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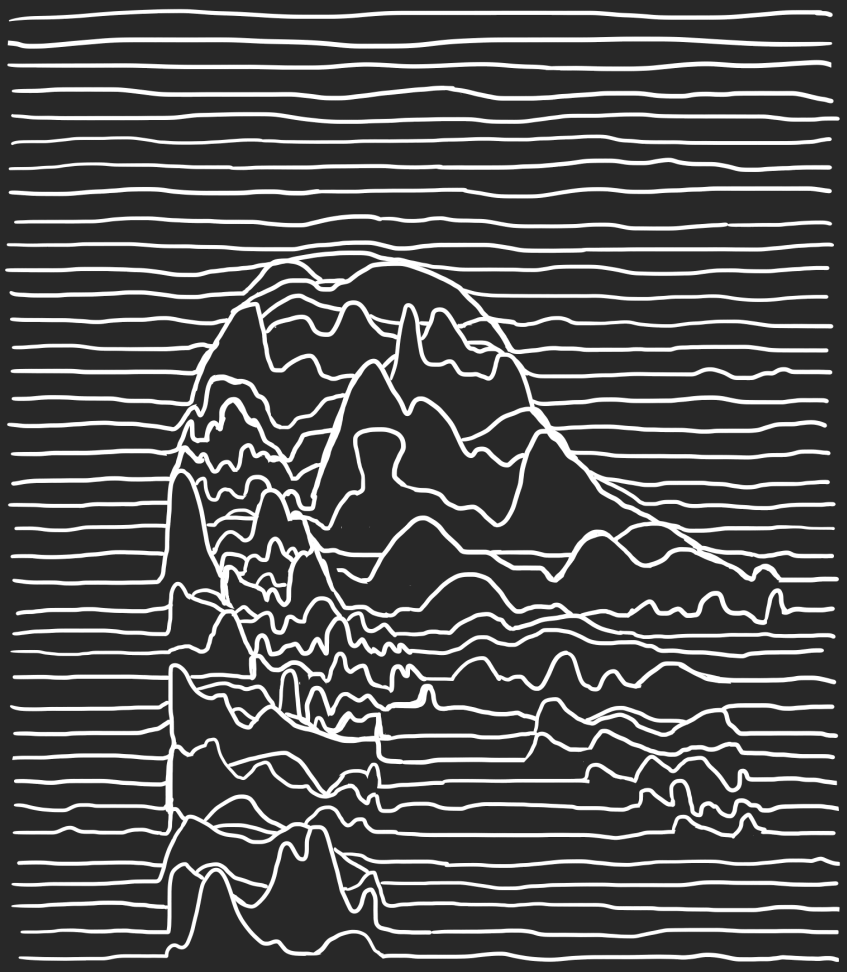
# Y DIVISION



## UPSILON PLEASURES

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# mastHEAD

# "WHAT ARE YOUR SPRING TERM PLANS NOW THAT YOU'VE FAILED YOUR EXAMS?"

Hello.

I, along with itorED, am in the **mathNEWS** office, eating pastries and sandwiches and feeling extreme dread about this term. I don't know *who* planned the scheduling of printing, but I heard that they're going to Toronto to have FUN. YES. FUN. Having fun, during exam season. Sacriliege, I tell you.

Just kidding. Even though my exams aren't until the last three days of finals week, I already feel burnt out. I suspect it's because unlike someone I mentioned above, I don't have any fun these days. Fun, to me, is buying German Chocolate flavoured coffee at the Eng C&D, listening to my favourite albums, and ... trying to come up with fun things I apparently do? Even sleeping doesn't bring the joy it used to, as I'm exhausted all the time. I could go on, but part of being a functional adult is learning to suck it up; beyond this pain, some of my beloved friends are waiting for me in sunny, warm California.

I hope that for all of you that this was a memorable term, balanced out by both the sweet and bitter events. Our last issue certainly reflects some of our writer's rollercoaster rides, but they made it out fine. Sometimes, it just takes longer for the happier moments to come to a head. I hope you too can find a silver lining in whatever circumstance you are in.

For first years: please become an editor because **mathNEWS** has brought incredible joy to many people, and wouldn't it be nice to be a part of that? (Plus, we have collections of fine literature in our office, examples of which you may or may not submit to **mathNEWS**). You are the future of **mathNEWS**; even if you don't want to become an editor, please keep contributing to it.

For those of you graduating, congratulations! Now get the heck out of Waterloo and enjoy your time away from this ~~awful~~ studious place. Stockholm Syndrome is a frightening thing.

For the rest of the student population and professors and lecturers et al., **mathNEWS** will always be here. We will never forget you, and hopefully you don't forget us.

*staplED*
*Editor,* **mathNEWS**

| | |
|---|---|
| CY | I'm going to Granville Island. |
| BOLDBLAZER | oof |
| CC | Retire to Guelph. |
| BEYOND META | Loitering through rise |
| ZETHAR | Plans? I had those? |
| EPSILON SCREWN | Back to school! |
| VESICA PISCIS | Take seven courses... |
| THE42NDDODECAHEDRON | Error 404 - Not Found |
| FINCHEY | Attend the closing show of *Othello* at the Four Seasons Centre, becoming mesmerized with the lead signer. I become enamoured with them—they are my all, my Angel of Music. My obsession grows and grows, ultimately culminating in their kidnapping, the fiery destruction of the opera house, and my untimely death at the hands of a mob of 4000 Torontonians. |
| πLLOW PRINCESS | Go to Toronto with my soon-to-be boyfriend! |
| LICENSE2DERIVE | Go back to Alberta where the taxes are low and the wintes are long. |
| SANDWICH EXPERT | Try to prove a major original result in math, and fail, because 1050 is a big. Too big. ☹ |
| GEORGE KENNEPUNKPORT | Hang out with Janice and make sure she doesn't burn down Edmonton. |
| DAWDLING | Retire to my first job, away from all the friends I made and won't see again for years. |
| CONFUSED | Fucking off to another country. |
| ITORED | Go to concerts in Toronto, then go to concerts in California. |
| STAPLED | Get a bitchin' tan in sunny California... then return to dreary Waterloo. |
| TERRIFIED | Sorry |

# ARTICLE OF THE ISSUE

The artilce of the last issue of this term's **mathNEWS** goes to the author of Sensei. It was a nice reminder for all of us to enjoy life's ride and appreciate the bumps.
Please come by MC3030 to pick up your prize; if we're not here, please email us to set up a time. We couldn't fit your author name due to space, but you know who you are.

*staplED*
*Editor,* **mathNEWS**

## mathNEWS is always watching.

ESTHER AHN, mathNEWS EDITOR FOR SEASON 2019
ALONG WITH JAMIE ANDERSON, TERRY CHEN, MICHELLE ZHU

# mathASKS 139.6

*FEATURING PROF. MICHAEL RUBINSTEIN*

**CIX: WHAT IS YOUR FAVOURITE RESTAURANT AND/OR CAFÉ IN THE KW REGION?**

There are a few that I like. But I prefer not to divulge my favourites out of fear of creating a stampede and a long wait at my eat outs that would prevent me from getting food.

**GREG: WHEN WAS THE LAST TIME YOU HAD EAST SIDE MARIO'S?**

I tried it once many years ago, probably when you all were in diapers. I would rather eat squirrel vomit.

**SANDWICH EXPERT: FAVOURITE NUMBERS IN N, Z, Q, R, C, H?**

Don't have any. I'm very open minded.

**UNORIGINAL: WHAT'S YOUR FAVOURITE PROOF?**

The proof of the Riemann Hypothesis.

**UW UNPRINT: HOW DO YOU THINK WE SHOULD ADDRESS THE INCREASING POLITICAL POLARIZATION BROUGHT UP BY THE AFTERMATH OF THE 2008 RECESSION?**

Not sure I'd attribute the current political polarization specifically to any recession. I think you could make a case for it in regards to the 1930s and the Great Depression.

But these days, I personally think facebook and social media are largely to blame for the increasing instability and polarization going on.

When I was younger, conspiracy theorists and cannibals were rare and somewhat isolated. Now, every village idiot can find likeminded shitwits on the internet, and together create a destructive tsunami of raw sewage. And it's not just the village idiot. Smart people too are using social media to find other like minded nitwits.

Good luck trying to deal with it. You could use social media to find other bozos who are concerned, but that would just contribute to the problem, rather than solve it. It doesn't help that governments around the world are throwing huge resources at engineering social discord and pitting different groups against one another.

Maybe virtual reality will be out saviour. In fifteen years time, virtual reality and AI will start to reach a point where people become totally disconnected.

**SANDWICH EXPERT: ARE YOU A REGULAR READER OF mathNEWS?**

I don't think I've ever read it. Is it something that gets circulated in print? I'm a bit disconnected from day to day things. Would I see it in the math building if I actually bothered to look? I suppose a google search would be a good start.

**πILLOW PRINCESS: WHERE IS YOUR FAVOURITE RESTROOM ON CAMPUS?**

I dislike them all. But I do like the sink in the bathroom of the ground floor of MC, the one that you step on to operate. It sort of looks like something you'd find on a farm.

**THEODORE BEAR: AT WHAT PERCENTAGE OF PURITY DO YOU LIKE YOUR MATH?**

If it isn't 100% then it isn't math.

**LICENSE2DERIVE: DO YOU PLAN ON PUBLISHING YOUR RESEARCH IN A PEER REVIEWED JOURNAL FROM UWATERLOO CALLED mathNEWS?**

Let me answer that question in Russian. Nyet.

**LICENSE2DERIVE: WHAT MATH COURSES DO YOU RECOMMEND?**

I'm not even sure what we offer, other than those that I've taught. I suppose you should take as many as you can with an open mind. I do recommend studying/playing music too.

**CC: WHAT SHOULD BE THE RATIO OF MATH BUILDINGS TO ENGINEERING BUILDINGS?**

In terms of square footage: pi/2.

**ZETHAR: WHAT ARE SOME HOBBIES THAT YOU DO IN YOUR SPARE TIME?**

I play piano (mainly western classical and my own), and tabla (as in, classical drumming from north India).

**BASE-10: CHANGE MY MIND: BASE -10 IS THE BEST BASE.**

Is that a 'minus' 10, as in Grunwald's negadecimal system? I'd hate to use that.

Anyhow, I don't really care to change your mind. For that you need to speak to your parents or a shrink. But from a practical point of view, seeing that we were all indoctrinated by Count von Count, base ten is a handy standard. Try telling that to a computer, though.

**EPSILON SCREWN: WHY DO YOU ALWAYS BRING A WATER BOTTLE (OR JUG, OR JAR...) TO CLASS, AND WHY IS IT ALWAYS A DIFFERENT WATER BOTTLE?**

Water is the essential element of life. Do you know how thirsty I'd be, talking for an hour while inhaling chalk dust, without a convenient source of water?

My bottle isn't different each time. What's different is the lighting.

**EPSILON SCREWN: DO YOU THINK THE RIEMANN HYPOTHESIS WILL BE SOLVED THIS CENTURY?**

According to the Oracle at Delphi, yes. According to my shrink, no. I prefer the Oracle.

**EPSILON SCREWN: WHAT WAS IT LIKE TO STUDY AT PRINCETON?**

In a sense, I am still studying at Princeton, though not physically present. I had great teachers and I could write about my wonderful experiences there, but prefer to leave that to when I am in palliative care high on pain killers.

**STAPLED: WHAT IS YOUR FAVOURITE SANDWICH?**

Out of fear of creating a shortage of avocado and 8 years old cheddar, I prefer not to answer that question.

# prof**QUOTES 139.6**

**CS 136: ALICE GAO**

❝ Always destroy your children before you destroy yourself.

❝ You should kill your children before you kill yourself, otherwise your children will be traumatized.

**CS 246: ROB HACKMAN**

❝ As we have seen in the Reversi example, a class can inherit from multiple classes. To some lesser programming languages (cough), Java, this can cause problems.

❝ Java is like an overbearing parent. Java thinks that you are weak and can't manage your own memory. I think better of you guys!

**MATH 136: RYAN TRELFORD**

❝ I will not be having office hours today. I will be home and drinking.

**MATH 136: DAN WOLCZUK**

❝ Off to the wonderful world of Cramer's Rule!

❝ Every electrical engineering textbook I've ever seen is full of Cramer's Rule, and you'd think it'd be so much easier to just row-reduce a matrix. They love Cramer's Rule.

❝ You look scared. Don't be scared.

❝ Actually, you should be scared.

❝ I see this mistake being made *a lot*, and I *don't* want to see it being made *anymore*.

❝ [Asks class] Yay? [Class half-heartedly says 'yay'.] ...Okay...

❝ What are they teaching you in MATH 135 these days? Gee whiz.

❝ ... Shoot, I forget what I was going to say. I hate when that happens.

❝ It's the last week of classes! ... You're supposed to say "boo"!

❝ The proof of this is in the course notes. You'll see it's kind of nasty.

❝ What is the [final exam] format? It's on paper, and has lots of questions.

❝ That was supposed to be funny. I failed miserably.

❝ Very very very very very few students got that question. It hurt my feelings.

❝ At least go for part marks! Part marks save the day.

❝ [Doing a proof] And Bob's your uncle. And poof. And we're done.

**MATH 138: JORDAN HAMILTON**

❝ Didn't bring my new Pikachu today.

❝ I applied for a job recently. My job.

❝ It's weird. I'm writing my application and it's like, "I'm currently a mathematics lecturer. I'm applying to be a mathematics lecturer".

❝ If the bonus question terrified you, it also terrified me.

❝ I'll take your silence as a no.

**MATH 146: ZACK CRAMER (GUEST LECTURER)**

❝ That sucks, but that's life.

