



“SNOW: YAY OR NAY?”

Why is it snowing? It's much too early to remember the inescapable threat of time looming over me.

Ah, yes, once Halloween passes, we exchange Pumpkin Spice for Peppermint! Time to curl up by the window with a blanket, a nice drink, and read your favourite news publication while burning your tongue off with hot chocolate. Perhaps you can listen to soothing music — but, as Mariah Carey is still defrosting, you'll have to settle for whatever weeb music kids listen to these days.

As I sit here, it's 10:15 PM right after the production night of 150.5, the issue you're reading right now. My stomach has been sated with pizza, assorted chips, and soda I probably shouldn't be drinking because I just had one two hours earlier. Not exactly my idea of comforting, but I make it work with the addition of the soundtrack of *Byoinzaka no kubikuri no ie* (Translation: The Hanging House on Hospital Hill), a soundtrack where when you finish as a philosopher enlightened to the meaning of life and death. Cool for a murder mystery made in '79, right? What do you mean, I'm still a weeb for preferring Japanese retro cinema?

In the spirit of a past volume that featured a cookbook (148?) we have a lot of recipes! From falafel and chicken soup to low effort banana pancakes, to... a chili recipe from a roleplaying site??? And don't worry — these are recipes that don't have a completely arbitrary preamble that contributes nothing to the recipe, unless it's variations or substitutes, but those will be granted 'thin ice' status.

If cooking isn't your fancy, there's still plenty of things for you to sink your teeth into! Like honey roasted peanuts. Or if you want to eat things of the more metaphorical sense, eating your words as you witness tragedies in five words, Waterloo's first snow (which I missed lmao) or reviewing biryani or vegetarian food across the Tri-Cities!

Man, now I'm hungry again, even though I had three slices of pizza. Maybe I should become financially irresponsible and buy two-bite brownies or something. Despite the fact that I have plenty of chocolate at home.

uknightED
Editor, mathNEWS

clarified
Editor, mathNEWS

WINK WONK	only if it's yellow
YUMMYPI	yay because it's beautiful for max 10 seconds before it begins melting in yer boots
PLATYPUSGOD	yay! The crunch of the first snowfall is great!
AAQSR	ans = (rand % 2) ? "yay" : "nay"
別	yay
DICK SMITHERS	Anyone who says "Nay" is a fucking coward
SOMEBODY	🙄
0.423	Big yay. Snow implies clouds. Clouds implies no sun. I hate the sun. So I love the snow. Fuck you sun.
MOLASSES	yay :)
YALEVOYLIAN	Very much yay.
X	yyy
PTKYR	nay
SHAHABEE	I don't go outside enough to have an opinion
WORDLOVER420	yay or you stinky.
SQRT(CAUSE)	Snow is a complicated answer, the problem being that snow becomes ice, and ice begets the inevitable debate about the ethics of salting, y...
__INIT__	I'm indifferent but it makes my non-Canadian friends excited when I talk about it
WEWLAD	Fuck nay. Also, I'm in New Zealand so I'm not seeing snow :)
APHF	What a bad fucking mastHEAD. It's just a fucking yes or no question. Yay of course though
SKIT	oh god its winter already
FINCHEY	Yay. It's the necessary second half to my "polar bear in a snowstorm" cosplay.
BLINCHIK	yayyy snow!!!
DISTRACTED	yayy!!! hot chocolate!! snowballs!! sledding!!!!

ARTICLE OF THE ISSUE

Congratulations to Dick Smithers for their winning article [*If... Clifton Hill Sucks So Much, Why Do I Love It?*](#). Get your prize (a \$25 Conestoga Mall gift card) at the mathNEWS office — that's MC 3030.

Don't even think about eating the yellow snow.

RYAN CHOW, mathNEWS EDITOR FOR FALL 2022
ALONG WITH TERRY CHEN, DANIEL MATLIN, NICHOLAS PRIEBE, AND CLARA XI

mathASKS 150.5

FEATURING mathNEWS EDITOR DISTRACTED

YALEVOYLIAN: WHY CAN'T I SUBMIT ARTICLES IN LANGUAGES OTHER THAN ENGLISH? LITERALLY 1984.

Boring answer: fonts + our audience is primarily English-speaking. Less-boring answer: we need to be able to read what you write so we can edit it and subtly alter the meaning in ways that are in line with our sinister views.

TENDSTOFORTYTWO: WHAT'S BEEN DISTRACTING YOU LATELY?

I've fallen prey to several Wikipedia rabbit holes recently. Topics include "radomes" (a portmanteau of "radar" and "dome", an enclosing structure for radar antennae); a type of American political/administrative division called an "independent city"; and the manufacturing process of extrusion.

TENDSTOFORTYTWO: WHAT HAS BEEN THE MOST UNEXPECTED PART OF BEING AN EDITOR?

I was worried that becoming editor would kill some of the magic of being a mathNEWS reader. But actually, even though I see articles ahead of publishing now, I still enjoy reading issues just as much!

A DECAYING SKELETON: HAI!! :3333 HEDLO!!!! HAI!!!! HEYY!!!!

haiz :3

TENDSTOFORTYTWO: WHO IS YOUR FAVORITE mathNEWS WRITER?

You of course, [insert writer name here]!

BOLDBLAZER: WHAT DO YOU THINK OF YOUR "DMAT" NAME ON DISCORD EVER SINCE CBAT BECAME A MEME?

Never really thought about that till now... but unlike Cbat, I'm not going away anytime soon, so it doesn't matter much to me!

LOOP: WHAT'S THE ORIGIN OF YOUR EDITOR NAME?

Nothing deep here—I consider myself to be a fairly distractable person, enough that I notice how that aspect of me affects various parts of my life. For instance, I find lectures (and lecture videos) more difficult to follow than a textbook; if I lose focus, it's much easier to go back a line visually, and I find text to have fewer distracting elements than audio. (I refuse to end this answer with a "hey look, a squirrel!" joke.)

A FRIENDLY DRAGON: HOW ARE YOU TODAY GOOD HUMAN FRIEND?

You ain't my friend, palooka. (Sorry, I rewatched Pulp Fiction the other day, and I can't stop quoting it!)

DICK SMITHERS: IS "mathNEWS EDITOR" GOING TO BE YOUR PEAK?

Hahaha, no... I peaked years ago!

APHF: WHERE DID THE FEET DISCOVERED IN THE SALISH SEA FOOT DISCOVERIES COME FROM?

This is just a quick guess, but I think probably legs.

CLARIFIED: WHO'S YOUR FAVOURITE EDITOR?

You of course, [insert editor name here]! (But seriously, all the editors are great people, I can't imagine picking just one!)

CIX: WHAT IS YOUR FAVOURITE mathNEWS COVER?

~~dead nutty~~ probably the Lazeez goose cover from 150.2. There's a frenzied energy to the whole scene; flying utensils and sauce, an exaggerated beak, and ruffled feathers—it's perfect. But the subscribers-only version of the 148.6 cover is nice, too 😊

CO-OP INTERVIEWER: SO TELL ME ABOUT YOURSELF.

Hi! As you, uh, know, my name's distractED, I'm a UWaterloo CS student, and—wait, this isn't a co-op interview!!

CLARIFIED: WHAT'S SOMETHING THAT NO ONE'S ASKED YET THAT YOU WANT OUR READERS TO KNOW?

I guess I'd mention that I almost started with mathNEWS way earlier: I considered writing for mathNEWS in first year, but a combination of always drowning in schoolwork and the worry that I couldn't find something to write about held me back. I now wish I had started sooner: the returns from being involved outweigh the loss of time spent writing (which is rewarding regardless of the mathNEWS context, so I wouldn't even describe that as a loss), and I would encourage others to ignore worries of not having stuff to write about/not being able to write well. I think that in the absence of constraints on topics (and you'll find none of those at mathNEWS), it just takes some awareness of what one's own thoughts drift to idly; at least for me, those thoughts often end up being the most important ones, the ones which I can start articles from.

UW UNPRINT: WHAT'S THE SMALLEST, MOST PAROCHIAL NEW JERSEY CUSTOM YOU WANT PEOPLE TO KNOW ABOUT?

I don't know about small or parochial, but I can point out something that sets New Jersey apart from almost the entire rest of the US: by state law, it is illegal to pump your own gas. The only other such places are some counties in Oregon, and a town in New York. Instead, there is always a gas station attendant ready to hear the common "fill it up with regular, please!". I had been driving for I think at least a year before I ever pumped my own gas; I still have the receipt from that, somewhere.

JEFF: FAVOURITE CS COURSE?

I would have to say CS245E. I took it in Fall 2020 with Prabhakar Ragde, and it turned my understanding of proof and logic upside-down in the best possible way. The first half of the course guided students in iteratively improving a proof assistant written in Racket, and using it to prove abstract formulae in intuitionistic logic. The second half had students complete exercises proving various statements about natural numbers, sorting, and more using the much more advanced proof assistant language Agda. The format and grading scheme were, in my opinion, ideal for a remote course: there were no exams, replaced by regularly spaced assignments of reasonable size, and there were almost no lectures, replaced by an excellent online textbook (*Logic and Computation Intertwined*, Ragde's own work) and frequent office hours run by our very available and helpful professor.

That course strongly influenced my computer science interests to lean more towards (statically-typed) functional programming and programming languages in general. I would be very interested to see a mainstream language which includes an internal language for rigorously proving statements about the behavior of other sections of code; where these proofs would be checked at compile time and not included in the resulting executable. Sometime in the past year, I read briefly about such a language called ATS ([https://en.wikipedia.org/wiki/ATS_\(programming_language\)](https://en.wikipedia.org/wiki/ATS_(programming_language))), but it seems to be solidly obscure.

JEFF: WHY IS C++ YOUR FAVOURITE PROGRAMMING LANGUAGE?

It has unintuitive syntax, confusing move semantics, and inheritance-based polymorphism, which seems nice but is actually a pain... wait, you said "is", not "isn't"?²

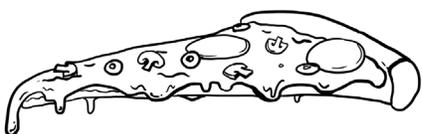
BLINCHIK: ANY SONG STUCK IN YOUR HEAD?

At this particular moment, it's "Kiss Me More" by Doja Cat, but that's just because it's the last song I listened to. However, recently I've had "Bleed Out" by the Mountain Goats stuck in my head often; I have to thank fgf for introducing me to that song.

CUTLET: HOW LONG DID IT TAKE YOU TO ANSWER ALL OF THE QUESTIONS IN THIS mathASKS?

I want to say 1–2 hours, spread across a day or so? Thanks to all the writers who sent in questions; I'm happy to have been given the opportunity to answer them!

1. "please" if you're polite, that is
2. however, the compile-time craziness you've demonstrated, jeff, is a huge redeeming factor :)

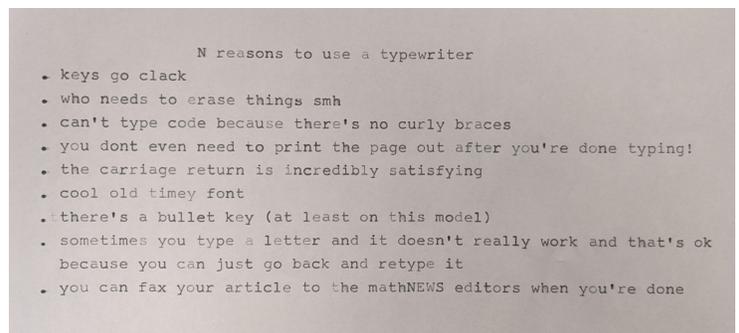


DOXXING UWATERLOO STUDENTS

- 330 Phillip St, Waterloo, ON N2L 3W9
- 165 University Ave W, Waterloo, ON N2L 3E8
- 303 Westcourt Pl, Waterloo, ON N2L 6P5
- 43.47192419959463, -80.55121332430505 [*Editor's note: damn you actually went for subatomic precision*]
- 252 Phillip St, Waterloo, ON N2L 0C9; the room with the fairy lights.
- Canada
- Somewhere in the United States, definitely.

alyssnya

N REASONS TO USE A TYPEWRITER



__init__

OPEN LETTER TO PROFESSOR CORMACK

I DEMAND TO BE TAKEN SERIOUSLY

Dearest Professor Cormack,

Could I please supply you with Discord Nitro? This would give you the "Kitten" role in all servers moderated by Raymond Li/Pikachu, among other minor benefits.

Please respond by just letting your afternoon class of CS145 know that you would like to take this offer and an anonymous donor should satisfy you as such.

Lots of Love (xoxo),

Lil Hotdog

gvc-admirer

MATHSOC SEZ

Hey folks! As the term draws to a close, here are a few more upcoming events and announcements from MathSoc!

NOVEMBER GENERAL MEETING

The Board of Directors has approved **Tuesday, November 22nd at 6:00pm** as the date and time of the General Meeting. The meeting will take place in **EXP 1689**. The General Meeting is where you can find out more about what the Society's executives have been doing for you this term, and where you can vote on motions presented at the meeting.

We'll also be nominating people for 1-year (and 4-month) positions on the Board of Directors—if that sounds interesting, you can submit an advance self-nomination for the General Meeting here: <https://bit.ly/GMDirectorNominationF22>.

All members of the Society (that includes you!) are invited to attend, and food will be provided! If you can't attend but still want your vote to count, you can designate a proxy to vote on your behalf at the meeting by submitting a signed proxy form (<https://bit.ly/F22GMProxy>) to the President's mailbox in the MathSoc office before 4:00pm on November 21st.

MATHSOC EXECUTIVE APPLICATIONS

Applications are now open to be one of MathSoc's four appointed Vice Presidents in Winter 2023! We're looking for students to fill in the roles of VP Internal, VP Operations, VP Finance, and VP Communications! Do you want to cultivate your management skills and get deeply involved in the Math student community?

If this sounds like you, then you should apply to be a MathSoc Executive at (<https://bit.ly/MathSocExecAppW23>)! Please note that you must not have any other full-time commitments such as co-op.

For more information about executive applications and detailed descriptions of each role, check out page 20 and 21 of our bylaws, which can be found on our website (<https://mathsoc.uwaterloo.ca>).

MATH GRAD COMMITTEE

MathSoc is looking for a chair and committee members to be a part of the Math Grad Committee! Do you want to make this winter's Grad Ball a night to remember? At a venue they'll remember, with food they'll love? Pick the valedictorians that will best represent the graduating class? Give the Class of 2023 the send-off they deserve?

Apply to be Math Grad Chair (<https://bit.ly/F22MGCchair>) or join the Math Grad Committee (<https://bit.ly/F22MathGradCommittee>)! You no longer have to be a graduating student to be the chair—anyone can apply to either position! However, please keep in mind that graduating

students will take preference over other students for the chair position.

GAMES NIGHT WITH PROFS

Games Night with the Profs is also happening soon! Come to the Math CnD on Thursday, Nov 24 from 7:30pm–9:30pm for a night of board games with your profs! There will be snacks and drinks provided—see you there!

MATH 135 AND 137 REVIEW SESSION

Calling all first years! Worried about MATH 135 or MATH 137 finals? Want to get a bit of extra practice in and arm yourself with extra knowledge? MathSoc is running review sessions for you, where invited presenters will walk you through important topics! Pizza will also be served!

The MATH 135 review session will be happening from 4:30pm–8:30pm on Monday November 28th, in MC 4045. The MATH 137 review session will be happening from 4pm–8pm on Thursday December 1st, in AL 116. Good luck everyone!

PREZ SEZ

Come to the General Meeting. Come to the General Meeting.

The MathSoc Executive Team

wordGUESS

Hi! **wordGUESS** is a Wordle clone implemented as a series of **mathNEWS** articles. People send me guesses for a four letter word, and I tell them how correct they are. Here's what our players sent in:

- **grass:** 🍌 🍌 🍌 🍌
- **eternallypuzzled:** 🍌 🍌 🍌 🍌
- **enamour:** 🍌 🍌 🍌 🍌
- **John S. Street:** 🍌 🍌 🍌 🍌
- **Pikamon025:** 🍌 🍌 🍌 🍌
- **__init__:** 🍌 🍌 🍌 🍌

Congratulations to **__init__** for taking this one home! With a score of 4/5, you have really shown the world that you have the ability to read minds (albeit with some trial and error).

For the rest of the players... I'll be looking forward to your submissions at spam@tendstofortytwo.tk. See y'all next issue!

IF CLIFTON HILL SUCKS SO MUCH, WHY DO I LOVE IT?

If you've ever been to Niagara Falls, you'll probably remember Clifton Hill, if not by name. It's the lane of cheap, junky tourist traps directly perpendicular to the waterfall itself, like a gaudy capitalist leech clinging onto a genuinely beautiful natural wonder, hoping to siphon some cash from tourists with mirror mazes and expensive ice cream. Objectively speaking, it sucks.

So why do I love it?

I grew up in the Niagara region (not the city of Niagara Falls, for the record), but it's not like we would go very often. It was a 20 minute drive away, back when going for a drive meant getting my parents to drive me (at least before all my friends got licenses—but somehow, when that happened in late 2020, no one was super thrilled to go into a large crowd of tourists). I would visit 3 times a year, maximum. I went to the dentist more often than the Falls.

But still, for reasons I don't entirely understand, I'm obsessed with this place. I mean it. There is a very high chance that I am the number one Clifton Hill fan on Earth.

Why is this? I know, consciously, that it's cheap, cynical garbage stuffed with wax monsters and/or bored teens. I haven't even been *inside* most of the buildings. Either they're too expensive (I've got bills to pay), or they're haunted houses (I'm a pussy (I write for **mathNEWS** I clearly have no reputation to protect)), or they're vape stores (see above). The draw can't possibly be the actual content of the Hill. So what is it?

Is it as simple as childhood nostalgia? That would make sense, right? I didn't go that much, but when I went, it was meaningful. It felt like a trip to Disney World that didn't cost my family several thousand dollars, just 25 bucks for parking. There was always something new and exciting to do, but even if we just walked down the street, being in the thick of this bizarre carnival was enough for me.

I was watching a YouTube POV of someone walking down the hill when I realized something: I had some form of attachment to every single building. Maybe it was a fully formed memory—that's where I had my first date, that's the wax museum we stopped at on a field trip, that's the haunted house I wouldn't even walk on the same side of the road as. For others, it was as small as a fragment of an emotion, the lingering remnants of a laugh or a scare or simply a curious glance I had when walking by the building as a kid. Every single building has, in some way, stuck with me.

Maybe Clifton Hill is just my *thing*, y'know? My one, bizarre, completely impractical obsession that's stuck with me from childhood. Everyone has their *thing*, and maybe this one is mine.

(As an aside—I don't trust people who don't have a *thing*. People who are too embarrassed or proud to admit they care

too much about something random and stupid, or that they only have 'adult interests', tend to be really boring and/or insecure.)

But somehow, I don't think that's the whole story. I have a lot of things I was attached to as a kid that I'm no longer interested in anymore. I used to watch the movie *Cars* once a day when I was a kid, and now I only watch it once a week. I feel like I'm pretty aware if I'm just swept up in nostalgic excitement, but this feels deeper than that.

Maybe one of the reasons could be just how aggressively, impossibly gaudy the entire thing is. Which seems like a reason I'd hate it but...I don't know how to explain it, but it's so extreme it almost feels like an elaborate joke. As if it's some Omega Mart-like elaborate parody of itself, or I've stepped into a sitcom where a family visits the most absurd tourist trap in the world.

Consider, for example, the House of Frankenstein—an honest to God combination haunted house/roller coaster/Burger King.



(REAL)

Look at it. Seriously, look at it.

