUR OF HACK THE NORTH SEASON*

hack the north is cool,
please let me participate,
thank you kind humans

*phisoup*

# THE POWER RANGERS SEASONS ON YOUTUBE

*WHICH ARE WORTH YOUR TIME?*

Did you know that the first twenty-three seasons of Power Rangers are available for free on the Power Rangers YouTube channel? That may seem like a lot, but don't worry: I've watched through them, and have a guide ready to help!

**MIGHTY MORPHIN (SEASONS 1–3)**

It's a tad rough, as the show's still finding its footing and relies heavily on its Monster of the Week format, but if that format appeals to you, these are definitely the series I recommend! Dated, but not terribly so, and a classic for a reason.

**MIGHTY MORPHIN ALIEN RANGERS (SEASON 3A)**

Basically they wanted to give the actors who played the Power Rangers a break, so they de-aged all their characters into kids and brought in a team of aliens to be the new Power Rangers for ten episodes. It sucks because it doesn't know whether it wants its focus to be the kids or the aliens.

**ZEO (SEASON 4)**

This is where the show finds its footing. The characters feel like they've grown into adults, and the plots become more complex. This, to me, feels like archetypal Power Rangers.

**TURBO (SEASON 5)**

So YouTube doesn't have the movie that leads into this season which is kind of key, which means you'll have to track it down separately. But honestly, it's not worth it. The villains suck, all the plots involve bombs for some reason, and the whole team switches out halfway through. Oh, and there's a preteen Ranger for the first and only time. It's a mess, but it leads into something great.

**IN SPACE (SEASON 6)**

I think this has to be my favourite season. The stakes are high but also feel personal, the dynamics are well-developed, and there's a real sense of momentum throughout the series. Its finale is also the finale of this era of Power Rangers; from now on, each new season replaces the entire team.

**LOST GALAXY (SEASON 7)**

The arc that gives the season its name sucks, and the characters are basically blank slates, but other than that? It's meh. Notable for having the first Power Ranger to die.

**LIGHTSPEED RESCUE (SEASON 8)**

Imagine if Paw Patrol was aimed to a slightly higher age demographic, and they fought demons. It works better than the premise would imply.

**TIME FORCE (SEASON 9)**

I think this season has the best characters in the franchise, they all feel really complex and fit together well as a team. I'm also a big fan of the premise and status quo. Overall, a highlight season.

**WILD FORCE (SEASON 10)**

The Zords (giant robots that the Rangers fight in) are CGI for the first time this season. This is 2002, so they don't look good, and there are way too many. Also has the first special anniversary episode with ten Rangers from all the old seasons, which I regret to inform you, sucks. Not a bad season overall though.

**NINJA STORM (SEASON 11)**

The show shifts back into more jokey territory here, which is a bit of whiplash after Wild Force. If you want ninjas doing a variety of extreme sports (which it leans into really hard due to extreme sports' popularity at the time), this is the show for you.

**DINO THUNDER (SEASON 12)**

A bit of a back-to-basics season, featuring high schoolers for the first time since Turbo… But this time, their teacher's a Ranger too, and a returning one at that! Broadly fine, the character of Trent is a highlight.

**SPD (SEASON 13)**

I have friends who love this season, a police procedural with aliens set in 2025. I am sorry to tell those friends that I disagree; this isn't a terrible season, but I think it's solidly mid-tier. The characters are good, though, up there behind Time Force. Check it out and see for yourself!

**MYSTIC FORCE (SEASON 14)**

Has the most of-its-time theme song in the series, which I personally find endearing. A lot of the overarching lore is good, and I like the setting, but a bit forgettable.

**OPERATION OVERDRIVE (SEASON 15)**

All the characters suck! The plots are boring! Don't watch this! (In fairness, the villains are well-done)

**JUNGLE FURY (SEASON 16)**

This season's mentor is a love him or hate him character. I find him absolutely insufferable. That being said, there's some decent character drama, and the Red Ranger has a really strong arc.

