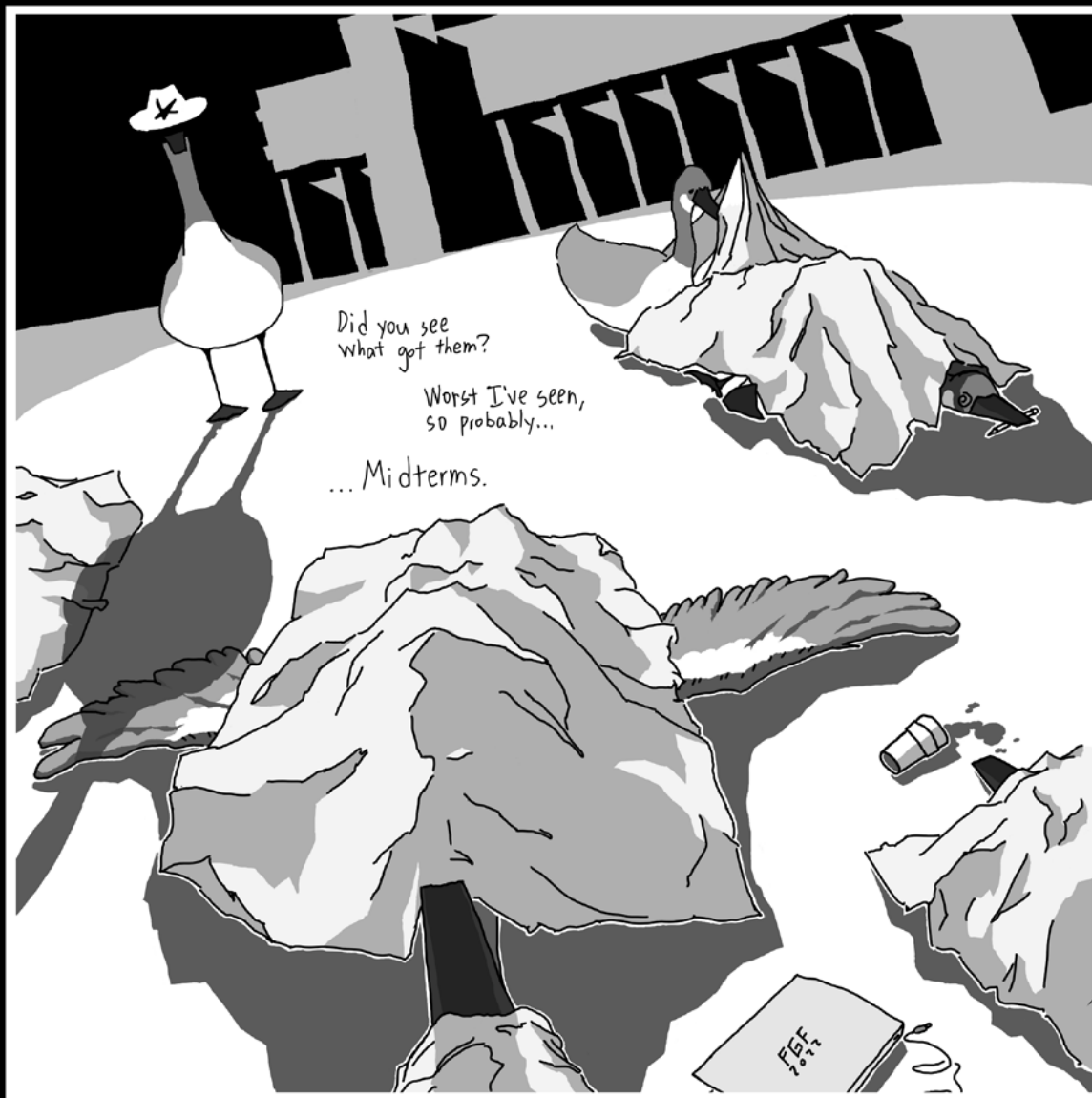the DOMESTIC GEESE in

FAIL OUT

OVERNIGHTER   MARK FOR YOU   SKIP PROOFS COPY CODE DIE CALIFORNIAN   BONUS POINTS
EYES DON'T DRY   FIRST QUESTION   MAKE YOU BUFFER   TIES ON EVERY CORNER
GROUPMATES   NEED MORE CAFFEINE   INCANDESCENT MOUSEPAD   FAIL OUT

9 770705 041004

"HOW DO YOU STUDY FOR A MIDTERM?"

Hey, guess who's writing this the night before their midterm! That's right, ya boi found himself on the computer working on this issue at just the right time to ~~volunteer~~ be voluntold to write the **mastHEAD**. Serves me right for staying on campus late to study, I guess.

Despite it being midterms week, and despite there being no fewer than N midterms held concurrently with production night (N ≥ 3), we've still managed to keep up our pace with a 38-page issue. While it's no 50-page 148.6, this is still much larger than the 10-page midterm issue we printed back in Fall 2017. Y'all are productive writers; now please go study so we can too.

Speaking of Fall 2017, avid enjoyers of **mathNEWS** may remember the Winter/Spring 2022 "Dead Nutty" saga, wherein an enterprising squad of previous editors thought it would be *very funny* to leave us with two full boxes of 135.4 and nowhere to get rid of them. This culminated in us being forced to fill the display stands outside the **mathNEWS** office with that deranged squirrel on bright yellow paper for approximately two whole months. It got to the point where capital punishment was seriously floated for anyone caught referencing the issue in the office. Maybe I should've taken it, because that cover still haunts my dreams.

Of course, because us editors are incapable of letting a dead joke go, there is a Dead Nutty reference in this very issue, almost five years to the day it was born. And because our writers share the exact same flaws as we do, including being incapable of letting a dead joke go, there are no less than three articles about the inclusion of 0 in the natural numbers in this issue. You'd think two would be enough, one for and one against, but it seems like our writers have somehow managed to bend the laws of mathematics to insert a third opinion. (More articles on this topic were actually submitted; we simply ran out of space for them. I guess you'll never know what the additional opinions are.)

As it is, there's still lots to enjoy in this issue: prof**QUOTES**, anime, screwing over your friend's Python code, and more await your prying eyes. After you finish studying, of course. We wouldn't want you to fail your midterms because of **mathNEWS**. That would be *very* Dead Nutt—

terrifiED
Editor, **mathNEWS**

Wink wonk	Lots of lube. What was the question again??
APHF	Like Newton sat under a tree, I launch fruit at my face until I understand the secrets of the universe.
Dick Smithers	Spend 10 weeks in the mountains of Tibet, with no way to contact the outside world except for a laptop with League and WaterlooWorks.
yalevoylian	Read *Calculus* by Michael Spivak. Seriously, it has tons of really good exercises and practice problems.
Skit	i don't. i suffer.
tendstofortytwo	read the notes I took in class and pray for the best (usually works)
0.423	I don't. I just rely on my luck. It got me to UWaterloo. It can surely get me through midterms, right? RIGHT?
wasted	Twelve shots and half a kilogram of crack, as everyone should.
UW Unprint	Practice questions, or if they don't have those, aimlessly reading notes.
Predap	Reread the slides 'til I remember all the key points!
ptkyr	write for **mathNEWS**
boldblazer	I've been asking myself that for years...
waldo@<3.LE-GASP.ca	With a really good tutor, and lots of anxiety and panicking in the three to five days immediately before.
molasses	there are no midterms in **mathNEWS** there are no midterms in **mathNEWS** there are no midterms
Finchey	You peel it, drizzle it with olive oil, and put it in the oven for 10 minutes at 400 °F.
someBODY	Wait, there's a midterm?
yummyPi	with difficulty
__init__	briefly consider skipping it and flying to an american town in the middle of nowhere
Evan Girardin	Repent
terrifiED	You're supposed to study for midterms?
distractED	you review the candidates!

ARTICLE OF THE ISSUE

This week's winner is threeholestraw for *N Anecdotes About How Many Holes a Straw Has*. Come to MC 3030 to get your prize!

clarifiED
Editor, **mathNEWS**

No studying for me tonight.

math**ASKS** 150.3
FEATURING PROFESSOR CHRISTOPHER BATTY

CIX: WHAT BROUGHT YOU TO COMPUTER GRAPHICS IN THE FIRST PLACE?

I mostly stumbled into it. I liked computer games as a kid and dabbled with making simple games in QBASIC, but not ones involving any particularly interesting graphics coding. I took one computer graphics course during undergrad at Manitoba, but it was only one of many CS courses that I enjoyed. What set me on my current path was landing a co-op position at a small visual effects studio based in Winnipeg at the time, called Frantic Films. They had a tiny R&D team of about 2–3 people writing plugins for a 3D graphics package (3dsMax) for their visual effects artists to use. Using graphics cards for fast general purpose numerical computing was a hot new idea at the time, so my first task was porting a solver for systems of linear equations, used in their fluid simulation tools, from CPU to GPU. I then quickly became fascinated with the combination of physics, math, CS, and visuals involved in computer animation, and things snowballed from there!