❝ Have a problem with it? Fight me. No, please don't fight me.

❝ You want it done right, so why would you hire a Western student?

**MATH 146: ROSS WILLARD**

❝ Let S be a crazy-ass set of polynomials.

❝ I love grad students. They'll do anything you tell them to do.

❝ I lie a lot.

❝ When asked how many children he has sired: "That depends on your definition of 'sired.'"

❝ Thank you to whoever has anonymously desecrated this classroom with pictures.

❝ Students: But sir, how many children HAVE you sired? Professor: It depends on the definition. Somewhere between 2 and 6.

❝ My first child was born when I was twelve.

❝ I've had multiple wives.

❝ There's no time for proofs.

**MATH 148: LAURENT MARCOUX**

❝ I read Zack Cramer when he took over my class said that if he gets the numbering wrong I would beat him. Makes me laugh. As if I need an excuse.

❝ When I grow up, I want to be a child prodigy.

❝ For those of you who took MATH 147 with Professor McKinnon, recall that he pulled these out of a different location.

❝ Notice I didn't say where my hat was.

❝ [goose honks outside classroom window] Sorry, my wife is trying to send me a message.

❝ [goose peers in window] Some people just don't want to pay for an education.

**PSYCH 211: BRANDON GOULDING**

❝ After doing developmental psychology for a while, I've realized that a 7-year-old is OLD. That's like... an adult.

❝ I can't see your hands, so just yell at me. I need new glasses and this room is big.

❝ Don't use torture or chemical weapons, that's bad.

❝ It pulls out? [Gasps] It pulls out!

❝ [YouTube video starts to autoplay] What is this? Go away.

**PSYCH 211: MADISON PESOWSKI**

❝ Just for shits and giggles, we'll play [Simon Says].

❝ I'm trying to judge how fast I should talk based on the amount of typing I'm hearing.

❝ You guys are so smart, I'm so proud of you.

❝ I strongly suggest never sending an email to your professor beginning with "Hey".

❝ If the teacher says, we're gonna do fight club, get in a circle and beat each other up, children are gonna say that's not okay.

**PMATH 352: MICHAEL RUBINSTEIN**

❝ Whenever you see double sums, what you do is mindlessly switch them and see what you discover.

❝ [places water bottle beneath the blackboard and erases the board]
[picks up the bottle and look inside and ponders]
[drinks the water]
A little bit of extra calcium today…

❝ My father once told me that during the war, the kids used to eat chalk at school to obtain calcium.

**MATH 136: MUKTO AKASH**

❝ You're all familiar with a matrix, right? The 1999 action movie starring Keanu Reeves, with those sequels that nobody seems to have seen?

❝ We don't need to show that much respect here.

❝ (On Monday) We did this yesterday! Friday. Friday is yesterday now.

❝ Please never write one over a matrix. You'll lose all your marks and get sent back to high school.

❝ I think I bought a bike from Walmart yesterday and rode it too long. My legs are gone and my head is also gone.

❝ When swapping between 2 identical rows, it'd be like asking identical twins to swap chairs. Although statistically different, it would look the exact same as before.

❝ Luckily we aren't playing a JRPG, or else something would pop out from the question and say "This isn't even my final form!"

❝ Today's lecture is brought to you by whatever shitty coffee I'm drinking.

**HIST 111: TROY OSBORNE**

❝ You don't want to change, and why is that? You're not mean, you're just conservative! Well maybe you are mean, but that's not the answer we want.

**CS 146: BRAD LUSHMAN**

❝ [On declaring void* pointers in C] But that way lies madness. I figure we're all mad enough by now that we can do it

# PROFS AND DRAGONS

**DAVID MCKINNON**

**Chaotic Good Halfling**

***Level 12 Bard***

STR 11 DEX 9 CON 14 INT 18 WIS 14 CHA 16

**Skills:** +8 Arcana, +7 Persuasion

**Languages:** Common, Halfling

*Let There Be Markers.* McKinnon holds two markers up to the light. For the next hour, McKinnon gains advantage on all ability checks. This can be done once every short rest.

*s and c.* McKinnon once defined trigonometry purely with algebra and calculus techniques without geometry. Once every eight moon cycles, McKinnon can assign a Homework Six where this definition is re-derived from scratch. When he does this, every creature within 60 feet must make a DC 15 Wisdom save or be enthralled for seven days to complete Homework Six. This save can be repeated at the end of every day. Each affected creature will only do Homework Six, ignoring other needs and desires, until it is completed when 36 DC 15 Intelligence checks are passed, once every hour at most.

**KENNETH DAVIDSON**

**Lawful Neutral High Elf**

***Level 17 Sorcerer***

STR 8 DEX 12 CON 14 INT 19 WIS 18 CHA 9

**Skills:** +10 Investigation, +16 History

**Languages:** Common, Elvish

*Encyclopedia.* Davidson can answer any question about mathematics in 1d4 turns and prove any historic theorem in 3d8 turns.

*Unconventional.* Davidson wears black socks and sandals. Lawful creatures within 30 feet with a passive perception of 18 or higher must make a DC 13 wisdom save or become frightened while within 40 feet of Davidson.

**STEPHEN NEW**

**Lawful Neutral Human**

***Level 11 Druid***

STR 11 DEX 14 CON 14 INT 15 WIS 14 CHA 12

**Skills:** +6 Perception, +5 Beauty

**Languages:** Common, Elvish, Sylvan

*Trick Question.* New asks and explains a trick question. All creatures within 90 feet must make a DC 16 Intelligence save or suffer shame for 1d4 turns where all attack rolls and ability checks are made with disadvantage.

*The Beauty in Mathematics.* New embodies the beauty in mathematics. Once a lunar cycle, New can alter, suppress, or introduce a fundamental axiom to a 5-foot cube, which takes effect for one turn.

**DAVID JAO**

**Chaotic Neutral Dwarf**

***Level 10 Warlock***

STR 10 DEX 15 CON 5 INT 18 WIS 15 CHA 7

**Skills:** +2 Deception, +5 Fathering

**Languages:** Common, Dwarvish

*Nerd Sniping.* Jao poses an interesting question and refuses to reveal the answer. All creatures within 60 feet must fail a DC 16 Intelligence save or be stunned for the next 1d6 turns.

*Fatherly Charm.* Jao exudes a fatherly presence. Those who spend enough time with him become entranced and refer to him as "Daddy." To those people, all of Jao's charisma checks are made with advantage.

**LAURENT W. MARCOUX, ESQUIRE**

**True Neutral Half-Elf**

***Level 14 Ranger***

STR 12 DEX 16 CON 11 INT 17 WIS 15 CHA 15

**Skills:** +7 Intimidation, +7 Insight

**Languages:** Common, Elvish, Dwarvish, Celestial, Giant

*Speedwriting.* When Marcoux writes with chalk on a blackboard, he writes five times as fast as the average with no difference in legibility. All creatures seeing him write for the first time must make a DC 17 Wisdom save or be awestruck (stunned) for 2d8 turns.

*Command Silence.* Marcoux stares silently and intently at a talking creature within 60 feet. This creatures must make a DC 15 Charisma save or be frightened for 1d6 turns and silenced for 2d4 turns.

**ROSS WILLARD**

**Chaotic Good Gnome**

***Level 15 Paladin***

STR 10 DEX 8 CON 12 INT 14 WIS 17 CHA 16

**Skills:** +8 History, +9 Performance, +5 Siring

**Languages:** Common, Gnomish

**Vulnerabilities:** Photoshop

*Command Laughter.* Willard makes a well-timed snide remark about Western. All creatures within 90 feet must make a DC 17 Wisdom save or burst into laughter, stunned for 1d2 turns.

*Engagement.* Willard is engaging. For one of his performances every short rest, all creatures within 30 feet focus their attention on him and must make a DC 17 Wisdom save at the beginning of every turn or lose their action and movement.

**GORDON V. CORMACK**

**Chaotic Neutral Halfling**

***Level 15 Barbarian***

STR 14 DEX 9 CON 10 INT 17 WIS 18 CHA 11

**Skills:** +7 Innovation, -2 Chalk Handling

**Languages:** Common, Halfling, Primordial

*Break Chalk.* Cormack breaks a piece of chalk on the board, and a loud crack sounds out. All creatures within 120 feet must make a DC 10 Wisdom save or immediately turn their attention to him for the next minute.

*Tangential Discussion.* Cormack changes the topic to something more vibrant and interesting. Conversing creatures that fail a DC 15 Perception check fail to notice the change in topic.

**BRADLEY LUSHMAN**

**Lawful Evil Tiefling**

***Level 9 Wizard***

STR 8 DEX 12 CON 9 INT 15 WIS 14 CHA 8

**Skills:** +5 Insight, +3 Philosophizing

**Languages:** Common, Abyssal, Deep Speech

*Philosophize.* Lushman discusses the nature of the world. All creatures within 60 feet must make a DC 11 Wisdom save or be stunned for the next two turns as they contemplate whether an imperative or functional world makes more sense.

*What Am I Supposed to Say, "We Do SIMP"?* Lushman is a master of language composition. Once every two moon cycles, Lushman may invoke this effect while explaining a new language. All creatures within 60 feet must roll 1d4 DC 15 Intelligence ability checks, at most one per hour. Any success results in fluency in the language. Complete failure results in a deep confusion that induces 1d8 psychic damage and one level of exhaustion.

**MICHAEL RUBINSTEIN**

**Chaotic Good Dragonborn**

***Level 11 Monk***

STR 9 DEX 8 CON 15 INT 14 WIS 5 CHA 7

**Skills:** +6 Religion, +3 Hydration

**Languages:** Common, Draconic

*Commanded Demonstration.* All creatures within 30 feet must make both a DC 8 Wisdom and DC 9 Charisma saving throw or follow Rubinstein's commands for the next 1d8 turns. This can be used once every long rest.

*Hydration.* Rubinstein loves his water. If Rubenstein has not drunk water in the last hour, he must consume one orange or suffer one level of exhaustion. Upon drinking water, Rubinstein gains advantage on all ability checks and saving throws for 10 minutes.

**ADAM KOLKIEWICZ**

**Neutral Good Wood Elf**

***Level 14 Cleric***

STR 8 DEX 9 CON 10 INT 16 WIS 16 CHA 14

**Skills:** +8 Survival, +7 Soothing

**Languages:** Common, Elvish, Celestial

*Ambiguity of Handwriting.* Kolkiewicz writes in his signature handwriting. The text is two-thirds as long as usual for conveying the meaning, but is readable in its entirety only by those he trusts.

*Soothing.* Kolkiewicz is relaxing. All creatures within 30 feet of him suffering from exhaustion suffer it at one lower level.

*dawdling, Epsilon Screwn, and The42ndRhombiDodecahedron, in consultation with cy, girafarig, and SandwichExpert*

# SENSEI

*DISCLAIMER: This article isn't about anime, or even anything Japanese.*

On April 6th, 2019, my cat was struck and killed by a car.

It was a day just like any other when I heard the news. I was minding my own business, preparing for exams. Time is tight, stress is high. But life doesn't wait for those it leaves behind. A buzz of my phone, a brief hello and…

Oof. Right in the gut, and I was doubled over in seconds. I tried to keep calm at first. Take it slow. Process the information as it came, though a part of me wanted to hang up, right there and then. Plug my ears. Wish it all away. But, of course, we're logical students, here in Waterloo Math. So I kept listening, as my mother continued, giving me the details neither of us wanted to hear.

We don't know much. It was almost certainly a mistake. My sister was contacted first, by the local veterinarian, who had identified the markings left in his ear, confirming his name and owners. Us. She then relayed the information to my parents, who in turn passed it along to me. And just like that, there I was. Bawling my eyes out in a corner of MC.

Grief. It's a weird feeling. Five stages, as they say, though all I could feel then, all I can feel now, is sadness. I feel hollow. Un-whole. Cold. I know why, but unlike so much of the knowledge I've gained in my time here, it does nothing to ease the emotion. If anything, it amplifies it, as my powerlessness is only exaggerated by awareness. Normally, I hate not knowing, but in its own cruel way, this is even worse.

The Chinese believe in fate. They believe in the idea that all actions are predetermined, that everything that begins is forecasted to end, that everything has a time. I don't know if I agree, but it helps to ease the pain. There's a sense of… finality, a tinge of acceptance, that the idea grants me. If nothing else, it's a reminder that there's no shame in moving on.

Of course, you didn't come here for a sob story (I hope). So in its place, I'd like to bring up a more general message, one that hopefully means more to more of you.

At Waterloo, life moves at a breakneck pace. Whether it be assignments, interviews, hackathons, clubs, parties, quizzes, or exams, there's always the next step in the line. For every hurdle cleared, there is another to take its place. We don't often realize it, but for those who fall, the speed makes it difficult to climb back up. As previously stated, life doesn't wait for those it leaves behind. So when one of us trips, we may not have the time to fully heal from the fall. Life is a fragile thing, and I find that many of us here stretch it thin. We're greedy, rightfully from our accomplishments, but greedy nonetheless. It only takes one punishment, one failed overcommit, before the band snaps.

For those who have lost, or are in the process of losing, someone or something they love, just know that whatever you're feeling is not wrong. Grief cuts deep, and the scars it leaves are the reminders of the love we felt, and of the love we can still feel. They're a testament to life itself, of which we should not be ashamed. And it's a reminder of the joys we've once had, the fulfillment of the lives we've lived.

For anyone else who is struggling with anything, anything at all, just remember that we're all here with you. I can't claim to understand how you're feeling or what's on your mind right now, but understand that you have a place here, as we all do, and that you should never stop moving forwards.