#### RPM (SEASON 17)

Post-apocalyptic Power Rangers fighting AI, probably the best premise that the series has ever had, and it delivers on it pretty well. A tad misogynist, unfortunately, which ruined it a bit for me.

#### MIGHTY MORPHIN RE-VERSIONED (SEASON 1A)

For behind the scenes reasons, they couldn't get a season ready in time, so they just put a bunch of VFX over the first season of the show. Puzzling, but not really worth your time.

#### SAMURAI/SUPER SAMURAI (SEASONS 18/19)

This is a personal favourite, but I can admit that if you're not me, it probably sucks. It feels like watching a really bad dub of a really good anime, because that's basically what it is: they copied the plot of the Japanese series this was based on almost exactly due to not having much lead time. Also, the characters are basically cardboard cutouts.

#### MEGAFORCE/SUPER MEGAFORCE (SEASONS 20/21)

The series that answers the question "What if they did Mighty Morphin again, but bland?", which nobody was asking. The second season dips into a bunch of nostalgia for old Rangers. Had to come up with a weird headcanon for the Red Ranger with some friends to make anything about him make sense (it's that he's an angel, for the curious).

#### DINO CHARGE/DINO SUPER CHARGE (SEASONS 22/23)

Has the most Rangers in the franchise on a team, but despite that, doesn't feel stuffed. The team dynamics are cool, and there are some really clever plot elements. Marks the show's return to form which continues to this day.

**Summary of Recommended Seasons on YouTube:** Mighty Morphin, Zeo, In Space, Lightspeed Rescue, Time Force, SPD, Jungle Fury, RPM, Dino Charge, Dino Super Charge

*Predap*

# ACCEPTING INVITATIONS TO MADNESS

There's a class of events that I have been calling invitations to madness. They all follow the general theme that you have limited time to do a creative project with constraints. Examples include hackathons: create a video game in a weekend; March Madness: direct a play in a week; NaNoWriMo: write a novel in a month.

These events take all sorts of shapes and sizes but all have the fundamental guiding principle of going fast and breaking things. The challenge will depend on the event. Not all mountains of madness are the same difficulty to scale (looking at you NaNoWriMo), but the idea is the same: create now, polish later.

I am a big fan of these kinds of events. They give structure and community to push you to create. The only way to get good at any skill is to *do it*. It's easy to say that you would like to do a Thing *someday*. These events force you to do the Thing *now*. They also help combat your inner critic; the very nature of these challenges means that a certain amount of imperfection is the expectation. You are expected to take risks, and you are welcome to make interesting mistakes. That's part of the experience; it's part of the fun. If you want to be a good writer, it's as important to know what works as what doesn't work. The best way to learn that is through experience.

Heck, I would argue **mathNEWS** prod night falls into the same class of events. The idea of prod night is you show up and you write an article. One of the reasons that **mathNEWS** is so lax when it comes to what it will publish is because of a philosophy that, if you encourage people to write, they will eventually get good. You can see that for yourself if you pick any writer and see what articles they wrote in their first year compared to their fifth year.

I encourage everyone to accept these invitations to madness when they come up. They can be a lot of fun. It really empowering to see what you can do when you try. They are really addictive. All of these events I have personal experience with have a dedicated following that keeps coming back to participate time and time again.

This article is brought to you by the **Inkfort Publishing Derby**: the most recent invitation to madness I have accepted. The challenge is simple. You are assigned the cover of a non-existent novel and you have to write a minimum of 10K words matching the cover and self-publish it. There's a competition to see who gets the most sales from the participants. How well can you market your novel using only an anonymous pseudonym?

Writing a novel has been on my bucket list since forever. It's so easy to say I would like to write a novel someday, but at some point you have to ask yourself if maybe that day is today. I am very grateful to the Inkfort Publishing Derby for giving me the push to actually take a step toward that goal.

As per the rules of the competition, I can't say which story I wrote. I can say that it will be available to read this Monday, September 25th. You can see all the stories here: https://inkfortpress.com/derby-2023/

You are welcome to see if you can figure out which one is mine. Is the decade I have been writing for **mathNEWS** a sufficient corpus for you to deduce my identity?