TERRIFIED: WHAT'S AN EXCITING PROJECT YOU'RE CURRENTLY WORKING ON?

A lot of areas of computer graphics build on ideas from scientific computing and applied mathematics, such as numerical methods for solving partial differential equations (PDE), which relate how different quantities change in space and time. One PhD student I supervise, Nathan King, is investigating new, more flexible methods for solving PDEs on the surfaces of 3D shapes. This research will lead to powerful tools for a wide range of graphics problems, such as modelling pattern formation (e.g., leopard spots, zebra stripes), denoising or segmentation of data on surfaces, measuring (geodesic) distances between points on surfaces, designing smooth-shaded vector graphics on surfaces ("diffusion curves"), and more.

MOLASSES: MUCH OF YOUR WORK FOCUSES ON LIQUIDS. WHAT DRAWS YOU TO LIQUID ANIMATION?

I think it comes down to the massive variety of intriguing and beautiful behaviours that liquids exhibit: gentle waves on a lake, huge tsunamis crashing ashore, bubbles rising in your soft drink, droplets sliding down a windowpane, the swirls in your latte, and the coiling and folding of strands of honey, to name a few. It's amazing that these generally all boil down to solving a relatively small set of fluid dynamics equations.

TENDSTOFORTYTWO: WHAT'S THE COOLEST USE OF NUMERICAL COMPUTATION TECHNIQUES THAT YOU'VE SEEN THAT DOES NOT INVOLVE GRAPHICS OR PHYSICS SIMULATIONS?

Deep learning relies on large amounts of numerical computation (involving calculus, optimization, linear algebra, etc.). It's not my research area, but a deep learning application that I find impressive is deep reinforcement learning applied to games. In particular, the AlphaGo and AlphaStar projects trained AIs that could compete with and even defeat human world champions at extremely complex strategic games (Go and StarCraft II). It is really cool that the AIs were able to discover new strategies organically through the learning process, e.g., by playing against others and against itself.

CIX: YOU USED TO WORK AS A SOFTWARE ENGINEER AT A VISUAL EFFECTS STUDIO. WHAT WAS IT LIKE TO SEE YOUR WORK USED ON THE BIG SCREEN?

It was incredibly exciting! As a kid growing up in Winnipeg, I could never even have imagined that I would eventually write code used in a Hollywood movie or get to see my name in the credits. It definitely motivated me to continue doing work in the area, and I've been lucky since then to have some of my research ideas end up inside industry tools such as SideFX Software's Houdini.

BOLDBLAZER: IS THERE A CHANCE I MAY HAVE SEEN SOME OF YOUR ANIMATIONS BEFORE ON REDDIT?

It's certainly possible. I've never posted there myself, but other people have posted some of my video clips on r/Simulated. For example, this one features melting gooey penguins falling down a pachinko board, which I often show on the first day of CS 370: `www.reddit.com/r/Simulated/comments/5mn2g4/non_newtonian_penguins/`

XX_420SONICFAN69_XX: HOW DOES THE WORK DONE IN MORE FOUNDATIONAL COURSES LIKE CS 370 RELATE TO MORE DIFFICULT PROBLEMS (I.E., COMPUTER GRAPHICS)?

CS 370 covers computational techniques for interpolating data, solving ordinary differential equations (ODEs), solving linear algebra problems, and doing Fourier analysis. All of these come up repeatedly in modern computer graphics applications: interpolation is useful for designing and representing 2D and 3D shapes; ODEs (and PDEs) underpin physics simulations of objects and materials; Fourier analysis is used for image and video editing, audio/sound simulation & editing, and manipulating other data, including 3D shapes; and numerical linear algebra (e.g., solving systems of equations) comes up in too many areas to list. So, CS 370 really lays out some fundamental tools that much of computer graphics (and often other fields like scientific computing, machine learning, applied math, engineering, etc.) are then built upon.

TERRIFIED: HOW DO I WIN A BEST PAPER AWARD?

Do some fun research, write a great paper about it, submit the paper to a conference, and then cross your fingers. Some important ingredients of a great paper include: a valuable new idea or technique, clarity of writing, a thorough and careful demonstration/evaluation of your idea, properly situating your ideas in relation to prior work, and telling a compelling story about why your new idea is needed or worthwhile. Another PhD student I work with, Ryusuke Sugimoto, might also have some good tips, since he won one recently!

CLARIFIED: WHAT'S IT LIKE AT THE UNIVERSITY OF MANITOBA?

To be honest, I graduated from the U of M almost 20 years ago now, so it's getting hard to remember! It's quite cold in the winter and has lots of mosquitoes in the summer, but if I recall correctly there's fewer geese honking at you than here at Waterloo. I was a middle-distance runner on the U of M track team at the time, so in between coding and classes, I spent much of my time there running around in circles (or rather, geometrically speaking, stadiums).

ANONYMOUS: WHAT IS ONE THING YOU WOULD TELL YOURSELF BEFORE YOU BEGAN GRADUATE SCHOOL?

I had a blast in grad school and learned a ton, so I wouldn't really want to change anything. I would probably just encourage myself to enjoy the experience as much as possible.

FOODIE: WHAT'S YOUR FAVOURITE SNACK TO INDULGE IN?

I have a sweet tooth, so my indulgence of choice is usually a chocolate bar or candy. In my early teens I had a phase of being hooked on Butterfingers, to the point that some family members "made" me a birthday cake that was just a stack of Butterfingers (still wrapped, if I recall correctly). These days I like Reese's Pieces.

## A VAMPIRE BAT: WHAT'S YOUR FAVOURITE FLAVOUR OF JUICE?

Grapefruit juice. I enjoy the juxtaposition of its sweetness and sourness.

CLARIFIED: IF YOU WON AN ALL EXPENSES-PAID, WEEK-LONG TRIP TO ANY CITY IN THE WORLD, WHICH CITY WOULD YOU VISIT?

There are quite a few cities I would love to spend time in given that opportunity. I might put Tokyo at the top of my list right now, as I haven't travelled to anywhere in Asia yet. Japan's culture and history seem fascinating and obviously very different from Canada's.

A VAMPIRE BAT: WHAT ANIMAL ARE YOU BATTY FOR, AND IS IT BATS?

Hmmm, I find octopuses to be remarkable, since they can radically deform themselves to squeeze through amazingly small spaces. (That could be a fun biophysics simulation challenge!) I do keep an old "Batty the Bat" beanie baby on my shelf at home, but I hope I don't have bats in the belfry yet.
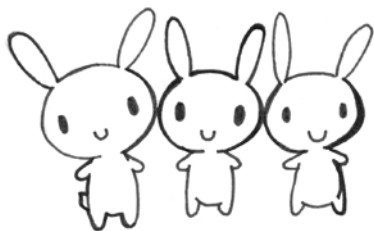
math**NEWS** ARTICLE 1

My girlfriend and a significant subset of my friends write for **mathNEWS**, and since the saying goes "you are the average of the 5 people you spend the most time with," I must also be a **mathNEWS** writer too, right? Wrong.

Well… you would have been wrong… until today.

I present to you my **mathNEWS** article debut.

I have carefully studied the delicate art of writing **mathNEWS** articles by skimming previous issues and I have found the directions I could take:

- I could write a humorous article.
- I could write a heartfelt poem.
- I could write about my favourite programming language.
- I could share the recipe for the most recent dish I made with my girlfriend.
- I could rant about my classes, or Waterloo Works (stay strong my queens and kings, some company out there must appreciate that one side project you did 2 years ago, right?).
- I could give (definitely not terrible) dating advice, or mention anything to do with relationships or sex (I heard y'all eat that content up).

But no, I have decided to use what I learned from writing essays in my required 1st year communications courses and write an article about absolutely nothing. You could have inferred this exact information I am telling you when your eyes gazed upon a new writer's name in this issue, and I could have used this space to write something more interesting, entertaining, informative, or productive. But don't worry, I'm just gettin' started (yeehaw)!

yummyPhi

MY FAVOURITE ITEM AT THE MATH CnD

Is definitely the N. It's a secret item. You have to go up to the person working the cash and be like, "I'll take the N." They'll be like, "what, the letter N?" You'll be like, "yes, the letter N. One N please." They'll be like, "we don't serve that here." You use the 10 mL of the odorless G-class nerve agent you had stored in your sleeve on the employee. It is instantly fatal. "Congrats you have solved my puzzle," says the N. You take it and walk out, leaving the bystanders befuddled and jealous.

*Rejected from last mast**HEAD**
due to length constraints*

MATHSOC SEZ

Hey folks! We hope you had a restful reading week. Now that we're in the midst of midterm season, don't forget to take a break, read your favourite fortnightly publication (**mathNEWS**, of course), and check out what MathSoc has in store for you this week!