To everyone reading this article, do me a favour and take a moment. Think about what you have right now, what you have in your future, and what series of events, fortunes and misfortunes, ups and downs, left and rights, have led you to where you are right this moment. Take a moment to think about what's waiting at home, and the things that you can look forward to, the things that can't be replaced.

Most of all, those of you who have pets, go home and pet them. Love them. For me.

Good-bye, Sensei. I will never forget your fat tummy, your furry warmth, using you as a pillow and getting bit as a consequence. It was worth it. I will remember fondly scratching behind your ears, or trapping you under laundry baskets, or feeding you what felt like half the fridge, you sure had an appetite. I will forever miss trying - and failing to pick you up, poking your paws when you were trying to sleep, scratching your tummy whenever you rolled over, and, most of all, I will carry the sound of your sleepy purring in my head over everything else, a sound I cared for more than anything else.

*RIP Sensei, March 3rd, 2013 - April 6th, 2019.*

# DOPPELGÄNGER

I'm not creative with names. In the summer before 10th grade, I set out to write a novel. I named all the characters after people I knew in real life. Not my close friends, of course, because that would have been weird, but people I knew as acquaintances (or less) in high school.

I named the protagonist Kiana, after one whom I had shared 9th science class. I just liked the name. After a month and a half of hot depression (my boyfriend at the time had just broken up with me and every Vancouver summer was increasing in temperature), it was done. Shy and socially-anxious Kiana had made friends in high school, kissed a boy for the first time, and finished tenth grade with 70k-words worth of new high school experiences. Look, it wasn't a very good novel.

Even after 10th grade started, I was still working on it when I could, with the intent of making this a real, good, publishable book! Needless to say, it never did become such a thing, but the point is, I had Kiana in my mind all day long. And when I bumped into Kiana in the staircase, when she opened her mouth and said "Hey, Cy—, I haven't seen you in a while," I was confused.

Am I stupid? Am I losing touch with reality? Obviously, one Kiana is real and one exists only in my head and on paper, and also the real Kiana is the opposite of shy and socially-anxious, and half-white, so they were pretty much as different as they could possibly be. Except for the fact that they both had an older sister. Yet the two of them had become doppelgängers to my mind's eye.

I'm pretty much obsessed with people, as much as shy and socially-anxious Kiana is. Maybe you have to be, as a writer, or maybe I'm just vain. In 11th grade I went on a school trip to Japan to meet students at our sister school (yeah, apparently we had one—it was a surprise to me, too). My teacher brought her husband as a chaperone, so they had to bring their son Callum, too, who was conveniently also in 11th grade. I mean, they could have left him at home, but he was into *Evangelion* so I guess he wanted to come. He bought an *Evangelion* CD there, anyway. He was kind of cute, but he wasn't good at reading maps and he certainly was not a fan of mathematics.

Then when I came here, I met someone who looked exactly like Callum. No, actually, the two did not look exactly the same, especially their hair, but there might be something wrong with my facial recognition because every time I saw one, I saw the other. Somehow I see them as the same person, even though the non-Callum one doesn't watch anime and the Callum one doesn't do math. It's okay, really, because the last time I talked to Callum was before I came here, when my class went to karaoke with our teacher and I'll probably never talk to him again, so having those two mixed up isn't a big deal, I guess.

Speaking of *Evangelion*, though, Shinji continually tries to understand himself through the three girls in his life and pretty much half the show is those girls "telling" him stuff, but they're just in his head. It's all him. I mean, I'm not as broken as Shinji, and I've got more friends than he does, though I suppose that here in Waterloo I hardly have any, but Callum talks to me in my dreams, only it's not him, it's the one in Waterloo, only it's not him either, it's me.

When I walk around campus, I'm constantly seeing people that I know, only it's not them. Waterloo is full of doppelgängers. I wonder if it's what I want to see. Up close, it's not like they are identical at all, but it's not like I ever come close to Waterloo students, and it's not like I was ever that close to most people in my high school either. I guess when viewed from afar, you can ascribe any quality to anyone.

I did hang out with one of my new Waterloo friends once and she said I seemed to be obsessed with my childhood. I have no particular opinion on that statement, but my favourite book is *The Catcher in the Rye*, so do with that information what you will. I think I will ask to hang out with her again, but the problem is that the people in my head who criticize me are doppelgängers for people I know in real life.

By the way, I have straight and long black hair, and I think it frames my face better when it's right by my face and down my chest but out of habit, I'm always tucking it behind my ears and behind my back. I also used to have bangs but I'm a lazy fucker who can't keep up with upkeep. So when I look in the mirror, I think I am a doppelgänger for *Kitsu Chiri* from *Sayonara Zetsubou Sensei*. But I have never watched that show.

*cy*

# N THINGS TO DO WITH THE CRANE ABOVE SLC

- Drop stuff off it for science
- Use it as a vantage point to spy on Imprint
- Re-enact scenes from Spider-man
- Hang a giant pink tie from it
- Put up a large **mathNEWS** banner ad
- Lure our enemies up there with free cookies and remove the ladder
- Actually put free cookies up there and see who's brave enough to get them
- Commandeer it and the building supplies to add a 10th floor to MC
- 'Accidentally' drop eggs on the Imprint office
- Dude Perfect: UW trickshots
- Make a wrecking ball out of old **mathNEWS** issues and attack people we don't like *[Editor's note: mathNEWS bonding activity, anyone?]*

**Fruitboy**

# ON THE SUBJECT OF BREXIT AND MAJORITIES

Who would have ever known that just over 1000 days ago, a chain of events would begin that would lead to the recent dumpster fire we are seeing in British politics these past few months. A big reason why it's a dumpster fire is how Parliament fails to reach any agreement on pretty much anything. However, to fully see how bad this lack of consensuses is, I will bring you along a journey through all the different kinds of majorities witnessed so far in Brexit. Let's start off with an actual majority of sorts.

#### 1) REGULAR MAJORITIES: 52%–48%

On 2016 June 23, the non-binding referendum on the United Kingdom leaving the European Union was won by a quite slim margin of 4%. This vote only offered 2 options: Leave or Remain. However, considering that not all of the 46,500,001 registered voters participated in the referendum, no side actually got a clear majority. This is more of a problem with a lack of participation, which many democracies have been facing recently, but that is a story for another time. At this point, history could have been different, if the government had just decided to ignore the non-binding referendum result. However...

#### 2) ACCLAMATION: 100%–0%

After the referendum results were announced, then-Prime Minister David Cameron surprisingly decided to step down from politics entirely, to give someone else the job to leave the EU. This triggered a Conservative Party leadership election. The 1922 Committee, a committee of Tory backbenchers, voted on the candidates until two remained. Theresa May received over 50% of votes in the first round after which all the candidates except Theresa May dropped out, and then she won the leadership, becoming the Prime Minister by default. No majority needed there.

#### 3) SUPER MAJORITIES: 522–13

At this point, the Conservatives in the House of Commons held a slim majority of seats. Theresa May decided that she wanted an even larger majority in the House, and thus brought a motion to the House to trigger a general election early in 2017. (If the House votes with a ⅔ super majority vote, then a snap election can take place.) The House voted with an overwhelming super majority of 522-13 votes. So the ayes have it. The election was scheduled for 2017 April 18.

#### 4) MINORITY GOVERNMENTS: 317/650

Theresa May thought it would have been an easy larger majority to win, but then Jeremy Corbyn happened. The opinion polling quickly turned on her and she lost her majority entirely. Out of the 325 seats needed for a majority her Conservative Party only managed to win 317. This meant a coalition was needed, so she turned for the help of the Democratic Unionist Party after exhausting her other options. (Considering her party is officially called the Conservative and Unionist Party, it seems fitting that they ended up with a deal.) It wasn't even a true coalition; the DUP would be able to vote against the Tories on all non-confidence motions if they wished, and it became evident that they would vote against it.

#### 5) ARTICLE 50: 498–114

One debate concerning the situation was whether the government would be allowed to proceed with Brexit without the consent of Parliament. The Millar Case, as this was known, concluded by giving Parliament more power in the Brexit process. So, Article 50 (the way by which countries leave the EU) bill was passed by Parliament 498-114 on 2017 February 1, and Theresa May triggered Article 50 on 2017 March 29. Later, they would also need to pass the final Brexit deal in what would be known as the Meaningful Vote.

#### 6) "EARLY" NEGOTIATIONS

Pretty much nothing significant happened for 2.5 years and the negotiations were slow af.

But, as it began to be apparent that Parliament was not agreeing on anything, Theresa May asked the European Council if they would extend the deadline of 2019 March 29 to June 30[1]. They said no, and the new deadline became April 12 if Parliament can't agree on anything, and May 22 if Parliament agrees to something.

#### 7) THE MEANINGFUL VOTE(S): 202–432, 242–391, 286–344

A big step of the Brexit process is that Parliament needs to pass the final Brexit bill. The vote was dubbed the Meaningful Vote, and if things went to plan for Theresa May, there would have only been one. However, on 2019 January 15, 202-432 happened: the Meaningful Vote produced the worst defeat of a government bill in Parliament's history. Thus PM May was forced to negotiate further. Yet, when the Brexit bill returned for Meaningful Vote 2.0 on 2019 March 12, it failed again with 242-391. At this point a question was raised: Would PM May be allowed to bring the same bill back again without meaningful changes? According to Speaker John Bercow, the answer is no. Thus, only a portion of the Brexit bill returned on the 2019 March 29 and again it was struck down 286-344, despite Theresa May saying that she would be willing to step down as PM if it would get a majority. All of the parties were divided internally about these votes; factions grew within parties and nobody could reach an agreement.

#### 8) CREATING MORE FACTIONS: 11 MPS

Amidst all the Brexit chaos, and the splinters and divisions within individual parties, 11 brave MPs dared to do what the Gang of Four[2] did decades ago. Starting with 7 MPs on 2019 February 18, they splintered off, forming their own group uncreatively called The Independent Group, with the goal of rejecting May's deal. This means that Theresa May would

need to work even harder to get the majority she wants, and deadlocks the process even further.

#### 9) NEGATIVE MAJORITIES: THE INDICATIVE VOTE(S)

By this point, Parliament still had not agreed on anything, and the deadline was approaching quick. So, a series of Indicative Votes were held on 2019 March 27. These were 8 votes given to MPs where they would vote aye or no or abstain on a certain aspect of the deal. The votes are simply to indicate which options Parliament had a majority on, and Theresa May would need to then negotiate based on their results. Incredibly, Parliament rejected all 8 indicative votes. Some with a huge margin, some only by a couple, but as all 8 options failed, a second series of Indicative Votes were held on 2019 April 1, this time with only 4 options. All options failed to have a majority again. Things are now definitely not looking good.

#### 10) SIDE NOTE – TIE VOTES: 310–310

Amongst all of these negative majority Indicative Votes, and motions passed by the House with slim margins, some with a margin of 1 vote, it was no surprise that a tie vote ended up happening. Tie votes in Parliament are rare, as the last one happened in 1993 on July 22[3], coincidentally also on the subject of the EU. This time it was 310-310 and Speaker Bercow casted his tie vote as a no, per precedent.

By looking at all the different Brexit votes that have happened, you can estimate the number of MPs who want a particular kind of Brexit or a Remain. For example, knowing what changed between Meaningful Votes 1 and 2, and the margin of those two votes, you can find out how many MPs supported that particular kind of Brexit agreement while not supporting the previous Brexit. You will see by doing this how fractured Parliament is, not just with parties but within parties, which is why negative majorities kept happening.

Here we are now. As of the time of writing this, the UK has until the April 12 deadline to pass something in Parliament so as to avoid leaving with no deal. (Leaving with no deal is a very bad thing btw.) The EU is unwilling to extend the deadline because that would mean the 2019 European Parliament elections would now get dragged into this mess. Parliament has rejected pretty much everything, including the indicative votes. No more indicative votes will happen because the Speaker said no. Over 1000 days of negotiating and voting and nothing has happened. Parliament has exhausted all their options, and backed themselves into a corner. Despite voting to prevent a no deal scenario from happening, it seems like it will be the only thing that will be happening; quoting a senior EU negotiator, it's like "the Titanic voting for the iceberg to get out of the way."

At least Canadian politics aren't as crazy as the UK's.

dzk

1. The June 30 date is significant as new MEPs after the 2019 European Parliament Elections take their seats on July 1.
2. Not the Chinese Gang of Four. Search the origins of the Social Democratic Party (UK).
3. It later turned out that one vote was miscounted so it was not a tie but the end effect ended up being unchanged.

# N INTERMEDIATE-ADVANCED EXAM ROOM STRATEGIES

- Bring your WatCard
- Request AccessAbility
- Change your last name once you find out the exam seating arrangements to get the ideal room to write in
- If the exam is choose-your-own-seat, pick a seat at the front so you don't get distracted by people in front pulling out their hair over a question
- Alternatively, choose-you-own-seat close to the clock so you have impeccable time monitoring skills
- If you're a pen person, use erasable pens instead of non-erasable pens so you can change your answers
- I don't possess the skills yet to make this article much spicier while avoiding suggesting policy-71 violations
- On that note, how clear does your clear water bottle need to be? Do we have some sort of precise opacity measurement? Everything is transparent at sufficiently intense light levels, right?
- Bring backup pencils/pens so if your writing instrument breaks, you instantly have a replacement
- Bring backup pencil sharpeners so if your pencil sharpener breaks, you instantly have a replacement
- Bring backup water bottles so if your water bottle breaks, you instantly have a replacement
- Bring a backup copy of the exam room so if the exam room breaks, you instantly have a replacement
- Bring a backup copy of your brain so if your brain breaks, you instantly have a replacement
- Oh, and don't forget to bring your WatCard, and you can also bring a backup copy of your WatCard so if your WatCard breaks—

*CC*

**Send more profQUOTES.**

THE ENTIRE mathNEWS READERSHIP

# A REVIEW OF MUSICAL FRUITCAKE

*THE BEST MATH ACAPELLA ALBUM EVER PRODUCED, AND POSSIBLY THE BEST ALBUM OF ANY GENRE EVER*

Listen to this album by searching for "The Klein Four Musical Fruitcake" on YouTube.