*Beyond Meta*

# COOKING AND WHY IT'S IMPORTANT BUT I HAVE A COMPLICATED RELATIONSHIP WITH IT, PLUS A RECIPE

*THE RECIPE PART IS GOOD, I PROMISE*

The vast majority of articles I've written for **mathNEWS** have involved food in some way shape or form, so now that I am a seasoned (AHahahHa) fourth year student, I thought I could take the time to explain what cooking means to me. I am a sentimental fella after all.

It all started when yummyPi was but a wee babe— ok we can skip this part. Obviously I did not come out of the womb with a skillet in hand (unless…). I learned how to cook from my mother, who was a professional chef in a hotel in China, when I was around 13 or so. When I was 14, I started to cook part-time in the restaurant my mother was working at in Canada.

People often think that I am really good at cooking, but I'm really not, I think I just have more experience and practice than most people do at my age. The question of whether I enjoy cooking is a more complicated one.

Once, I asked my mom while she was making dinner if she liked cooking. She laughed and said no. She said cooking at home was a thankless job. And cooking for customers was a back-breaking, arthritis-inducing thankless job that paid little. My mom started cooking full time when she was 16. She liked her job in China, but after some legal circumstances surrounding my birth, she was forced to give it up (I wish I was joking, it's kind of a long story. I definitely wrote about it in one of my past articles.) But what really broke her passion was cooking at home.

That isn't to say that my father never cooked, or that we never went to a restaurant. But the vast majority of this labour fell to my mom. And her reward? The family got to eat and live another day.

The majority of domestic labour is like this. The reward for cooking regularly is that your family is fed. The reward for doing laundry is that they are clothed. The reward for cleaning is that the home is free of mold and pests. In other words: it is just the status quo. It is what is expected. No one gives you fanfare or money for it. And you have to do it again and again, unless you are wealthy enough to hire someone to help you, eat out or otherwise outsource this labour.

My mom didn't really have a choice in the matter. She knew what she had to do to keep us alive, and she did it. But she eventually tired. And now I have this very complicated relationship with cooking.

Stepping in a kitchen is comforting to me, yet very agitating when things do not go my way. The sound of the kitchen fan roars in my ears, but I stop hearing it after a while. The smell of the food I'm cooking fills the room regardless, and my senses dull. I move my knife confidently, even though my soft skin has been split by it countless times. It's hard to describe the feelings cooking invokes in me. Do I like it? I don't know. I just know that I have to do it.

But there are aspects of cooking that I absolutely do love. When my friends and family smile and tell me that my food is good. When I execute a dish exactly the way I envisioned it. And most of all, when my mom teaches me a new dish, she tastes it, and she says "Good job. Look at you. You're a good cook now." She loves teaching me how to cook (she didn't always, but that's a story for another issue) and watch me succeed in this essential life skill. And I love her.

Her recipes can't be written down. She teaches me by speaking in Mandarin and Shanghainese. She teaches me by showing me how it's done on with one example and letting me do the rest. I can't replicate it in writing. The ingredients are dependent on what you have on hand, and how creative she feels. She teaches me the way I imagine countless people have taught their children how to cook, throughout the ages.

But here's a recipe somewhat close to what she teaches me:

### PORK AND PICKLED MUSTARD WITH BLACK FUNGUS AND PEAS

**Ingredients:**

- Pork tenderloin, cut into thin strings
- Salt
- Pepper
- Cooking wine (optional)
- Corn starch
- Cooking oil
- Black wood-ear fungus, hydrated in water for ~30 mins and cleaned and chopped
- 1 pack pickled mustard root, chopped coarsely
- Sugar
- Peas

**Preparation:**

1. Mix the pork with salt, pepper, a splash of cooking wine and a spoon or two of cornstarch in a bowl. Refrigerate for ~15 minutes.
2. Heat a skillet or frying pan on medium and add some cooking oil.
3. Fry the pork until the colour has changed (fully cooked). Use a lid if you have it to speed this process along.
4. Add the wood-ear mushroom and pickled mustard root.
5. Add sugar to taste, stirring and cooking for another minute or two.
6. Stir in the peas and cook until everything is warmed through.
7. Plate and serve with white rice.