This looks like a Simpsons gag. It looks like something from *Itchy and Scratchy Land*. The elaborate, Gothic castle facade, a winding roller coaster plopped awkwardly on top, tied together with a gigantic Frankenstein, towering over the skyline, munching down on a delectable Whopper.

This shouldn't exist. It just shouldn't. It's not a real building, it's a Grunkle Stan-style over-the-top absurd hustle. It's the tower of Babylon, a testament to humanity's shamelessness and boldness and ego that something like this exists, and a

part of my mind finds it impossible to imagine as anything other than an elaborate joke that I'm also in on.

I can't help but laugh along. Yeah man, it's hilarious you built a go-kart track on the edge of a waterfall. Remember that awesome bit where you have a decomposing, decrepit Planet Hollywood directly across the street from the Duty Free? It's so funny you had a wax museum featuring Wax Jack the Ripper, Wax Jeffrey Dahmer, and Wax Hitler—and it's even funnier that someone *stole Wax Hitler* and they never found him again.

That Wax Hitler story is true, by the way. Look it up.

On that note, maybe that's another part of what fascinates me about this place. The stories that have built Clifton Hill are varied, and mostly crazy—but they're also obscure. Information about specific events, or even records of when something was built/destroyed can be extremely difficult to track down.

I'm, in particular, fascinated by Marvel Super Hero Adventure City—a defunct Marvel themed arcade/amusement centre built into the basement of a hotel. It featured officially licensed Marvel attractions—plural—anchored by an honest to God 3D Dark Ride starring Spider-Man, one of the top 5 most popular fictional characters on the entire planet—and *no one* seems to know *anything* about it.

I *had* to have seen it. I have no memory of it, and I would have been really young, but the timeline of my youth and its existence make it basically impossible that I wouldn't have gone.

Maybe it's just because I grew up in the information age, where I just take for granted that some obsessive superfan will keep track of this information for me to look up at my leisure. The fact that something this big, featuring the most popular superhero in the world, can just appear and vanish without a trace...It drives me crazy. No one but me cared enough to pay attention.

There's one ride video that exists, and it's from the production company that made it, uploaded in 2007. *Nothing* else exists besides old Flickr photos of the outside of the building, and pictures from the Niagara Falls public library. There isn't even an exact date for when it got the Marvel theme stripped away—2007 to 2009 is my best guess. There isn't even an official *reason*, as far as I can tell.

I've always been most interested in the things we know very little about. Even as a kid, I gravitated towards stories about folk legends, cryptids, things that could only be half-true at best. I loved diving into the margins and living on the fringes. I found staying on the well defined road with the well defined facts to be extremely boring. I much prefer having to find the truth to being told it.

Clifton Hill is packed with these kinds of stories. Full attractions that existed for years that no one cared enough

to document. Thousands of man-hours spent imagining and constructing it, potentially hundreds of thousands of people who have walked through, been entertained, been scared, been intrigued, had their lives touched ever so slightly by these experiences—and all we have to show for it is a handful of forum posts from 2003. What a legacy to leave.

Researching this stuff feels like archaeology. I could fall into hour-long rabbit holes looking for any evidence that these things ever existed. In fact, while researching this article, I fell into the Spider-Man rabbit hole *again*.

(If you're interested, the Marvel complex still exists and is now simply Adventure City. It sits at the bottom of the hill, right next to the last Rainforest Cafe in the country. The Marvel characters have been very, very lightly re-themed, but most of the structure still exists. Like most things on the Hill, it sucks and I adore it.)



MEET 'SPIKEY AND FRIENDS' IN THEIR LEGALLY DISTINCT ADVENTURES!

There's one more dominant feeling I got from Clifton Hill, and I think it's an interesting one. Every time I went to a *good* themed entertainment centre as a kid, something like a Disney or a Universal, I always walked away with a sense that I had been transported into another universe. It barely even registered to me that someone *made* these things. Even as an adult, I look at those experiences with an admiration for the creativity, engineering, and ingenuity it takes to make an experience on that scale. I remain deeply in awe of the artistry of many of these experiences.

The feeling after I left Clifton Hill was different. It was almost always "I could do that"—and later, "I could do better".

Even as a kid, I could always see the seams. I knew that "haunted castle" was made out of plastic and plywood. I could see the exposed wiring and the chipped paint and the barely-disguised projectors that make up what could charitably be called attractions. I knew these were man-made.

If the goal was immersion, then these experiences obviously failed. If the goal was entertainment, then their success is debatable. But they had a different effect on me, one I'm not sure they intended—they inspired me. These were deeply flawed and messy, but they felt made by real people, not just dropped from space. They were understandable, comprehensible—and it made me feel like if I just worked hard enough, I could make something like that too. It took the act of creation and helped me realize that mere mortals can do it too.

For as long as I remember, I've always wanted to entertain. When I was really young, the vector through which I tried to do that was by dreaming up my own "rides" that I could make with an iPad, a copy of iMovie, and the toys in my basement. I would film a POV of running around in the backyard, then play it on a computer monitor. I would sit my little brother in the chair and shake the chair around in time with the action on screen, to simulate a 4D theatre effect.

I'm not sure what in my childhood made me so determined to work so hard on ways to surprise and entertain other people with the power of cool technology. But I know for sure that Clifton Hill—via sucking so much—made it clear to me that I *could*. I can trace the path my life has taken back to that original inspiration in a pretty straight line.

I'm not sure if I have a closing point to this. I don't really think I've gotten to the bottom of why I care so much about this terrible, terrible place, but I think I've come to at least understand it—and myself—a little deeper.

But I guess a sensible explanation, or an obvious explanation, or a conclusive explanation, or even just a *good* explanation... that wouldn't fit the spirit of things, would it?

Dick Smithers

VIGNETTE: KITES

I forget that kites exist, sometimes. They're one of those curious objects that can leave one's mind entirely, until a glimpse of one returns the thought to sharp relief. Aren't kites such metaphorical things? The tug of the string, a gentle contest against a far superior force—a father playing with his child, perhaps? A symbol of defiant celebration, launched high, high? Or perhaps a tethered animal, yearning to break free. Yet when I think of kites, all I see are the sweet golden fields of my childhood. Perhaps, you do too.

CC

It's hot being a cow.

TY GHASWALA

WINTER

I like winter, primarily because I like snow. It looks pretty and is fun to eat if you're 7. It's cold, sure, but is it really any better in the summer when it's super hot out? I don't think so. I used to consider Fall my favourite season because of Thanksgiving and Halloween, but snow is cooler. (Get it? *Cooler?* Ha.) I thought of writing an article named *Winter* when I saw the snow last weekend, which reminded me of the article *Fall* that **mathNEWS** contributor boldblazer wrote a couple of issues back. They spoke in a rather morose tone of their worry for the incoming first-year students, of which I am one, so I figured I would respond. I also did something like this last issue, so maybe I should brand myself as that guy that replies to other people's articles because he doesn't have any ideas of his own.

So anyway, my university experience has been enjoyable for the most part. I'm fortunate to not live very far from the university, so I can take the GO Bus home every other week or so to visit my family. I imagine it must be harder for people from out of province, or from other countries. I like my classes, for the most part. There are a few moments where CS 145 has made me question my existence, but MATH 145 and MATH 147 have been really fun. There is truly no experience quite like working out the last assignment question while eating pizza at 1 AM in an empty lecture hall.

I'm not depressed, which I suppose is good. In fact, I sometimes get the impression that I'm a happier person than average, which is sort of weird because by most objective accounts I'm fairly certain I should be considered an average. I sometimes wonder what next term's co-op search will entail, since I've heard several of the Cali-or-bust types talking about leetcodeing and internship-searching in preparation for it, neither of which I have done in the past 3 years.

So anyway, I suppose I should give some advice to the nonexistent first-year students reading this, because I am one, and being that I am an all-knowing guru of how to be happy, it could be of assistance. First of all, try not to compare yourself to others. I frequently fail at this, and I think it often makes me upset. At a university as large and as academically rigorous as Waterloo, there will always be someone who is better than you—at math, at programming, at writing **mathNEWS** articles, at rock climbing, at getting a job, at getting a girlfriend, the list is as long as you're willing to make it. I know because I've met them myself. Second, go outside. It sounds cliché, I know, but it's also proven to be beneficial to mental health. Probably. Don't quote me on that. Finally, you should join clubs, specifically the Pure Math Club. I am definitely not a paid shill.

In all seriousness, though, try being more optimistic about life in general. Couldn't hurt. Happiness is like (and I assure you I didn't steal this from an anime) glass; you don't really notice it unless you intentionally change your point of view to do so.

I will return next week with a recipe. Maybe it'll be for Coq au Vin, I'm sure Anton's 145 students would love that.

yalevoilian

A DOWNFALL OF ROAD FOCUSED BUS PLANNING

Bus route planning is an interesting problem—you have people that want to go places and various paths they can go between these places and you have to deal with traffic, fluctuating demands and an often unsympathetic public. It's like Graph Theory and Algorithms++. You also need to space your stations a good distance apart—not too close so that the bus just inches along but also not so far that the stations are not close to people's origins or destinations.

With so many potential factors to consider, it is thus easy to understand that not all elements receive the same amount of attention. However, one element that GRT, and likely other transit agencies, don't do a great job of is ensuring that their bus stations are walkable from all directions. Take, for example, the section of Ottawa Street between Fischer-Hallman and Westmount.



This section of Ottawa St. has two lanes in each direction as well as bike lanes on either side. It also has a number of bus stops in both directions. However, there is no spot for pedestrians to cross between these streets. Thus, pedestrians are left with the difficult choice to cross a four-lane road (recommended by Google Maps and Apple Maps) or walk an extra 10–15 minutes every time they want to take the bus. To make matters worse, because route planning apps can't distinguish which side of the street you're on, it's very possible that the bus stop that is actually closest to you as a pedestrian is for the opposite direction of your route.

It's not just this section of Ottawa St. where pedestrians are discouraged by poor design from both apps and transit agencies to get to bus stops safely. It's many sections on many major roads where we've planned buses for roads and road users over the people that use buses. There is however, a solution. We can add more crosswalks to allow people to get to bus stops easier and make crossing major streets safer. Would drivers hate it? Probably. But fuck 'em.

Sybbus

IF YOU NEED FRIENDS, FEEL FREE TO REACH OUT TO ME :))

Not really math-related but I'm sure that by now you've heard about what happened at Laurier (RIP David; I send out my deepest condolences to his loved ones and friends).

As a first-year, I sometimes wonder whether that could've been me, one of my friends, or even someone I just knew of. There are several reasons why people commit suicide or experience thoughts that lead in a similar direction, so it's generally hard to determine a cause. That said, we can all do at least the bare minimum to check in on the people we care for and know. We're at a point where the university's mental health help, mental therapy, and related services take months to book an appointment for, so it's up to us students to do the right thing and help each other out, especially at a time of general stress and confusion like finals season.

And if you're the average reader here, you may not be very outgoing (like myself) but may still be looking for someone to talk to. And everybody says "don't be afraid to reach out". And I think this doesn't really help anyone.

If I got this advice I'd be very confused. Who would I contact? How do I contact them? And my biggest worry... Why would they want to help me—will I not just be wasting their time?

This is why I want to assure you that you will NOT be wasting my time and that you can most definitely reach out to me (I will try my best to help). I came to university to (other than study) learn about and interact with people to help them. To be honest about my intentions, I plan to gather a lot of different perspectives from this experience and I would also like to personally contribute to people's lives in ways like this rather than stay dormant and wait for people to approach me :))

My name is Anvay. I'm [nvts#9861](#) on Discord, [@anvay_temp](#) on Instagram, and a7vats@uwaterloo.ca on Email. Feel free to just say "Hi" so I know what's up.

PS— Please don't DDOS me, I will be very sad. Also, I apologize in advance if you find me weird online.

Kanye Quest

LIFE IS HARD

But you know what else is hard?

your mum

A COMPREHENSIVE REVIEW OF THE 301 ION LIGHT RAIL STOPS: PART I

On October 16, six brave **mathNEWS** writers embarked on a perilous journey; one to traverse the entire extent of the Grand River Transit's 301 ION light rail train route. This is their story. This is the comprehensive review of the 301 ION Light Rail Stops.

MEET THE PARTY

- **a decaying skeleton:** an MMORPG skeleton, resident DnD group DM, Maritime dweller.
- **boldblazer:** the one who came up with the idea to do this, transit enthusiast, world record holder for going to all the stations on the Vancouver SkyTrain (probably).
- **creature_f:** unhinged thought haver, *Celeste* enjoyer, wore manganese's cat ears for most of the trip.
- **__init__:** addicted to touching grass, has already seen most of the stations, not British.
- **manganese:** resident Benadryl enjoyer, wore a maid costume to mess with a roommate's parents, big fan of light rail.
- **tendstofortytwo:** organized the entire thing, somehow a car fan who got into a public transit enthusiast meetup???, loves being caffeinated.

CONESTOGA STATION

This is where our journey begins. creature_f arrived first; she got a Baja Blast at the Conestoga Mall. She says she liked it. The next three to arrive were tendstofortytwo, boldblazer, and __init__. While waiting for the others, these four witnessed the Holy Changeover Of ION Track From One Side To Another. Truly an experience one must witness with their own eyes. Indescribable. Then a decaying skeleton and manganese arrived and we started on our journey.

Rating: 7.5/10

NORTHFIELD STATION

The station was situated in an industrial sprawl, providing a truly dystopian look into the Waterloo of tomorrow. Close to the ION station was a set of tracks on which we chanced upon a Cool Regular-Ass Passenger Train (But It's Old Fashioned So Like ???). We waved at the people at the back of the train. They reluctantly waved back. We briefly considered raiding the office __init__ used to work at. We also saw a derailer, which derails a train in case it goes on the ION tracks without permission. a decaying skeleton does not remember this, despite there being an actual sign there that said "Derail." Finally, at this station we saw for the first time the ❄️ Heat Boxes ❄️ which provide heat and protection from the wind for all passengers waiting for the next 301 ION to Fairway/Conestoga stations.

Rating: 7.1666.../10

RESEARCH AND TECHNOLOGY STATION

Truly a place for Research and Technology. As we exited the station, we were greeted by a friendly face—or rather a multitude of friendly faces. Their name was Karl Gay, according to the inscriptions on their back, and in our conversations with them, we also discovered that they were a Satanist (that was also inscribed on them). When you get a chance, we suggest you take time in your day to go and visit Karl—they truly are one of the greatest plural systems of all time, perhaps ever.

Walking past Karl, we saw a large installation (huddle? group? murder?) of solar power stands, with Tesla Superchargers available beneath them for the Elon-minded individual. __init__ may or may not have swapped two chargers around from their stands, however, these allegations have no evidence backing them and we have no reason to believe that they are true. a decaying skeleton and tendstofortytwo may also have tried to scan arbitrary cards from their wallets in an attempt to get into the building, but we cannot verify the veracity of these allegations either.

We said our goodbyes to Karl Gay, mused about N lesbians in a trench coat and departed from the station. At this station, we cleared our group from the presence of any and all Daniels. There were no Daniels among¹ us.

GUY ENCOUNTER #1

We think, but cannot confirm with certainty, that this was the station where as we boarded the train to depart, a Guy disembarking the train saw us and said, "What the fuck? It's you guys again!" This would not be the last time we saw Guy.

Rating: 8.8666.../10

UNIVERSITY OF WATERLOO STATION

Yeah.

Rating: 6.5/10

LAURIER-WATERLOO PARK STATION

Truly a beauty of nature in the sea of buildings. a decaying skeleton took this wonderful opportunity to touch grass. When creature_f was given the chance to do the same, she disgustedly turned it down.

We walked down to the park to bask among¹ the trees and found a wooden box (?) with power outlets coated in dirt and rust. There was free tetanus available on the rusty nails on the top of the wooden box, which we, unfortunately, did not have

the opportunity to avail of, on account of wanting to finish our journey before succumbing to ([localized?] paralysis and) death.

After this brief investigation, we walked down a path through the woods to arrive at The Bridge. The Bridge was decreed to have no calcium and no salt on it at all times and was said to possess a capacity of 9,000 kg.

Once we walked on its delicate planks, we were, simultaneously and in perfect cohesion, struck with the urge to jump on the bridge. At the count of three, we jumped. The bridge thrummed and vibrated at the impact of our combined feet (yum), and It Was Good. This served to prove that the six of us did not have a total weight of 9,000 kg.

tendstofortytwo is noted to have wished that they too were a bridge so somebody would jump on them.

This station was marked by The Return of Guy.

Rating: 7.5/10

WILLIS WAY STATION

We rode past this station for now, on account of being with Guy, and planning to return here later via its 301 ION to Conestoga Station counterpart, the Waterloo Public Square station.

GUY ENCOUNTER #2

Guy boarded the train with us at the Laurier-Waterloo Park station, and loudly exclaimed his surprise at seeing us for the third (?) time. Upon sitting down, he looked at us and mused that he must have “smoked acid and gotten into a loop” the way he kept seeing us.

Shortly after, Guy accused a decaying skeleton of smoking weed. The allegations were denied, and it is to be noted that the smell only entered the car at Allen Station. We explained our quest to Guy, which is when he informed us that Allen Station is also an alarmingly effective location to acquire illicit substances (a rumour that we did not confirm).

The topic drifted to Guy’s origins, where he revealed himself to be from the great province of Newfoundland, and then quickly deflected further conversation about himself by asking where all of us were from. Our origins were covered without incident, other than Guy refusing to believe that creature_f could be Indonesian, and alleging himself to be Indian once tendstofortytwo revealed himself to be from India.

a decaying skeleton established a deep and intimate relationship with Guy based on their shared origins in the Maritimes, and they connected with each other in ways that the rest of us can only hope to decipher.

After this, Guy bid us goodbye and we mutually hoped to see each other again. He left us with the words, “See you in 45

minutes.” Did he see us? That’s for him to know and you to find out.

ALLEN STATION

We rode past this station for now, on account of being with Guy, and planning to return here later for a planned post-ION dinner at The Bauer Kitchen.

GRAND RIVER HOSPITAL STATION

Having bid our adieu to Guy, we resumed our mission at the next station, next to the Grand River Hospital. This station is also extremely close to the offices of CTV Kitchener, and we may or may not have walked to the back of the building and loudly banged on one of the satellite dishes to see if they were real. Apologies for any network interruptions on that day, any inconvenience caused is regretted. The back of the CTV Kitchener offices was also notable for __init__ climbing and sitting on top of a garbage bin, a position he quickly left on realizing that the top of the bin was made out of rubber and could collapse him into the bin any second.

After our maybe-exploits at CTV, we headed on over to the namesake of the station, the Hospital itself. Here, we encountered a true gem, a rarity that is as uncommon a sight as an honest politician or a perfect score on a midterm—a bench that is not actively hostile to a person trying to sleep on it. a decaying skeleton verified that this was indeed a rare example of, uh, un-hostile? welcoming? architecture from the city, and we all marveled at the human capacity to have the slightest bit of empathy for others. Only at hospitals.²

After our misadventures here, we departed onward for the next station.

Rating: 7.75/10

CENTRAL STATION

At the Central Station, we once again rejoiced at being reunited with our beloved home away from home, on encountering the University of Waterloo School of Pharmacy. We walked around the building, to its back, past its parking lot (where tendstofortytwo may have tried [and failed] to get a parking ticket by pushing a button), and up a grassy hill into a clearing. Here we saw some nice graffiti and a previously-used fire pit.

The clearing opened up into a paved pedestrian path that ran next to the Kitchener GO station, so we caught a glimpse of the *third* kind of train so far on this trip. __init__ has been here but does not recall seeing this paved path. The path led us straight back around the building, past the parking lot, and right back at the ION station, in an unnervingly straight-forward manner. We found it reminiscent of video games that give you an easy path to backtrack once you have cleared an area completely.