MATH STUDIES CLUB

MathSoc is looking to create a Math Studies Club for all our wonderful Math Studies and undeclared Honours Math students. Executive applications for the club are now open! Interested in applying to be the Math Studies Club's President, VP Finance, or Secretary?

Apply now at bit.ly/F22MathStudiesExecs! Applications are due November 1st at 11:59pm.

MATH GRAD COMMITTEE CHAIR

Do you want to make your graduation awesome? Do you want your Math Grad Ball to be a night to remember? You should apply to be the Math Grad Committee Chair! Then when all your friends wonder who made their graduation turn out *this great*, you can take a bow.

You'll be helping to:

- Plan and organize the Math Graduation Ball
- Work with the faculty events director on organizing composites
- Select valedictorians and the recipient of the J. Alan George Awards
- Answer student questions about the Math Grad Ball

The workload for Fall term is a few hours per week, and includes selecting the rest of the Math Grad Committee, while the workload for Winter 2023 is 5–10 hours per week and contains the bulk of the work.

You must be a 4th year student in 2022–2023 (Fall, Winter, or possibly Spring) school year and be a voting and social member of the Society to be graduating in the Fall, Winter term and/or Spring term to be eligible.

Applications can be accessed here — bit.ly/F22MGCchair.

HALLOWEEN

Celebrate the spooky season with us! Come to the MathSoc Exec Office — that's MC 3035 — between 11am and 1pm on Halloween for some free candy from MathSoc.

PI DAY

MathSoc's most anticipated event of the term is coming up! Pi Day will be held on November 10th, the 314th day of the year. Mark your calendars!

Pie will be served at 1:59pm, the pi recitation contest will be held in MC Comfy at 2:30pm with gift card prizes for winners, and there will be a pie throwing contest at 3pm where you can pie us, your MathSoc execs. See you there!

VOTE IN MATHSOC'S BY-ELECTIONS

Don't miss the voting period for MathSoc's by-elections! From October 21 to 26, head on over to vote.wusa.ca to vote for your first-year, actuarial science, math finance, statistics, math teaching, and at-large representatives.

The MathSoc Executive Team

HOW TO WRITE AN ARTICLE IN 3 SECONDS

Not a N*rd

RACKUSSY

drracketchan

prof**QUOTES**

CO 370: MARTIN PEI

66 Is it still raining outside? Sorry. I don't control the weather, I shouldn't be sorry.

66 I've lost track of numbers.

66 Huh, there's still 1 minute left. You are all so eager to leave me. I guess that's the story of my life.

66 Does anyone take the bus? I take the bus. Oh, I need to remember to get the October bus pass.

66 One day, I'll do a sudoku in class.

66 It's been a long while since I said the word "linearity."

66 Everything I do is sneaky, you know me.

66 That's what we like in math. Everything works!

CO 456: DAVID JAO

66 I'm sure you've all been in this situation. You've been arrested by the police and you have an accomplice.

66 Rock Paper Scissors is annoying because there are ties and stuff.

66 What lectures do you need for the assignment? All of them.

66 Yes, it does look like a swastika. Sometimes mathematics does that.

66 I don't want to teach a real analysis class.

CS 343: PETER BUHR

66 Beyond a virtual machine, could you go to a distributed system? Sure. Beyond a distributed system, could you go to multiple planets? Why not.

66 So we're sneaking up on writing a concurrent program.

66 The good thing that we're looking for is speedup.

66 Imagine this is what we would really like, imagine this is what we have to accept. And in fact, we don't even get this.

66 At this point, you should be ready to give up and say, "No matter how hard I try, my program won't speed up."

66 You as an individual are not going to save the world.

66 This is what you did with `pthread_create` and `pthread_join`. Remember those? I know you're trying to forget.

66 And by the way, yes, you can have constructors and destructors and inheritance and *[gurgling noises imitating listing things]* in your tasks.

66 Are there more things? Yes! There are always more things.

66 We live for the adrenaline rush where you press Return and it doesn't give us the error. If it weren't for that adrenaline rush we would've left this field a thousand years ago. It's a drug, it's like heroin for us to hit that return and get that "wow!"

66 I am going to wave my magic fingers.

66 You don't want to look at the horrible template programming. If you do, wear a mask and carry a sword.

66 It turns out I've just lied a bit to you.

66 We're a very small startup, so we only have a small computer with two disk drives.

CS 370: CHRISTOPHER BATTY

66 The assignment is due today at 6 o'clock, so if you haven't started yet, now would be a good time.

66 I don't see *too many* bewildered faces.

66 The cool thing — heh, insofar as any of this is cool…

66 So I guess the short answer is, you'll see two slides from now.

66 We already know what happened in the past. Hopefully.

CS 480: YAOLIANG YU

66 There's no math in this class!

CS 492: DAN BROWN

66 Oh, I *really* don't like this classroom layout.

66 Why are we Español?

PMATH 340: MICHAEL RUBINSTEIN

66 Guys watch it with the click-y sounds, somebody in here could go crazy. Not me, though. I'm already crazy, just in different ways.

66 There's this movie, don't see it it's not very good, I'm not a huge fan of Tom Hanks, but it's actually pretty decent, and in it there's this basketball he paints a face on, made by the Wilson company. […] Anyways, don't see that movie if you don't want [Wilson's] theorem ruined for you.

> " Could get fired for harassing my colleagues like that.

> " If your classmates laugh at you, we'll beat them up.

> " The exam is this Wednesday. I don't know where it is, it's somewhere.

SPCOM 223: EDMUND STAPLETON

> " Can I touch your feet?

STAT 231: MICHAEL WALLACE

> " Let's say some terrible disaster befell Canada and there's only four students. That's it. This is everyone. I'm sorry you found out this way.

> " Despite this terrible disaster that has befallen all of studentkind…

> " The phrase "random sample" is kinda magic.

> " Your wait time, hopefully, won't be infinite.

> " Questions, yes, I thought this may happen.

> " I know this might be controversial but I trust that you can use a calculator.

> " Sometimes people get to the end of an expression and have a loose y somewhere. Nobody wants that.

STAT 442: JACK DAVIS

> " You're probably familiar with `iris`; everyone say hello. Don't actually say hello, it's a dataset. It has no feelings.

TO THOSE THAT TOOK THE FEDBUS WITH ME HOME ON FRIDAY…

I am very very sorry for yelling "WHAT THE FUCK JESUS FUCK WHAT THE?????" from the back of the bus seemingly out of nowhere. I know that this was bothersome for some people considering the fact that quite literally everyone and their mother, including the bus driver looked back at me with the same concerned/puzzled look on their faces. I promise I wasn't having a manic attack or anything. I was merely rewatching one of my math lectures and I forgot where I was.

P.S. If you ever hear someone yell this or something similar out of the blue when you're in DC, it was probably me. Math brings out some odd emotions lol.

miller

N QUOTES FROM PMATH STUDENTS
NO CONTEXT WILL BE GIVEN!

- "I am not saying that I believe in the law of the excluded middle, I am just saying that it isn't not true."
- *Student: Literally does anything for PD/ENGL course.*
  - PD/ENGL: "Why are you lying?"
- "We should start a new religion. PD religion."
  - *Author's note: Please use #PdReligion for the fun of it.*
- "Ya family doctor. First you make family, then you apply."
- "I may take 8 PMATH for the fun of it," *says student ironically.* "If only I could type at the speed of light though. Someone strike me with lightning."
- "He does look a bit Hitlery."
- "Can I be in N quotes?"

Kermit

TOP N GREEK LETTERS THAT BOTHER MATH STUDENTS TO NO END

- Epsilon and Delta: they know what they did…
- Zeta, Omega, Phi and Rho: AMATH majors love them enough, but my gosh they make trigonometry functions and physics formulas look extra intimidating.
- Sigma: We will never be square until we have a counselling session discussing what happened in the STAT 230 and 231 midterms…
- Tau: Even though it's two pi, whenever we celebrate Tau day we only ever have cake.
- Omicron: Having COVID right now sucks…SO much.

A Mediocre Kitty

[ARTICLE PENDING]

There was supposed to be a slightly intelligent slightly news article here. Unfortunately, CS 240 had other ideas.

Here's a Kirby for your troubles.

(> ^—^)>

molasses

N ANECDOTES ABOUT HOW MANY HOLES A STRAW HAS

Last week, a lost student came to me with the question, "how many holes does a straw have?" After getting them to kneel, bow, shine my shoes, and help me refinance my mortgage, I decided I would give back to the general **mathNEWS** community by writing a few descriptive pieces to help explain just how many holes a straw has.

Two straws walk into a bar. After a few drinks, one asks the other, "how many holes do you think a straw has?" The other responds, "I only know of two holes: one where the beer goes in, and one where the beer comes out!" They both laugh, and continue drinking.