I recently discovered The Klein Four, an a cappella group which sings math songs. This is a review of their best, and unfortunately only album (as far as I know): "Musical Fruitcake". They have produced at least one single which is not a part of this album called "Get Tenure", which is a parody of "Get Lucky".

Here is my review of "Musical Fruitcake".

### POWER OF ONE

The album opens strong with *Power of One*. This is a catchy love song with a good beat. It has an unfortunately long intro though. Its lyrics also provide inspiration for possibly the best math pickup line of all time. "If you were a number you'd be 1, because there's no power high enough to make you anything but the one for me."

### FINITE SIMPLE GROUP (OF ORDER TWO)

This love song is what brought The Klein Four to fame, and is also my new favourite song ever. Every lyric of this masterpiece is a beautifully crafted math pun. The song tells the tale of a relationship going through a rough patch, and is presented in the form of a mathematical proof that the couple belongs together. My favourite lyric from this song, and indeed from all of music is "without loss of generality, I will assume that you feel the same way" which I wish I could say (and get away with saying) to my crush when I tell them I like them.

### THREE-BODY PROBLEM

This is a fast-paced love song about how the singer's girlfriend left him for another man, leaving him with a three-body problem. The math puns are a little too applied for my taste, but it is nevertheless a fantastic and catchy song.

### JUST THE FOUR OF US

This is a catchy song whose rap verses rival that of the musical *Hamilton*. My favourite lyric from this song is "Academics, women, Nintendo, pick two out of three." I guess to update this you could replace Nintendo with League of Legends, but let's be honest, even if you sacrifice academics, if you play League of Legends, you aren't getting any women. The song is about the four singers in The Klein Four, "and some other random guy" and their adventures doing math together. It also reflects on getting rejected from MIT.

### LEMMA

This is a slow love song, but it's not about being in love with a person like the other songs in this album. This song is about being in love with a really useful lemma that allows you to solve lots of math problems. This makes the song more relatable to most math students than the rest of the album.

### CALCULATING

This is a quite unique song. It is about being lost in math. My favourite lyric from this song: "Is this thing a donut, or just a coffee cup? I just can't tell the difference." This song has a big of an echo feeling to it, not my favourite song in the album, but the beat is pretty catchy.

### XX POTENTIAL

For a math a cappella song, *XX Potential* is somewhat lewd. It's a sexy song about a hot girl in the singer's math class. It also has a bit of a kinky femdom vibe to it, since the singer sings about the girl emasculating him. I think this is a great song, because that's my kink.

### CONFUSE ME

This is the most relatable song in the album. It is about your math professor confusing you. You should sing this song to your professor whenever you're confused in class. The best lyric from the song is: "I keep trying to study, but all you do is confuse me."

### UNIVERSAL

This song has a less math-y vibe to it, but I think that's just because most of it flies over my head. My best guess is that this is a love song full of puns about universal algebra, since it mentions the word "category" and category theory is one of the many places I got lost when trying to read up on universal algebra. This is a nice slow song, good for dancing with that special someone. Shout out to my prof Ross Willard, who I'm sure would love this song, as universal algebra is his research area.

### CONTRADICTION

This is a fun song about proof by contradiction. I repeat, there is an a cappella song about proof by contradiction, and it's actually pretty good. Just, wow. This album is like rule 34 for music—there's a song about everything.

### MATHEMATICS PARADISE

This slow song has a fun and jazzy feel to it with a sick beat that makes you want to snap along. It's a bit philosophical and existential, and questions why $\pi$ and $e$ are defined the way they are.

#### STEFANIE (THE BALLAD OF GALOIS)

This song is a beautiful history lesson about the legend of Galois and his love Stefanie. This song is catchy, and features singing with a French accent. It also contains an exchange about the pronunciation of Galois. Is it Gal-oise or Gal-wa?

#### MUSICAL FRUITCAKE (PASS IT AROUND)

This song it where the album gets it's name from. It's about being in The Klein Four. Pretty good as a song, but not enough math puns.

#### ABANDON SOAP

This opens with some Gregorian chant and has a really weird ending. In the words of the song: "I have no idea what's going on." This is the only bad song in the album.

In summary, this is the best album ever created. I think the math orientation committee should at least consider having all students learn, by heart, every song in this album (with the exception of *Abandon Soap*) instead of learning the math dance.

*Music Expert*

# IS THAT A TRANSFORMER™?

The rules are simple. Nine of the following names below belong to a real Transformers character. Six of them do not. Think you know your shapeshifting alien robots? Give it a go and challenge your friends! Which one among you is the TRUE Transformers trivia expert?

- Bad Boy
- Bareback
- Blowpipe
- Chokehold
- Discharge
- Drag Strip
- Eject
- Erector
- Hardhead
- Headstrong
- Impactor
- Muffler
- Shaft
- Squeezeplay
- Vixen

(Unless you're Chris McFeely, you're probably going to need to check your answers on tfwiki.net.)

That's it folks! Have fun, transform, and roll out!

*Finchey*

# IT'S A BEAUTIFUL DAY FOR A WALK WITHOUT A DESTINATION

Hello there, fellow student! I suppose that you've probably just finished studying, are about to go study, or both. It's a stressful time, with finals coming right up, and maybe co-op right after. This article is for those of you who have been studying very hard lately, and feel at least a little stressed in spite of all that studying. The gist of what I wish to say is, "It's a wonderful spring day outside; *go take a walk!*"

You have worked hard these past few days, and likely plan on working harder in the coming weeks. Maybe you lament that you haven't been productive enough, efficient enough when studying. I think that if you're the type of person to worry about that, you probably study very hard already. There's an ideal balance in most things, and studying is no exception—taking good, *real* breaks helps. There are plenty of articles to read on the web describing the benefits of taking breaks, so I'll just say that it's a good idea to take breaks, and put forth my own recommendation for one: a walk outdoors with no exact purpose or destination.

The weather has been absolutely wonderful these past few days, and I've taken a walk or two myself. There's something different about a walk that has no explicit destination. No longer is there a rush to get somewhere, or worrying about what needs to be done upon arrival. I figure my recent walk was the first time I've walked somewhere without any idea where I was going since coming to UWaterloo, and there was a certain carefree peace that came with that. I understand that it can be very difficult to let go of the stress of studying, and the uncomfortable feeling that one *should* be studying whenever one isn't. I'll ask you to try, at least for a little bit. It's not procrastinating; it's a well-earned break.

How do I figure that the weather will still be great for a walk when you read this article? Look at it this way: suppose it's raining. Then, there's nothing more visceral than a walk in the rain, with fresh, cold sky-water filling the air. What if it's cloudy and windy? Then, the air will never be fresher as the wind blows it past you. Let's say that the day is bright and sunny and clear. Then, you can enjoy the warmth of the sweet spring day. Like many things, it's the perspective that matters more than the actual day itself.

It doesn't have to be a long walk. It doesn't have to be a scenic walk. It doesn't really even have to be a walk. All I ask of you is to take a step outside with me, breathe in the wonderful sights and sounds of spring, and remember—even if for just a moment—that there's a whole world out there, waiting for you.

*CC*

# JAZZ IS NOT ALL THAT BAD

> *Music is your own experience, your thoughts, your wisdom. If you don't live it, it won't come out of your horn. They teach you there's a boundary line to music. But man, there's no boundary line to art.*
>
> —Charlie Parker

Published on page 15 of the April 1st issue *[Editor's note: March 29th, but it was indeed the April Fools' issue]* of **mathNEWS** was Vice Mitt's article, "Jazz Music Is Objectively the Worst Music Genre Ever Created, and Anyone Who Truly Enjoys It Is a Disgrace." The article's title does a good job of conveying its message—I think it's hardly necessary to elaborate on what the author intended to convey. The following is my response to Vice Mitt's article.

It is unfortunate that this article was published in the April Fool's edition of **mathNEWS**, as it makes it difficult for one to determine whether or not the author is being facetious. *[Editor's note: It really isn't.]* If Vice Mitt's defamation of jazz music, its performers, and its consumers was indeed a joke, the humour was well disguised. Yet the author's arguments are so poor as to make one wonder whether the article was intended as a parody of jazz "haters." *[Editor's note: It was.]* Still, it is my belief that Vice Mitt's intention was to produce a serious critique of the genre, and it is as such that I will treat it.

Vice Mitt's article begins by introducing jazz as a "hotly debated topic," although the author never explains why, stating that "some have said that jazz is the one true piece of original culture created in North America," and then proceeding to claim that "saying that jazz is to be preserved solely due to its birthplace and roots is a poor argument at best." The latter point may be true. Although one could argue that cultural or historical significance is sufficient reason to warrant a genre's preservation, I will not take that route. Instead, I will challenge the author to provide an example of an argument that jazz should be preserved solely for those reasons. Without presenting such an example—which the had a conspicuous absence of—Vice Mitt is refuting an argument that has not been advanced, i.e., attacking a "man of straw."

This is not the main thrust of Vice Mitt's article, however, which appears to be the claim that "Jazz is... regressing music by manipulating musical [sic] theory in incorrect ways to justify playing incorrect notes and ruining proper musical harmony." This statement is loaded with implicit premises, none of which the author addresses.

The claim that music theory can be manipulated incorrectly or that harmonies can be improper implies that there is a correct, proper way of writing music. Such an assertion is not only presumptuous but also betrays a lack of knowledge of music history in the one who makes it. If a universal measure of the quality of a composition existed in music theory, surely the music theory of different cultures and eras would not differ so drastically. Such convergence to an accepted standard is not observed, however—elements of music theory as basic as pitch and tuning vary intensely from culture to culture. One is then forced to adopt the notion of a music-theoretical measure of quality specific to Western music, the category under which Vice Mitt places jazz.

One soon encounters the same problem as when one tries to impose a measure of quality on music in general. Objective guidelines for musical quality must be stringent, and any stringent restrictions on music theory will filter out all but a narrow spectrum of genres. Even if one limits oneself to classical keyboard works, this remains true; one cannot judge Bach's Goldberg Variations and Debussy's Suite bergamesque by the same metric. One's guidelines for quality, then, must be context-specific and essentially arbitrary—hardly an objective measure. One's notions of musical quality must, then, be subjective, and to insist that one's own individual measure of quality provides a "correct" or "proper" standard for musical composition is presumptuous at best.

Furthermore, the notion of incorrect or improper compositions runs against the entire history of Western music. In the interest of brevity, I will restrict myself to one example: the second movement of Beethoven's piano sonata no. 32 in C Minor. Beethoven was never averse to breaking implicit rules—many of his late works, including the famous Ninth Symphony, exhibit passages that flew in the face of the conventions of the era. In this particular movement, he experiments with styles that verge on ragtime and "boogie-woogie." Enforcing "proper" and "correct" notions of musical composition stifles the creation of such revolutionary works; with such standards in place, classical music—ignoring, for the time being, the rest of Western music—would not exist as we know it.

Vice Mitt goes on to remark that "stupid [chords] like Dsus2add11b5 [sic] . . . only exist to justify poor musicianship and bad musical writing abilities." Readers, consider the logic behind this statement: complex chords, which are objectively more difficult to play, "exist to justify poor musicianship." Draw your own conclusions regarding its validity. The author makes a similar argument about syncopated rhythms. In the interest of keeping this refutation at a publishable word count, I will leave the rebuttal of this argument as an exercise for the reader: it is similar to the previous example.

Vice Mitt concludes by encouraging readers to listen to classical, a "truly refined and proper genre," instead of jazz. As a classically-trained musician and an avid consumer of classical music, I find it highly unlikely that individuals who dismiss jazz based on the "arguments" presented in this article will be broad-minded enough to appreciate the diverse and often disruptive genre that classical is. As soon as Handel introduces syncopated rhythm, Ravel strikes a dissonant chord, or Beethoven starts to play ragtime, they will have to tune out.

Vice Mitt's attack on jazz and those who enjoy it falls flat on many levels. It addresses arguments that nobody makes.

It presumes that one can establish an objective measure for judging musical quality—something demonstrably impossible. Its claims that the complex harmonies and rhythms of jazz exist to justify bad musicianship just don't... make... sense? Finally, it resorts to an appeal to classical music as a proper, refined genre—a sharp contrast to the degeneracy of jazz. No one who has studied the history or theory of classical music would agree with this characterization, as I have illustrated. While it is certainly reasonable to dismiss jazz because of one's personal taste, to characterize jazz as "objectively the worst music genre ever created" and its fans as "disgrace[s]" based on these arguments demonstrates ignorance, close-mindedness, and an inability to think critically.

*Epsilon Screwn*

# HOW TO: WASH YOUR HANDS

It has come to my realization that there exist students who will walk into the male bathroom, take a shit and leave the bathroom right after, without completing the crucial, sanitary, and hygienic task of hand-washing. I do not want to shake your shit-covered-toilet-paper hand, nor do I want to touch anything you might have infected because you are too good for soap. I do not care if you used the urinal, the toilet, or just went in to blow your nose using the stall's toilet paper. You just left a public bathroom. Where approximately 100 shits are flushed down the toilets daily. Wash. Your. Hands.

If you don't know how, here are five easy ordered steps, all equally important.