Back at the station, we saw the Google office on the other side of the road, and tendstafortytwo spotted a cool car which they took some really bad pictures of. `__init__` is noted to have thought that it looked like a normal car. The car was later identified to be an Oldsmobile 442 by our experts in the Cool Car Identification Lab. With the mysterious path traversed and the cool car identified, our job was done here, so we left for the next station.

Rating: 6.625/10

INTERMISSION

Here, dear reader, we must pause our chronicling, for Ye Editorial Gods Above threaten to smite our article lest it grow beyond bound. Thus by their decree it is split in twain.

Join us next time in a brand new episode of *A Comprehensive Review of the 301 ION Light Rail Stops*. See you, dear reader, in the future.

a decaying skeleton, boldblazer, creature_f,
`__init__`, manganese, tendstafortytwo

1. haha among
2. #SupportOurFrontlineWorkers



`\(\int_a^b f(x)dx\)`

$$\int_a^b f(x)dx$$



`\[\int_a^b f(x)\mathrm{d}x\]`

$$\int_a^b f(x)dx$$



`\[\int_{\text{A}}^{\text{B}} f(\text{🍌})\mathrm{d}\text{🍌}\]`

$$\int_A^B f(\text{🍌})d\text{🍌}$$

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`\usepackage{hwemoji}`

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HONEY ROASTED PEANUTS ARE THE CLOSEST THING TO CANDY I'VE EATEN IN THREE YEARS

My secret to healthy teeth? A total avoidance of sweets.

Around 2017 I decided to pull my sweet tooth, and hop on the sugar-free wagon. No caramels, no cupcakes, zero ice cream, marshmallows or chocolate crepes.

You ever had your dentist tell you *NOT* to floss, I have, and that makes me the orthodontic omega chad while I have depicted you as the oral surgeon soyjack.

Or that would be the case, only I have discovered the joy of honey-roasted nutting.

Honey roasted peanuts are like normal peanuts but they make my mouth hurt in that good way. Where your gums scream at you to stop, but the feeling of the apine syrup sliding down your gullet keeps you going. Allergens abound, but even with a swollen throat the golden slivers of nutting goodness jump at speed to my mouth. My happiness, as with many who've self-restricted foodstuffs, peaks with the euphoria of such an unclean, nondental act. Only for the rapid onset decay of my molar gentlemen.

This was a mistake, the temptation of sugary goodness woos one into a false sense of sickening sensibility. Tooth root rot thoughts flood my dreams, and rueful regret arises in each brossage. Dentine and enamel lost with each succulent golden snap. Once the nut is nearby none can notice the pain, and the noshsome nibbling commences.

My personal recommendation is to find some brace-faced friends (they're already spending a fortune on dental work, what's a few hundred more) and finish the jar in one sitting. This reduces the total exposure time, which while risky toxicologically, reduces the possible time at the dentist.

The days of chasing whole heads of lettuce with a fistful of nut have done me wrong, and moving forward I have shed the honey roasted shell for cleaner pasture. The only way I could stop was reaching the end of the bottle, looking down on my shame and smelling the sickly sweet rot of gingivitis. Since that horrible conclusion my teeth have thanked me, stopped hurting so dang much and risen from their sugary grave to once again dominate the lettuce scene. For once without performance enhancing nuts.

Sugar sucks, eat nuts. Bolts aren't bad, but washers are right out. Anyways, halitosis is no laughing matter, brush your teeth mother fuckers.

`sqrt(cause)`

LOW EFFORT BANANA PANCAKE RECIPE

MAKES 6 SMALL PANCAKES

INGREDIENTS

- ½ cup all purpose flour
- 1 tsp baking powder
- pinch of salt
- 1 egg
- ¾ cup milk
- 1 ripe banana, the more overdone the better
- If your banana is not ripe (smh) try adding a small spoon of sugar in as well

STEPS

1. Mash banana in a bowl
2. Add in milk and egg, beat well
3. Sift in in salt, baking powder and flour (if you can't sift it, just dump it all in and pray to the lump gods that you won't get lumps of flour. Pretty counter-intuitive, but whatever)
4. Mix well. If batter too thick, add more milk. If too thin, add some more flour.
5. Spoon batter into a hot oiled frying pan or skillet on medium heat. I usually do two spoons batter per pancake to cook 3 small pancakes at a time.
6. After the pancakes start bubbling, flip them over (about 2–3 mins per side).

GOOD TOPPINGS

- Whipped cream
- Honey and cinnamon
- Maple syrup
- Butter and cinnamon
- Sliced bananas (preferably not overdone) or other sliced fruit
- Peanut butter
- Chocolate chips



Now in recipe blogs, you usually get a couple long-ass paragraphs of some whack-ass story before you actually see the recipe. But this is **mathNEWS**, and they don't pay me enough for that many keystrokes.

Anyway, it all started when my parents were growing up in the twilight years of Maoist China. They told me stories about how their lives shifted from trading ration tickets between families to—

yummyPi

HOW TO MAKE FALAFEL

INGREDIENTS

- 1 cup of dried chickpeas
- ½ cup of chopped red onion
- ½ cup of parsley leaves
- 7 screebles of cayenne pepper
- 9 greebles of cinnamon
- 4 cloves of garlic
- 1 cup flour
- 1 tbsp baking powder
- 304 U.S. teaspoons of mistakes
- Olive oil

You will need: A loaf pan or alternative inventive means of baking chickpeas, a knife and bowl, and self-loathing.

STEPS

1. Rinse then soak the chickpeas for at least 24 hours before making the recipe. After the fourth hour, add ½ tsp of mistakes at every two-hour interval.
2. After a full day has passed, drain the chickpeas. Then, try to turn them into paste using nothing but a knife, your hands, and another 4 cups of mistakes. Should you succeed, immediately give up and find a real falafel recipe. Otherwise, when your arms are weak, your hands are shaky, your morale is broken, and your chickpeas resemble paste as much as they do a handful of pebbles, add another 2 cups of mistakes.
3. Preheat your oven to 400°F.
4. Combine the chickpea substance, chopped onion, parsley leaves, garlic, flour, baking powder, and spices in a large bowl. Mix very well.
5. Transfer the chickpea mixture from the bowl into your baking dish, preferably a loaf pan. Remember to line the pan with parchment paper, or alternatively, another 2 tbsp of mistakes. Drizzle the mixture with some amount of olive oil.
6. Bake for 40 minutes, until the point that some slight browning has occurred along the top of the mix, and your willpower has crumbled to dust.
7. Remove from the oven. Sprinkle with broken dreams. Serve :)



If everything has gone well you'll have a ~~very tasty absolute crumbled mess that in no way resembles the original intention~~ falafel :)

molasses

Goes well with breakfast, CS 240 assignments, endless nightmares, and unshakable dreams.

A TRIP ABROAD: PART 1

Hello, and welcome to what is essentially my trip diary! I gave people a slight preview last issue, so here it is.

The country I'm currently in is New Zealand! Congratulations to terrified for getting it before the preview got published, and sqrt(cause) and 別 for brute forcing the answer.

This writeup will cover my first few days of the trip. As of writing, this trip is still ongoing, so I will have to write a part 2.

The writeup will be my thoughts on the day, mostly.

DAY -1: NOVEMBER 8

I am so nervous. I'm worried that something will go wrong. Last minute packing isn't helping. The weather is unpredictable in Auckland. I hope it doesn't rain too much. Hope a plane isn't late or cancelled.

DAY 0: NOVEMBER 9

In order to get to New Zealand, my travel involves going from Toronto to Los Angeles, spending over 9 hours there, then taking an overnight flight to Fiji, then, after over 2 hours, taking a flight from Fiji to Auckland. Because of this complicated itinerary, I did not check any baggage. Only a carry-on luggage and a backpack my dad gave me.

I woke up at 5am. Partly to get to the airport early, partly because I couldn't sleep much. My mom ended up dropping me off, and she was probably more nervous than me lol. I made sure to check in last night.

Toronto has US customs. Amazingly, there wasn't a lineup. I still hate it. I don't need to be legally in the US for any longer than I need to. They asked me a bunch of questions, and were amazed that I was on break from university. They also asked why I'm going to New Zealand. Nevertheless, I got through no problem.

Somehow, during security, my middle fingers were bleeding from the bottom of the nails. How???

I got a credit card that allows me access to a lounge. Got some breakfast and a comfy chair. I got through at 7am, and my flight boarded at 9:40am. The chair was nice. Unfortunately, the lounge did not have a window to see planes take off and land, which made me leave sooner than I should've.

The flight to LA was on WestJet flight 1100 in a Boeing 737-800. The overhead bins filled up fast, so my carry-on luggage was a few rows behind me. I was in the window seat, with a couple next to me. I'm a big guy, so the seats were narrow, but the legroom was surprisingly enough. Amazing considering my long legs.

Despite this being a 6 hour coast-to-coast flight, WestJet did not provide a full meal. Only a drink and a choice of a cookie or pretzels. There was no screens on the headrest (although I later learned that they had an app that could've acted as the in-flight entertainment).

Luckily, past me ripped a bunch of movies off of DVDs (some were mine, most were borrowed from the library) years ago, before DVD drives on laptops became extinct. So, after listening to a few podcast episodes of The Unmade Podcast (a podcast done by Brady Haran, the man behind Numberphile, and his friend Tim Hein), I ended up watching Tangled. Throughout the movie, I started to feel like Rapunzel, with both of us travelling to our dream location, and being super nervous about it. Certainly calmed my nerves.

Plane lands at LAX, and I have so long in the city. Immediately, the airport layout confused me, and it took me a while to get to a place to store my bags while I explore the city. After seeing a road that looked more like a highway, I can say that I am FIRMLY in the #FuckCars camp. I was, but not with passion.

After a walk for eternity, I finally get there, and immediately head to In-N-Out, which has an epic planespotting view. With the long lineup, it took a while to get my food and it was alright. Not mind-blowing. A bit overrated. Still a great burger.

At this point, my plan to get to Santa Monica was starting to fade. Because I took so long to get to In-N-Out, I would be cutting it close to ride on the roller coaster at the Santa Monica pier. Usually, the amusement park there would be open until 7pm, but it was going to be closing at 3:30pm to the public on November 9th. I splurged on an Uber (when the original plan was to get a bus). Unfortunately, I put the wrong address in Santa Monica, so I got dropped off nowhere near the pier, and the Uber didn't seem to want to take me further.

Time: 3:05. Google's walking estimate: 15 minutes. I had to start walking. I did take some brief pictures, and posed in front of a Route 66 sign, but I knew I had to get to the coaster. I get there. The workers are starting to put up fences. But the sign says that it closes to the public at 3:30pm. Time? 3:20pm. I got in. I got on the West Coaster. I don't care that it cost \$10 for a single ride, I got on it. It was a mild experience, but doing it on a pier jutting into the Pacific Ocean made it great. Totally worth it.

I stayed on the pier for a while longer. Partly to rest my legs, partly to take advantage of the free wifi, and partly because of the view! It was a great view of the ocean, as the sun is getting closer to the horizon. Magical.

I then decide to go back to get my bags. The place closed at 6:30 pm, so I had to get them before then. Taking the bus took SO FUCKING LONG BECAUSE OF ALL THE CARS ON THE ROAD SERIOUSLY FUCK CARS WERZEDTBINETON

[BUZZ]

Sorry, it just sprang out. I got my bags, and realized that Sepulveda Blvd had plaques of notable Americans in aviation. It was nice to geek about that stuff. Walk to LAX, and check-in. Security line was fucking long, and because of the sweat I had, the guy had to pat down my chest and back because the sweat blocked the advanced scanner they put you in. I get through, and I didn't even stay in the main shopping area for long.

In my habit of wanting to know where my gate is, I walked for SO FUCKING LONG. LAX is so huge, and they have cart shuttles just in case. Plus side, it was quiet. Minus side, not many restaurants near my gate. I decide to snack and hope the in-flight meal would be fine.

The flight to Fiji was on Fiji Airways flight 811. It's on an Airbus A350-900, a new plane that is a big plane with two huge engines. This is the plane the airline promotes a bunch. It is a great plane.

I was in an aisle seat in the middle of the plane. Again, the seat was narrow, but that's just me having a fat ass. One feature that they have are cameras! You can have a point of view from the tail or under the plane. Amazing feature. Problem: it's 11pm. You can't see anything after you take off and go over the Pacific Ocean. Still, it was cool to see.

DAY ½: NOVEMBER 10

Dinner was rice, sweet n sour chicken, and some veggies, with a side of a brownie, crackers, and cheese. It was alright. Good enough to eat.

The silliest thing about this flight is that it overflew Kiribati. So while (spoiler alert) we skip November 10 for the most part, it actually flipped a couple of times, where it was the 10th, then the 11th over Kiribati, then the 10th again after leaving Kiribati's territory, and the 11th again going over the International Date Line for the rest of the flight.

DAY 1: NOVEMBER 11

Yep, that's right! We've gone so far west that we are on the east side of the world! We've crossed the international date line, and [mostly] skipped over November 10th.

Unfortunately, I couldn't get a long sustained period of sleep. A few nodoffs here and there, but I couldn't make myself go into a deep sleep. Breakfast was then served. A prism of egg with cheese on top and tomato sauce on the bottom, hashbrowns, and a cherry tomato, with a side of a blueberry muffin, and fruit. A good breakfast.

Sunrise arrived, and the cameras became useful. Touch down looks amazing from the underside point of view. We arrived at Nadi airport in Fiji.

Immediately after disembarking, we went to an open-air part of the airport, which gave a brilliant view of the plane. There

was even a rainbow! A rainbow that could be touching the plane. Amazing!

After going through security, I went to the lounge, as my credit card allowed for that. They have a shower, so I used that to the fullest extent. I later ate second breakfast (after all, I'm going to New Zealand), and ate as much as I could. In my head, I realize something amazing. I saw a blue shark plushie in the duty free earlier and joked about Blahaj. My head now said "Bulahaj!" Bula is the Fijian way of saying "Hello". I immediately had to buy it.

The flight to Auckland was on Fiji Airways flight 411, on an Airbus A330-200. The plane is an older plane, and you can tell by the entertainment system having a remote with a credit card swipe reader (I'm sure it doesn't do anything now), and a game controller on the back of the remote. The legroom was too small for my long legs. Luckily I had an aisle seat. I then had my third breakfast on the plane. The flight was only 3 hours, so I wasn't squished for long.

Finally, I arrive in Auckland. Going through final security was a bit stressful, as they are strict about not bringing in non-native seeds or animals. They even had dogs, ready to sniff anything undesirable. Luckily my shoes were clean enough.

So after getting off my 3rd plane of the journey, what is the first thing I visit? A memorial for the crew of Air New Zealand flight 901, a sightseeing flight of Antarctica with 257 people on board, which crashed into Mount Erebus. By the way, did I mention I'm into plane crashes? Anyways, the memorial was near the airport, but it was a nightmare to get to. I was walking with my luggage and heavy backpack for 30 minutes, and the directions I got from Google were terrible, and I was forced to carry my luggage over grass. But I found it. A small memorial site, and a bench. I paid my respects to the crew (which included the pilots that were wrongfully blamed in the initial report before a second report found that they were set up for failure), and went back to the airport to get a bus.

The bus took you to a metro station, and from there, I went to downtown, and finally got to my place to stay, and I rested.

So what kind of unique New Zealand dinner should I have as my first meal? KFC! To be fair, the KFC in New Zealand is better than in Canada.

I then did a bit of investigating. Near the place I'm staying at, there is suppose to be a proper, public memorial for the aforementioned ANZ 901 under construction. However, due to legal reasons, the construction was halted, and there wasn't any updates since March of this year. So I took a look, and found that construction was still halted. That was disappointing.

After that long travel journey, finally, a good night's sleep on a bed.

DAY 2: NOVEMBER 12

I woke up early. I didn't have any food with me, so I went out for breakfast. However, I did want to have a proper, local meal. So I went to a café in downtown, and had some eggs Benedict on toast with spinach, and tea. The eggs were very good, and, for the first time having spinach, I didn't totally hate it, which is a big deal for me. I also saw that they had a Nutella Beignet, which I had to have. It was yummy.

On a whim, I go to the ferry terminal, and apparently, some ferries can be accessed with the same metro card that you use for buses and trains! So I decided to go to Devonport, and climb Takarunga/Mount Victoria (most places in New Zealand have both an English and a Māori name). It was steep at points, and I was unprepared, but it was worth the view on top.

The most interesting thing about New Zealand is that their wildlife is unique. The trees look different, the plants are different, and the birds have different songs. It was breathtaking to hear birds I've never heard before.

The main event today was the 2021 Rugby World Cup Bronze and Gold Matches! They were on the same ticket, and both Canada and New Zealand were playing (not against each other though). Two points: yes, it was marketed as 2021, played in 2022, and this is women's rugby. World Rugby have decided to get rid of the gender disambiguation from the marketing to create a sort of parity between the men's and women's game.

I decided on a battered hot dog as my lunch (a corndog). It was okay, nothing to complain about.

The 3rd place match was Canada vs. France. France lost to New Zealand in the semi-finals by a point (a slim margin), while Canada lost to England by 7 points (which is the amount of points awarded for a try, the rugby version of a touchdown, plus a conversion kick). There were many French fans, and some Canadian fans. I saw a person with an Andrea Bargnani Raptors jersey, and thought "How big of a Raptors fan is that guy?!"

Unfortunately, Canada got shutout by the French. It was disappointing to not see a single Canadian score, but it was a nice time. Then, as the fans of New Zealand and England started arriving, it became packed. The DJ had the people partying, and I felt WAY out of my comfort zone. As a UWaterloo Pure Math student, partying is foreign to me, so I was like a fish out of water.

It was now time for the final. And boy, what a match! It went back and forth, the teams were evenly matched, and fans were booing the referee. New Zealand started behind, got the lead, lost it again, and, with 9 minutes left, scored a great try. The Black Ferns won 34–31 against England, and the crowd went wild. Over 42,000 people in the stadium, a record attendance for women's rugby. Beer was sprayed, fans cheered, and music sung. Not to mention the haka after the trophy presentation.

The train back was like a tin of sardines. It was super packed, almost like the Japanese metro at rush hour.

wewlad

The hint in the preview was ROT13 for basically saying that the country I'm going to is where my professor in MATH 135, who's in C&O, is originally from. Peter Nelson was the professor.

BENCH REVIEW: THE BENCH AT ALEXANDRA AND WESTMOUNT

I was just walking down Alexandra Ave and noticed a bench in the middle of the intersection at Westmount Road. There's a triangular parkette sort of thing in the middle of the intersection, where Alexandra splits off into a Y shape to intersect with Westmount in two spots. There are a couple trees here and a bench in the middle of it all. It looked like a strange place to put a bench, so I'm now sitting on it.

It's a pretty good bench. The side/leg pieces are made out of a coarse concrete which looks really nice, and the seat and back are wooden and covered in moss. It's pretty comfortable, shaded by a tree, and there's no divider in the middle. The traffic noise from Westmount isn't even that noticeable somehow. I'm listening to Beach House's Thank Your Lucky Stars, watching the leaves fall from the trees, and trying not to think too hard about the midterm I have tomorrow.

I recommend this bench.

__init__

LOCAL MAN HAS STARTED MORE BLOGS THAN BLOG POSTS

Your Blog
Just another WordPress weblog

Hello world!
September 29th, 2008

Welcome to WordPress. This is your first post. Edit or delete it, then start blogging!

Posted in [Uncategorized](#) | [1 Comment](#) »

Pages
» [About](#)

Archives
» [September 2008](#)

Categories
» [Uncategorized](#) (1)

THE NO NOVEMBER CHALLENGE

The month following October in the standard calendar is known for many things. Thanksgiving, Black Friday, Christmas music playing way too early, and moustaches. But most notorious of all is the challenge that many young people attempt for the duration of the month. I myself am an active participant in this challenge, and I know that for some it may seem daunting. However, allow me to convince you to participate, as well as rehashing the rules for anyone who doesn't know. Here is what you need to know about No November.