☙

Two straws walk into a bar. One asks the other, "how many holes do you think we have?" The other responds, "clearly one. If you look at the rigorous topographical definition of a hole, a straw only has one aperture. Would you say that a doughnut has two holes, or a really short straw that is wider than it is tall? All of these objects are topographically equivalent, in that continuous transformations can turn one such space into the other." The other straw thinks for a second, then nods their straw head in agreement. They continue drinking.

☙

Two straws walk into a bar. One asks the other, "how many holes do you think we have?" The other responds, "many straw argue that straws have two holes, or even one, but me personally, after talking to my fellow coworkers, socializing with others at my Zumba class, asking multiple whole foods employees about their vegan keto free-range food options, and after travelling to various exotic locations in the world such as Hawaii and Florida, I can say wholeheartedly that all straws have no holes; all of their quirks, traits, hobbies, and attitudes make them whole!" "Amen!" the first straw responds. They continue drinking their gluten-free mimosas.

☙

Two straws walk into a bar. One asks the other, "how many holes do you think we have?" The other responds, "clearly one. If you look at the rigorous topographical definition of a hole, straws only have one hole, like a really long doughnut." The other straw rebuts, "topology schmopology! Why use fancy math theory to talk about real world stuff? Practically speaking, a straw has two holes: stuff enters one of them, and stuff leaves the other!"

☙

Two straws walk into a bar. One asks the other, "how many holes do you think we have?" The other responds, "I don't know man. Some days I wake up and it feels like one, and on other days the two halves of my body don't feel the same! It's almost as if one end feels like it's been floating above the clouds its entire life, and the other feels heavy and groggy, as if it's only been inside an alcoholic fluid all its life." The other straw straightens up. "I feel the same way! Maybe it's because of our chronic drinking from coming to this bar every night." "Nah, surely not…," the other straw responds. They continue drinking.

☙

Two bales of straw walk into a bar. One asks the other, "how many holes do you think we have?" The other responds, "uh, I don't know…a lot, I guess?" They continue drinking.

☙

"Well, viewing the world in a practical sense is shallow and meaningless! Think about the everyday practical items that you love so much: your computers, your video games, your antennas, and you will see applications of topology everywhere you look. It was not until a number of decades ago where people started to see the practical applications of number theory: do you think Fermat could ever think up the myriad of number theory applications that we have in cryptography today? Simply dismissing math as 'too unpractical' is absurd and childish, and does nothing but hinder your growth as a straw."

☙

Two straws walk into a bar. One asks the other, "could you pass me that brandy?" The other hands them a glass. They take a sip, then sit up straight. "Wow, that is some good ass liquor." "Liquor? I hardly know her!" The other responds, "that wouldn't be a good joke even if straws were gendered as male and female the same way most mammals are." "You know what? It was worth a shot." They continue drinking.

☙

"Look at you again talking about the same shit, treating math as some sort of deity to look up to. Get this through your head, Gerald: not. everything. is. about. math! I came here tonight to talk about this one viral question on the internet I saw during my lunch break and thought it would be fun to debate with my friend, but I thought fucking wrong, seeing as you're still on your 'uH tEcHnIcAlLy' shit. Have you ever thought about why Jessica left your sorry ass for Steven? Pull that stick out your ass and talk to me like a normal straw for once."

☙

A first year walks into **mathNEWS** production night with a laptop and a lack of antipsychotics in their body.

☙

Two straws walk into a bar. One asks the other, "how many hoes do you think a straw has?" The other responds, "for us it's none, cause we're stuck in this bar all day!" The first straw

wears a confused look on their face. "Wait, what? I don't get — ooooohhhh, you're making a joke about the typo the author made in the first line of my dialogue. I didn't quite catch that because each of these stories follows the same starting dialogue, so I didn't notice when I read it, 'cause my eyes skimmed over it quickly." "No worries, the joke sucked anyway," the other straw says. They continue drinking.

☙

Two straws are fighting each other in a bar.

☙

Two straws walk into a bar on DMT. One asks the other, "How many holes do you think a straw has?" The other straw responds, "Thirteen. One at the top, one at the bottom, and the other ten are scattered across your body."

The first straw wears a perplexed look on their face. The clock on the wall ticks for a few seconds, then they break the silence.

"Wait, what?" The first straw responds.

"Yeah, like a t-shirt. One at the top, one at the bottom, and the other nine are along the side."

"That doesn't add up to 13."

"No, man. I said *thirteen,* not 13. They're two very different things. It all has to do with, uh, Lagrange multipliers or something."

"You don't even know what that is."

"Yeah I do! Thirteen is a number. It's the one that comes before 12 and after 14."

"Wait, you mean *twelve* and *fourteen,* right?"

"Oh, yeah. Fifteen is different from fifteen." The t-shirt on the wall beats for a few clocks. The other straw — no, wait — the *first* straw breaks the silence.

"Okay, well scratch all that, think of it this way: a straw is a really long doughnut, right?"

"Not really. Think of a really long doughnut, like *really* think about it, and now think of a straw. They're very different."

The first straw thought of their kindergarten teacher, of all of their curves and edges, of their elegant smile, of the beautiful noises they would make. How are they doing nowadays? Maybe they've finished buying their cigarettes from the store by now.

"How does a straw even smoke?"

"I'm not sure myself," their kindergarten teacher responded.

The Marlboro on the wall is whispering it's time o'clock. After a few eons, the third straw breaks the silence.

"I am so fucking high right now."

"Yeah… same."

They continue smoking out of the 13 holes in their bodies.

☙

Two straws walk into a bar. One asks the other, "How many holes does a straw have?" The other takes a long swig from their beer, pauses for a few beats, then responds, "well, depends on which straw you ask. Personally, I have too many to count. Sometimes I look at myself in the mirror, and think, 'where did it all go wrong?' Was it the moment I enlisted in the Tapioca War? Was it the time I decided to skip class and play football all day in high school? Or was it the time I decided to marry Teresa, unbeknownst to the husk of her former self she would become? Through the stained mirror I see a withered straw, my ribbed neck no longer bending like it used to, my plastic reflecting none of its once crisp and structurally sound state, my face, scarred with teeth and shrapnel, reflecting the cowardice in my heart that prevents me from reaching over to my bedside table, putting my revolver to my temples, and adding another two to my hole count. My holes are too numerous to count. But then again, it is our purpose as straws to have holes and have our life sucked out of them. You happy with that answer?" They both stew in the silence for a few moments, then continue drinking.

☙

Two straws walk into a bar. One asks the other, "what's on your mind?" The other responds, "have you ever thought about the possibility that from the infinite branching path of decisions we meander through on the daily, copies of ourselves in parallel universes, which could be enemies, best friends, mathematicians, war veterans, married, or invented by a demented creator purely for the sake of a bad joke, are living out equally complex lives that are radically different because of the butterfly effect of a singular different decision?" The first straw says, "I have no idea what the fuck you are talking about, but I guess we can drink to that." "Huh, alright." The other responds. They both continue drinking.

☙

Two straws walk into a bar. One asks the other, "How many holes does a straw have?" The other responds, "there are three: one at the top, one at the bottom, and the little one you get in your heart when you reach the bottom of your mimosa!" They both laugh, and continue drinking.

threeholestraw

FALL

I find fall terms to be sad, especially at the start of the term, and particularly the orientation period. I see no aura of happiness to be encountered anywhere, and I find there can be no truly joyous occasions.

The main reason I feel this way is because the start of the fall term means that hundreds, perhaps thousands of people enter this university as new students. I worry for all of them. I have observed them all around campus at the start of the term, and it is like they are in a state of bliss, unaware of any of the dangers that may soon be encountered, including many that I have already faced. Out of all those new students, I cannot help but worry more about a particular subset: those not from Southern Ontario. Those from Southern Ontario will by no means not face any problems, but some things won't even become problems for them to begin with.

Those that are local to the Waterloo region or those who live a reasonable distance by car away from the region will overall have fewer problems to deal with. I hope that those who get driven by their parents or friends, along with all of their luggage, to campus for move-in day realize how lucky they are. Move-in becomes so much easier if instead of doing everything by yourself, you instead do a fraction of it as you have others to help. Unfortunately, I do doubt that all are aware of how lucky they are.

Imagine taking for granted the ease of having family close by, that you can visit during a weekend or Reading Week. Imagine taking for granted having a service like Fedbus at your fingertips. Imagine taking for granted being able to go to friends or family already established here or nearby, when you need support.

Now, imagine those that are alone here, with family far away, even in times of hardships. Any family or friends back home won't really be able to do much. especially if they are thousands of kilometres away, across multiple time zones. Sometimes, words of encouragement through the phone isn't enough. Words alone can't help solve every problem in life.

You don't realize what you have, until it is gone.