**Feeds:** as many people as it needs to.

**Calories:** God, who the hell knows.

**Time:** Depends on how much you're making.

**Customizations:** Literally use whatever vegetables you'd like to add in, just adjust everything to taste and make sure it's all cooked.

I hope this was helpful. It's very likely that no one other than myself will make this, but it is one of my favourite dishes from my childhood. And I finally got the recipe (sort of) this weekend. So I am very happy with it. And I hope you are happy too, dear reader. You deserve happiness.

yummyPi

# OVERVIEW OF MODULES IN MATH++

Math++1920 introduces *modules*, a modern solution that turns Math++ rings and fields into more abstract objects. A *module* is like a vector space but with scalar multiplication over a ring rather than a field (or more precisely, the set of scalars are a ring). Modules eliminate or reduce many of the problems associated with the use of vector spaces. They often reduce proof assumptions. Numbers, comments to the reader, and bound variables declared in a module aren't visible outside the module. They have no effect on the translations of the proof that uses the module.

You can use modules in any order without concern for the working mathematician. Professors in the mathematics faculty don't participate in overcrowding resolution or name calling in lectures about modules. After a module is used once, the results are stored in a Springer book that describes all the defined sets, functions, and theorems. The reader can process that book much faster than a blackboard. And, the author can reuse it every place where the module is needed in a proof.

You can use modules side by side with algebraic structures. A Math++ proof can use modules and also include algebraic structures. In some cases, you can use algebraic structures as a module, which is faster than using including it to process it with the proofreader. We recommend that you use modules in new proofs rather than other algebraic structures as much as possible. For larger existing proofs under active development, experiment with converting legacy algebraic structures to modules. Base your adoption on whether you get a meaningful reduction in publishing times.

To contrast modules with other algebraic structures in mathematics, see *Compare algebraic structures, modules, and Springer books*.

terminal

# B1 :(

I don't have to tell you things are bad. Everybody knows things are bad. It's depressing. **mathNEWS** is out of MC and scared of losing B1. An article buys 1,000 words; Imprint is going bust[1]; and the geese are running wild on Ring Road, and there's nobody anywhere who seems to know what to do, and there's no end to it.

We know B1 271's plugs are unfit to use and the tables can't fit a laptop. And we sit watching our announcements channels and **mathNEWS** mailing lists while some local editor tells us that today we will just have to come with our computers precharged as if that's the way it's supposed to be!

We all know things are bad — worse than bad — they're crazy.

It's like everything everywhere is going crazy, but what can we do? We sit in B1 271, and slowly the issues we're writing are getting smaller, and all we say is, "Please, at least leave us alone in our writing and reading. Let me have my **gridWORD** and my **profQUOTES**, and I won't say anything. Just leave us alone."

Well, I'm not going to leave you alone.

I want you to get mad!

I don't want you to protest. I don't want you to riot. I don't want you to write to MathSoc, because I wouldn't know what to tell you to write. I don't know what to do about the room booking and the article word count and the used book store and the crime in the street.

All I know is that first, you've got to get mad.

You've gotta say, "I'm a **mathNEWS** writer, goddammit! These prod nights have value!"

So, I want you to get up now. I want all of you to get up out of your chairs. I don't care if you are in a common area or at your apartment or even in class. I want you to get up right now, take a deep breath, and yell,

"I'm as mad as hell, and I'm not going to take this anymore!!"

*aphf*

1. No more kindling :(

# ORIENTATION #1'S!

TRIGSTERS, TRIGSTERS
SHARP & BRIGHT
MATH'S OUR GAME
WE GET IT RIGHT
TRIGONOMETRY!!!!!!!

Trigster

# HOW YOU CAN GET INTO WATERLOO

So I'm sure you all have many questions, and I'm here to answer.

How did I get into Waterloo for *[INSERT DESIRABLE PROGRAM HERE]*?

Well tough luck kid. It's pretty much impossible and you should give up. Unfortunately for us both, I want to write a big article that takes up the entire page and inflates my ego, so… Follow these tips, and you might just have a shot.