The rules are simple: There's no November. It is not November. It's still October. When referring to the date, simply count up from the first day of October. For example, the **mathNEWS** issue containing this article will be released on October 49th, and the last day of October is October 61st, after which December starts as normal and you have successfully completed the challenge. Pretty simple, right?

Not only is the challenge easy, but there are a lot of benefits. Here are just a few!

- It's an exercise for your mind. Calculating the date can be difficult. If you need a tip, try taking the date number it would be if you weren't doing the challenge and add 31!
- It helps with restraint. With the advance of technology it's getting more and more difficult to refrain from the actions you shouldn't do during this challenge. As soon as you open your phone or computer, the date which shall not be spoken is staring you right in the face. Once you persevere through this challenge, you won't be a slave to what your calendar says anymore!
- More spooky month! Halloween is way better than Thanksgiving and it's especially better than having Christmas almost two months early. On October 34th I went to a drug store to buy some candy for a Halloween-themed movie night. And do you know what kind of M&M's they had? Christmas themed. Clearly they failed No November since everyone knows that Christmas doesn't belong in October.
- You vacuously succeed at No Nut November since there is no November to not nut in! Now you can eat all the pistachios, cashews, almonds, pecans, walnuts, hazelnuts, chestnuts, Macadamia nuts, pine nuts, Brazil nuts, peanuts, coconuts, doughnuts, and cum you want!
- If your birthday is in this month, then doing this challenge might make you sad. You might feel like your special day is being desecrated. Like many people, you may even be tempted to take a "cheat day" from No November in order to keep your birthday intact. But don't fall into this trap! It may not seem like it, but there are a lot of advantages to having your birthday during No November! Think people whose birthdays are February 29th are lucky since they age at $\frac{1}{4}$ th the speed? Well you, my friend,

have hit the jackpot! If you so choose you could not even age at all! But if immortality isn't appealing to you, you could also brag that your birthday's day is so much higher than most other people! Not to mention it gets moved to a way better month.

Hopefully you've either been convinced to attempt this challenge if you weren't on board before, or you're even more determined than you already were! Happy No Novembering!

someBODY

N COOL WORDS I MADE BECAUSE THE EDITORS ARE DEMONIC APPARITIONS

THESE ARE REAL WORDS, mathNEWS EDITORS. BECAUSE I SAY SO.

- **Penumbraeing.** *Conjugated form of the verbified noun, Penumbra, to Penumbra, to cover something in a penumbra or shadow. Often in a metaphorical sense, such as if one wishes to speak of "the [bagel's] skin stretch[ing, and] penumbraeing the soft and beautiful flesh within."*
 - This is a word; it follows the normal structure of gerundification. The earth may penumbra the moon in an eclipse, why would you speak about "how the earth's penumbra envelopes the moon," when instead, you could talk about "the earth penumbraeing the moon."
- **Gerundify.** *verb.* The process of turning a verb into a noun by creating a gerund (an affix of -ing).
 - Who actually uses the phrases "to turn into a gerund," or "the gerund form of ___" when this wonderful alternative is easily available?
- **Unicorniform.** *noun,* a uniform that emulates a unicorn. An analogue of a fursuit. Sometimes used in conjunction with maid outfits for when people desire to unleash their inner corny in other contexts.
 - This is a wonderful word. Imagine all the contexts when you might have to speak about both your unicorn persona and your desire to fall under a structured establishment of similarly-minded individuals.
- **Corny.** *noun,* someone who is enthusiastic about unicorns, who has a unicorn persona, or who might want to dress up as one.
 - This is obvious.

profQUOTES

CO 370: MARTIN PEI

- “ You have a quiz on Friday. I haven’t made the quiz yet.
- “ Let’s draw something. Wheeeeeeeeeeeeeeeeeeee!
- “ Q because it follows P, R because it follows Q.
- “ What’s your favourite letter? W?
- “ *[to a student that arrived late]* You arrived just in time for the break.
- “ *[casually completes a Sudoku in about 5 minutes during the break]*
- “ I didn’t calculate it. I got Matlab to calculate it.
- “ *[class votes on the incorrect answer]* Democracy doesn’t work in math. Math is a dictatorship.
- “ We love content. I could be a Youtuber.

CO 456: DAVID JAO

- “ ...with various subscripts that are ugly.
- “ The classes that I took are the classes you should take.
- “ You could price oil in oil.
- “ *[computer crashes]* Technology at work on a Monday morning.
- “ Some of you were alive in 2005.
- “ I think technically any inequality can be called a Variational Inequality Characterization.
- “ He was an air force pilot working on game theory, because that’s what air force pilots do.
- “ So we’re talking about Pokémon cards.

CS 145: GORDON CORMACK

- “ Streams are like baby birds. They sit there and say “feed me.”
- “ This is how the mommy birdy says, “shut your mouth, you’re not getting any more.”
- “ It’s too late in the afternoon. Well, in the morning class I said its too early, but now...
- “ Computers only have two fingers.

- “ Functions don’t do anything. They just sit there and functionalize.
- “ Back in a different century, I did some prime hunting.

CS 245E: PRABHAKAR RAGDE

- “ I’m getting private messages that people are having fun with the assignments. They don’t want to say that in public.
- “ I’ve been tempted to dance on the train while wearing headphones, but I haven’t yet. This is Canada, I can get arrested.
- “ When magic fails, you’re left with nothing.
- “ The first one is ‘r’ for result. The second one is ‘s’ for the letter that comes after r.
- “ Real numbers are not real.

CS 246: BRAD LUSHMAN

- “ If you were in the morning section where Ross said this, he stole my line!

CS 246: ROSS EVANS

- “ If we absolutely despise Shakespeare... in the constructor, if they give us an author with Shakespeare, we can set it to Jane Austen instead.
- “ This is a fun game you can play at 2 AM: which of these leaks memory?
- “ *[about the projector screen]* It goes up a lot easier than it comes down. I think that’s a metaphor for life.
- “ I have some examples here of really cursed code that you should never write.
- “ It’s a cool trick, though – you can go to work and say, “hey, I can calculate Fibonacci numbers using exceptions” and your coworkers will say a) “why would you do that” or b) “I took CS 246; I saw that example too.”

CS 246E: BRAD LUSHMAN

- “ It takes one, two, three, [...], twenty-one characters to type, which is plenty of time for you to reconsider your choices.
- “ It’s a theorem that you cannot have a class on object oriented programming without talking about cars.
- “ The motor is part of the car; it does not have an independent existence.

“ Friendship implies coupling.

“ I’m going to make the case that a square is not a rectangle. Keep in mind, we are in a building dedicated to mathematics.

“ We’re about to have an “I’m not weird you’re weird” moment.

CS 246E: EDWARD LEE

“ Your children can’t have access to your private parts.

“ Partial assignment is like giving your friends pieces of your course notes. Toronto students give each other pieces of their course notes.

CS 246E: RAFAEL TOLEDO (ISA)

“ I love Windows. I love Windows so much.

CS 343: PETER BUHR

“ While you can kill yourself, you can’t bury yourself.

“ You’ll be doing [...] in assignment 4. Now you may be saying, “Didn’t I do this in assignment 3?” Well, you did, but many of you did it wrong.

“ Someone probably walked in your CS350 morning class, said [*blubbling noises*] “semaphores,” which never showed up on an assignment again but was one small question on the midterm.

“ Did you know as soon as 94 people enter this room, these doors snap shut?

“ Prof: What’s the worst case scenario if we take off the locks off the individual bathroom stalls?
Student: All three people end up in the same stall?
Prof: And maybe that’s what they want!

“ These functions are meant to be informative but not correct.

“ Now imagine you’re on a co-op term and you’re at a company and the company makes its money with these five lines of code.

“ Now your manager says, “Ah, you’re from Waterloo, the reason we hired you is that you can make this 100 times faster.”

“ This isn’t like real life where you tell your friend, “Yeah, yeah, the CS 343 assignment, I’m done,” when you haven’t even started yet.

“ Do we want to do a problem with schmilblicks and maloobas? No! We want to do a real problem.

“ I want to find all the party animals in the audience here.

“ So you go to the court, you take your CS 343 course notes, and you explain to the jury how your code covers all 5 rules of the critical section game. And it does! It covers all 5 rules. You’re found guilty and spend 10 years in jail.

“ You go grocery shopping, and you run into the most angsty moment. You have the most difficult decision to make; which checkout line to join?

“ So you’re out of jail, back working at Airbus, you write the code again, the A380 takes off, flies around the airport 10 times, then comes crashing right down. So you spend another 10 years. In jail.

“ It’s a bit silly. But will work. I wouldn’t put it in an Airbus A380.

“ You’ve learned enough about locks to be able to cause significant damage.

“ The stuff you’ve been doing is a bit pedestrian compared to that, and you’ve seen that it’s horrible.

“ So they go to this bar in Norway and everyone is talking about this cool new programming idea. You gotta go to the right bars.

“ In 1965, Dahl and Nygaard just woke up one day and invented object-oriented programming.

“ Chairs are sometimes useful for people to sit down while other things are happening.

“ This is a dating service! This is our next startup that we’re going to do.

“ The only thing that can make me happy is for a girl to put her telephone number up there.

“ The heap is our enemy.

CS 370: CHRISTOPHER BATTY

“ Hopefully everyone enjoyed your midterm experience last night.

“ Don’t miss your last chance to spread COVID at tonight’s midterm!

CS 456: SAMER AL-KISWANY

“ Student: Doesn’t this go against the principle of net neutrality?
Prof: Yes.

“ Now we have this technique [NAT] that’s not minding its own business, it’s getting into everyone else’s business as well.

CS 458: SIMON OYA

- “ Do people know about the birthday paradox? [*people say yes*] Well, I need to go over it anyway.
- “ Have you ever verified an SSH fingerprint? [*student says, “Once!”*] Well, that’s once more than me.
- “ It’s a big mess but everyone uses it and the world’s economy depends on it.
- “ Maybe you want Facebook to read your messages, right?
- “ Questions about this... will be... I mean... don’t worry too much, okay?

MATH 145: BLAKE MADILL

- “ If I try to swap classes, I’m gonna end up in RCH.
- “ If I were to prove it to you, we would all just be a little sadder.
- “ Ah, I’ve given away the assignment solution!
- “ It was terrible, just like the rest of Niagara Falls.
- “ Oh the acronyms... Oh kill me.
- “ Bézout? More like Bé-who.
- “ French mathematicians are paying my bills. Just not that one.

MATH 147: DAVID MCKINNON

- “ In particular, if you don’t agree, you’re not cool.
- “ I got a PhD in math, not in art.
- “ I won’t ask you to find the ‘c,’ unless I do.
- “ Theorems don’t have to be correct all the time.
- “ C&O is a fantastic department, it’s almost as good as pure math.
- “ This is all easy and standard. Does anyone have any questions?

MATH 239: OLIVER PECHENIK

- “ If you’re thinking about the graph with no edges, you’re probably doing something wrong [...] Having said that, I’ve spent a long time thinking about the graph with no edges.

MATH 249: OLIVER PECHENIK

- “ You can never trust... clocks.

- “ You’ll learn that all trees are a form of cactus, which is also false.
- “ I believe you more because you’re further from the blackboard.
- “ That’s my favourite thing. you do 2 examples and then you extrapolate.

PMATH 340: MARK RUBENSTEIN

- “ I’m gonna die.

STAT 230: AUDREY BELIVEAU

- “ I wrote this problem as a trap... and I’ve fallen into my own trap.

STAT 231: MICHAEL WALLACE

- “ If I was innocent of robbing a bank—and to be clear, I am—it would be really suspicious for my house to have a bunch of bank robbing stuff.
- “ We’re going to be looking at Tim Hortons, and my favourite liquid, which is tea.

STAT 240: AUKOSH JAGANNATH

- “ Did it work, or did the TA give it full marks?

AND I LOVE POPPERS

anonymous

DUNGEONS AND DYAD TRIGON DUOCRISTALS

I still love dice, and I'm back this issue trying to visualize 4D beings playing Dungeons and Dragons.

BASIC STRUCTURE

First, we have to know just a little about 4D shapes before we can move to dice. To understand 4D shapes, I usually find an analogy to time useful. Imagine we have a super powerful time machine that lets us jump to any point in time we want. To us, then, space has 4 directions: 3D space and backwards/forwards in time. From there, imagine an object not just as a bunch of atoms in space but as the entire trajectory that object follows from start to finish. Each instant is a "slice" of the object. Do you know that one recursive graphic effect where a person's silhouette is left behind after each frame? It's like a funky version of that.

ROLLING

The whole point of finding dice is to roll them, and for that we will need a table (or table-equivalent object) to roll them on. In our lowly three-dimensional world, a die has faces in two dimensions, so we need to roll them onto a table surface that has the same number. Similarly, we need to roll our 4D dice onto something that looks like to a cube. You see, we can view a cube as a bunch of connected squares. In 4D, a hypercube or tesseract is a bunch of connected cubes, where one faces "up" when our die strikes the cube. Alternatively, if we have really good aim we could land one onto a plane, which is very similar to trying to land a 3D shape onto one of its edges.

REGULAR DICE

The most famous dice in our world are the so-called platonic solids, which are convex and have identical regular sides. These are the "most symmetric" solids we have, which is why they make such good dice. That means that our best dice start with the 4-sided tetrahedron and end with the 20-sided icosahedron. However, if you take the analogous shapes in 4-space you get 6 regular solids, with numbers of hyperfaces equal to 5, 8, 16, 24, 120 and 600. These range from the lowly Hyper-Tetrahedron to the mighty Hyper-Icosahedron, and I love them all equally.

All of these faces, by the way, are platonic solids: for example stitching together 8 cubes along the "time" axis will get you your very own tesseract. Good luck trying to pick it up in 3D, though.

WEIRD DICE

In 3D, we have to make some concessions for practicality's sake. Since our numbers are decimal it's super useful to have a 10-sided die, so we reluctantly accept the deltohedron among our dice. Similarly, we can accept a whole range of hypersolids that aren't regular, including ones with any number of faces from 5 to 20. These are all "fair" in that the sides have the same volume, but they lack the symmetry of their regular

counterparts. If you're interested, there's a forum post out there with a list, which includes some funky graphics.

(Bonus note: 2-dimensional creatures are the luckiest RPG players: every natural number has a corresponding regular polygon, so they have a regular die for every number.)

Shahabee

A GUIDE TO THREAT ASSESSMENT IN MAGIC: THE GATHERING

Have you ever been interesting in playing Magic? The cards always look cool and shiny whenever you go, and the concept looks interesting. If you're interested, first things first: find someone who has really good decks and ask them to lend you one. Because uh, deck strength *really* matters, and trying to make your own deck is scary.

Now that that's out the way, there's a lot to learn because there's a whole list of words that mean something specific and you kinda got to memorize what they mean. Or players will kindly tell you as they kill the one fucking card you care about I swear to god this is the only decent card I have in my not even a threat just thought the flying creature was cool comon-

Anywayss once that's out of the way you can try to attack people. Specifically I've been playing commander so there's 3 options for people who can face your wrath. So threat assessment has become pretty important. Here's some scenarios to help you get a feel of good threat assessment:

Say player 1 has a big scary creature out and cards that protect it from getting destroyed. Player 2 has a lot of ways to get mana considering it's early game (don't know if I'm explaining mana ramp poorly). Player 3 has some cool enchantments letting them play some more counterspells. Most dangerous player: Player 3. They secretly played something to get 4 counterspells a turn and now nobody can play anything.

Say player 1 has a pretty scary graveyard going on, so they keep pulling back cards from their discarded pile. Player 2 has a few big creatures. Player 3 has a lot of ways to pull cards. Scariest player: Player 3. They played something that nobody noticed and now every player has to draw infinite cards and take 6 damage while doing so.

The scariest player is always Player 3. QED

(Yes this article is only being written cause I'm salty, and isn't meant to be informative at all. Oops.)

Not a N*rd

N PLACES TO GET BIRYANI

But aqsr, I don't even know what Biryani is?? Don't worry, dear reader, you are about to embark on a beautiful journey. Biryani is this wonderful, magical desi rice dish full of spices. Its divine fragrance wafts through the streets of India and Pakistan and brings my nose home every time. It's eaten in many different places and comes in many different types and forms, so no two restaurants' Biryani has the same taste.

So when I realised I was getting shipped away across the world to go to Waterloo, I made it my mission to find the best Biryani available.

YOUR ROOMMATE'S FRIDGE

- Rating: 1/5
- Convenience: 5/5
- Price: their wrath

You wake up at 1 pm in a daze. You feel horribly dehydrated, hungover and overall numb. Shouldn't have done that proof last night, you think to yourself. As you lazily get out of bed and open the fridge (hoping some food manifests itself for you to consume) you see *it*. Your roommate ordered it last night. And the fruits of their labour (despite being cold and dry) are yours for the taking. They'll never know if you take a bite... surely?

MATH CND

- Rating: 2/5
- Convenience: 4.5/5
- Price: idk cnd closed by this time

I was tempted to not put this in the article since it usually sells out pretty fast, and I need it to stop doing that. But then someone would bug me about it. Math CnD has *acceptable* Biryani. It is cold and dry and does not have much in terms of taste. But it's in the CnD and the perfect lunch between classes. There is certainly much much better Biryani you can find close to campus, speaking of which...

AUNTY'S KITCHEN

- Rating 3.5/5
- Convenience: 4/5
- Price: \$11.95 onwards

Located on the plaza next to E7, Aunty's Kitchen has been bringing expensive Pakistani food to Waterloo students for years. This was the first Biryani I tried in the KW area and it was good enough for me to come back every now and then. The Biryani, to me, does not taste particularly authentic, but it tastes good enough. I really wish it would be spicier though. In my opinion, only the 2 piece standard Biryani is worth it: the portion size is pretty good.

If you have never eaten Biryani and are wondering if you'll even like it (you will), or if you don't want to go fast or order

in, or it's late and you want food (Aunty's Kitchen may close as late as 3 am), this is a good choice. Else, looking elsewhere is not a bad idea.

P.S: The nihari poutine is GOOD. Trust me.

From here on out, I will ditch the convenience, as all these locations are off campus and require either ordering from Uber Eats or a trip. To me they are equally inconvenient :)

URWA'S PAKISTANI AND INDIAN CUISINE

- Rating: 4.5/5
- Price: \$10.99 onwards

Despite this being on the lower end in terms of price on this list, this place is good. The Biryani could be spicier but is certainly not bland. The staff are nice, but that's irrelevant since you're here for the food, aren't you? I've heard rumours that the staff let you sample dishes for free to see if you'll enjoy ordering them, but I cannot personally verify this.

Honestly, I am actually going to order this tonight after eating some free prod night pizza.

P.S: Try Gulaab Jamun.

RAJA FINE INDIAN CUISINE

- Rating: 4/5
- Price: Chicken Chukka Biryani — \$18.50

This one was strange, mainly because this style of Biryani was so different from what I am used to. They included an egg for some reason? By the time I was done with my plate, I was not quite sure what I had eaten, but what I *was* sure of was that I had enjoyed it.

The dish itself was more seasoned than Aunty's but less than Empress, and I have no complaints about it. The portion felt a bit small to me, but maybe that's cause I ordered it at an obscene hour with basically negative hours of sleep. Rather delightfully, they sent me a large menu with tonnes of items that they deliver with my food. So I'll definitely go back. That said, this was one of my stranger experiences, and I recommend you try this to see if you like it.