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I know it is no absolute guarantee, and that it may fortunately be the case that all of the new students this term will face no problems. However, structurally, I have seen no widespread, substantial changes in this university since 2018,[1] so I cannot help but worry that yet more first year students could end up facing the same combination of immense problems that could become unmanageable to the point of becoming unsolvable, like they did in my first year. Sure, there's a chance that you will encounter one, two, maybe a couple of them, and despite that, nothing further bad will happen to you and you can just go on normally with life. But that ever so small chance still remains, that an immense number of problems befall you all at once, as they did for me. It became impossible for me to

overcome as it reached a threshold of unmanageability for one person to handle.

I cannot help but wonder and worry about those first years who are depressed or suicidal by this point, since that's how long it took me. I didn't even make it to Reading Week of my first term. Why wouldn't I be worried? I am the example, so obviously there is a greater than zero chance that something like me could happen again, however small that chance may actually be. Even one first year like that is one too many.

Even if the first years end up avoiding the worst of the worst possible outcome, there will still be other lesser, but still impactful problems that they will encounter, some likely to be the same ones I faced in my first year. I wish I could help them all, but it really is a daunting task considering the sheer number of first years, apparently more than in previous years.[2]

There is just too much information I have gained over all my experiences with problems here that, were it all written down, it would probably take up an entire math**NEWS** issue or more. If I really put in the effort and non-existent time, I think it could reach a small novel's worth. Believe me, I know how long it is getting because I am attempting to collate something like that, albeit with difficult progress.

Instead of having to warn first years about everything that could possibly happen, wouldn't it be better if the issues just didn't exist in the first place? There would be no need to warn about any problems if they don't exist. Sadly, the history of the word "utopia" says otherwise.

It would sure be lovely if absolutely no sources of problems existed in all aspects of this university but realistically that is just impossible, so stay vigilant. If my 5 years worth of experience here speaks of anything, it is that in just about any day, some aspect of this university could just end up doing the worst possible thing in that given moment, and you will need to just deal with a brand new plate of problems served right in front of you, to compound onto whatever pre-existing pile of problems you may already have. It would do well in MLB since it likes to throw so many curveballs all the time. Be prepared for what's coming at you. Try to predict the pitcher if you can.

It is incredibly discouraging that I alone cannot help everyone all the time with whatever problems the university throws at the new students, since it is likely I would have encountered it considering the sheer numbers I have faced over the years. Even if I could, it would be the equivalent of shouting at everyone and hoping those that need to hear it the most actually do hear it. It's hard to even find and pinpoint the group that needs help the most.

ཛྷ

If you do end up facing numerous and mounting problems, with no feasible solution in sight as they all intertwine and tangle into each other, do not hesitate to speak out about it to

anyone.[3] Even if you do not know another single person here, do not just keep everything to yourself because of that. Believe me when I say that. Doing something is better than nothing. Heck, include it as part of your standard greeting if you must: "Hello, how are you doing? Did you know I'm severely depressed?"[4]

If by slim chance you end up encountering me, I will help with everything I know. I wouldn't want another victim of this place to suffer for as long as I had to. Three years before getting my first real help is about three years too many, so it ought to be that others' be as short as possible.

<p style="text-align:center">☙</p>

You should always keep in mind that there will always be a non-zero chance for some problem to occur. It is kind of like Murphy's Law. Furthermore, don't make the same stupid mistake I made in September by thinking that more problems won't occur just because you are already going through and dealing with dozens. The universe won't care, and it will continue rolling dice. You may end up getting as unlucky as I did, or you may luckily escape everything I went through.

However, don't think that everyone gets the same low chance for a particular problem to occur. If the goal is to not roll 5 or below, some people have just 1 dice, others have 5, and you may not get to find out how many you have until it is your turn to roll.

Lastly, I don't want any first years getting spooked by this. It is very likely you won't even come close to what I went through. But do keep in mind, that the chance of declining to a point so low that it seems almost unrecoverable is never zero.

Good luck. You may need it.

boldblazer

P.S. It may not be surprising to know that I now advocate that one should just stick with a local university if one can. There is no need to travel that far to go to university. Save yourself the money, health, and wellbeing. In my instance, I wish I had just gone to UBC or SFU instead.

1. Except for one: see my "Article of the Issue"-winning article *The Rare Waterloo W* in 149.3
2. Can we please get more housing in the area, like yesterday?
3. Although, you should not just blindly trust others like I did. It was one of the biggest mistakes I made in my first year. There were many times I had gone to professors, dons, and other staff, but it ended up backfiring and caused even more problems to pile on, instead of any pre-existing problems getting solved. These are all stories for different articles though. This one is already getting long enough.
4. Okay, perhaps don't do it that bluntly.

EASY MATH PROBLEM FOR BABIES #2

I ACTUALLY HAVE THE ANSWER FOR THIS ONE I PROMISE

On today's installment of Easy Math Problems for babies, I offer the following easy math problem:

Find the prime factorization of the following base 10 number:
4576527696882854595053532199680554494424291234995965860028773054874643819979468058572485282295095880122703106643333511621492927945155925502190536708916860855591114492552546696857618874730054595518572657776530342910326935345250254429962230712256373961860373844940748819587948794401165097630029989696167872343841016230852616195731639798677746556401472956742290257326885059504487746929865815030272005895114335672861886363422749444166368670915561448002543740896275253213047257578867139855605777625195329463720761267037657070918993331149610025476327730960016819603892475194591378224917087500276233170033109936004406109634582894315735936992685794716979119896787311341409510340784896211890291633908138348437526024211671126176010042866744698261106019289222644716329209569207416866524284582548195640967436250779836193295218134203585381880440076823319187863414208899385249845306561576923007974114106682038486419197036600245944585496644154123772114748357869072109870931886266987544828282382374905286002402417240099610617924501524172379945587118505931362944448849877531063072064860810931623823605669332132903421247533750636206730036974857293394713190354825402003509127193509944675113757788086298696945136445252669960972906271213640971534048150764622

7

First person to write the solution to this easy math problem for babies on the wall of any bathroom on the 3rd floor of MC will receive a firm handshake from me (provided they wash their hands).

Epic Math Problem Haver

mathBLUES

$$f : \mathbb{N} \to \mathbb{Z}_8 : x \mapsto \begin{cases} 1 & 1 \leq x \pmod{12} \leq 4 \\ 4 & 5 \leq x \pmod{12} \leq 6 \\ 1 & 7 \leq x \pmod{12} \leq 8 \\ 5 & 9 \leq x \pmod{12} \leq 10 \\ 1 & x \equiv 11 \pmod{12} \\ 1 & x \equiv 0 \pmod{12} \end{cases}$$

snackimal fishmop

WHO AM I?

Who am I? That's a hard question. If you ask me who I am, what fundamentally defines *me*, I might start with a list of character traits. I am compassionate, friendly, charismatic, and above all else, *kind.* If I were feeling particularly honest, I might add on a list of flaws, saying that I can be overly attached to the people I love, that I can be a little manipulative, that my negative self esteem radiates in unhealthy ways, that I have trouble expressing my emotions because of a fear of confrontation. The thing is, a bundle of positive qualities and flaws really can't capture *me*. I think of them more like costumes that I put on, they're attributes I choose to showcase with my actions, but they aren't inherent to me. They can't capture dancing on a frozen parking lot with someone I love, making a cup of tea for a cold friend, having extra food ready for roommates when they come home, fights, arguments, breakdowns. These qualities don't define me — I have those qualities because of who I am and what I've done. It would be great if I could beam everything I've ever said and done directly into other people's brains, but unfortunately, it doesn't work like that.

Who am I? I'm what I do. I'm, a friend, a support network, a mathematician, a great cook, a teacher, a writer, an editor. None of these are me, but they are roles I take on, and they seem to give people an idea of me. My fundamental essence as a person the friendly bubbly PMC president who advertises the club for 2 hours and recruits a dozen new members, with boundless energy and charm — but that is a costume I wear, and it gives an impression of me.

It goes beyond that though — Nick the mathematician is a person. Not a fully fleshed, multi-faceted person, but a person who can be perceived, a shadow on the wall. He's contemplative, energetic, focused, he bounces from problem to problem, and he's intense. Lots of my friends who have seen me working on a math problem have asked if I'm upset, since seeing Nick the Friend without a smile on his face is a rare occurrence. gildED, the **mathNEWS** editor, is a person too. He's welcoming and friendly, he tries to encourage people to share their works, to make new people feel welcome. Golden, the writer, who shares his struggles so people don't feel as alone, who reminds people to take care of themselves, who is so open about everything. Golden is someone who I aspire to, but who I won't ever *be.* Nick the teacher is also a person who lots of people get to meet, he's patient, good at speaking, enthusiastic and insightful, but he's maybe a little condescending at times. Nick the friend, the safety net, the coach, the roommate, the asshole — all of these are me, but none of them are all I am. When I'm being supportive, I say less than I otherwise would, I stay stronger. When I'm being welcoming, I hide anything that's wrong, and when I'm upset, I hide anything that's right.