**1. Wet hands.** Literally getting your hands wet. In between your fingers. Up to your wrists. All over.

**2. Lather.** The application of soap onto your skin. Again, in between your fingers. Under your nails. All over.

**3. Scrub.** Rub the soap into your skin for at least 15-20 seconds. If you don't want to count, sing happy birthday twice (out loud is encouraged as it will let anyone else in the room know how much you care about being a decent human being).

**4. Rinse.** Turn on the tap and run your hands under water until all traces of soap are gone and your hands are squeaky clean.

**5. Dry.** Paper towels are preferred. Make sure to dispose them in a trashcan and not on the floor. Hand dryers work too.

It is not that difficult. It takes about 30 seconds if you're not a complete idiot.

*πllow Princess*

# A COMPREHENSIVE INVENTORY OF ALL THE SHIT ON MY DESK RIGHT NOW

I haven't cleaned my desk since, I don't know, August? There's so much stuff on top of it that I've forgotten what the surface underneath used to look like. But in the words of Mr. Einstein himself, if a cluttered desk is a sign of a cluttered mind, of what, then, is an empty desk a sign?

Let's take a look:

- A pair of headphones that I never use because they're too small to fit over my ginormous fucking head and give me headaches whenever I wear them.
- A Kobo Touch e-reader I got off Kijiji for free from this nice old man named John in Kitchener.
- A 6.5" x 8.5" Mickey Mouse-themed zipper pouch with nothing in it.
- A hairbrush I bought three months ago but still haven't used.
- My PSYCH 101 notebook from last term.
- A bronze statue of a crow bought on vacation in New Brunswick that was a gift from my cousin's English teacher.
- Thirteen pens of various colours and types. One of them is a ballpoint pen/highlighter hybrid that I've managed to hold onto for nine whole years. It still works.
- A small plastic Ziplock filled with 18mm watch springbars.
- A limited-edition 2019 Beatles calendar, also a gift from my cousin's English teacher.
- Barry Goldwater by Robert Alan Goldberg.
- A stuffed Beanie Boo keychain. I think it's supposed to be an owl. It's eyes are so big. I can't escape from its stare. I think it may be watching me. For the will of what master? I can only wonder.
- Issues 1-5 of Volume 139 of **mathNEWS**.
- 44 loose sheets of lined paper. There's stuff written on all of them but I can no longer read it.
- A bottle of Borax solution. I accidentally drank it once despite the clear "DO NOT DRINK" warnings written in permanent marker all over its surface. Sometimes my illiteracy gets the better of me. (How did it taste, you ask? It was fuckin' nasty. Almost as bad as the time I drank cleaning vinegar by accident.)
- A Grade 6 math textbook.
- My cellphone.
- A stapler.

*Finchey*

# UNAVOIDABLY, THE AESCULUS HIPPOCASTANUM

I wake up. I eat breakfast and take a shower. She's there with me. She's always there. What a fucking pain in the ass, that bitch. We leave my house and I break into a sprint, channeling my inner Usain-Bolt-about-to-win-gold-at-the-2016-Rio-Olympics. But I'm unable to shake her off.

"You fucking hoe, can't you just fuck off for once?"

"Lol nope," she says, sneering.

"I literally hate you. Let go of me, you annoying-ass ghost bitch."

"Try again later," she cackles. Her hair, impossibly long and smooth like squid tentacles, wraps around my neck, nearly strangling me.

Somehow I survive and make it to work. I've got a pretty sweet gig, not gonna lie. I work for a globally renowned tech corporation at their headquarters in California. The work I do is valuable and personally engaging, and I get along fantastic with everyone in my department. I'm well-respected as an employee, have a good work-life balance, and make $300k a year. It's fucking sick.

"Hey, fucking pay attention to me, fuckface." She pokes me. I still have no fucking idea who or what she is. Is she the ghost of my ex? Or a hallucination? How long has this been even going on anyway? And why the hell won't she leave me the fuck alone?

"What could you possibly fucking want? I have work to do."

"Nothing much, I just wanna distract you and get you fired is all." She does something vaguely reminiscent of a lap dance on the table, her white dress thrashing wildly between her legs.

"Dear fucking God you're disgusting. Begone, THOT." I bellow the last two words in the spirit of the original Vine, sweeping her off my desk with my arms. As she crashes onto the floor, she hits her head and passes out, finally giving me some peace.

I use the time to touch up the last few bits of our department's latest project, the program code for a hyper-efficient, hyper-affordable solar energy cell. The cell's predicted to revolutionize the global energy industry, and has been praised by multiple leading experts as a major step towards sustainability. Our company's already set up agreements with various national governments to implement widespread use of the cell once it's passed testing. Working on it has been immensely enjoyable and fulfilling.

I hear a groan, and look down.

"The fuck did you do that for, asswipe?" She rubs her head, staring daggers at me. I contemplate kicking her square in the face, bashing her skull in with the rubber sole of my boot. But before I can do so, she quickly shoots up and looks at the clock.

"Hey, it's lunch time right now," she says. She jumps into my arms. "Carry me! Carry me!"

"Get the fuck off of me!" I rise up from my chair and try to drop her onto the floor, but her hair has already wrapped itself tightly around my arms, and she suspends in midair. Her hair, curly and thick, is so warm. Just like tentacles. What the actual fuck.

With her hanging from my arms, I walk towards the lunch room.

"Where do you think you're going?" She asks.

"Uh, let's see. It's lunch time, so I'm going to the lunch room to eat my fucking lunch, shit-for-brains."

"But I don't wannaaaaa," she screeches. It's ear-splitting, reminiscent of the cry of a banshee. "Let's go play Conkers outside instead."

"I can't," I say.

"You will."

"I'm tired."

"That's a lame-ass excuse, even coming from you."

"Shit. Well, I should be in the lunch room anyway."

"You need fresh air."

"I can't."

"You will," she says. I notice now that her tentacles have twined themselves over every single one of my limbs, vine-like. She forces me to walk past the lunch room and to the building's exit, controlling my every step like a deranged puppetmaster. I try to struggle against her, but I am powerless.

She opens the door. We're outside. It's hot and bright. The reflection of the sun's light off her unnaturally white dress is blinding. There's a big tree in the yard, and she forces the both of us to sit in its shade.

"This is a horse-chestnut tree. Sometimes referred to colloquially as a conker tree. Scientific name Aesculus hippocastanum," she prattles.

"Why the fuck do you know so much about trees, you fucking weirdo? And did you know this tree was going to be here? Do chestnut trees even grow in California?"

She ignores my questions. "Let's play a game of Conkers!"

"I don't want to."

She pouts and whines, but I ignore her.

"This would be the perfect day to test out the solar cell we've been working on," I say, relaxing in the cool shade. "It's so sunny out!"

"I don't give a fuck about your stupid solar cells. Let's play Conkers."

I look down at her, about to give that bitch a piece of my mind. The light of the noontime sun filters through the leaves of the tree, illuminating her face. I've never really taken a good look at it before until now. I gasp and she blinks in surprise.

"Wow... has anyone ever told you how fucking hideous you are?" I say.

Her eyes glow red with anger. Saying that was a big mistake on my part. I see that this is the point of no return. She marches me over to the edge of the field, on the other side of the Conkers tree. There's a big cliff, and she unravels her tentacles around my body, flinging me over it.

She watches as I fall and tumble towards the ground below. It's a long way down, about 800 feet. As I tumble to my doom, I can only wonder why the hell she wanted to play Conkers so bad. What the fuck even is Conkers anyway? I never figure out the answers to these questions though. I meet my untimely end at the foot of the cliff after an eight-second freefall.

"That's for calling me ugly, douchebag."

*Finchey*

(Author's note: This is a parody of cy's genuinely amazing piece "Inevitably, the Conkers Tree" from the previous issue of **mathNEWS**. Go read it, if you haven't already!)

# MAKING FRIENDS AS A FIRST YEAR

Back in September, I thought I would make some friends while at UW. Considering I'm not even from Ontario, I understood that it would be difficult.

So far, I have not made any friends whatsoever from outside of my hometown. The only friends I have here are people who went to my high school. The only new friend from UW I managed to make is from the rival high school. I didn't think it was going to be this hard finding friends outside of [city redacted]! At least I know lots of people back home.

Maybe in September things will become easier. I hope.

*JH*

# LEARN THIS ONE COOL TRICK FOR DIFFERENTIATION! MATHEMATICIANS WILL HATE YOU!

Sometimes we come across functions like $e^{(x^2)}$. While you could recognize this as a composition of functions and apply the chain rule, why not use logarithmic differentiation instead?

The formula for logarithmic differentiation is:

$$f' = f \cdot (\ln f)'.$$

Let's put this into practice. Take $y = f(x) = e^{(x^2)}$.

$$y = e^{x^2}$$
$$\ln(y) = \ln(e^{x^2})$$
$$\ln(y) = x^2.$$

Then we have:

$$\frac{dy}{dx}\frac{1}{y} = 2x$$
$$\frac{dy}{dx} = 2xy$$
$$\frac{dy}{dx} = 2xe^{x^2}$$

Next we differentiate both sides.

Easy peasy! This method also works on functions like $f(x) = x^{(x^x)}$, while the chain rule will not.

Citation: en.wikipedia.org/wiki/Logarithmic_differentiation

*MATH 148 Gang*

# A mathNEWS REVIEW OF PARTY WITH PROFS

The Winter 2019 Party With Profs took place on Monday, April 1 in Federation Hall, and there were plenty of **mathNEWS** writers in attendance! Here's what they thought of the experience.

### FOOD

*"For a party scheduled all the way through the dinner hours, the lack of dinner was remarkable. I guess that's what happens when it's also scheduled on April 1st. The cake was pretty good though."*

WATER:

*"Sad."*

UW UNPRINT

*"Due to me not actually attending, all I can say is that the Food was most likely statistically average."*

CC

### DRINKS

*"True to myself, I had my own water (filtered by Brita®). Good thing I did, because apparently only inferior beverages were available at the bar."*

WATER

*"I got two for free. The cider was nice."*

UW UNPRINT

*"Due to me not actually attending, all I can say is that the Drinks were most likely statistically average."*

CC

*"I asked the bartender for a glass of water and was told that they don't have water. Dave Tompkins suggested asking for a glass of ice and waiting as an alternative."*

SANDWICH EXPERT

### PROFS

*"The best part of the night was when Dave Tompkins showed up and called CS 100 his stepchild."*

SANDWICH EXPERT

*"Due to me not actually attending, all I can say is that the Profs were most likely statistically average."*

CC

### SERVICE

*"One of the bartenders (Mark) was fuckable."*

PILLOW PRINCESS

*"Due to me not actually attending, all I can say is that the Service was most likely statistically average."*

CC

### VENUE

*"There was a door with a sign which read 'do not open'. I really wanted it open it, and Dave Tompkins told me I should. He also told me that if you don't take your card out of the ATM it will be shredded."*

SANDWICH EXPERT

*"Due to me not actually attending, all I can say is that the Venue—oh wait; I've been there before! I can actually say something about Federation Hall! The carpet is nice."*

CC

*water*

# N NEW UW MERCH IDEAS

It's the end of first year and I've bought absolutely no Waterloo merch so far because none seem like it's worth it. Here's a fresh new set of merch ideas that is sure to be more profitable than the hiked up international CS tuition:

- **Goose Spray:** It's like bear spray, but much stronger. Also, it smells like the average Waterloo student that doesn't shower, so the user won't stand out from using it.
- **MIT Hoodies:** We're MIT of the North, why do we only sell UWaterloo branded clothing?
- **Full Body Goose Suits:** For those who feel that the scent of goose spray stands out too much, a scentless approach to not being attacked by goose would be this.
- **Mandarin Workbooks:** How else are all these Canadian students supposed to learn the official language of UWaterloo? The language barrier is serious here.
- **Canada Goose Jacket, Waterloo Edition:** Made 100% from the geese on campus.

*License2Derive*

# GREAT EXPECTATIONS

"My god, you look absolutely gorgeous!"

"Oh shutup Liz, you're just being nice", uttered Sarah. A sly grin crept across her face. She did look great tonight. That new red dress from 'La Creme Decor' hugged her in all the right places, accentuating her soft curves.

"No I'm not, you're looking seriously hot tonight. Who's the lucky guy?" And who cares if she might be exaggerating a bit? Sarah hadn't been out with a guy in months (at least not that Liz knew of) and she needed that extra bit of confidence. That's what girlfriends were for!

"Well it's actually some guy I met at ... the gym. He's an investment banker, seems like a real go-getter. And look at that six pack!" Sarah flipped her phone around and proceeded to scroll through the profile of one Daniel Kristoff, particularly through the album entitled '2017 Punta Cana'.

"You know, I've been looking for someone like this. The guys at my work are all losers who probably live in their mom's basement. This guy seems like a real sweetheart."

—

"Where you headed tonight?"

"Oh I'm meeting up with this Tinder broad. We're going to Luigino's on 5th Ave," Daniel said while stroking his beard and looking into the mirror. Personally he didn't care much for facial hair, but he knew that woman found it attractive. It made him look a bit more ... sophisticated.

"Oh, that's a classy joint. Is this the one?" Sam and Daniel slowly locked eyes, Sam sporting a grin from cheek to cheek.

Daniel chucked. "Haha, fuck you man. You know my methods by now, common. It's all a facade, dating that is. We all think we're some kind of catch, look for someone that is 'compatible'. It's like we're all going to the flea market, each with our own pile of shit. And everyone thinks that their pile of shit is much more valuable than everyone else's." 'Look here, I have a great job and I work out five times a week.'" Daniel turned his head for comedic effect. "'Yeah, well I volunteer at a non-profit and on top of that, I have a great ass!' It's all a fucking game man, no-one wants to settle because it's an outright admission that they are not as great as they think they are."

Sam, almost on the verge of tears, croaked out, "And where do you fit into this game, oh wise one?"