EMPRESS OF INDIA

- Rating 5/5
- Price: Shrimp Biryani — \$18

This is it friends. This is the best Biryani I have eaten in the KW area so far. The shrimp was well cooked, the rice was well seasoned, and even if the portion was smaller than some other places on this list, it was large enough to fill me for the rest of the day. Keep in mind, by well seasoned I mean decently spicy. So mentally prepare for that.

If there is one restaurant I would go back to just for the Biryani, this would be it. If you have money to spare and feel like treating yourself: go get the shrimp Biryani. You will hopefully not regret it!

P.S: The veg. samosa was also good but not worth the price in my opinion.

aaqsr

Feel free to send in more suggestions of Biryani restaurants to me on Discord. You can find me in most math clubs' servers.

THE EDITORS' TYRANNY STRIKES AGAIN

I'm at prod night for the second time. And this is the second time I have experienced the tyrannous editors shoot down the best pizza suggestion.

For those of you who don't know, the way prod night works is that a bunch of pizza suggestions are written on the board and then we vote on it. The first time I was here, I saw a wild suggestion. No cheese, no sauce, triple chicken. Sounded interesting. I wanted to try it. And I wasn't the only one. The pizza was one of the top voted but the editors just straight up refused to order it. Infuriating, right?

Tonight is my second prod night and with hope in my heart, I went there with the suggestion. Obviously there was a line for suggestions and before I got my turn, I heard someone else suggest the exact same pizza. And do you know what they did? They straight up refu

0.423

A BRIEF CONVERSATION I HAD MOMENTS BEFORE SNOW BEGAN FALLING OUT OF THE SKY WITH THE FORCE OF A THOUSAND GOOSESHITS

ME: Man, the sky sure is dark, it looks like it could snow.

Lemman

TOP TEN SUBSEQUENCES OF PI

UP TO THE FEYNMAN POINT

10. **657595919530**

many nines + many fives = fun to recite

9. **384626433**

a five-(almost seven)-wide palindromer!!

8. **4811174**

the first triplet that shows up, pretty cute

7. **5559644622948954**

the second triplet that shows up, but it's surrounded by doubles

6. **3367336244065664**

so many doubles.

5. **8277857713427577**

ridiculously easy to memorize

4. **5079227968925892**

even easier to memorize

3. **61173819326117931**

the same block of four repeated that soon??? (bonus 932/931 repetition)

2. **062862089986280348**

3/24 permutations of "0268," with lots of 8s tossed in there

1. **999999**

and so on.

ptkyr

THE FIRST SNOW

fell, and it brought the memories with it. They pushed through my chest like a freight train. Let's live through this part again, I suppose.

Sick of Losing Soulmates

SOMEWHAT COMPREHENSIVE GUIDE TO VEGETARIAN PLACES IN WATERLOO

My qualifications:

- Vegetarian
- Hungry
- Too lazy to cook

Compared based on:

- Taste
- Price
- Re-eatability (can I eat this for a week and not want to throw up)

Notes:

- I eat eggs but you can figure out which ones have eggs in them, I've tried to include egg somewhere in the name/description.
- This is just based on what I like, you may have different tastes.
- Hopefully the notes next to the places will be helpful.
- Many of the dishes/places have vegan stuff I just didn't label all of them. It's pretty easy to figure out which ones are vegan.
- If you're eating at a East/South-East Asian place, make sure to ask what the broth is made of. The broth is usually chicken/beef but sometimes they'll say its vegetarian anyway unless you explicitly ask.

S TIER (YES YES YES)

- Harvey's 2 veggie burger deal for \$7 (+close to campus, +vegan, +affordable)
- Basically Royal Paan's entire menu (-you may not like Indian street food, -next to Laurier: risk of exposure to golden hawks, +re-eatable because there's so many things to try)
- McDonald's \$1 icecream (-it's not food, -next to Laurier: risk of exposure to golden hawks, +the icecream machine is never broken!)

A TIER (YES)

- Fresh Burrito (+really really good tofu, +close to campus, -boring, +vegan)
- Burger King Impossible Whopper (+tastes good, +pretty big, -not that close to campus, +vegan)
- Williams Avocado Tomato Spinach Egg Bagel (-not too expensive \$5, +close to campus)

B TIER (GOOD)

- Campus Pizza (+close to campus, +very affordable, -haters say it tastes like cardboard)

- Kismet Chana Masala (+close to campus, +vegan, +half naan half rice option),
- Mel's Diner Beyond Meat Burger (-difficult to manage and end up spilling sauce all over yourself (totally not based on personal experience), +I like the fries)
- LooBapBap Veggie Kimbap (+vegan, -small)
- Harvey's Veggie Poutine (-very unhealthy)
- Williams Berry Waffle (+tastes great, -expensive for what you get)

C TIER (ITS ALRIGHT I GUESS)

- Mel's Diner Spaghetti (-bland, +at least you get garlic bread)
- Mel's Diner Florentine Benedict (-not a fan of liquidy egg)
- Tim Horton's Everything Bagel with Butter (-bland)

D TIER (IF YOU HATE YOURSELF)

- Tim Horton's Everything Bagel with Sour Cream (-the cream is too much for me)
- LooBapBap Avoholic Egg Toast (-they told me it was vegetarian but mine had HAM (!!!) -but its D because maybe they just messed up my order, +it had potential)
- Twisted Indian Wraps (very meh)

E TIER (IF YOU REALLY HATE YOURSELF)

- Seoul Soul (-literally the only dish you can get there is Japchae and its meh at best, -they say that the BROTH IS VEGETARIAN until you ask them what its made of and then they say BEEF 🤢)

F TIER (PLEASE DON'T DO IT)

- Kismet Veggie Biryani (-awfully bland, -a total disgrace, -big portion: but you won't want to finish it so you're just left with guilt, +close to campus, +vegan)
- Baba Grill (-I can't remember what I ate but I remember that all the options sucked)
- Mel's Diner French Toast (-the pictures are misleading, -super bland)
- Lazeez Falafel (-literally just sauce with fries with one or two pieces of falafel, -I realize that insulting Lazeez comes with a death penalty but I had to speak the truth; I accept my fate with my head held high)
- Ennio's Pasta House Arrabiatta (-the most basic pasta you've ever had for \$20, +ambiance, -next to Laurier: risk of exposure to golden hawks)

Final Notes: There are some places like iPho, Empress that I didn't add because it was too long ago to remember and some places I might not have covered. If you want to add to a future version of this list, send me an email to help.johnsstreet@gmail.com.

John S. Street

A RANDOM RANT

If the universe is probabilistic and most things are determined only when they are detected, how can we be sure the memories we have are real and not something we are creating on the spot? What if you just made up your whole personality right now while reading this article? You would never know. I would never know.

We have no idea how shit works. We have no idea who we are. There is a very real chance that I did not exist before you decided to open **mathNEWS**. And yet, we keep grinding.

Now obviously we all have existential crises on a regular basis (right?) and we can't stop thinking about them until we forget, until they randomly come back again. My reason for writing this particular rant (at 5 AM) is because I just woke up (not intentionally. I would never wake up at 5) to a very weird dream. I have written it down in a kind of poem which you can probably find nearby. Anyway, my first thought when I woke up was: is the world the same as it was before I went to sleep? What if it was just created?

I cannot write more because I wanna go to sleep. Excuse my bad writing. I blame it on my lack of skills and well, 5 AM.

another.mathnews.writer

???

A story that I dreamt last night, a story that transcends time. There exists nothing here. Nothing except my thought. And I have no idea who I am, or I am not. And then suddenly I, sensed some unrest, I opened my eyes, *sic mundus creatus est*.

another.mathnews.writer

CHEESE KNOW-HOW

Pig's milk does not coagulate, which means it is a lot harder to make cheese with it. It is also very difficult to milk sows, which places pig cheese among the most expensive cheeses.

himugüegeli

EPISODE 47 + CALL FOR APPLICATIONS

Enjoy Episode 47 of the MathSoc Cartoons series: MATH 137—The Epsilon-Delta Definition of a Limit!

Want to see the next comic when it's released? Follow @mathsoccartoons on Facebook and Instagram! Want to see the next comic BEFORE it's released and provide feedback to help us out? Sign up to be a reviewer at <https://bit.ly/mathsoc-cartoons-reviewer-signup>! As always, feedback, suggestions, and fan art can be left on the MathSoc Cartoons Discord channel in the MathSoc server or sent to cartoons@mathsoc.uwaterloo.ca.

Also, MathSoc Cartoons is hiring PAID comic writers and artists for Winter 2023! If you love explaining concepts, drawing comics, or telling bad math puns, hurry and apply by December 30th at <https://bit.ly/join-cartoons-team>!

MathSoc Cartoons

mathNEWS

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UW'S BASTION OF ERUDITE THOUGHT SINCE 1973

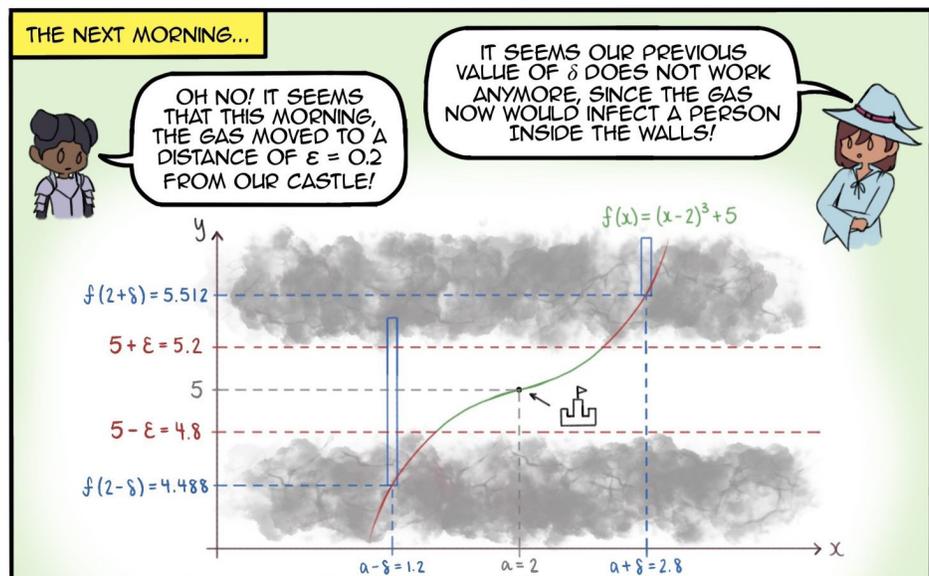
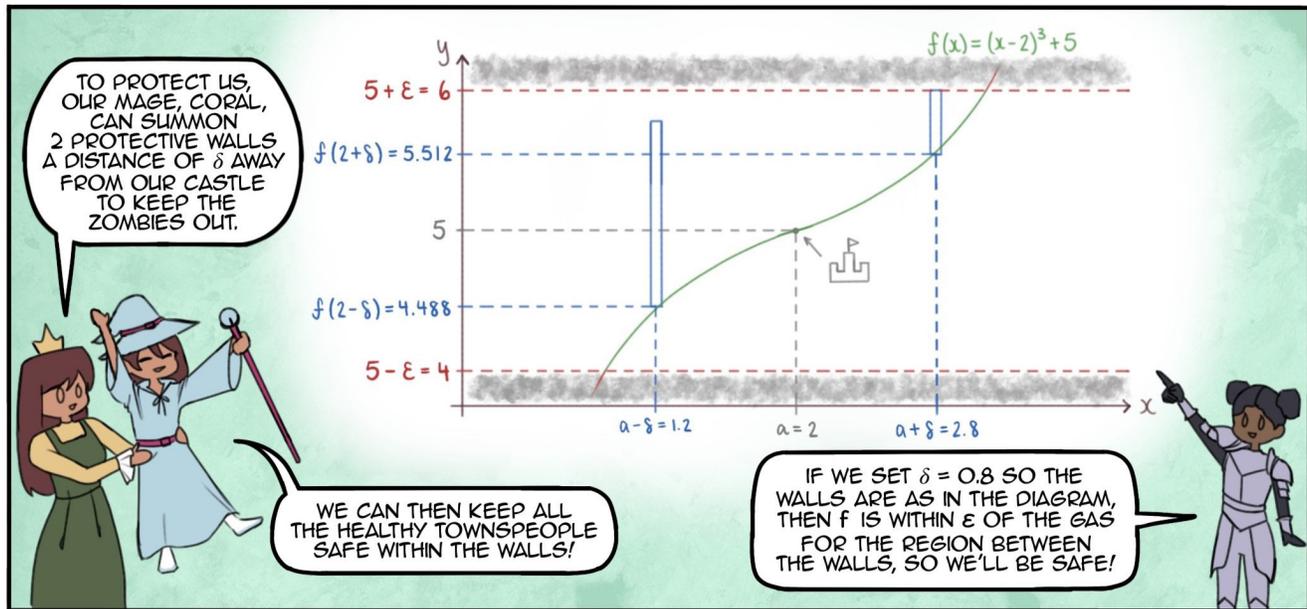
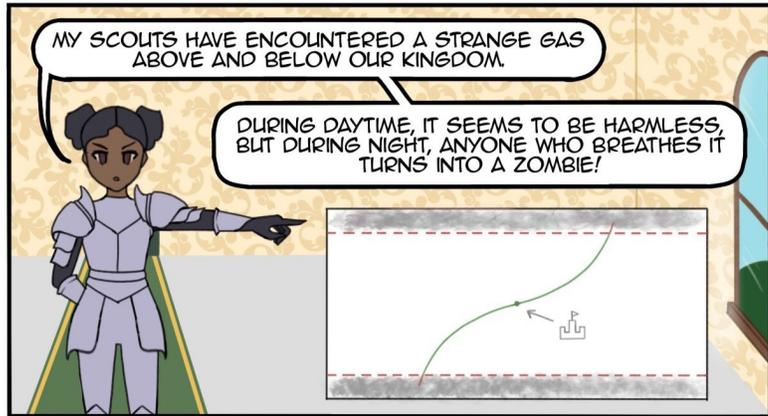
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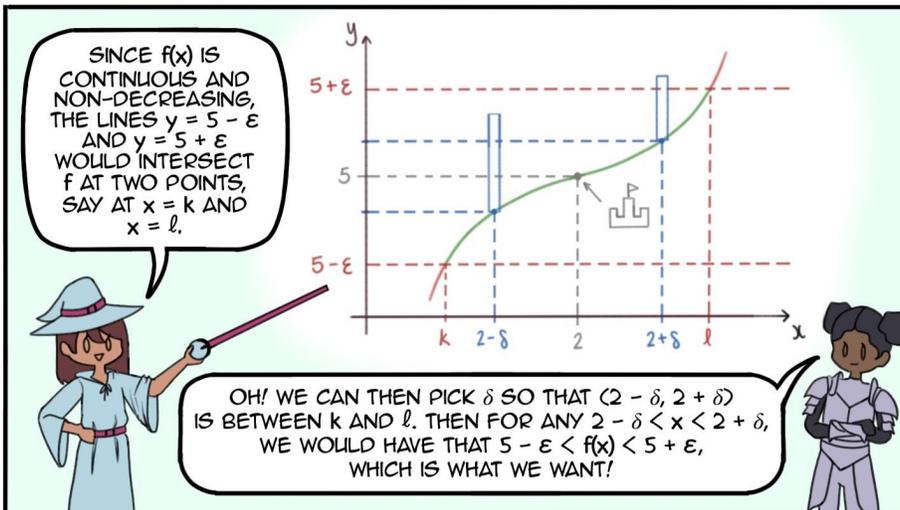
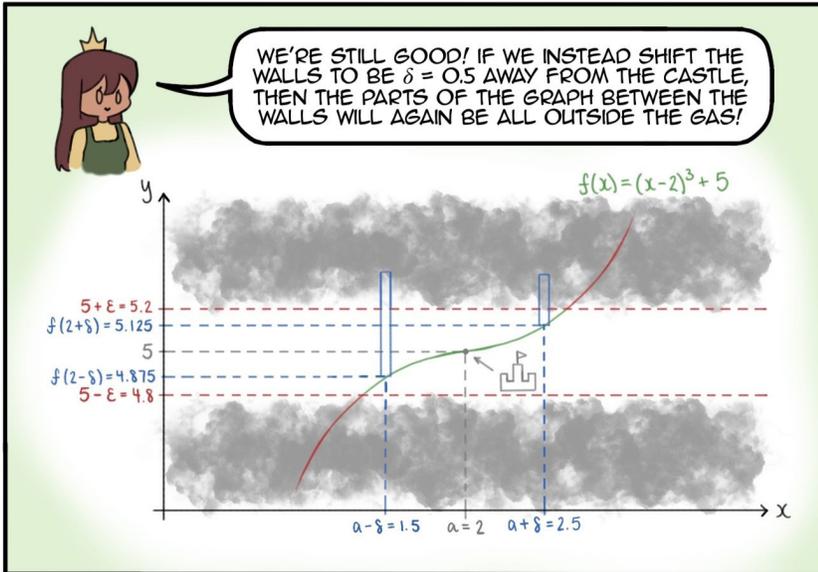
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MATH 137 - THE EPSILON-DELTA DEFINITION OF A LIMIT

STORY BY: MARCUS CHAN, ART BY: WINNIE PHUNG



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NOTE:
TECHNICALLY WE DON'T NEED f TO BE NON-DECREASING FOR THIS ARGUMENT TO BE TRUE - THIS WORKS IF f IS ANY CONTINUOUS FUNCTION. HOWEVER, SHOWING THIS RIGOROUSLY REQUIRES MORE WORK. IF YOU WANT TO KNOW MORE, CHECK OUT THE INTERMEDIATE VALUE THEOREM.

IN FACT, THIS IS WHAT LIMITS OF FUNCTIONS DESCRIBE IN CALCULUS!

IF FOR ANY $\epsilon > 0$ (THE DISTANCE BETWEEN GAS AND THE CASTLE), THERE EXISTS A $\delta > 0$ (THE DISTANCE BETWEEN THE WALLS AND CASTLE) SUCH THAT FOR ALL $a - \delta < x < a + \delta$, $x \neq a$ (ANY POINT WITHIN THE WALLS), WE HAVE THAT $L - \epsilon < f(x) < L + \epsilon$ (THE PART OF THE GRAPH IS BETWEEN THE GAS LAYERS), THEN WE SAY f CONVERGES TO L AS x CONVERGES TO a .

SO IN OUR CASE, WE WOULD SAY THAT $f(x) = (x - 2)^3 + 5$ CONVERGES TO 5 WHEN x APPROACHES 2.

SO NO MATTER HOW NEAR THE GAS IS, IT IS ALWAYS POSSIBLE TO FIND A WALL PLACEMENT THAT KEEPS US SAFE!

AND THE TRIO LIVE HAPPILY EVER AFTER...

CHICKEN NOODLE SOUP

Hey everyone, UW Unprint here. Today, no politics or satire or weird stuff. Just a chicken noodle soup recipe. I made this on Saturday and it was the bomb.

If you're expecting a normal recipe, unfortunately I don't keep notes or measure things. So, this is going to be primarily vibes-based. Imagine a "(some)" as the quantity after each ingredient here.

INGREDIENTS

- Chicken thighs (breasts would probably work too)
- Whole chicken carcass (probably optional)
- Oil (edible)
- Onions
- Garlic
- Carrots
- Herbs (I used rosemary and dried basil)
- Water (hope you have this at home already)
- Salt
- Pepper
- Soy sauce
- Chicken bouillon powder (if you can't find this, don't sweat, keep reading)
- Pasta

PROCEDURE

PREP

At some point, you need to chop up your onions and carrots. They should be bite-size, so imagine fitting them on a soup spoon (and remember that they'll shrink a little as they cook). If you're a cautious person, or don't like multi-tasking, chop your vegetables beforehand. Otherwise, you can live life on the wild side and chop them right before they're needed, while other stuff is cooking.