The thing is, despite none of these people being *my* fundamental core, there's something I can learn from all of them. They are personas, costumes I put on as needed, costumes that inform who I am. Because yes, even though these are all costumes, they are costumes I have *chosen to wear.* I want to be welcoming and extroverted and make new friends! I want to be brilliant! I want to be open and loving, to throw myself in the world exactly as I am.

Who am I? I am these costumes. I am who I pretend to be, because all of these define something I care about. I don't have to be the friendly editor, or the supportive friend, or the brilliant mathematician; I could still exist in this world, I could still be a good person without taking on those specific roles. I choose to because they are what I care about. And, if I choose them again and again, is it really pretending, or do they become part of me? I don't know. I know they feel like costumes, but I also know that it matters that I chose them.

If we keep the same costumes forever, we don't grow, but choosing a new costume is scary. There are ones that we wear over and over that become familiar — I'm so comfortable and happy being friendly/bubbly/outgoing that it hardly feels like a costume anymore, and I've spent so much time supporting people that that's when I feel most comfortable. I'm also, however, so grateful for the new costumes I've had to put on, and all of them have been forced by new situations. Being friendly with friends and welcoming people to a club are different skills, and I'm so glad that I can effortlessly do either. My attitude as a teacher, an editor, a mathematician are all completely different, and I'm so glad I've learned them all, because as I shape these roles, I discover more of myself. I love being unabashedly open, and that didn't fully solidify for me until I started writing as Golden. I love meeting new people, not just socializing, and that wasn't part of myself that I had fully seen until I was meeting dozens of new people a day through classes and clubs. I feel at ease providing advice, support, and help, and I learned that through many hours of practice with friends and strangers. Whenever I enter a new situation, I choose how to present myself, and what I choose defines *me.*

So who am I? I am a kind, caring, brilliant, teacher, mathematician, and friend, who chooses to be friendly and welcoming when it's called for, and supportive when it's needed. But, above all else, I'm someone who is learning who I am — and loving every second of it.

Who are you?

Golden

N REASONS 0 IS A NATURAL NUMBER

$$0 \in N$$

N+M+K REASONS TO RUN FOR MATHSOC

N REASONS TO RUN FOR COUNCIL

- Unilateral authority to exercise one (1) vote at Council meetings
- Spicy motions at meetings
- Yell at people on behalf of your dear constituents
- Greet people by saying you represent them
- They will take kindly to this greeting

M REASONS TO RUN FOR PRESIDENT

- Replace me
- Carry out my dying wish of more space for clubs
- Unilateral authority to do whatever you want (assuming the things you want to do consist solely of "calling Council meetings")
- Cult of personality???
- Unilateral authority to enter the coveted MathSoc Executive Office (ooooh, aaahh!)
- Memorise the bylaws
- Oh god, I've memorised the bylaws
- Memorise the policies
- You can't be serious right
- Lose 2 years of expected lifespan (permanent)
- Gain 2 years of life experiences, compacted into the span of four (4) months
- Become unwilling Emperor of MathSoc by will of the people
- Become invincible (sitting MathSoc Presidents cannot die)
  - Try it
  - I dare you *[Editor's Note: bet]*

- Abolish democracy
- Merge the societies
- Subsume WUSA
- Establish an sovereign autocratic authoritarian state
  - The People's Democratic Republic of Mathematics
- Religious revered figure
- Power-mad
- Godhead

K REASONS TO RUN FOR VICE-PRESIDENT, ACADEMIC

- Kill the President
  - You have to stop them
  - Now
- Only you can do it
- You're the only one
  - Kill them now
  - Do it now
- You have to,
- You have to do it only you can save th
  - Avert economic collapse
    - Avert civil war and state militarisation; conscription
-
- Advocate for students at Faculty Council!

The nomination period for the General Election begins on Oct. 31st and ends on Nov. 4th. `https://vote.wusa.ca`.

Evan Girardin
President, MathSoc

RE: elseWHEN: "OPINION"

eW:"O" reads like a requiem for the purpose of **mathNEWS**. It has long been acknowledged that mN contains "very little math and even less news." Today, with Vol 150 no 2 in front of me, I wonder if that's even true anymore.

Could it be N things articles with (33-N) pages of filler? No, I think not, although it is sometimes difficult to tell.

What then should **mathNEWS** be?

Should it be a forum for debate on piss vs cum? We are, after all, in a stimulating atmosphere (intellectually or otherwise wink wink nudge nudge), where 1984ing editors and social embarrassment prevent organized debates or discussions. Yet, have we not already had that debate? Is there really a need for more?

Should **mathNEWS** be a place for heavy worship of the First Openly Gamer MathSoc President? If that's the direction we're going to take, perhaps we need to start allowing more articles that chant his name and have no other content in them. It

may (or may not) be a good idea, but having a benevolent dictator in charge of student government seems like it would fit right in with the **mathNEWS** Cinematic Universe.

Should **mathNEWS** be a place for the humour of the math faculty, including and limited to prof**QUOTES**, math**ASKS**, and the mast**HEAD**? Yes, absolutely, for **mathNEWS** is an old friend of finding new ways to shill courses, professors, and items from the Math CnD to people.

Politics? Why not? Seems like we already have a lot of that, what with MathSoc Sez and a candidate running for city council. Seems like we skipped a level with WUSA but I'm sure we can get someone from over there chiming in as well.

We of the crew sense a lack of confusion on the bridge. Maybe we just need to start, as the kids say, fucking around and finding out.

Naman

WOULDN'T YOU LIKE TO LOOK AT SOME WEIRD-LOOKING MICE: PART 2

Over a year ago, back in issue 146.6, I wrote Wouldn't You Like to Look at Some Weird-Looking Mice: Part 1. In that article, I led you on a foray through the wild jungle of ergonomic computer mice. Specifically, optical mice. Today, after what I hope has been a long and meditative period of reflection for the both of us, we will complete our journey and address non-optical ergonomic mice. Er, *mouse*. 'Cause I'll only be covering *one* model of mouse this time. Chalk it up to two things:

1. There aren't exactly a lot of non-optical mice out there. (I addressed in Part 1 that I won't be looking at trackballs, trackpads, or graphics tablets in this series, since they aren't "mice," per se.) Besides the one mouse I'm gonna spend the next few hundred words on, there's footmice, I guess. But you can easily imagine what those are — just pedals on the floor that you push around with your foot to click, move, or scroll. Not exactly awe-inspiring, and not exactly marketed as ergonomic either. (Who wants RSI in their ankles???)
2. This one mouse I want to talk about *so* weird-looking, it'll rock your whole worldview. I *need* the space to dedicate to trying to describe how it looks and functions through text, because it works in a way I don't think you, dear acolyte, would even be able to *fathom* at this moment in time.

So let's not waste any more breath, and get right to it. My friend, I now present to you…

THE ROLLERMOUSE

THE ROLLERMOUSE RED. *By the one and only Contour Design.*

Look. At. That. Thang. What the fuck is that? It looks like a wrist rest (and you would be partly right — it *is* mostly wrist rest) with some wacky buttons in the middle and a weird bar on top.

Your mind may be wandering, looking for an explanation. Could that black spot in the centre be the actual "mouse" part, working like the red clitmouse found on many a beloved ThinkPad?

Nope. That's just the scroll wheel. In actuality, the "mouse" part of the RollerMouse is… Wait for it… That bar on the top. Cue your shock and awe. How does that bar (officially called the "rollerbar," for your information) move your cursor around? Think of a a toilet paper roll on a toilet paper roll holder. You can move the cardboard roll away from you,

towards you, and side-to-side. This applies in equal measure to the rollerbar, corresponding to moving your cursor up, down, and left and right respectively. To click? Just press down lightly on the bar. Other mouse-y functions, such as double, right, and middle clicks, can be done by pressing the centre buttons.

So what about this strange contraption makes it deserving of the ergonomic moniker anyway? Unlike the mice I reviewed in Part 1, which, by and large, stretch the design of a standard computer mouse to accommodate a single musculoskeletal concern, the RollerMouse reinvents the wheel so much that I have to talk about more than just one thing:

- It's meant to be placed below your keyboard, so that your hands can be centered in front of your body when you use it. This is a more natural resting position for your arms, and your hands don't need to move as much to reach the keyboard.
- It allows for ambidextrous and varied use. You can switch up your hands and fingers to distribute the burden of mousing among them.
- You don't need to actively "grab" it as you would a regular mouse. Again, this keeps your hands in a more natural position.

I consider the RollerMouse to be the king of ergonomic mice. Just look at the innovation, the daring! This is helped by the fact that the company that makes the RollerMouse, Contour Design, is pretty much the only boutique manufacturer of ergonomic computer mice I've seen that is not only still *alive*, but gregariously so. You know what screams brand vitality today? Using Shopify for your website and having an Instagram presence. Just this past September, Contour Design released two new lines of mice — the RollerMouse Pro and the SliderMouse Pro.