"I am the great exploiter. The counter of cards, the mafia boss that rigged the boxing match. I see through all the bullshit and am able to shift the odds in my favor. Take for example this broad tonight. Look at her, she's cute but not overwhelmingly so. Maybe she's smart but probably not in a high position at work. And look what it says here on her Tinder profile: 'Only looking for a serious relationship, don't even bother if you're not.' See, she even blatantly lies to herself. She's not on Tinder for a serious relationship. She's probably on here so she can bathe in all the attention from these pathetic men. Until someone comes along, like myself, who she clearly cannot resist", Daniel said with a little wink and a smile.

"Oh yeah and it definitely doesn't hurt that your profile says you're an investment banker."

Daniel snatched his phone back from Sam, an even bigger smile growing across his face. "All part of the game, my friend, all part of the game."

—

"So how'd the date go?"

"You know, he's actually one of the sweetest guys I've ever talked to. He was just so compassionate; I felt like I could open up to him about anything. I even told him about David."

A subtle feature of disgust crept up in Liz's face. "You talked about your ex?"

"Yeah, but I didn't bash him or anything! I talked about what a great guy he was. And Daniel was genuinely interested in the topic! I don't know, that gives me the impression that he's serious, you know?" Sarah was visibly happy. This seemed like someone she could open up to about her issues; the someone she had been looking for. And his great body didn't hurt, mind you.

Liz, a bit puzzled by the description of the night's events, asked "Well, so how did it end?"

"He asked if I wanted to go to his place for a coffee. And to be honest ... I did want to go. But I have this rule that I never sleep with guys on the first date, never. Something came across his face when I said that, maybe he was a bit upset or something, I'm not sure. But we kind of just parted ways. He said he would call me when he's free, since his schedule is never too open. The drawbacks of being an investment banker, I guess. We'll see what happens next, I do hope he calls though. He seems like ... a nice guy."

*Raw cookie dough*

**A mathematician cares primarily about the abstract nonsense.**

**PROF. DAVID JAO**

# A LIST OF BEST AND WORST PLACES IN WATERLOO TO GO REEEEE IN PUBLIC

I read the article last issue called "A List of Best and Worst Places in Waterloo to go Cry in Public," but I just couldn't identify with it. As a university student, I'm a big boy now and that means I totally don't cry anymore. Instead, I, and other Waterloo students, more commonly express emotions by REEE-ing. So, I decided to come up with a more helpful article for fellow UW students.

#### IN THE CAFETERIA:

No one's going to give you extra food from reee-ing, since this noise isn't usually associated with hunger or poverty. However, the cafeteria is always a pretty noisy place, so you won't draw too much attention to yourself and be able to ree publicly without being shut down.

Verdict: Good

#### AT AN EXAM:

It's totally okay to go reee on an exam, everyone knows how stressful this is. In fact, everyone else probably wants to let out a reee too, but it's just not a good idea on math exams. It sounds too much like the number "three," so you'll likely unfairly get accused of cheating. Thus, it's suggested you reee before or after the exam, but not during.

Verdict: Bad

#### THE DC LIBRARY

The staff will come kick you out before you even reach the third E in REEE for "disturbing the peace." In fact, since it's exam season, not just the staff but the studious students will take part in kicking you out for distracting them, when they were probably browsing r/uwaterloo the entire time.

Verdict: Bad; worse during exam season

#### THE DP LIBRARY

People are a bit more rude and noisy here, so I guess letting out a nice, long, clear REEEEEEEEEE during exam season will be more acceptable than at DC.

Verdict: Better than DC

#### ON THE BUS

If you've taken high school physics, you may recall the Doppler Effect that occurs for a moving sound source. Hence, on a moving bus, the stationary listeners that the bus passes by as you go reee will be able to hear a reee that changes in pitch very smoothly, like rrrrRRREEEEEEEeeeeeee.....

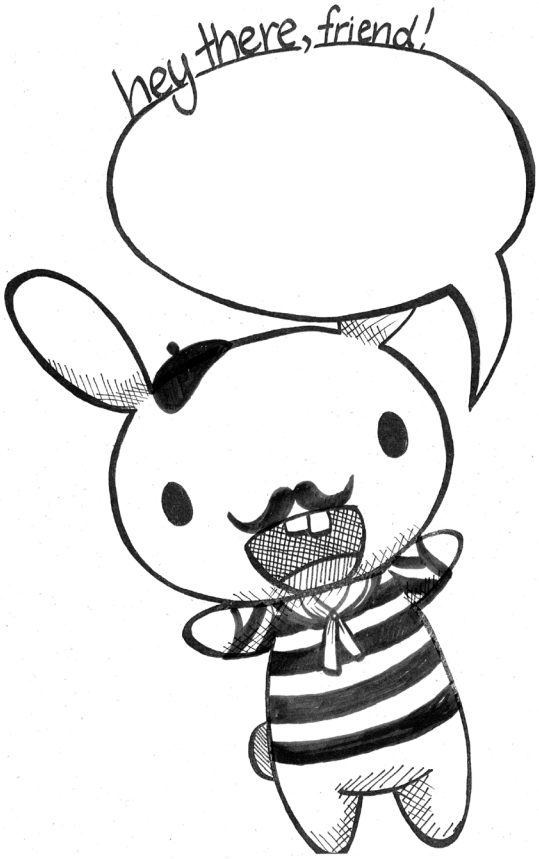
Verdict: Great

*License2Derive*

# A POEM FOR THE END OF FIRST YEAR

Gather near and hear
all of you in first-year,
the end is almost here
All that's left are exams, oh dear,
I feel like they are going to go up my rear
But have no fear, don't shed a tear,
just give a mere "thank" to Mr. Goose
to pass, or get ready to lose
But whatever happens, just break a move!
Life's more than exams and grades,
university is not your grave
I can't think of more stuff to rhyme
So until next time,

*License2Derive*



# MY FIRST YEAR EXPERIENCE: CHAPTER 1.

### *ORIENTATION, HEARTBREAK, AND A NON-EMPTY SET OF FRIENDS*

As I moved into my room in V1, I was greeted by a sign on my door. George Kennepotbunk it read. Of course, my real name is George Kennebunkport. I guess spell check was too much for my don. As my family helped me move in, I was off to SLC to get my orientation goody bag. It came with a key chain, math orientation sticker, and a condom, which lies a few meters away from me in my medicine cabinet as I write this. It's still unused, of course. After meeting up with a few friends from high school who are at Waterloo as well, I call it an early night to prepare for orientation activities the next day. Of course, I sleep in a bit, and am late to the first event. I manage to catch my group just as they are leaving. We get the headquarters for our team in MC. I sit next to some random guy, trying to start a conversation and make a new friend, but Jesus fucking Christ, could he be more boring to talk to? This is not the kind of person I want to hang around with. Finally we go off to our first activity, saving me from the awkward "conversation" I was stuck in. Maybe I'll have more success talking to girls, I think to myself. On average, I've found girls to be less awkward than guys. That's how I made my first friend at university: Alex. She's pretty cool, speaks three languages, and was rejected from CS too. At lunch that day Alex introduced me to her friends Carol and Azalea. Carol is a calm and quiet girl, and Azalea appeared to be as well. I later found out that Azalea was just toning her inner self down. She's actually super badass, breaks all kinds of laws, and is way too kinky—even for a city boy like me.

The first day of orientation was lots of fun, but the night was harder. You see, I had broken up with my girlfriend Penelope just a week before starting school here because neither of us wanted to do long distance. We knew from that start that it would eventually happen, but it was still hard. I missed her and I was still thinking about her often. I decided that I would to keep myself as busy as possible for the first few weeks. As they say, time heals all wounds. I've learned that that saying is mostly true. Sometimes there are scars, but eventually you turn out okay.

The next day I tried really hard not to be late to orientation, and ended up being a bit early. Morning activities were pretty so-so. At lunch I met a new friend: Thomas. Thomas is the gayest and most flamboyant person to ever prance about this green earth. Truly a delightful person to meet that my religious family would not approve of in the slightest. That afternoon, the info session for that advanced math sections was held, which I had enrolled myself in. I make very poor decisions, you see. In line I met a bouncy girl with glittering golden hair named Whild. At the info session I sat next to Wanda, who was very relaxed.

The professors seemed like their goal was to scare us. But hey, I did AP in high school, how hard could these "advanced" courses really be? Of course, as I would later learn, the answer to that is: the hardest fucking thing you've ever done in your whole goddamn life. I say that as someone who used to teach grade two students game programming in Microsoft Visual Basic. "Where is the Q key?" they would ask, "It's literally the first key on the keyboard." I would reply. That was a hard job.

With a new set of friends, and a non-empty set at that, I was ready to start university classes. And boy oh boy, was I not ready in the slightest.

The moral of the story? Orientation is what you make of it. If you want to be a bummer and complain, you won't have a good time. If you stop taking yourself so seriously and learn the math dance by heart, you will have a fantastic time. "I can hear a voice from the other side of the room..."

*George Kennebunkport*

# MY FIRST YEAR EXPERIENCE: CHAPTER 2.

### *DADDY JAO*

It was my first day of lectures. We had received an email from David Jao earlier in the week, sent at 4:02am.

> *Hi,*
>
> *I'm David Jao, your instructor for MATH 145 - Section 001. I'm very excited to get this class started -- you are all in for a special experience.*
>
> *First things first: If you look at your schedule, MATH 145 has a tutorial on Fridays at 1:30pm in STC 0060. If you are in my section (Section 001 - which you should be),* **THIS TUTORIAL WILL BE USED ON THE FIRST DAY**. *That is, you are expected to attend the tutorial hour on Friday, September 7 at 1:30pm in STC 0060, in addition to the lecture hour on Friday, September 7 at 2:30pm (also in STC 0060).*
>
> *Other math classes at Waterloo do not start their tutorials until the second week of classes. MATH 145, as you will quickly discover, is like no other math class. [...]*
>
> *Some of the first few assignments in this class require you to install and use the Coq proof assistant. [...]*
>
> *We have a fabulous classroom, one of the best in the entire university. Every seat has its own power outlet so you can keep your computer powered on all class.*
>
> *I want every single student to succeed in this class. Please do not hesitate to contact me anytime, by any means if you have questions.*
>
> -David

Wow. Sent at 4:02am, "special experience," and "like no other math class." What the hell did I get myself into? And Coq? I think I've heard of that. Is it what I think it is? It is. Dear god, what did I get myself into?

The first lecture was teaching us Coq, a programming language for programming math proofs. There were so many people in that first lecture that some people had trouble finding seats! We had an assignment on Coq as well that we were given that week. We had to prove things like -a * -b = a * b, something I never thought even needed to be proven. We had to come up with our own axioms for the integers, which was quite an incredible experience. I personally liked this axiom I came up with: $\forall\ a \in \mathbb{Z},\ a < a + 1$.

Now, it turns out that proving -a * -b = a * b is hard. So I asked a girl I went to high school with, Mars, who was in 145 with me if she wanted to meet up and work on the assignment. She brought her friend Whild, who I had briefly met at orientation. We managed to get through that assignment while trying to avoid any Policy 71 issues. Those issues went away though after Jao said on Piazza that we are allowed to work together on assignments (as long as the groups aren't too big), and so the three of us started working together a lot more.

Throughout the term, a few more people joined us. For assignment 2, we were joined by Chrysanthemum, who is one of friendliest and chillest people I have met at university. We (re)discovered the continued fraction expansion of *e*, which remains as my favourite math fact ever. It turns out that *e,* a transcendental number, can be written as an infinite nested fraction whose terms are from a simple predictable sequence.

Once I went to a TA's office hours where I met someone in the class who asked us if we were part of the class group chat. This group chat is of course the famous Daddy Jao chat, which as far as I know is how David "Daddy" Jao got his nickname.

Later in the term we met Claire and Sasuke who joined us working on the assignments together. Having friends in the course really helped making succeeding in it possible.

One of the best parts of MATH 145 was the timing of Jao's office hours. He held office hours twice a week at the perfect time to fill awkward gaps in my schedule, so I attended religiously. In fact, some people proposed worshipping David "Daddy" Jao as an idol. Jao had a special ability to answer your questions without answering them. He would give you just enough to get you unstuck, without ruining the fun of the problem or the learning from doing it. He also gave out great life advice and had no issue answering math questions completely unrelated to the course topic. Once I asked him about p-adic numbers and since there was nobody else in office hours that day, he essentially gave me a lecture on what p-adic numbers are, which was fantastic. I learned that p-adic numbers are beautiful and I can't wait to study them more in future years.

The most memorable day of MATH 145 was the day before the final. I rushed through my PSYCH 101 final to make it to office hours, which for some reason had been moved to some room in DC instead of being in MC as usual. When I arrived there, I realized why.

Jao moved his office hours during the exam to a secret room in DC that contains magical amenities such as a rock climbing wall! We studied in that room for a while. At one point, someone, we assume a graduate student, stopped by, told us he was a friend of Jao, and offered us help studying for the final. It was really a wonderful experience.

The moral of the story? Jao is wonderful, go to your prof's office hours even if you don't have questions about the course, and if your prof allows it, work with friends. It can really enhance your learning.

*George Kennebunkport*

# MY FIRST YEAR EXPERIENCE: CHAPTER 3.

### *THANKS, KEN*

It was time for my first ever math lecture! MATH 147 with Dr. Kenneth Davidson, where on the first day, he gave us axioms for the reals. We also had an assignment already and orientation week wasn't even over! He said that if you can't handle the first assignment, you should drop the course. Well, I couldn't handle the first assignment, so I went to our TA's office hours.