BROWNING

First, you want to start off by browning the chicken in some oil. This gets some flavour on the chicken, and the brown bits from the chicken will add some colour and flavour to your soup. Heat up some oil in a big pot, and add your chicken. I used a Dutch oven, but a big stock pot would work. I don't recommend nonstick for this, since it'll impair the browning.

Make sure to flip your chicken often so it doesn't burn. Don't be too worried about sticking though. First, sticking improves the fond, and second, you'll be hacking this chicken up later, so looks aren't that important.

You're not looking to cook the chicken through, because it'll be simmered in the soup for like half an hour anyway. So, don't worry about the inside of the chicken. Your guide for when to stop is the brown stuff (hopefully) building up on the bottom of the pot. People on food YouTube call this

"fond" and it'll add some flavour. When this starts getting dark brown, it's about to burn, and you should pull your chicken.

BUILDING

Next, add your chopped onions and cook them until they're softened and browned a little. As long as you don't burn them, or the fond, it'll be fine. While they brown, take this opportunity to chop up the chicken you browned into bite-size pieces.

Next, add a little bit of water and your chicken carcass to the pot. I get chicken carcasses by roasting a whole chicken and saving the carcass in the freezer. This, admittedly, is a lot of work, so feel free to skip adding the carcass. I haven't tested this at all, but the carcass probably adds some flavour, so you might have to compensate during seasoning later.

Add in your chopped carrots, and add enough water to almost cover the carcass. If you don't have a carcass, imagine a chicken sitting in your pot and add enough water to cover (and account for displacement of water, I guess). Add your chopped browned chicken.

Then, toss in your herbs. Like I said above, I used dried basil and rosemary, The rosemary was like a month old from my fridge, so no need for restaurant quality ingredients here.

SEASONING

All that's left now is simmering and seasoning. Stir once in a while, so you feel engaged. I'm guessing you can't really simmer it too long at this point, so take as long as you're willing to wait. However, do make sure the carrots are soft enough to eat. When you're tired of waiting for soup, start seasoning. Remember to take the carcass out, if you're using it.

Since you're using water and not a pre-made stock, your main goal is going to be adding enough salt to make it taste like soup and not chicken water. For this, I used a combination of normal kosher salt, soy sauce (for extra colour and deeper flavour), and chicken bouillon powder, because that's what my mom does.

You could probably skip any of these, except for the salt. Or, use other stuff that's salty and flavourful, like fish sauce. Unfortunately, I didn't have any when I was making this and I lost my Asian card. Experiment! If you can't tell already, this is not a rigid recipe.

It's not too complicated, if you go slow and taste often. The basic procedure is to add stuff until it tastes good and not bland. I also mince and add a few cloves of garlic, since garlic tastes more garlicky if you cook it for less time.

Finally, add your pasta. The pasta shape is flexible, but something long like spaghetti would be a poor choice, in my

opinion. If you used lasagna noodles, that would be really funny, but probably inconvenient.

Let the pasta simmer until it's soft enough to eat, and you're done! If you end up making this (and it actually tastes good with these vague instructions), email a picture to mathnews@gmail.com, and I trust our fearless editors will forward them to me.

Eat more soup! It's an underrated food category.

UW Unprint

N RECIPES I GOT FROM WHAT IS PROBABLY THE WORST PLACE TO GET THEM

- **Crock Pot Chili:** Stew beef, 1 can tomato sauce, one jar corn and blackbean salsa, one can pinto beans, two green bell peppers and two red onions minced, garlic and onion powder (to taste), chili seasoning (one packet), half a stick of butter, and one and a half teaspoons of Sweet Baby Rays BBQ sauce. Dump in a crock pot, cook on high for 1 and ½ hours, then on low for four.
- **Ajitama (Soft Boiled Eggs):** Combine 1 cup water, 1 cup sake, ½ cup mirin, ½ sugar and ½ cup soy sauce. Soft boil 6 eggs for 6–6.5 minutes. (Tip: let them reach room temperature first before putting them in.) Wash the eggs under cold water, and peel. Marinate eggs in mixture (Ziploc bag or container) for four hours or overnight.
- **Drop Biscuits:** Preheat oven to 375°F. Whisk 3 cups all purpose flour, 4 tsp baking powder, 4 tsp sugar and 1 tsp salt. Add 2 cups of whipping cream, stir. Should be rather thick. Drop by desired bun size, 1 in apart, on a greased baking sheet. Bake until bottom is golden brown (roughly 17–20 min).
- **Revenge Meatloaf:** Get 4–6 lbs of hamburger/turkey burger (ground beef/turkey). Mix in 1 pk onion soup or ranch mix, 1 tbsp ketchup, 1 tbsp spicy brown mustard, 1 tbsp BBQ sauce, 1 tbsp steak sauce, and 1 egg. Mix, shape into loaf on a pan, bake at 350°F for 2 hrs. Also makes good taco filling if taco seasoning is used.

Out of these recipes, one I got from Tumblr, one from a fanfiction, and the other two from an adult roleplaying site.

Go on. Guess.

A REFUTATION OF ENTHUSIPISS' ARGUMENT ON COMEDY

“I think piss is funnier—you can kind of get away with piss jokes in the workplace, but cum jokes would be inappropriate”

Take a moment, dear **mathNEWS** reader, and imagine a world in which the merit of comedy is determined based on how appropriate it is for the workplace. How devoid of humour this place would be—any jokes with offensive language, satire that criticizes the establishment, jokes about cum, all these *crucial* pillars of the current human condition would be stripped away. To live in this world would be to drown in sorrow and monotony. Comedy, fundamentally, is the vehicle through which humans connect with one another. The society Enthusipiss describes is an edgeless graph; people are left with no way to bond. Organizations crumble. Governments collapse. Society is derelict and humanity fades from existence. All because piss was thought of as funnier than cum.

enthusicum

N THINGS TO DO IN MC COMFY WHEN IT REOPENS

- Sit
- Chat with your friends
- Sing a song
- Play an instrument
- Attend MathSoc events
- Be kicked out of the room for a MathSoc event that you aren't attending
- Host a MathSoc event so you can kick out the people who aren't attending your event

MathSoc Event Enjoyer

11 REASONS WHY BINARY IS THE SUPERIOR NUMBER SYSTEM

1. Decimal is used because of the number of fingers. Switch that to number of arms. They are bigger.
10. Computers also have 10 fingers. — Gordon Cormack
11. I can only come up with 11_{bin} reasons. 11_{dec} is a lot.

M SENTENCES

FROM THE LAST mathNEWS ISSUE, IN CHRONOLOGICAL ORDER

In a truly arcane constitutional procedure, the United States has a “debt ceiling” that limits the total national debt. Even if borrowing has been authorized in a Congressional budget, the debt ceiling must also be raised. If this limit is not raised, Bad Things could happen, such as a government shutdown, or a default on American debt.

FROM MIDTERM RUNDOWN, BY UW UNPRINT

UW Unprint has the unnatural passive ability to just write seemingly bland articles that are incredibly entertaining to read. When I was taught about author’s voice, it was always in the most extreme contexts—a depressed drunk from the 1800s writing poems about the macabre, or a black woman raised in the 1930s deep south writing about societal pressure during her childhood. UW Unprint’s voice is so much more subtle in comparison, but it is what makes all the difference in their articles. A page and a half long article about what’s at stake in the 2022 American midterms really shouldn’t be as engrossing as this one is.

(Last issue was probably one of the best ones **mathNEWS** has put out in my tenure here. So densely packed with absolute bangers of articles was it that I could not physically restrain myself from writing this article, praising my favourite sentences. There is not really much discourse about **mathNEWS** issues after they are released, but some of these sentences I enjoyed so much I simply wanted to share them.)

If Doug Ford uses or threatens to use the non-withstanding clause for some absolutely batshit stupid reason one more time I’m going in the oven along with the cake. Do not challenge me on this.

FROM 4 INGREDIENT UPSIDE DOWN FRUIT COCKTAIL CAKE, BY YUMMYPI

A common criticism of cooking writing is that it is dry and soulless. That the only real value is the recipe and ingredients, and everything else is extraneous and forgettable. So strong a sentence has yummyPi crafted here that it renders the article ascendant in the land of kitchen literature. I just like how violently the sentence contrasts with the recipe up until this point. It just seems to give the whole article a direction that no other recipe I have read has. I give both the recipe and this sentence a 10/10.

(This format of article is wholly ripped from N Sentences by girafarig in 145.2. What a good article that was. By highlighting certain sentences, girafarig weaves this undercurrent of appreciation for the whole of **mathNEWS**. The original article balances analyses of the sentences featured with paragraphs like these, where girafarig espouses their admiration for the art of the sentence. So intimately familiar is girafarig with each of the writers, that in the analyses girafarig ties each sentence to the whole of the writer’s work.)

- *Become a worm and inhabit the earth. It’s quite fun to work under the soil, amongst the roots.*
- *Become a dragon and inhabit the skies. It’s quite fun to work*

in the clouds, amongst the planes.

- *Become a crab and inhabit the seas. Crab rave.* 🦀 🦀

FROM N UNORTHODOX STUDY SPOTS, BY WANDERLUST UNION

*As much as I can write overwritten analysis about why I like certain sentences, at the end of the day some of them are simply funny. **mathNEWS** is a publication full of bits, and N things articles have been synthetically distilled to contain the highest quantity of bits per capita. I have nothing but the utmost appreciation for those who can craft sentences that perfect this sacred genre of article.*

(Connecting each sentence to the whole of the writer’s work is something I cannot do in this spiritual sequel of an article. **mathNEWS** has grown substantially, both in issue length and number of contributors. When girafarig wrote N Sentences, each issue was under 20 pages. Back in those days, when I would read **mathNEWS** every other week, I too was able to connect each author’s article with the whole of their work. Of course I could. I knew every last author. Prod night was just a dozen of us in a Discord call.)

Astaroth pulled the lever. The trapdoor fell open. Screams

FROM COOLING THE LAKE, BY MOLASSES

My favourite sentence from my favourite article of last issue. It played in my head whenever it came up. I certainly could talk about how I can hear Astaroth grunting as he pulls the heavy lever, the loud and low metallic clangs and whirs as the trapdoor drops, and the screams emanating from deep below, yet you hear all of these sounds so much more clearly when reading the original sentence than when reading what I have just written. Go read this article.

(Objectively, those Discord prod nights sucked. You all know how much nicer it is to speak to people face to face, and we had no pizza either. Every single one of those prod nights, I would sit listening to stories from the upper years talking about how things were pre-covid. About in-person co-ops, about a bustling and lively and populated campus, and about the glorious **mathNEWS** prod nights of the before days.)

*What do you call your stepbrother that likes math?
Algebrotha from anotha motha*

FROM FUNNY JOKES, BY OKIPULLUP

Complete and thorough delivery on the premise of the article. This joke is indeed funny. What can I say, if you want a surefire ticket to the extremely evitable next installation of M Sentences, write a shitty pun with a rhyme scheme.

(And now here sit I at **mathNEWS** prod nights bigger and more in-person than I could have imagined during the pandemic. We had 50 people at the last one. As clichéd as it is, the room is alive. It buzzes with constant collaboration between authors. So many minds means **mathNEWS** is

pushing out the greatest and grandest issues in years. And yet, it would be impossible to write another *N Sentences* in keeping with the spirit of the original. That feeling of a singular **mathNEWS** community it has just doesn't exist anymore. I don't think **mathNEWS** will ever have anything like another **mathNEWS** With You or another **mathNEWS** Minecraft server. I may have become a bitter old man angry at the world for changing in ways that are objective improvements, writing really pathetic articles about it, but I can't help but feel as if something got lost on the way here.)

Some places are so remote, that the nearest grocery store is over an hour's drive away, which was really fun to figure out when we arrived at our hostel, less than an hour before grocery stores closed.

FROM PEACELOVEMATH.TAKES.ON.ICELAND, BY PEACELOVEMATH

There isn't too much to dig into here, I just like how well this sentence works on such a simple level. It's simple setup and payoff, and yet it works so well. It's a complete story, where our narrator is left to starve, foodless and forsaken, in the Icelandic waste and I don't think there is any better way to convey that.

(I give all these excerpts the collective award of "Sentence of the Issue." I also induct all these sentences into the **mathNEWS** sentence hall of fame, a hall reserved for only the most famed **mathNEWS** sentences.)

aphf

If you do go back to 145.2 to read the original *N Sentences*, you might as well read *Fuck P.D.* by Deriving for Dick, it is one of the greatest works of eroticism in **mathNEWS** canon.

WHAT AM I DOING?

I know I had like 5 things to work on like assignments or applying to co-op or something but I can not recall which one I was working on so I will do the sane and rational thing of being indecisive and thinking about it for the past hour and a half instead of getting work done or leaving my room for some fresh air and going to **mathNEWS** and getting some free pizza and instead I will simply write about my struggles online and not even enjoy the free pizza so if someone could get me some cheese pizza that would be fantastic kthxbye

braindamaged

A TRAGEDY IN 5 WORDS

you just lost the game.

eggo_chuggo

WHEN THERE'S NOTHING TO WRITE ABOUT

What happens after a **mathNEWS** writer has hit their peak? Don't say that writers can't peak. In fact, it's probably pretty easy to chart the "career" of a long-time writer along any metric you pick—people don't stay in university for long, and one can only churn out so many articles in that time while also dealing with the rest of their life.

So, what happens after a **mathNEWS** writer has hit their peak? It can get uncomfortable to think about yourself this way. By definition, what follows a peak is decline. Does that scare you? In a full life, we peak and decline professionally, physically, and mentally. Do you know what it's like to realize what can no longer be realized? To know that your past self was more able than you? To confront the End?

What happens after a **mathNEWS** writer has hit their peak? Well, I'd bet they'd find it hard to think of new article ideas. They'd probably look back fondly on the days when the words flowed freely, when they had just settled into their voice and their niche. Serials abounding. But the peak hit too early and the decline came too fast. The thought of what they will write about for their last article ever would've probably crossed their mind a few times...

Finchey

AFTERMATH OF STAT 230 MIDTERM 2

GODSPEED TO ANONYMOUS GEAR



miller

THE FIRST TIME I GOT DRUNK

Does this Sangria have shrimp in it? Or was it your \$2 wine?

A drinking game? I'm down.

Another shot? What do I actually think about? I really wonder—let me finish this drink. I want my filters off tonight. Let me pour myself another cup. You're an angel. You're a puppy. You're a golden retriever and

i'm (you look) i'm (you look french) not drunk yet (you look like you're from quebec)

i'm fine i swear (you just look so quebecois)

i'm not drunk yet. i just feel-

I feel refreshed. I feel understood. I feel like I

I know the answer to this assignment question and I need to write it down and I

-this warm feeling in my throat and (bijections? odd sets to even sets? was that what you were asking me about?)

it feels a little funny? (you look so french) but im sure youd understand

i just need to loosen up a bit more (you look) so let me

just stand (you look) here and (STUNNING I LOVE YOUR LIGHTS AND YOU'RE A FANTASTIC PERSON AND YOU AND I REALLY APPRECIATE YOU AS A FRIEND AND AND AND YOU AND AND)

my cups empty and so is the pitcher! i need a refill but

you look like a himbo [1:23 AM]

rum! rum! rum and lemonade! ive lost track but thats fine, im here for a good time

i don't notice the feeling anymore; i promise i'm not drunk but

they're starting to leave now, so i have to finish this half cup. It would be a waste otherwise. I'm sober now. I'll be fine. The night's going to

Do you knowjory to tiurTe a bfe for in 3, finrbxib [1:37 AM]

end soon

I don't know what semiconductors are [1:43 AM]
But that's so cool [1:43 AM]

wont you walk me home? i tink im still tipsy

an d ti's a lon g wayd to go back

and i cant see a thing and you've gripped onto my arm so i dont wander into the cars olr the ditch but

what if i want to? that woudl be so funny

but we're homle and i'm not the one sober tihs time

tthe room is spknning now. youre movgin teh furntiner away from me bujt trujst me, i'm fine, i can stikll draw and talk and message people on discord and thinkm abojut my frineds and and

whats a homomorphism?

you lookl lik e a hompomorphism!

Yoo you're awake right [3:46 AM]

What the fuck is a homomorphism [3:46 AM]

That is incredibly fascinating _ I think I install any 35% of it [3:49 AM]

where do people come froml? the people factory?

whant if both of us got drunk? who wou.d

take care of us?

would he take care of us?

like the power rangers?

minamete

N PUNS ABOUT DRINKING

This is my first time writing a **mathNEWS** article. Let's rum with it.

- Why do French people like drinking so much? Because they think it's *alcool*.
- Why did the volleyball player barf at the party? Because the drinks were *spiked*.
- I tried a red with steak for the first time the other night. It was nothing to *wine* about.
- I tried fermenting my own grain. It was a lil *whiskey*.
- I had a great time trying Korean alcohol. I was *soju*-bilant.

toe-quila

I WANTED TO WRITE A SONG

A friend of mine left a guitar in a club office for anybody to use, so I've been playing it during my lunch break. The lower register is very resonant; I can feel it in my chest when my thumb plucks lines on the lowest string.

I've also been quietly figuring out how to sing. I have all of these preconceptions of how I want to sound while singing, but I try my best to set them aside whenever I actually do. I want to sing in a way that is true to my speaking voice.

I was at a friend's place the other night, and they had a guitar. I had been picking at it all night, but at one point, I sat cross-legged on the floor and played a song I'd been listening to all week. It was hard to coordinate the rhythm of the words with the motion of my hands, so whenever it fell apart, I would curse and scramble to pick it all up—to catch up to where the rhythm of the song would be. I was giggling the whole time. I heard someone point out that I wasn't even drunk. I wasn't, but I might as well have been—I felt fast and loose and playful.

Why do I bring this up? I couldn't write anything all prod night. For the past few issues, I've been writing poems about the goings of my life. And poem-worthy things have probably happened over the past two weeks, but I couldn't get myself to write anything. I've felt that fast and loose and playful feeling while writing poems on other nights, but not tonight.

I've felt a bit antsy and jumpy these past two weeks. I feel like at the drop of a needle, I could pick up a musical instrument and tap into the fast and loose and playful—that place from which all creation originates, I bet. But I don't feel like I can consistently do that when writing, especially not when writing poetry.

In fact, I wonder if I understand poetry at all. Yesterday, I would have said that writing saved me from something—there was a time in high school when I very edgily believed that nothing meant anything and that everything could mean anything. I then would have pointed out some writers whose work showed me not that everything could mean anything, but that everything could mean *something*—something *personal*. I would have said that this marked a turning point for my writing and my music making and my mental wellbeing. Today, I would probably still agree with that.

But I don't know. Today, I've realized that even the so-called greatest poems often feel dead to me. I hate that English courses have made poetry so stiff and academic—I hate that if I'm not using my brain, I'm missing what the keepers of poetry would have me believe is the “deepest meaning” of a poem. In contrast, even the most mediocre song can feel feral and free—the scrutiny I would place onto the lyrics on paper melts away when carried by a song. I've found that the heart finds its way to the deepest meaning of a song, and it makes me question if I knew anything about written poetry to begin with.

I couldn't fall asleep, so I read an interview by one of my favourite songwriters. He describes his process as “trance-like”—he'll play the same set of chords for hours and mumble until lyrics and melodies crystallize. When I read that, I realized that tonight, I would have rather done exactly that—I would have rather curled up in the club office and riffed on chords and words until I wrote a song. Even if it sucked, I would have felt fast and loose and playful doing it. I would have felt free.