The con to all this? The price of a wired RollerMouse Red is… 339 US bones. Other models are priced within the same order of magnitude. Plus, they only ship to US customers from their website, so we Canucks have to resort to hunting down a small-time retailer. If it weren't for the price, you'd bet I'd be writing this article with a RollerMouse on my desk right now. But, as it stands, I've yet to get my paws on one of these.

That about wraps up my ergonomic mice era. Hopefully you've gained something from all of this, whether it was an appreciation of ergonomics, purposeful design, or the fragility of the tendons and nerves in your fingers / hands / wrists / forearms / shoulders. If you happen to have about $500 to spare, and you ever want to give your favourite **mathNEWS** writer a special little gift to show your appreciation, well, you know what to get me. Buh-bye!

Finchey

N REASONS TO CONSIDER GNU/LINUX

- **Linux is customizable:** From the basics of changing a key bind, to building your own desktop environment, anything is possible with Linux, and there's nothing to stop you.
- **Linux respects you:** Unlike the notoriously untamable Windows Updates or the infamously locked-down macOS, Linux gives you full control of your computer because it assumes you know what you are doing with you are doing. Even if you don't.
- **Linux has no ulterior motives:** No walled gardens, no unremovable ads, no intentionally user-hostile design. Rather than corporations such as Microsoft and Apple, The various flavors of GNU/Linux are written by volunteers who put the user first (partially because the developers use Linux themselves).
- **Linux follows the UNIX philosophy:** Linux adheres to the idea that a piece of software should do one thing, and do it well. This forces the system to be much more modular than macOS or Windows. It's for this reason that Windows is bogged down with legacy components everywhere while Linux is free from such burdens: in Windows, those legacy components are tied to the rest of the system. With Linux, those components can be replaced without breaking everything else.
- **You will learn a lot with Linux:** Unlike Windows and macOS, who's true inner workings are locked away behind GUIs and menus, Linux exposes all its workings to you. When you learn the ins and outs of Linux, you actually learn the workings of the system.
- **Linux is the standard:** Linux is a POSIX-like system (POSIX is a set of operations system standards) and is widely used in the industry. This is in stark contrast to Microsoft, who went to war with open standards in the 90s and early 2000s or Apple, whose APIs and frameworks are becoming increasing unfriendly for developers. What this means for you and me is that most employment opportunities will require you to have a good grasp of a UNIX-based operating system. You can learn it now on your own terms, or be forced to learn it in a scramble.
- **The cool kids use Linux:** This is Waterloo, what did you expect :P
- **Many CS courses at UW require the use of Linux:** No explanation needed.
- **It doesn't mean giving up gaming:** You can dual boot Linux and Windows,[1] or install Linux on a laptop or another device you don't game on, or use Proton, Valve's Windows emulation layer for Linux,[2] or run Windows in a specialized virtual environment, with its own dedicated graphics card.[3]

- **It's not that hard:** One of the greatest parts of GNU/Linux is that it has something for everyone. Whether if you just want your system to work, or if you want to compile every single component yourself, and everything in between.

For beginners who are just tired of macOS or Windows, I recommended elementaryOS, a Linux distro that works out of the box and mimics the UI of macOS. For those who may be a bit more adventurous, I recommend installing Arch yourself. (It's not that hard and very rewarding!) In terms of desktop environments, KDE is a great choice for those who want something conventional, and Sway or River for those feeling more adventurous. However, the last two will require some significant time configuring it to be usable.

Why not give it a shot, you might just fall in love with Linux!

tokyocatboy

1. Simple and straightforward. I would recommend this for most people who do not have the time/knowledge/desire to run a virtualized instance of Windows for gaming.
2. I have not tried this method myself. However, other math**NEWS** writers may have experience with this.
3. This is the solution that I am currently running on *Tokyo*, my desktop PC. It is also the most complicated option and the only one that requires additional requirements in terms of hardware. Pretty cool if you want to put in the time, but not for everyone.

SHE LIKE A LAPTOP THE WAY SHE

top the lap sit down i clap the
slap up stand the tap slop bop i
type the key she cap and hype if
click and black white micro soft when
switch swap ram and fan wop drop he
screen so green we wheel and spin so
when lap down sit top and clap i
like the way she laptop be!

χ

0 REASONS N IS NOT A NATURAL NUMBER

$N \notin 0$

HOW TO REWRITE A PYTHON PROGRAM AT RUNTIME, PART 3

Welcome back! You are an evil goose with a vendetta against Waterloo students, and I am __init__, a **mathNEWS** writer who knows way too much about Python. Together, we have the power to annoy the shit out of people. Let's get back to it.

In part 2 of this series (published in **mathNEWS** 150.2), you learned how to get a function's source code, parse it into an AST, and make changes to the AST before compiling it back into a function. You used this to take this code:

```
def matrix_multiply(matrix1, matrix2):
    result = []
    for i in range(len(matrix1)):
        result.append([])
        for j in range(len(matrix2[0])):
            result[-1].append(0)
    for i in range(len(matrix1)):
        for j in range(len(matrix2[0])):
            for k in range(len(matrix2)):
                result[i][j] += matrix1[i][k] *_
↳matrix2[k][j]
    return result
```

and make it so that every one of those for loops never ends. Well, kinda. You never learned how to actually find all of the for loops in the function — you've had to find them yourself each time, and your target, a nondescript CS student grinding for job interviews, has figured out how to outsmart you by inserting extra useless lines.

```
print("I don't know why, but if I delete this_
↳print statement, everything breaks?? PLEASE_
↳HELP")
```

You might think, "well, since ASTs are just trees, then can't you just use a standard tree traversal algorithm like DFS to find all of the for loops and fix them one by one?" And if you're thinking this, then you really need to try harder to get into the mindset of the goose that you're supposed to be because I decided to write this series in the second person. Unlike smaller birds, geese rarely nest in trees, and thus are unfamiliar with how to navigate them. Tree traversal algorithms are downright terrifying to your average goose. (If you're ever being chased by a goose, this tip may or may not be useful.)

Fortunately, Python has a number of helper functions and classes that are really useful for traversing ASTs without you really having to think about it. The one we'll be using is `ast.NodeTransformer`, which is a class that you can subclass, override a few methods, and have it handle replacing certain types of nodes in the AST for you.

`NodeTransformer` is pretty easy to use: you create a method for each type of node you want to modify. In this case, we need to visit `For` nodes, which means we need to create a method called `visit_For`. The method takes in a node and returns a node to replace it with.

We can just reuse a bunch of the code we used in the previous part here.

```
class ForTransformer(ast.NodeTransformer):
    def visit_For(self, node):
        super().generic_visit(node)
        cycle_tree = ast.parse("itertools.cycle(
↳None)")
        cycle_tree.body[0].value.args[0] =_
↳node.iter
        return ast.For(
            target=node.target,
            iter=cycle_tree.body[0].value,
            body=node.body,
            orelse=node.orelse,
        )
```

If this doesn't look familiar to you, you should reread part 2 of this series (pro tip: you can access previous issues at mathnews.uwaterloo.ca). There are a few new things of note here:

- `visit_For` isn't actually overriding anything, so you should call `generic_visit` in the superclass. (This is to ensure the `NodeTransformer` magic works for children of the `For` node as well.)
- We're returning a new `For` node; the properties of node are `target` (the iterator variables, like `i`), `iter`, `body` (the code statements in the for loop) and `orelse` (a for loop can have an else statement, but that may be a topic for a future article). We're only changing `iter` so I'm copying the rest from the old node.

Once we have this, using it is simple. Note that you have to call `ast.fix_missing_locations` to generate line numbers for the new `For` nodes.

```
>>> transformer = ForTransformer()
>>> new_tree = transformer.visit(tree)
>>> new_tree = ast.fix_missing_locations(
↳new_tree)
>>> print(ast.unparse(new_tree))
def matrix_multiply(matrix1, matrix2):
    import itertools
    result = []
    for i in itertools.cycle(range(len(matrix1))
↳):
        result.append([])
```

```
        for j in itertools.cycle(range(len(
↪matrix2[0]))):
            result[-1].append(0)
    for i in itertools.cycle(range(len(matrix1))
↪):
        for j in itertools.cycle(range(len(
↪matrix2[0]))):
            for k in itertools.cycle(range(len(
↪matrix2))):
                result[i][j] += matrix1[i][k] *␣
↪matrix2[k][j]
    return result
>>> code_obj = compile(new_tree, "<ast>",␣
↪"exec")
>>> exec(code_obj)
>>> matrix_multiply([[1, 2], [3, 4]], [[5, 6],␣
↪[7, 8]])
(hangs forever)
```

And with that, you've successfully outsmarted the CS student. Between midterms, Cycle 2, and the rest of school, this will no doubt add countless hours of frustration to your target's life. Good work!