The next lecture consisted of some theorems, a proof for each, and a few examples. The lecture after was the same. And so was the lecture after that. Apparently university math classes are just theorem, proof, example, repeat. Kind of repetitive, but all of the math professors seem to have their own unique style of humour to keep things interesting.

The midterm was coming up. I never needed to study for tests in high school, but I heard university is harder. Guess I'll study a little bit. When it came time to write the midterm, I opened up the paper. I couldn't solve the first problem. No biggie, let's go to the second. Nope. Third? Nope. Fourth? Fuck me. Fifth? Motherfucker. Sixth? Why am I like this. Seventh? WHAT THE FUCK, THERE ARE ONLY SIX PROBLEMS! Guess I'm going back to the start. Is this how limits work? I dunno. What is this limit? e^π seems as good a guess as any. I thought I had passed, and I definitely passed if he dropped the denominator, which he had done on all of the assignments. Was I ever wrong. One morning I get out of the shower, and my phone lit up. Email from Crowdmark. My midterm had been marked. 43%. Fuck me. I'm scared. What now? I went to the 147 lecture that day, and Ken starts by writing the midterm mark distribution on the board. He puts a line through it. "If you're mark is below this line, and you're not planning to drop to 137 already, you should really talk to me first."

Well you see, I'm a stubborn person. If you tell me not to do something, I will fucking do it. My high school physics teacher once told me not to do the topic I wanted to do because it was too hard. He got a 60 page research paper to read through from my group.

I went up to our professor after class and said, "Professor, my mark was below that line but I don't want to drop this course," and so we set up a meeting for later that day in his office. My friends Mars and Whild went with me and waited out in the hall for me. That was by far the most terrifying experience I have had. Meeting with a professor because you fucked up the midterm so hard? That shit is scary, but it ended up not being too bad. Ken turned out to be really nice and understanding. After discussing why I don't want to drop, and looking at what I messed up on the midterm (everything) he told me I could stay, but I'd have to work hard. So I did. I asked him for a book recommendation on proofs and started reading through it whenever I had some time. That book really helped. It's called "Reading, Writing, and Proving" and Waterloo students can download it for free (when connected to eduroam) at link.springer.com/book/10.1007%2F978-1-4419-9479-0. Definitely recommend to anyone struggling with proofs.

I studied my ass off for that course after that. I read through that book until I was comfortable with proofs, I went to my TA's office hours almost every week (I swear that I would not have passed the course without that TA), and during exam time, I locked myself in my room and studied for a week straight. No breaks. When I ate breakfast and dinner (I skipped lunch to study) I would be reading notes. I manages to pull a 79% on the final (before the curve) and finished the course with an 85% (after the curve).

The moral of the story? Don't let yourself get down because of a few bad marks. Even if you get one mark so godawful the professor tells you to consider dropping the course, if you work your ass off, you can still do well.

*George Kennebunkport*

# MY FIRST YEAR EXPERIENCE: CHAPTER 4.

### *CO-OP*

Eventually 1B came around and it was time to start applying for co-op jobs. Fuck. I had a lot of programming experience, but I still can't compete with upper years.

How do you write a resume? I heard from someone that MathSoc was holding resume critiques, and so I went. Got my resume destroyed by an upper year who happened to go to the same high school as me. That was fun. Did a new one, applied to 50 jobs for main round.

On the first day of interview selections, an interview came to me! In the interview I was asked about lambda functions, and thanks to the wonders of CS 135 (praise be to our Racket overlords) I was able to handle the question!

I got 4 more interviews for dev jobs, fairly uneventful interviews. I got some interesting interview questions. One interviewer just asked me about one specific project on my resume from a year ago in excruciating detail, as if a normal person would remember on the spot what specific data structure was used for the frontend and backend to communicate in some project from over a year ago (I think it was JSON, it was a high-tech project). I was asked how to write a program to calculate the cost of washing windows. TD asked an actual coding question!

Eventually rankings day comes around. 4 no ranks, 1 rank. Very sad. Match day comes around. WaterlooWorks goes down. WaterlooWorks comes back. I am unemployed, very sad. But what is this? An email from WaterlooWorks! I was matched with a job? How? Let me message my advisor because I'm not seeing this on the site. Oh great. It was a mistake. So very sad. Continuous time.

Let's apply to every developer job in my big city hometown. Am I desperate enough for QA? Okay, let's do just one QA. Why is there a job under "Junior" that's asking for a Master's degree? It's a blockchain job! Let's apply just for the hell of it, no way I'm getting it.

Not selected for QA. Oof.

One day, I'm in my CS lecture. "Congratulations! You've been selected for an interview." Oh shit. What's this? How the fuck was I selected for the blockchain job. Actually. Was this a mistake? Time to learn what blockchain is I guess. I texted my mom about it, and she sent me an online blockchain course that I did to prepare for the interview, but what really helped was watching the 3Blue1Brown video on Bitcoin.

I walk into the tiny webcam interview room. Is that ...? *No.* I sat down and I hear the interviewer ask me "Do you know this guy?" while pointing at the man next to him. It's my friend from high school; I guess he's on co-op there right now and is helping with the interviews. What. Anyway, the interview goes terribly, but that's not my fault. Skype kept freezing and disconnecting. So terrible. I was very upset about it, and then after the interview finished I went to MC hoping to get some pi day pie, but it was all gone! So sad. That night, I was ranked no offer. Ready to give up, I drafted an email to my old employer asking for a job, but miraculously, I was matched the next morning! How did this happen? Nice though! Time to delete that draft email I had ready to ask for a job at my old workplace.

The moral of the story? Never give up! You can do it!

*George Kennebunkport*

# MY FIRST YEAR EXPERIENCE: CHAPTER 5.

**mathNEWS**

I really enjoyed some of the **mathNEWS** articles last fall, so this term I decided I would start writing. Plus I knew terrifiED so I felt I had to go. At the disorg, terrifiED was late, which was very disappointing.

At the first production night, I didn't know many of the other journalists. When it was pizza time, I decided to sit next to someone I barely knew at a group of people who I didn't know. It was then that I met Janice.

"Hello, what's your name?"

"I'm Janice, and you?"

"I'm George."

"ARE YOU THE GEORGE KENNEBUNKPORT WHO ANSWERS EVERYONE'S QUESTIONS ON PIAZZA?"

"Yes, I am."

"WOW! I FEEL LIKE I'M IN THE PRESENCE OF A CELEBRITY RIGHT NOW!"

Janice is one of the funniest journalists who writes for **mathNEWS** and has plenty of artistic talent. It then turned out that she was in my CS tutorial, and after that we quickly became close friends. We gave each other advice on articles and bitched about our CS assignments with each other. It's very important to have someone to bitch about assignments with.

Later in the term I met some more people at production nights. The people are **mathNEWS** are so friendly! And the pizza is so good.

Writing for **mathNEWS** was a wonderful experience. I was harassed gently talked to by terrifiED for pushing the edge of what **mathNEWS** can legally publish, which was fun.

I was very sad when the end of term event was scheduled for after I have to leave residence, but that's partially my fault for not checking what dates I was voting for and just checking off every Friday night or weekend box. Oops.

The moral of the story? Check what you're voting for. Also, you should come write for **mathNEWS**. You can make wonderful friends and eat wonderful pizza.

*George Kennebunkport*

# EXAM PROCRASTINATION GUIDE

Here you are in the final stretch, almost done your classes for the term—perhaps forever. All you need to do is study hard and soon you will be free. However, studying is hard and sometimes you need a break. So here you are reading **mathNEWS** looking for distraction; however, **mathNEWS** is only so long and soon you will have finished reading it and will be on the hunt for new content.

Below is a list of procrastination material from UW alumni. You can trust my advice: I graduated, so clearly I did something right with my life. Trust me, you totally have time to read and watch all of One Piece. (This is definitely not an elaborate ploy to extend your time in school so I can limit the competition in the job market.)

- Read all 45 years of **mathNEWS** and do all the gridWords. Who knows? You might learn some math while you do it.
- Reread some beloved series. This is a very effective way to delay studying, as you already know that you like the material.
- Decide that now is the right time to learn a new language. Reread you favourite series in that language.
- Learn how to ride a unicycle and juggle at the same time. Physical exercise is really important while studying.
- Weave some beautiful baskets underwater that you can then use to try and bribe impress your profs.
- Become intimately acquainted with your navel. Before you can know anything, you must first know yourself.
- Take over the world. Your course material is insignificant in the grand scheme of things. If you truly want to make a mark on the world, you need to implement wide reaching systemic changes.

*Beyond Meta*

**Production Nights are every other Monday. We meet at 6:30 in the MathSoc Office.**

**Please come...**

A LONELY mathNEWS EDITOR

# WHERE WILL YOUR NEXT CO-OP BE?

**INSTRUCTIONS:**

Let a be your answer. Perform the calculations next to the question after answering. Your result is the sum of your calculations.

How many side projects do you have? **(a × e)**

How many clubs were you part of this term? **(a × π/2 )**

How many courses did you take this term? **(a − 5)**

What is your average? **(a mod 10)**

What is the highest numbered course you took this term? **(a / 100)**

How old are you? **(a − 18)**

How many languages are you good at (programming and spoken)? **(a)**

**YOUR FATE:**

**(< 10) School Term**

Sorry friend! You didn't get a co-op job. :( That means it's time for another school term. Better amp up your resume, learn some languages, make a side project or two and try again next term!

**(10 − 19.99999) Winnipeg**

So, you got a co-op at least. It may be in the sad middle of nowhere Canada but at least it's not one of the territories? Luckily for you, you won't get kicked out of the co-op program, and you'll have lots of time to work on your side projects because nothing ever happens in Winnipeg.

**(20 − 29.99999) Waterloo**

Another term in this boring city! Thankfully Waterloo co-ops can actually be pretty cool and interesting and you get the opportunity to join school clubs and make fun of your friends who are in school and actually doing work on the weekends.

**(30 − 49.99999) Toronto**

Toronto is large and has lots of jobs which is why the category is big, at any annoying people wondering. It's also a super fun place with stuff going on all the time like concerts and parties and festivals. You worked well this term and now you're gonna get rewarded with unpleasant weather and so much to do you'll never get bored.

**(≥50) California**

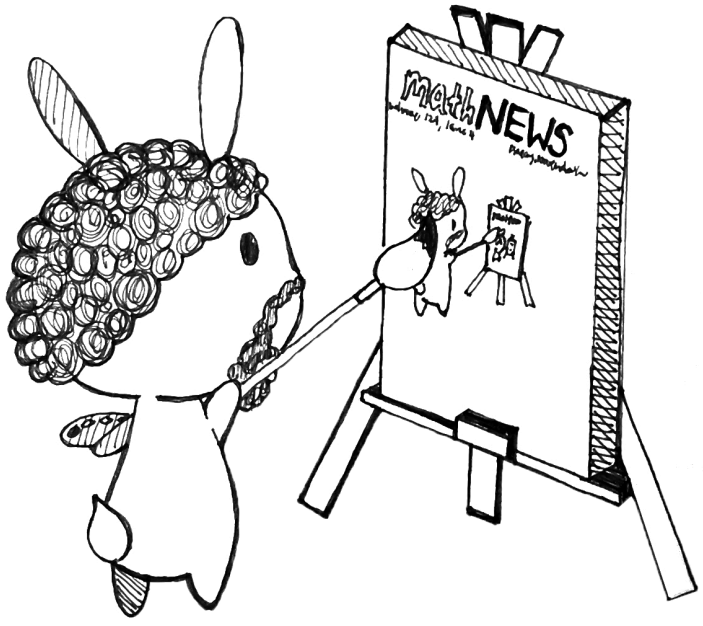
You made it to the coveted California job! Good job friend! All your hard work this term is going to finally pay off! Work it babe! <3

*Whild*

# LAST TERM'S PROMISES

At the end of my last exam in 1A,
I went, "finally, oh yay"
But then my marks came out, and I said, "oh nay"
I promised myself, I'll come back,
I'll come back stronger and smarter, ready to be
a better mathie, for a better 1B
So I made myself promises:
get good grades in the end,
get side projects and,
get a girlfriend
Now here I am, at the end of 1B,
ready to be set free
Yet I've failed all promises, all three
of them, and now I want to go REEE
Incredible how time flies, how it flees
from my grip, just like the geese
History seems to repeat itself
as I again make promises to myself
for my future 2A self
I may feel crushed today
and the next day, and maybe until May
But I'll come back, stronger and smarter
for a better 2A

*License2Derive*



# JOB ID: 69420 — HOUSE-TRAINED ROOMMATE INTERN (FALL 2019)

At Homeless Mans™, we are looking to lease a 4-person apartment but are in need of some extra roommates. Please see if you are interested in this 4 month internship and submit your applications by the Fall term.

**JOB SUMMARY:**

We Homeless Mans provide a comfortable housing environment for motivated individuals to get through fall term without being homeless. The Roommate will be responsible for not being disgusting like the common random roommate (see r/uwaterloo for examples) and provide a good experience for the other roommates. The ideal candidate will be very clean, near silent, without complaints, not have parties, and overall be non-existent.

In fact, it would be best if the intern signs the lease and never shows up.