I wonder if such a trance-like state exists when writing poetry—I wonder what it looks like, and I wonder if I can enter it. I wonder about the ways that poetry enjoyers think differently than I do—I wonder how their brain plays with their heart when they scan through lines of dry ink. I wonder what it's like enjoying a poem.

Please let me know!

X

STOP DOING LETTER CASES

- **ORTHOGRAPHIES WERE NOT SUPPOSED TO BE GIVEN INHERENT IN-BAND DATA**
- **YEARS OF SPELLING YET NO REAL-WORLD USE FOUND** FOR CHANGING THE SIZE AND SHAPE OF YOUR **GRAPHEMES**
- **WANTED TO INCLUDE EXTRA INFO ANYWAY FOR A LAUGH? WE HAD A TOOL FOR THAT: IT WAS CALLED “PARENTHESES”**
- **“YES PLEASE USE THE BIG LETTER FOR NAMES. PLEASE STYLE USING THE SMALL BIG LETTER”**—STATEMENTS DREAMED UP BY THE UTTERLY DERANGED

LOOK AT WHAT LETTER CASE USERS HAVE BEEN DEMANDING YOUR RESPECT FOR ALL THIS TIME, WITH ALL THE PENS & WORD PROCESSORS WE BUILT FOR THEM

(THIS IS REAL WRITING, DONE BY REAL WRITERS):

New York	RuBisCO	semi-Neumannian
?????	???????	??????????????????

“HELLO I WOULD LIKE mathNEWS APPLES PLEASE”

THEY HAVE PLAYED US FOR ABSOLUTE FOOLS

blinchik

HOW TO PASS FIRST YEAR COURSES WITHOUT GOING TO LECTURES

It is pretty clear that I didn't have the smoothest possible first year, so obviously, struggling in my classes was also a feature then too. Yet, I still managed to pass all of them with "good enough" marks.

I can attribute that to what can mainly be divided into two groups. The first is just luck and circumstance, something that is less repeatable. So, I will instead focus on the second part, which is realizing that some of these first year math courses are highly standardized and unified in their content.

How do you teach the content of these first-year courses when there may be a literal dozen sections and perhaps just as many professors teaching? Well, you ensure that for the most part, everyone follows the same plan and teaches exactly the same content at the same pace. Could you imagine everyone teaching in their own way? It would become disastrous come final exam time since every section may need their own final exam if the content was different enough between the sections.¹

Since every section is taught the same way, they all follow from the same base material: the course notes. This is where the idea forms. If every section teaches from the same course notes, you could just skip that entirely and learn from the course notes directly. Of course, some may argue about the benefits gained from attending lectures, but at the very least, all the material is already there in the course notes. All you need to do is buy a course's course notes from the WStore.² The course notes, compared to how much each course costs, is definitely worth it, if it means you don't fail the course. It may even be that they are uploaded on to the course site on Learn for free! If you do end up getting the book version, there may also be the current versions available for cheaper from the used book store at the bottom floor of SLC.

These course notes can also feature practice problems, so while you learn by yourself, you can practice what you learn, so you don't worry about if you are learning properly or not. Also, there should very likely be a course Piazza so you can ask questions there and none would be wiser. You could ask anonymously too if that feature is enabled for that course's Piazza. You can also take clues from the Piazza to see if you are following the pace of the lectures or not.

You don't have to worry about the order of the content for the most part. If you were to take the course notes to your lectures, you will often find that the content of the lectures follow the exact order found in the course notes. However, do keep in mind that not all of the content in the course notes may be covered in that term's course. For example, they might end up skipping a section if the pace is slower that term. Conversely, if a prof decided to teach something outside of the course notes, content for that may be posted on Learn so do keep an eye on Learn, which you should do in general anyway. There are also course notes where more than one course is

combined. A regular version of a course and the advanced version of the course will have for the most part the same content covered, so both courses will have the same course notes, such as with STAT 230 and STAT 240. But there will be content covered in the advanced version, not covered in the regular version, that will still obviously be in the course notes, so do keep in mind that if you are in the regular version of the course, that you can skip topics for the advanced course.

I do specifically mention "first year", however course notes continue to exist for your second year math courses too. Only starting with third and fourth year courses, do you find that they tend to not have compiled course notes and instead the best you may have could be each lecture's notes being scanned and uploaded onto the course site on Learn rather than a nice published book of all the course's content.



Now, I want to be clear that you should not take this article as an excuse to be lazy and skip lectures that you can absolutely feasibly attend. This is instead more as an assurance to those first years that cannot go to lectures regularly, that there is still a method available to advance through your studies, despite any struggles or problems in life. Are you too depressed, demotivated, and exhausted to get out of bed to head to your classes at all? No problem. When you feel ready enough to start your day, you at least have your course notes to work through and still learn the material that way. It may not be a perfect substitute to lectures, but something is still better than nothing, and doing something is better than doing nothing and risk failing a course.

As an example, I myself ended up learning a considerable chunk of MATH 136 via this method. It went from not knowing what a basis was 3 weeks into the course,³ to passing with a 64% in the end, so I would say it is a method that can work well.

You can combine other methods with this too. If you are lucky enough to know some friends taking the same course, you could ask them to help with learning some of the content. If you are comfortable enough with going to office hours, you could absolutely do so. Discord servers are also a wonder. If your expected graduation year is 2024 or later, there are Discord servers available for just about anything. There's also bound to be a Discord server fit for your particular course.⁴

I hope this ends up being helpful in some way to some non-zero number of people. It may not reach everyone that it needs to, but at least this is now out there.

boldblazer

1. Something like this actually happened in my CS245 course in Fall 2019 where all 3 of the profs, each with their own section, were

supposed to teach in the same way, as planned starting with that term, but one of the profs went “rogue”, and so in the final exam, you were allowed to use both types of logic notation, one taught by the “rogue” and the other with which the remaining profs actually unified.

2. Alongside your purchase, you can also buy the non-item <https://wstore.uwaterloo.ca/this-is-not-a-textbook-no-text-required-please-see-your-course-syllabus.html> referred in my previous article *None Book With \$10+ Shipping* from 148.1.
3. I still remember that conversation I had with the only people I knew back then, and their facial expressions, when I asked “What’s a basis?” to them.
4. By the way, if you are comfortable enough to do so, consider joining the mathNEWS Discord server. I’m pretty sure there will definitely be people that could help here too.

N REASONS THE CHINESE REMAINDER THEOREM IS THE BEST THEOREM IN MATH 145

- It’s cool as fuck.
- The proof is very easy to understand, but also makes you feel cool (#inductionmoment).
- I have never been unhappy when using The Chinese Remainder Theorem.
- It just kinda slaps.

Congruences Slap

A MESSAGE FROM MY GRANDPA

GOOGLE TRANSLATED FROM KOREAN TO ENGLISH BECAUSE I DON'T SPEAK KOREAN

You must be studying hard.....

It is life
to set a goal of surrender
and strive
to achieve that goal.

Fighting.....

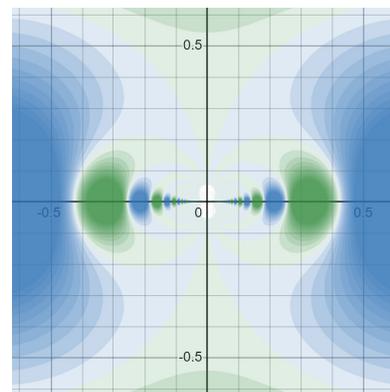
TEST ARTICLE

An N things article is also known as a listicle

creature_f

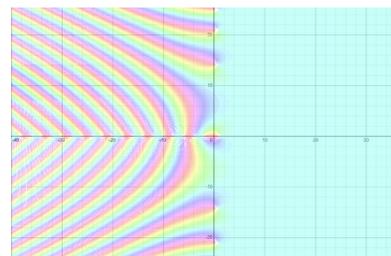
N STEPS TO MAKE A COMPLEX PLOTTER IN DESMOS

1. Convince yourself that \mathbb{C} is just \mathbb{R}^2 with some funky operations.
2. Notice that addition and negation just *work*.
3. Implement the trivial functions: \times , \div , conjugation, etc.
4. Implement the less trivial functions: exponentiation, trigonometric functions, etc.
5. Implement the Mandelbrot set to make sure stuff looks good.
6. Acknowledge that integrals over points do not work and become sad.
7. Rework all of the above to split into closed forms for the real and imaginary parts.
8. Implement some funky functions: The Gamma Function, The Riemann Zeta Function, etc. using two integrals.
9. Give people some way to specify a function: $f(z) = z$.
10. Lie to them about how it actually works, the veil must remain!
11. Plot too many inequalities to make it look pretty.
12. Serve: <https://www.desmos.com/calculator/izbmo3m9po>



PLOT OF THE LOGARITHM OF THE MAGNITUDE OF A

FUNCTION: $\ln \left(\left| \frac{z \cdot \tan(z^{-1})}{z} \right| \right)$



ANGLE PLOT OF RIEMANN ZETA FUNCTION: $\text{Arg}(\zeta(s))$

intriguedmango

AN UNSOLICITED REVIEW OF 'THE QUEEN IS DEAD' (SIDE A)

Over two months ago, upon the demise of the late Queen Elizabeth II, I posted on my Instagram story saying if the story got 10 likes, I would do an album review on the best album to ever exist; 'The Queen Is Dead' by The Smiths. Unfortunately, the story only got 4 likes, but whatever, so here we go with the review.

For those who don't know (or care), The Smiths were a Manchester alternative 'rock' band active from 1982–1987 consisting of Morrissey on vocals, Johnny Marr, the musical maestro of the band, on guitar, Andy Rourke, an incredibly underrated bassist, and Mike Joyce on the drums. Some of their more popular songs not on this album are 'This Charming Man', 'Heaven Knows I'm Miserable Now', and 'How Soon Is Now?'. They released four studio albums, one each year from 1984 to 1987.

Now this is the disclaimer paragraph where I deal with the fact that the singer, Morrissey, has become a bit of a problematic figure over the last few years, with his militant veganism and sometimes unsavoury political takes. This album, as well as all the music by The Smiths, is a great example of separating the art from the artist.

Any reference to Morrissey being 'literally me' in this article means Morrissey in the 80s, not now.

'The Queen Is Dead' was released on June 16, 1986. The music has a lot more production value than their last two albums, and is usually cited among the greatest albums of all time. But enough about what the experts and music critics think about it, it's time to listen to what a lonely, reclusive, 'literally me' virgin has to say. Please listen to the album if you haven't already; just a suggestion.



1. THE QUEEN IS DEAD

A fucking banger of an album opener. The first part before the actual music hits is 'Take Me Back To Dear Old Blighty' which was sampled from some movie from the 60s, which was an area of fascination for Morrissey for some reason, probably similar how music from the 80s is an area of fascination for me (he's literally me).

The song opens with heavy drum banging which leads to some intense rocking for 6 minutes straight. It plays a bit like a punk song, with the wailing of guitars, jumpy bass, and unpredictable cymbal hits. I swear the song (and all of these songs) sound a lot better than I'm describing it.

The song mainly talks about how useless the monarchy had become, not saying that the Queen was actually (or should be) dead, but more that the institution itself might as well should be. This song, along with the Sex Pistols' music has made me

reconsider my blind support for the monarchy and turned it into a full support for the monarchy. Real.

Morrissey has a penchant for writing really witty and biting lyrics about whatever the topic of the song is about. There are many silly lines throughout; one is of Morrissey breaking into Buckingham Palace 'with a sponge and a rusty spanner', having the Queen diss his singing ability, for him to reply that she 'should hear him play piano'. In their final album, he plays piano on a track, and it's dreadful.

Then at the end, after proclaiming that 'The Queen is dead', he goes on to repeat that 'life is very long when you're lonely'. And to that I give a profound 'where will it end?'.

To boil this all down, the song says that we live in a society, then proceeds to do some guitar shenanigans for another 3 minutes. It's crazy how brilliant The Smiths were, that they predicted that the Queen was in fact mortal despite all evidence to the contrary.

2. FRANKLY, MR. SHANKLY

An entirely silly song, supposedly directed to the band's manager at the time. Morrissey talks about how despite success in 'this position [he] hold[s]', it 'corrodes [his] soul'. This is the first time I cannot relate to his words, as I have never held a co-op position. He then says he 'wants to go down in musical history', which he succeeded handily.

The music is similarly goofy and fun, nowhere near the hard punk of the last track, and definitely nowhere near the melancholy style of the following track. Nothing too notable for me here.

In the end, after slugging the manager's poetry, and calling him a 'pain in the ass', Morrissey asks for money from him. There are gems like this throughout the whole album, the finding of which will be left as an exercise to the listener.

Overall, it's probably the weakest song in the album (I will not back down from this statement); sure it's got the witty repartee and nice composition of any Smiths song, but there really is no gravity about it, and I can't pinpoint why. I am a math student after all; I haven't critically listened to enough music to discern what makes something good or bad. Of course, if you can't objectively quantify something, it doesn't exist.

3. I KNOW IT'S OVER

And time for some severe genre whiplash. This song was one of the main songs I listened to after breaking up with my ex, like a 'Glimpse of Us' of the 80s, but six minutes long. With the slow, sombre guitar, and melancholy lyrics it's the perfect music for the acknowledgement of your eternal, persistent

state of solitude, and feeling incapable of doing anything but crying about it.

Morrissey captures the essence of the hopeless romantic perfectly, this guy is obviously writing as if he were me (because he is), languishing alone in my empty bed each night wishing that I wasn't so damn alone (he's literally me). And now, I don't know where else I can go, since it never really began.

The hard-hitting lines, for me, were in the stanza, with 'If you're so funny, then why are you on your own tonight?', continuing with 'clever', 'entertaining', and 'good-looking', ending fatalistically by saying that the reason is that 'tonight is just like any other night'. Just like I am now writing up this article. Maybe the monotony and captivity of such a lonely lifestyle wouldn't be stinging me as hard as it is now. I guess we'll never know.

Morrissey's vocals shine, especially at the end, with the repeating of how he 'can feel the soil falling over [his] head', the way I feel constantly buried in assignments and sorrow. I swear I'm okay, I've just had a really bad week as I'm writing this. One day, we're going to be so back, as it's far from being all over. Probably. Get me out of here.

4. NEVER HAD NO ONE EVER

Yet another gloomy, doomy tune. They're quite good at this type of stuff if you couldn't tell.

Although admittedly I can't say that I've never had no one ever, it pretty much feels like that has been the case forever. And I'm just realizing writing this whole article is just a therapy session in printsheet form. Feel free to analyze.

The lyrics aren't what I think stand out in this song particularly. Somehow, it goes stalker-y, with Morrissey saying that he is in fact alone and 'outside your house'. So if you ever feel like your life is a bit complacent and void of paranoia, just imagine this 63 year old British dude with flowers coming out of his back pocket standing outside of your apartment, specifically looking at you through your window.

The ending music is, though repetitive, quite haunting, and yet again, perfect music for lying down and thinking about how life could have been a lot better. Then the soundbites of Morrissey laughing interspersed throughout the outro make you realize everything is a farce, and that bargaining for your sanity is useless—acceptance of this fact will set you free to grind all your assignments and apply to those co-op positions without the sadness of leaving whatever partner you might have behind in Waterloo. You'll have Morrissey at your window to keep you company anyways.

5. CEMETRY GATES

Living in Waterloo has ruined this song for me, as each time I get any mention of Keats Way, I immediately hear Morrissey sing 'Keats and Yates are on your side'.

The song talks about, obviously, death, and how behind each tombstone, there was a whole life, not too unlike our own, there. It might just be me being a recluse, but I often forget that other people, for lack of a better phrase, exist. Not in the sense that I can't see them, but that in their mind, they have things that motivate them, people they like, troubles that press them, etc.

This applies to dead people too. When I visit my grandmother's grave at the cemetery, I walk around and see the gravestones, and guess at maybe how things ended up, not unlike Morrissey in his youth. There was this one gravestone with a father in his 30s and his son, who was two years old, both with the same death date. Behind all these were, ideas, loves, and promise that the world will never get to see. They all had plans for what they were going to do the following day. They all had friends and family who really cared for them. All of this, we'll never fully know about.

Does it make me feel less lonely that other people are struggling just like me, or does it make me feel more lonely that it all will go away one day? I've got better things to think about, like writing my chalkboard manifesto for two issues from now.

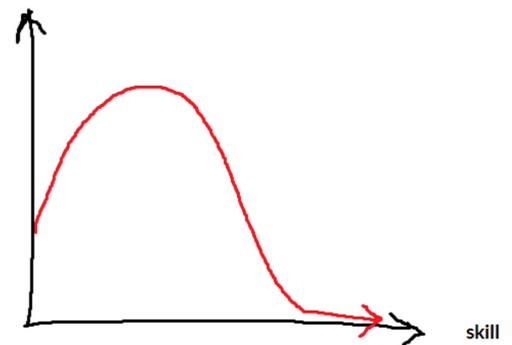


And this is the end of the A-Side of the album. There are five more songs to go, but this article has gone on way too long, so stay tuned next time for the three biggest songs on the album, among them their most popular (and best) song. Again, your homework is to listen to this album in its entirety so you can tell me how wrong and stupid I am for liking this drivel.

seagullman

SKILL ISSUE

frustration with racket



What? You're telling me you don't like representing your lists with cons cons cons cons cons cons cons cons cons???

docs.racket-lang.org

COMPUTABILITY THEORY: EPISODE 1

Hi there!

I'm doing my research this semester in computability theory, which is a branch of pure math that not a lot of people know about. I figured that I would introduce you to some of the key ideas in a broad overview, because it's pretty cool!

Computability theory is a branch of logic that first concerns itself with a specific set ω . What is ω ? The set of non-negative integers. It focuses in on subsets of ω to ask computability questions¹ about these. In this sense, unless we specifically say we're changing spaces in a given context, you can always assume that we're working in subsets of ω .

Computability theory is able to ask these questions using Turing machines! I'm sure you've at least heard of these since *The Imitation Game (2014)* was a huge sensation. A Turing Machine (TM), is a theoretical model for what a human computer can do. It has a tape that extends infinitely on either end, a read/write pointer (read/write head), and a finite control. This can be understood as having a bunch of paper, a pencil that can write and erase, and a brain that's following some instructions.

To expand on these, the tape has cells on it, initially filled with blanks. The read/write head points at a single cell on the infinite tape. The finite control contains states and transitions, which can be thought of as a directed graph with labels on the edges. We then have what makes the TM tick: the transition function. We take the inputs of the current cell's value at the read/write head and the state (vertex) of the finite control. If these inputs satisfy the label on an edge, we use the directed graph to transition to a new state. In addition, in the transition step, we tell the read/write head to change or keep the same value in the current cell, and then move left one cell, move right one cell, or stay put on the current cell.

We have three special states "entrance", "fail", and "success". We begin computation by starting at the entrance state and pointing the read/write head at cell 0. If we transition to the fail state, computation stops, and it answers the input in the negative. If we transition to the success state, computation stops, and it answers the input in the positive. If computation has stopped or entered some infinite loop, the TM has failed to halt on the input, which we could also call being stalled on the input.

TMs are very robust, allowing for as many infinite tapes as you want, vector cells instead of single cells, nondeterminism in the finite control, staying put on the tape between states, and anything else you can reasonably think up. This leads to the Church-Turing thesis: you can describe a computable algorithm in any way and it can be done in a TM. Basically, Sinatra Law: if you can make your algorithm compute here, you can make it compute anywhere. In this sense, the effectiveness questions we ask about $A \subseteq \omega$ are about whether A can be computed with a TM, what degree of non-computability A has if not, and notions of completeness of A within a

certain amount of power. But, we need to discuss how to form these algorithms as well.