First off, make sure you knew that you wanted to go to Waterloo from at least 2 years old. If you spent time to discover yourself or explore your options you're out of luck, try again in the next life. Remember that admissions officers are looking for people willing to sacrifice everything to go to Waterloo, including their time, dignity, and health (They chose you because they knew you would succeed).

Secondly, secure a Senior Software Developer internship at Apple, Google, or Tesla before grade 12. Waterloo wants to accept people who will thrive in their co-op programs, so an internship at any of these companies will be adequate. If you tried working at a normal Summer job like your local Tim Horton's, Walmart, or Pizza Hut, you should give up right now. You're just wasting the admissions officer's time.

Thirdly, create a direct email conversation with the dean of the faculty of [INSERT DESIRABLE FACULTY HERE]. Show them your side projects (Did I mention you should be doing side projects?) and keep pestering them about how you are extremely excited to go to Waterloo. Remember to keep repeating your name, student number, and programs you are applying to. This is a tried and true strategy which will guilt the staff into accepting you.

Finally (and this is the biggest tip), have rich parents. Tell them to make a generous donation to the University of Waterloo. Make sure the amount is large, the larger the better. Waterloo admissions officers are looking for students who prove they can pay off their crippling debt when they get out of university. Imagine every thousand dollars is an extra percent added to your grade (in this scenario, you can go over 100%). Extra points if your parents are alumni. If the university is constantly going to ask them for funding, their kids may as well benefit, right? A (large) donation is a guaranteed way to get in to Waterloo, and you don't even need to do any work for it!

**LINK HERE:** https://uwaterloo.ca/support/give-to-waterloo/how-to-give

If you follow all these tips, you just might have a shot at getting into the prestigious, world renowned, extremely accountable University of Waterloo. Remember to brag about your accomplishment to everyone you meet. Bonus points if your family brags to other families at parties *("**My** son/daughter just got into Waterloo!")*.

So that's how **you** can get into Waterloo. If you get deferred, I am not responsible for any feelings of sadness, regret, and anger you may feel. Good luck!

*mustafa25*

# PROS AND CONS OF TRANSFERRING INTO CS

**PROS**

- Can access CS exclusive upper year courses
- Bragging rights

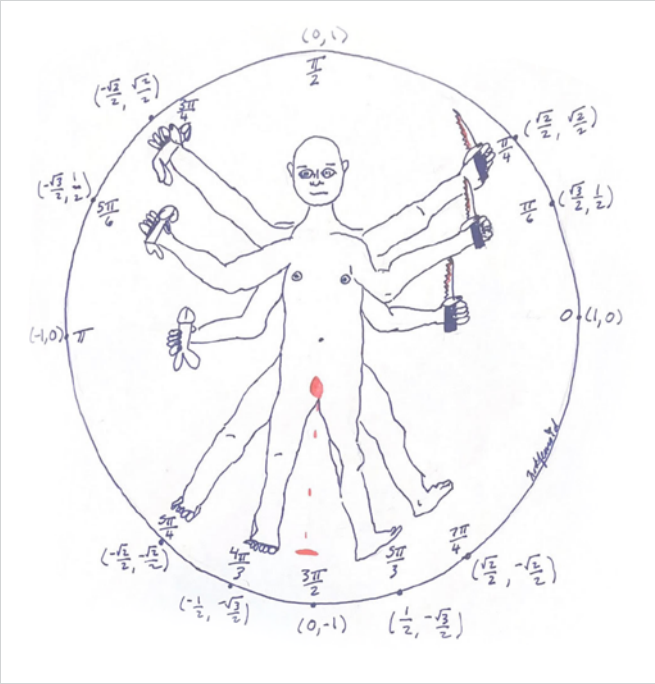
**CONS**

- The tuition is a lot higher
- You become a duck salesperson

Written by someone selling rubber ducks to pay for increased tuition. $1 per duck! More information in the next edition of **mathNEWS**!