**MAIN RESPONSIBILITIES:**

- Shower like a decent human
- Don't cook smelly food
- Wash the dishes like a decent human
- Don't blast music at any time
- Don't blast League of Legends at any time
- Not yell at all those LoL teammates who are better than you at 2 in the morning (and other hours)
- Don't blast anime at any time
- Just don't blast in general
- Flush
- Don't have loud sex*
- Clean room to the point that there are no spiders
- Please be normal

**REQUIRED SKILLS:**

- Education: Potty trained
- Experience: 1-18 years of social interaction
- TensorFlow experience is preferred

**TARGETED DEGREES AND DISCIPLINES:**

- Anything but ECE Class of 2023

*License2Derive*

**This will not apply to candidates from UWaterloo for obvious reasons*

# N THINGS I LEARNED IN FIRST YEAR

- I really should have reviewed math over the summer
- 140s algebra is easier than 130s algebra
- Your mental health is more important than your grades
- $e^{i\pi} + 1 = 0$
- Washing things is important
- Friends are good, show them love
- Gaussian Integers > Polynomials
- My memory is actually terrible
- $\mathrm{AM} \geq \mathrm{GM}$
- Windows are angelic and need to exist in more locations
- Math is way better than CS and anyone who says otherwise wants your money, not your friendship
- My hair is definitely brown, maybe golden brown, but not red.

*Whild*

# BLACKPINK COMEBACK REVIEW

I listened to the new BLACKPINK album the moment it was released, just like the time I listened to "Whistle" and "Boombayah" when they debuted. This time, I didn't feel that the songs were as ecstatic as before and didn't feel so impressed. "Kill This Love" is going off the charts right now, but I felt it was too childish, and I feel the rest of the singles were not up to their usual standards, though "Don't Know What To Do" came pretty close.

Am I just becoming old, or is BLACKPINK not as fresh as before? Clearly it can't be the latter, so I must be getting old. My younger self didn't realize this, but listening to Kpop now, I can't imagine listening to these lyrics on repeat. I don't even know a quarter of the trending groups and songs these days.

Or maybe BLACKPINK just doesn't fill the hole in my heart made by the dissolution of 2NE1, which I don't think any group can fill for me. It's gonna be a while until their next comeback, but BLACKPINK is still the most special group out there, even if this album didn't live up to their name. Until then, I'll be waiting for that fulfilling hit that brings me back to Kpop.

*License2Derive*

# THE ROAD NOT TAKEN

*And both that morning equally lay*
*In leaves no step had trodden black.*
*Oh, I kept the first for another day!*
*Yet knowing how way leads on to way,*
*I doubted if I should ever come back.*

—Robert Frost

The end of first semester did not feel like an ending. In a handful of days, we would return to routine, surrounded by familiar faces. Course codes and classrooms might change, but the people around us would remain, and with them the permanence we had come to know over the last four months. The end of first semester was a beginning, the hackneyed "first day of the rest of our lives." Perhaps it is not the same bright-eyed beginning we experienced in September, but it is a beginning nonetheless.

A different set of emotions shrouds the end of second semester, as we anticipate the time when, in a handful of days, our paths will diverge from the paths of those who have studied alongside us. Come September, we will reunite with some. Others we may not see again until graduation. Even for those of us who will be back for a third consecutive study term in May, the end of second semester feels like an ending. Each of us will look to an empty seat and remember the person who occupied it until a handful of days ago. Others may fill it, but never in quite the same way. The end of second semester does not feel like the beginning of second year.

A decision we made months ago—pick a number between 1 and 4, inclusive—has farther-reaching ramifications than we could have known at the time, ramifications with faces and names. It seems strange to say goodbye before our friendships have run their course. But say goodbye we must, and promise to "stay in touch." Will we? Maybe. Time will tell. Whether or not we do, the people who grew with us as we began the transition from high school to adulthood will remain intrinsically a part of our university experience as long as it lasts.

There are many people I will miss—a writer whose poignant stories made me smile; a lovable troll whose invocations of the Axiom of Choice gave me fits; an ambitious young businesswoman I will always remember as "Tim Hortons Girl"; a slightly crazy nerd who somehow convinced me to buy him a flyswatter; an absolute sweetheart who regrettably never got the change to introduce me to sushi; a double-degree student who somehow managed to handle all three 140s math/CS courses on top of her already heavy courseload; a cheerful Racket whiz I always ran into in MC in the evenings; a second-year couple who taught me how to make dumplings.

I am, in a sense, quite fortunate. When I go back to school in May, the majority of my friends will return with me. I will be roommates with one of three closest friends and classmates with another. Two out of three ain't bad, I suppose. Yet I know that, regardless of what the C++ style guide and design recipe for CS 246 may dictate, I will always place my beginning brackets on a new line. *[Editor's note: Sacrilege!]* Whenever I travel home after **mathNEWS** production night, I will carry on a one-sided conversation with an absent friend. Whoever chooses to sit on the left side of the front row of MATH 245 and 247 next term, I will reserve that seat in my my heart and in my mind for someone else. So it goes.

So we come to the end of second semester. Soon we will either venture out into the world of employment, start the next year of our studies, or take a summer off to recharge our batteries for another round of the Waterloo grind. Despite these new prospects waiting for us, as we turn our pages of our calendars from April to May, we finish a chapter of our lives. Eight months ago, eight months stretched ahead of us like an ocean; now, they appear like a puddle in our rear-view mirrors. Perhaps the end of our second semester is only the end of the beginning. But it is an ending nonetheless.

*Epsilon Screwn*

# WHAT TERMS SHOULD BE CALLED ACCORDING TO A VANCOUVERITE

Current -> New
Fall Term -> Winter Term Part 1
Winter Term -> Winter Term Part 2
Spring Term -> Summer Term

*boldblazer*


## ISSN 0705-0410

**UW'S BASTION OF ERUDITE THOUGHT SINCE 1973**

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# gridCOMMENT 139.6

It is the dreaded exam season, and perhaps the shiny new **mathNEWS** catches your eye. Perhaps you need a bit of a distraction before whatever left-determining examination you will have anon, and have decided (perhaps foolishly) to spend what precious seconds you have perusing this paper instead of preparing for doom. Whatever the reason, welcome to the final **gridCOMMENT** of the Winter 2019 term.

I am very glad to say that we have received four submissions for last issue's **gridWORD**, and they are as follows, along with their answers to the last issue's **gridQUESTION**, "Which math course would you add to the UWaterloo curriculum?":

- Kiln submitted a correct solution and answered "MATH 001: Basic Arithmetic for Western Students"
- Monad Monkeys who submitted a correct solution and answered "I would add a course on math crosswords"
- Tendon of the extensor carpi radialis brevis submitted a correct solution and answered "the mathematics of love ♥"
- Ambrose submitted a solution which unfortunately contained a mistake. Their answer was "MATH 101: Introduction to Counting. An introductory course that gives a brief overview of counting principles such as cardinality, order irrelevance [?], and one-to-one correspondence. Various counting techniques and strategies are explained. Prereq for MATH 135 and MATH 137."

It was a very difficult decision among the correct answers as to what my favourite answer to the **gridQUESTION** is, and after consulting with staplED, it was decided that "the mathematics of love ♥" was the best answer, as in her immortal words "everyone in math seems so lonely". Congratulations, please drop by the **mathNEWS** office at MC 3030 to pick up your prize from the editors.

As this is the last issue of the term, it is marginally traditional to reprint an older crossword to see how this column has changed over the ages. Today I have chosen to reprint the Volume 72, issue 5 **gridWORD** which was originally published November 29, 1996 by Gridby. The solutions of this issue's **gridWORD** should, provided that the editors remember, be found in this issue elsewhere.

Happy Solving and see you next term,

*Zethar*

**ACROSS**

1. Half-opened
5. "So there," mathematically
8. Spoken
12. Coke or Pepsi
13. Purpose
14. Die
15. Class of birds
16. Newsgroup beginning
17. From afar: Pref.
18. Writer?
20. End of a writer?
22. Slot machine feature
23. Jail
24. Monstro et al.
27. Fin
31. Yes, Pierre
32. Hawaiian dish
33. Proved otherwise
37. Magic persona
40. Selective gate?
41. Most people use it on their beds
42. Expression
45. Halo
49. Uncouth
50. Take a chance?
52. Middle East area
53. On
54. Floral arrangement?
55. Ladies hit
56. Irritant
57. Seasonal worker?
58. Sloth and others

**DOWN**

1. Stat
2. Roman god
3. Capital of Yemen
4. Alfalfa or Buckwheat
5. Scruples
6. Subj. for many immigrants
7. Notice
8. Gas ingredient
9. Regrets
10. Competent
11. Sordid look
19. Annoy
21. Cheery noise?
24. Palindromic interjection
25. Colour
26. Broadcast
28. U.S. Govt.'s Greenpeace
29. Neither partner
30. Screwed
34. Save
35. Japanese theatre
36. Tweeter's department
37. SF question
38. Promissory note
39. Homes (in)
42. Dross
43. Stringed instrument
44. Vows
46. Science magazine
47. Madonna song
48. One puzzle asks for five of them in a row
51. Type of fish

**The gridWORD (& solutions) are on the next page. Happy solving!**

A PERPETUALLY BORED mathNEWS EDITOR

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | ■ | 5 | 6 | 7 | ■ | 8 | 9 | 10 | 11 |
| 12 | | | | ■ | 13 | | | ■ | 14 | | | |
| 15 | | | | ■ | 16 | | | ■ | 17 | | | |
| 18 | | | | 19 | | ■ | 20 | 21 | | | | |
| ■ | ■ | ■ | 22 | | | ■ | 23 | | | ■ | ■ | ■ |
| 24 | 25 | 26 | | | | ■ | 27 | | | 28 | 29 | 30 |
| 31 | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | 32 | | |
| 33 | | | 34 | 35 | 36 | ■ | 37 | 38 | 39 | | | |
| ■ | ■ | ■ | 40 | | | ■ | 41 | | | ■ | ■ | ■ |
| 42 | 43 | 44 | | | | ■ | 45 | | | 46 | 47 | 48 |
| 49 | | | | ■ | 50 | 51 | | ■ | 52 | | | |
| 53 | | | | ■ | 54 | | | ■ | 55 | | | |
| 56 | | | | ■ | 57 | | | ■ | 58 | | | |

## LAST ISSUE'S gridWORD SOLUTION

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T | A | C | T | I | C | ■ | T | A | R | O | ■ | S | A | D |
| A | V | O | U | C | H | ■ | U | L | A | R | ■ | O | L | E |
| F | O | R | E | C | A | S | T | I | N | G | ■ | C | O | N |
| T | S | P | ■ | ■ | K | O | S | ■ | K | I | M | C | H | I |
| ■ | ■ | ■ | P | A | R | T | I | C | L | E | B | E | A | M |
| C | A | S | A | B | A | S | ■ | R | I | S | E | R | ■ | ■ |
| A | P | P | L | E | ■ | ■ | T | E | N | ■ | ■ | M | T | L |
| F | I | E | L | D | S | A | N | D | G | A | L | O | I | S |
| E | S | C | ■ | ■ | C | R | T | ■ | ■ | G | A | M | M | A |
| ■ | ■ | T | H | R | E | E | ■ | M | I | N | D | S | E | T |
| R | E | A | L | A | N | A | L | Y | S | I | S | ■ | ■ | ■ |
| A | R | C | A | N | A | ■ | E | T | H | ■ | ■ | C | P | P |
| D | O | L | ■ | G | R | A | P | H | T | H | E | O | R | Y |
| A | D | E | ■ | E | I | R | E | ■ | A | U | T | H | O | R |
| R | E | D | ■ | D | O | E | R | ■ | R | E | C | O | D | E |

## THIS ISSUE'S gridWORD SOLUTION

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S | N | I | S | ■ | F | L | E | ■ | T | S | E | P | | |
| D | I | N | E | ■ | I | E | L | ■ | P | O | T | A | | |
| N | A | M | O | ■ | T | E | B | ■ | E | D | U | R | | |
| A | R | O | R | E | ■ | U | A | R | O | H | C | I | L | C |
| ■ | ■ | ■ | E | ■ | O | H | E | ■ | R | O | X | ■ | ■ | ■ |
| D | R | A | Z | I | W | ■ | T | N | E | R | E | W | | |
| I | O | P | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | U | O | | |
| D | N | E | E | H | T | ■ | S | E | L | A | H | W | | |
| ■ | ■ | ■ | N | A | C | ■ | M | R | A | ■ | ■ | ■ | | |
| R | E | S | A | R | E | ■ | L | I | C | N | E | P | | |
| E | L | E | T | E | T | ■ | L | A | T | S | V | A | | |
| E | B | U | C | U | S | E | ■ | U | S | D | O | S | | |
| L | E | R | O | R | A | D | E | Q | ■ | E | A | J | A | |

# lookAHEAD

| SUN APR 14 | MON APR 15 | TUE APR 16 | WED APR 17 | THU APR 18 | FRI APR 19 | SAT APR 20 |
|---|---|---|---|---|---|---|
| Study | Study | Study | Study | Study | Good Friday<br>Study | |

| SUN APR 21 | MON APR 22 | TUE APR 23 | WED APR 24 | THU APR 25 | FRI APR 26 | SAT APR 27 |
|---|---|---|---|---|---|---|
| Study | Easter Monday | Study | Study | Study | Study | GTFO and enjoy your break, kiddos! |

## NEW UNDERGRAD LINUX SERVERS

MFCF has deployed two new Linux servers in the undergraduate environment.

The set-up is completely different from our traditional way. The older servers will remain available this year so you can get accustomed to the new ones while still having the familiar old ones to fall back on.

We intend to retire the old ones at the end of 2019. Thin client terminals in the labs offer the choice of both (along with Windows). Details are on the MFCF web site at https://uwaterloo.ca/math-faculty-computing-facility/student-linux-server-specifications.

If you run into any problems with these machines please let us know at the Help Centre in MC 3017 or by opening a ticket at https://rt.uwaterloo.ca/SelfService/Forms/MFCF/.

MFCF

otherNEWS is made technically possible by club executives of the Math Faculty.

I say "technically" because if they had sent us more news this week, this box wouldn't be here.

THE mathNEWS EDITOR WHO PUTS THE "NEWS" IN mathNEWS