The last thing that computability theory concerns itself with is functions. Specifically, partially computable (p.c.) functions, where we have a map $\phi : \omega \rightarrow \omega$ that may not be defined for all of ω , but rather, a subset, and can be undefined at certain points. Why not focus on total² computable functions instead? A few reasons: Prof. Talmage once told our class, in the context of discussing singularities, that there exists a point of sufficiently complicated math. Computable functions are too easy, and totally uncomputable functions are too hard, so we hone in on partially computable functions. Another reason is that there are some logic parallels that I'll introduce later on, where computable stuff ends up being not powerful enough for our purposes.

While I've introduced all the objects of study, there's one last piece I want to bring up before getting into the weeds of some computability theory results: indexing! The Turing Machine is robust, and encoding information in bits leads to Universal Turing Machines that can take TMs and their input as input and replicate the TM's actions as output. In addition, computability theory has its first strong connection to mathematical logic here: in the proof technique of Godel's incompleteness theorem, each math statement is given an index that can even be made to recover the statement. These allow you to index TMs, and thus index functions! We refer to as ϕ_e as the e^{th} p.c. function in the list of all functions $\{\phi_e\}_{e \in \omega}$ under a "canonical encoding" (the details of which are largely unnecessary). ϕ_e , we say, codes for Turing program P_e , and has a domain $W_e = \{x \in \omega \mid \phi_e(x) \downarrow\}$.³ We don't know what ϕ_e solves, and it doesn't matter! Just as long as it's there. This enumeration is really important if you want to say something about every function, because you can do things at step e and do a computable amount of things at each step, and you end up with a program! Think of it like for loops that intentionally go to infinity.

If you want to read about computability theory in more detail, I recommend Soare's *Turing Computability: Theory and Applications*, which explains this subject in greater depth and with more rigour. This starts from a more theoretical/pure math perspective, and there are Waterloo Library online copies available. There are Waterloo library resources that approach this subject from a more CS perspective, but they're all physical only resources so I recommend you talk to a research librarian for availability.

In the next episode, we'll discuss some basic theorems, as well as some connections to logic.

Layth

1. More commonly referred to as "effectiveness questions", but I think the word "computability" fits better here.
2. Henceforth called "computable functions".

ASH KETCHUM BECOMES WORLD'S GREATEST TRAINER

POKÉMON: DOES IT HAVE TO END? SHOULD IT?

It's been all over the news; even the BBC did an article on it.

Ash is finally the world's greatest Trainer.

Hard to believe. I've been watching him since I was 4, through all the highs and lows, and he's finally made it to the top of the top. Now, of course, this does not mean he has accomplished his dream of being a Pokémon Master, as the actual meaning of that term has been famously ill-defined, and there have been heavy hints that even being the best Trainer in the world will not mean he has succeeded...but still.

He's come a long way.

His growth definitely hasn't been linear. We've had moments like the Sinnoh League where it felt like it was his time, before he got almost swept by a guy with a bunch of Legendaries, only to infamously have Pikachu lose to a Snivy only a short few episodes later, resetting Ash's progress back to basically zero.

There have been good moments like the Alola League, too, where Ash finally won his first regional championship, leading to, well, this.

Honestly, it's wild that Ash has won two major tournaments in a row now, especially after the reputation he had for years and years as a loser. Maybe it was finally hitting that twenty-year mark that turned things around for him.

It's kind of exciting looking forward to what's next for the show. What will Ash's new goal be? We had a whole series where he just went to school and didn't focus on battling at all, so I think maybe a series taking another break from a battle focus might be a good idea. After all, there's kind of nowhere else to go now that he's the World Champion, other than maybe defending his title.

The new games do have three different story paths, only one of which involves the Gyms. I'd love to see Ash take on a mentoring role like Brock in the older series to a new kid trying to take on the Gyms, I think it's a good progression of his arc and that it'd allow the writers to develop a different side of his character.

But hey, we still haven't officially gotten an announcement for a Scarlet & Violet anime series. It could end here.

Which, if it does...would really be something. The Pokémon anime's basically a constant, releasing practically every week for twenty-five years. It may be a bit strange to say this about a children's television show, but I can genuinely not imagine what it'd be like without having a new episode each week. Sure, only a very small fraction of people that I interact with actually care about each new episode, but it's rare that serialized narratives like this one spend this long telling one continuous story.

The anime has been having some production issues lately, having to take a bunch of skip weeks, which might indicate a good reason to close up. People are more important than entertainment, and if the studio's barely hanging on, there's no good reason to continue to force them to work.

Unfortunately, it's still likely that they'll try to push through, maybe adjust their schedule a bit. After all, there's a reason the series still continues at its hectic pace; it's a perennial hit. Pokémon is the biggest media franchise in the world; there are always going to be new kids eager to watch the series.

In any case, the battles we got in this tournament were really good, and whether or not we're approaching the ultimate finale, this feels like a satisfying end, at least of a sort. And I'll always have the twenty-five years of the anime that already exist, over 1200 episodes' worth, to watch if I'm ever feeling nostalgic.

I'm just happy that the amount of coverage over this victory means that this show that means so much to me can still inspire so much emotion in others, as well, even if they stopped watching years ago.

Predap

MULLED CIDER RECIPE

INGREDIENTS

- 1 gallon apple cider
- 1 large orange, cut into ¼" slices
- 3 cinnamon sticks
- 4 star anise
- 1 tablespoon whole cloves
- 1 tablespoon whole allspice
- 1" ginger root, sliced
- 1 ½ cup spiced rum
- 5+ humans to drink it (you might want to make the cider first to bait them)

STEPS TO MAKE IT

1. Dump all the ingredients (besides the rum, perhaps the human) into a pot.
2. Bring mixture to a boil. Reduce to simmer and cover for 2–3 hours.
3. Add rum to the apple cider mixture.
4. Remove fruit and spices from the pot.
5. Serve! Garnish the drink with the rest of the ingredients.

Enjoy :D

THE CURSE OF BUREAUCRACY

On the way along the growth of any informal group effort from humble beginnings to illustrious grand organization is a curious transformation. Similar to how we anthropomorphize animals and things, we also tend to bestow human-like attributes to companies and professional bureaucracies. Not that they discourage it! Large organizations want to be thought of in relatable human-like ways. Indeed in some jurisdictions they are even legally considered persons! They display glowing value statements flowing with moral language.

At the beginning a group or team is informal and does things ad hoc. This suffices in the initial stages when rules are yet to be written and things are flexible. The need to make any group of people with a common purpose robust and professional entails structure and rules. This is to ensure the group effort survives into the next generation of leaders. Many efforts have stalled or failed due to the passing of the captain or leader. Succession and planning are necessary for organizational survival.

As such companies and organizations become even larger, it becomes prudent to think of them as organisms in their own right. This is where the espoused values and morality notions break down. Such bureaucratic structures as organisms live to grow and further themselves. There is no morality at this level, only power maneuverings among bureaucracies in competition for survival. Any relatable human values are practiced (and necessary!) at the low level of such organizations in order to ensure basic functioning. But these are typically not present at the upper echelons of power. They may well be considered a burden.

What is one to do when finding one's self in such large bureaucracies? One should be skeptical of the values promulgated by their organization. For example if one is employed in tech firms supposedly dedicated to changing the world and making it better, it is useful to consider alternate perspectives on the motives of the leadership. Often such firms will promote such values and drive the rank and file to dedicate themselves almost completely to the benefit of the firm. One should instead seek to have meaningful time and space outside such companies, if only to clear one's head and have a balanced life. Proper boundaries are essential.

It is good and proper to have team spirit and camaraderie at the small group level within large organizations. Though skepticism should be maintained for the larger aims and motives of the firm and its executives. It is not that they are necessarily unethical. It is simply that they are not incentivized to practice conventional morality as part of their company goals or pay structure. Large organizations are necessary for creating and advancing large projects. However such large human social structures bring with them their own centrifugal forces that threaten to discard and cast away anyone (internal or external) in the way of their goals, no matter how questionable such aims may be.

In the end, complex communities feature extensive bureaucracies as part of their nature and this cannot be avoided. Therefore it is prudent to be cautious and not be drawn extensively into either the messaging or the orbit of such organizations.

TLC

THINGS I HATE ABOUT THE WINTER

1. It's cold.
2. I have to wear boots when it snows outside.
3. If I don't, my feet will be bathed in cold water all day.
4. Even if I do, my feet will be bathed in sweat all day.
5. I have to wear a jacket when going out.
6. If I don't, I might catch a cold.
7. Even if I do, I have to carry my jacket once I go indoors.

winter hater

SCARF

A couple of years ago, my mum gave me a silk scarf as a Christmas present. This was notable for two reasons: firstly my mother (having two sisters) never gave me much clothing. Secondly my neck is usually cold (especially in the winter when I'm out in my t-shirt).

It was a silk scarf with a map pattern on it, in the style of old aviation scarves; pilots used to wear scarves with maps on them so if they crash landed they'd be able find their ways around wherever they crashed.

It's too bad that my scarf has a map of France. Who crashes in France?

Give me pizza or give me dessert

REMINDER!

Look up at the sky! It's so ridiculously *big*. More than half of what we see is just *sky*, and we don't even know what's on the other side. Take a breath. Feel yourself becoming small. Reminder to love the sky.

X-student

HOW TO PROVE THEOREMS WITHOUT MUCH THOUGHT

As we all know, proving things can be very difficult. However, there are a few techniques that one can use to prove things either mindlessly or in a very different way than usual. All of these have their disadvantages, and most cannot be used effectively to prove the sorts of theorems which professional mathematicians will prove. However, many can be used at least somewhat effectively to prove the sort of theorems you might be asked to prove on an assignment. I cannot list all of these techniques here, but I think that the following three are particularly useful.

The first technique is brute-force proving. All you have to do is create a list of all the (finitely many) things you already know: all the theorems and definitions from class and all the hypotheses of the theorem you are trying to prove. Then, go down this list one item at a time. At each step, figure out all the statements which immediately follow from the statement in question (there are only finitely many). Add all of these to the bottom of the list. Eventually, assuming that the theorem you are trying to prove is indeed a theorem, you will arrive at your result. If you are allowed, you can use a computer program to do this, which will be much faster. This technique will always work (assuming, of course, that you are not trying to prove an unprovable statement), but it will often take an unreasonable amount of time. It can be sped up by discarding any statements which seem irrelevant, but then you risk missing the way to your theorem. You will only really be able to use this method on relatively simple theorems that you probably could have proven yourself with a bit of thought, though. This brings us to our next technique.

The second technique is similar to the first, but involves a bit more thinking in order to bring down the time required. What you do is convert everything into a very basic form. Integrals? I think you mean Riemann sums. Write down the statements you know and the statement you are trying to show in terms of these fundamental concepts only. Then, manipulate these statements, working from both ends, until you end up with statements similar enough that you can see how to join them. This technique works better in some areas of math than others: for instance, it probably will not help much in graph theory. It does work surprisingly well in some cases, though it will result in a proof many times longer than necessary. I have done this on a few occasions and received full marks every time. If you do this, you may receive some amusing comments from markers, such as this one I got: "To save yourself future pain, you should use integration by parts." I mean, I could do that, but that would involve thinking. My way only involves five pages of virtually mindless algebra on unwieldy equations.

Our third technique is what I like to call unconventional induction. Let's say that you need to prove the statement "for all positive integers n , $S(n)$." The standard method of induction would be to prove $S(1)$ and then, given $S(k)$, prove $S(k+1)$. But there are other ways to prove this inductively. For example, I once proved $S(1)$, then that $S(2k+1)$ implies $S(2k+3)$, then that $S(2k+1)$ implies $S(2k)$. If you can prove that $S(k)$ implies $S(k-1)$, which is sometimes very easy, then you

can jump by any amount, even a changing amount, in your inductive step (though you may sometimes need a few more base cases). For example, it would be sufficient to prove that $S(k^2)$ implies $S((k+1)^2)$ or that $S(p)$ implies $S(2p)$ for any prime p . In other words, you can get additional information, such as primality, for free. This technique, unlike the other two, usually requires a clever insight. However, if you get used to thinking this way, it is sometimes easier than using more conventional proof techniques.

Keep in mind that, objectively speaking, all valid proofs are equally good. Unless an assignment explicitly says otherwise, you are under no obligation to prove things in a way that results in a short proof or in a way that is similar to the proofs done in class. Doing proofs is hard, and you should not be afraid to use any tools you have to reach your goal.

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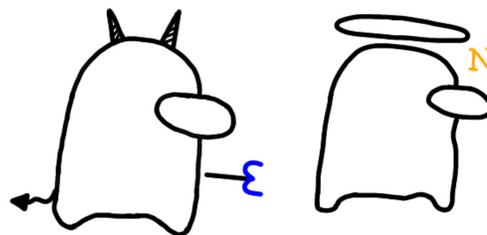
EASY MATH PROBLEMS FOR BABIES #5

#4 GOT 1984'ED, PLEASE RELENTLESSLY ANNOY THE EDITORS TO SOLVE THIS INJUSTICE

Define the sequence $(s_n)_{n=1}^{\infty}$ such that $s_1 = 2$ and $s_{n+1} = 2^{s_n} - 1$. Find the prime factorization of s_6 . For every person who sends a **mathNEWS** editor the correct solution followed by the sentence "WHERE IS EASY MATH PROBLEMS FOR BABIES #4?", I will give you \$20.

Fermat's Little Slut

DAVID MCKINNON'S WISDOM



"a demon gives us an $\epsilon > 0$, we find N s.t. for $n > N$, $|a_n - L| < \epsilon$ "

YOUR DAILY REMINDER TO DO THE gridWORD (AND STAY PEGGED)

gridCOMMENT 150.5

A new **mathNEWS** issue, a new **gridWORD**! Last week I may have been a little out of my gourd with some clues. I have been identified as a “menace,” but one of my favourite streamers gemy978 is also a menace so I take this as a compliment :)

Speaking of streamers, you all had some interesting favourite streamers when I asked in last week’s **gridQUESTION**:

- **anonymous goose**: “Bophie”
- **Malia**: “i’m too busy studying, but hopefully i can watch schlatt play jack in the box again”
- **Aleks**: no response 🐼
- **Leonhard**: “my favourite twitch streamer is GMBenFinegold because he f*cks”
- **Whiphid**: “ludbud and proud, represent!”

Whiphid also happened to send in the leaked picture of logwig’s balls from the *Cold Ones* podcast. Ludwig needs to

ask his doctor about having an inguinal hernia repair, and Whiphid needs to get those balls out of my emails. Malia however sent a bunch of crying and screaming images, which is exactly how I felt after Whiphid’s email, so Malia, please come by MC 3030 at some point to receive your CnD gift card!!! Good work everyone with your solutions!

It’s disheartening that this is the second last **gridWORD** of the term, so let us cherish it while we can!

Something that has been on my mind as of late has been Club Penguin, so I ask you all for this issues **gridQUESTION**, “where were you when club penguin is kil?” Send solutions, your pseudonym, and **gridQUESTION** answer to mathnews@gmail.com by 6 PM November 28th please and thank you!! Oh, and as far as the theme goes, remember to **stay pegged!!!**

Wink wonk

ACROSS

- Opposite to
- Party
- Fancifully worded
- Frolic
- Amino acid to help build protein
- Flaxseed-eating finch
- Renter
- “___ there, done that”
- Someone you might peg for a mistake*
- Magna ___
- Manulife, for one
- Coniferous forest, like in Minecraft
- Snoopy
- What you might add to your boba
- Open, in a way*
- Cashew, e.g.
- Encircled
- Antelope of Africa
- Puke
- Entices
- Earthshaking?
- Indicate
- Espresso cup
- “Road work ahead?” creator
- Clippers

- Withdraw from a membership of an alliance
- Bit of keyboard dazzle*
- Identified*
- Most suspicious
- Adjusts the wheels
- Departures

DOWN

- Iridescent gem
- Sweat source?
- Gamepieces*
- Milo and ___
- Fourier series function
- Most slick, in a way
- Not a number, as in JavaScript
- Solid mass of spores
- Peevish
- Rubber gaskets
- Soup container
- Bed-and-breakfast
- Big heart?
- Allow
- Bible letters
- The proper term for IVs in a hospital
- Beat in a heat

- Like our numerals
- Tapered cylinder
- Used a birchbark craft
- “Make love, not war” proponent
- Certain discrimination
- Dust remover
- Fishing equipment
- Sounds of reproof
- Your and my
- ___-Wan Kenobi
- Intense dislikes
- Dunghill or refuse heap
- Like a type of martini
- Marshy lowland
- Roll call reply
- Protection: Var.
- Long, long time
- Ascend
- Drunkards
- Hot springs
- Unagi, at a sushi bar
- Hollywood special FX
- What a bald head looks like?
- Coffee order: Abbr.

Want to write for **mathNEWS**? Come to the next production night! New writers are always welcome! Check the **lookAHEAD** for the next date!

1	2	3	4	5	6	7	8		9	10	11	12	13	14
15									16					
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64							65							

Send us your gridWORD solutions via carrier pigeon,
or to mathnews@gmail.com.

SUN NOV 20

MON NOV 21

TUE NOV 22

WED NOV 23

THU NOV 24

FRI NOV 25

SAT NOV 26

Drop/Add period begins
(by appointment)

Drop with WD ends

Add Period begins (no
appointment)

Thanksgiving (US)

Black Friday

Drop with WF begins

SUN NOV 27

MON NOV 28

TUE NOV 29

WED NOV 30

THU DEC 1

FRI DEC 2

SAT DEC 3

mathNEWS 150.6
production night

Buy editors pizza day

Buy editors soju day

Buy editors tequila day

mathNEWS 150.6 released

LAST ISSUE'S gridSOLUTION

1	P	2	I	3	S	4	S	5	E	6	T	7	U	8	D	9	E	10	A	11	N	12	T
13	A	L	L	A	H	14		15	V	A	G	U	E	16	G	O	A						
17	S	L	I	L	Y	18	E	U	L	E	R	19	O	B	I								
20	S	U	M	M	E	21	R	22	P	I	T	23	N	A	P								
24	A	M	M	O	N	I	25	T	E	26	E	27	M	I	L	E							
28	T	E	E	N	A	G	E	29	I	S	R	A	E	L	I								
31	A	D	D				32	E	33	C	L	A	I	R	S								
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				37	P	H	O	N	E	M	E					38	M	39	O	40	A		
41	S	42	N	A	I	L	E	D	43	S	44	T	45	R	46	A	I	N	S				
47	W	A	Y	N	E				48	S	T	E	E	P	L	E	S						
49	E	T	A				50	D	51	A	L	52	C	H	E	E	S	E					
53	R	I	B			54	L	O	C	A	55	L				56	A	M	A	I	N		
57	V	O	L			58	A	D	A	G	E					59	B	E	G	E	T		
60	E	N	E			61	M	O	I	S	T					62	N	E	S	S			

THE BEST TIME TO VISIT TIM HORTONS

IS IT WHEN I'M NOT THERE?

No, don't go there, the management disrespects the food services staff, allegedly counter to labour legislation. Visit the CnD's instead. Math CnD has garlic sticks, and some of the other food is technically edible, but I doubt the coffee.

Sci CnD is quaint,

Eng CnD CPH has ice coffee

and

Eng E7 CnD also exists but I don't like it because I don't know the employees as well and our conversations are awkward.

The best time to visit Tim's is never.

"I DIDN'T SHOWER THIS MORNING CUZ I SHOWERED LAST NIGHT..."

Then they walk into class and immediately the fumes instantly attack your nostrils. The stench alone has already depleted the human population by 13.2% and is permanently affecting newborns and people under the age of 21 cannot keep occurring. The government should be shot on sight. CS students aren't real. They don't exist. They have never existed. They will never exist. If we don't acknowledge their existence then the stench will dissipate.

Thank you for coming to my TED talk.

miller

sqrt(cause)