*mathgeek*

# THE EUNUCH CIRCLE




*hotfemoid*

# HI gridWORDERS

## gridCOMMENT *153.1*

helo :o

welcome back to more **gridWORD** action!! being as this is the first issue, i'll leave this short so you can just get started on doing the **gridWORD** >;)

i look forward to seeing all the usual people send solutions, and hopefully to seeing some new people too :0000

for this issue's **gridQUESTION**, i ask you "what is the weirdest thing you would do for $5?"

please send your **gridWORD** solution, along with a **gridQUESTION** answer and your pseudonym to mathnews@gmail.com by October 2nd at 6pm, and i will see you all again next issue :)

have a great semester everyone!!!1!1!1!1!11! :oooooo

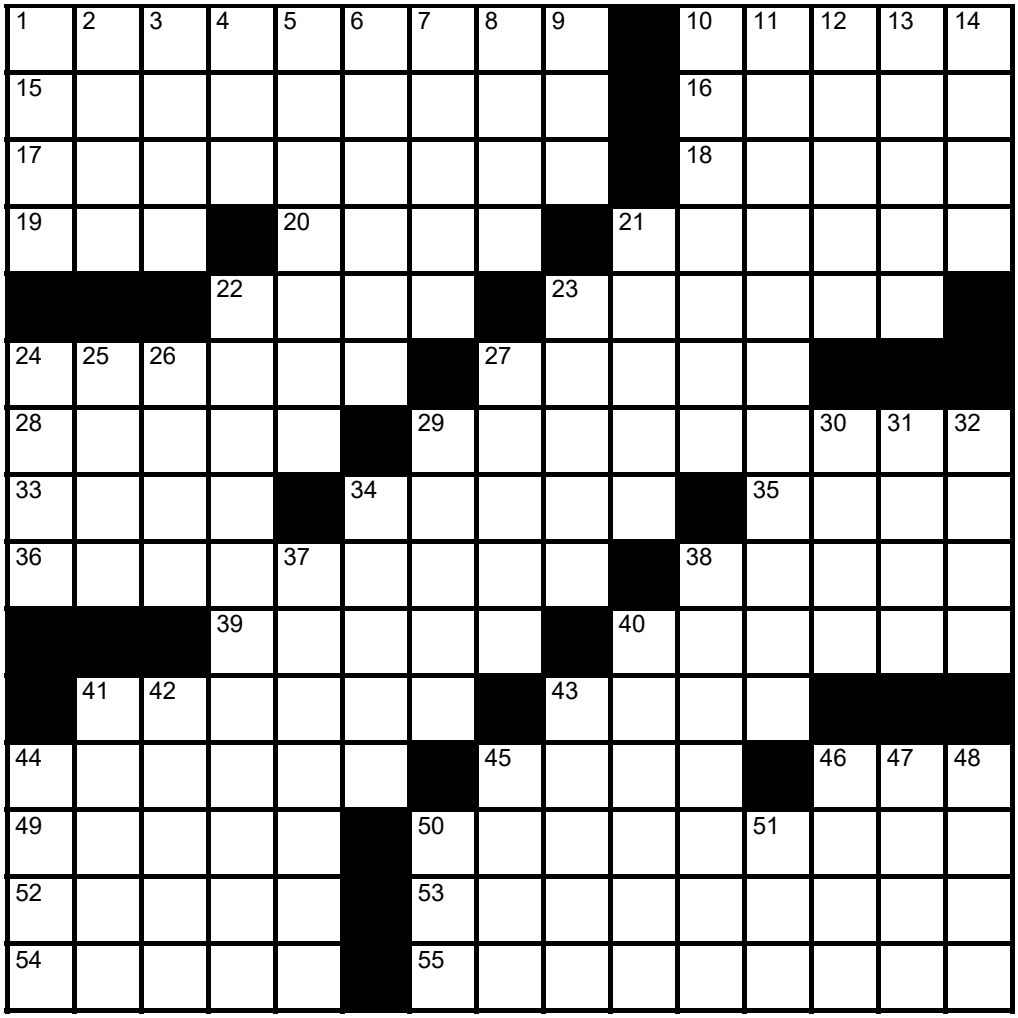
*Wink wonk*

### ACROSS

1. Happen
10. Spasm
15. One who pauses from uncertainty
16. Brewer's need
17. Say a third time
18. Female demon
19. Not quite right
20. Load
21. Flocks of quail
22. Feel sorry for
23. Like for some peoples teeth
24. Tart
27. Access the Web
28. The answer is "araks" lol
29. Welding and soldering et al.
33. Bermuda, e.g.
34. Desire
35. Side squared, for a square
36. Is obtrusive, again
38. Markiplier's favourite drink
39. Bay window
40. Semicircular antenna housing
41. Church bylaws
43. Moistens
44. Colors slightly
45. MP, as in an RPG game
46. The pink one you should all have*
49. Pond buildup
50. Things made of iron or steel
52. Wispy clouds
53. Not time-related
54. "Father of the Symphony"
55. Is a menace to

### DOWN

1. "Comin' ___ the Rye"
2. Coral ___
3. "In your dreams!"
4. It may be picked
5. Loafers, e.g.
6. Even or odd
7. Europe's "boot"
8. Memorization method
9. Before, in verse
10. Pain killer*
11. Upwards, to the sky
12. Chinese silk plant
13. Willow twig
14. Greek H's
21. Brought forth
22. Like pikachu on paper*
23. Politician's quest
24. Animal house?
25. Gaelic language
26. French Sudan, today
27. Carpenter's tool
29. He split the red sea
30. After-lunch sandwich
31. 500 sheets
32. Glacial sand deposit
34. Loonies and toonies*
37. Muscle builder
38. Tree with long beanlike pods
40. Handle differently?
41. Eyelashes
42. Furious
43. No-cal drink*
44. R.p.m. indicator
45. I can't believe Mr. White broke bad and made ___
46. Container weight
47. Persia, now
48. Snakelike fish
50. Welcome ___
51. Know, archaically



# lookAHEAD

| SUN SEP 24 | MON SEP 25 | TUE SEP 26 | WED SEP 27 | THU SEP 28 | FRI SEP 29 | SAT SEP 30 |
|---|---|---|---|---|---|---|
| | National Quesadilla Day | Drop deadline<br>Tuition and fee refund deadline — 100% | Drop with WD begins | Ask a Stupid Question Day | | Saturday II |

| SUN OCT 1 | MON OCT 2 | TUE OCT 3 | WED OCT 4 | THU OCT 5 | FRI OCT 6 | SAT OCT 7 |
|---|---|---|---|---|---|---|
| Inverse Halloween (least scary day of the month)<br>International Coffee Day<br>Saturday II (observed) | **mathNEWS** 153.2 production night<br>Final exam schedules released<br>Course selections end | | Cycle #1 interviews end | Cycle #1 employer rankings available | Cycle #1 match results available<br>**mathNEWS** 153.2 marches boldly onto the front lines | Reading week begins |

## BECOME AN MSC EXEC AND CLUB MEMBER

The Math Studies Club is making a comeback, and we are looking for execs for the fall 2023 term.

We welcome anyone interested in participating in the Math Studies Club and would like to involve themselves in more Math Faculty clubs. Specifically, we are looking for people to fill the following roles:

- Social and Academic Event Coordinators
- VP Marketing
- Marketing Exec
- VP Operations

To apply for a position, email us at mathstudiesclub@gmail.com.

*Amelia (MSC President)*

## EVERY ANIME ROM-COM EVER

Face full flush with the box cutter blush and the
Words full slush in a half stutter rush with the
Brain full mush and the heart flutter gush from the
Fateful brush with her half-brother crush

*Anonymous*

## 2023 KEY CLUES CHALLENGE

Geese have taken over the Dana Porter Library, we need your help before it's too late!

https://keyclueschallenge.com/

CEMC

## THE EDITORS' FAVOURITE ROOMS ON CAMPUS

- **evaluatED:** MC 3030
- **distractED:** MC 3030
- **awED:** MC 3030
- **caffeinatED:** MC 3030
- **classifiED:** MC 3030