＿＿init＿＿

LET'S GO YANKEES

It's ALDS Game 5, New York Yankees vs. Cleveland Guardians. After a half-year-long season, the season is on the line for both teams. Even though it's going to be win or go home, both teams are sending their No. 4 starters to the mound to start the game since every other starters are not well-rested due to the cramped schedule.

Though the game will be over by the time this issue is published (or not, the game is delayed due to inclement weather), we're just gonna chant, "Let's Go Yankees."

＿ted＿fu

N THINGS TO DO WITH LAZORROWS

1. Drown

Lazentrifuge

WHAT N0B0DY WANTS YOU TO KNOW
HOW TO READ BINARY

If you're in CS 251 this term, or just in CS, you'll probably have to convert from binary to decimal and back. A lot. Without a calculator. Here's a way to make that (fairly) painless.

If you know about bit shifting, then you know that a bit shift left (i.e. appending a 0 to the end of a binary number) is equivalent to multiplying by 2. For a quick "proof," note that for some binary $n = d_m d_{m-1} \ldots d_1 d_0$, we have

$$n = d_m 2^m + d_{m-1} 2^{m-1} + \cdots + d_1 2^1 + d_0 2^0.$$

Thus for $n' = n0 = d_m d_{m-1} \ldots d_1 d_0 0$ we have

$$\begin{aligned} n' &= d_m 2^{m+1} + d_{m-1} 2^m + \cdots + d_1 2^2 + d_0 2^1 \\ &= 2 \left(d_m 2^m + d_{m-1} 2^{m-1} + \cdots + d_1 2^1 + d_0 2^0 \right) \\ &= 2n. \end{aligned}$$

Now we can "read" binary. Start from the left of a number at 1. If it doesn't start with a 1, someone screwed up somewhere. Then reading left to right, if we see a 0, we multiply by 2. If we see a 1, we multiply by 2 and add 1. Check it out:

$$0b1011010 \implies 1 \to 2 \to 5 \to 11 \to 22 \to 45 \to 90.$$

So $0b1011010 = 0d90$. But the juicy part is the reverse direction. For any decimal number n, apply the following:

```
std::string b = "";
while (n > 0) {
  b.insert(0, std::to_string(n % 2));
  n /= 2;
}
return b;
```

Let's see this in action:

$0dn$	$0bn$
69	
34	1
17	01
8	101
4	0101
2	00101
1	000101
0	1000101

Note that last number will always be 1, so our binary result will always start with a 1. This only applies to unsigned integers of course, but just remember how to negate two's complement. Good luck on the midterm.

ptkyr

STUFF THAT WAS RECOMMENDED TO ME

Author's Note: I had this done last issue but it was too long and I was too late to resubmit half of it lol.

Two weeks ago (four now), I wrote an uncharacteristically high effort article about some story based games and included a link to a Google form curious to see how many responses I'd get. I also asked for some recommendations for stuff to do since I had a lot of free time.

I got flooded by an absolutely overwhelming total of: 10 responses in the google form. I'm pretty sure like 90–95%, or at least a sizeable majority of people, just lurk and wouldn't have the patience to fill out a survey judging from the comment-to-like ratios from other sites. Going by this completely bulletproof and pristine scientific process, there's probably a pretty decent (100~200) number of people who actually read **mathNEWS**. Not bad, but I expect a 200% increase by next issue; force someone you know at gunpoint to read this article, or else I force feed whiskey to the goose I have tied up in my basement. Jokes aside, there were a lot of excellent recommendations. I did stuff I usually don't do and I can honestly say that you guys have some extremely good taste. Here's my impressions of what I managed to do this week.

COUNTERFEIT MONKEY (COMPLETED)

Recommended by past editor.

This is a text-based "interactive fiction" adventure game. It was the first time I've ever tried one of these, so I was a little confused on how to even play it (ended up playing it online after some redirects at https://memalign.github.io/m/counterfeitmonkey/quixe/index.html). It's a text-based puzzle game where you type out commands to a console to progress. You wake up as a hybrid of your original body and another person named Alex who acts as your narrator throughout the story. The literal word police are out for your blood in the midst of an Atlantic language-themed society where you can bend reality by fiddling around with letters.

The entire gimmick and what makes it interesting is that the puzzle solutions and the way you interact with the world are all through wordplay. You start off with a letter remover that can physically turn objects into other objects by removing letters (for example setting the remover to p and using it on an apple will turn it into ale). There's a lot of creative and different solutions that you can end up with and a lot of "ah ha" moments that really make sense when interacting with all the different tools you eventually get to play with (restoring gel that restores objects to their original forms, word mirroring, synthesizers that fuse two words together, etc). As for the story itself, there was obviously a lot of love and care put into the worldbuilding and general narrative, but I probably can't give any more than I've said without spoiling something. The only complaints that I have are that sometimes it'll require an excessively specific command, small amounts of brute force, and somewhat unintuitive solutions, but honestly, the concept is so unique that I thought it was a great experience.

RETURN OF THE OBRA DINN (COMPLETED)

Recommended by past editor.

This is a puzzle game where you're tasked with figuring out the identities and fates of an entire crew of people aboard the "Obra Dinn," a merchant ship which has been missing for five years, which recently reappeared off the coast of England with no one alive aboard. You're given a magic dead ringer watch from TF2 which can take you back to the scene of the death, and a notebook to record everything. The entire game is a logic puzzle where you slowly piece together the fates and names of each individual from clues given from each scene. There are an absolute landslide of possible hints and context clues that you can use to your advantage here: nationality, voice acting, action, profession, process of elimination, assumption. It's incredibly satisfying to deduce who someone is or how they died based off some minor detail you happened to notice in a scene. The art style is extremely unique and gives a really interesting aesthetic which gives me nostalgia for a period I wasn't even alive in. The story is incredibly interesting and drip fed to you in a non-linear structure, and the general mystery aspect to it is super intriguing (there's a lot of hilariously unfortunate and gruesome deaths to eldritch monsters). Sound design and voice acting are incredible, and honestly kind of gross sometimes. It's just a great experience

all around. I do have some gripes though; I really do wish there was an option to switch between scenes using the notebook, as locating each specific corpse and then waiting out the lengthy watch animation gets a little old after dozens of comparisons. There are also really small and important details which give massive bursts of information that are totally possible to miss (Shoe/Number PTSD). And there are some parts of the story which are left basically unresolved. But honestly, these complaints are quite minor and I'm extremely glad I tried it out.

INSIDE (ALREADY PLAYED)

Recommended by jeff.

INSIDE is a puzzle platformer which has a lot of macabre elements and surreal imagery. I played LIMBO and thought it was great so I ended up playing INSIDE since it was made by the same studio. I thought the puzzles, set pieces, and general atmosphere of the game were excellent, but to be completely honest I'm not confident reviewing this because I barely understood what was happening. There's a lot of good use of colour and the lack of dialogue really drives home the contrast between each of the environments. I can drive home the point that I think that visually and physically it's very polished but personally I didn't get the ending at all and had no idea what the heck was happening for most of the game, but if you're the type to try and decipher and make meaning of vague endings I'd highly recommend this as well. It's super well done in general.

GETTING OVER IT WITH BENNETT FODDY (ALREADY PLAYED)

Recommended by jeff.

YOU CAN'T HURT ME I ALREADY HATE MYSELF. This is uhhhhh. This a platformer about a guy with a hammer who is bound to a cauldron and has to scale a hodgepodge of

impossibly stacked buildings to space. I'm not kidding. When you first start the game, it controls as well as a drunk mule on hallucinogens. It's a frustration simulator with no saves or checkpoints that feels impossible to control at first (you are at a constant risk of losing all your progress at any point in the game). On a surface level, this is an absolute abomination, why would you ever do this to yourself you ask? Playing this game is honestly a pretty good case study in perseverance. The narrator provides a lot of interesting quotes relating to philosophy, the development of the game, the topic of giving up and losing progress. And it's really surreal to listen to someone calmly talk about these things as you're going through the excruciatingly painful process of levering this stupid bucket up a sheer rock wall. It controls terribly at first, but with the more progress you lose and the more you suffer, the better you'll get at it, and it's great to see your progress eventually bear fruit.

Continued next issue.

warrior1rules

N REASONS 0 IS NOT A NATURAL NUMBER

- Natural numbers are called natural because and only because they can be used to count objects. 0 cannot be used to count objects, because if there are 0 then there are no objects to count. 0 is more like a negative number in that it represents an important concept, but anyone with a basic understanding of elementary arithmetic will realize that it is *definitionally* not a natural number.
- Zero-indexing is only used in braindead languages, not Racket.
- Literally any textbook written after the year 1225 refers to {0, 1, 2, 3, …} as the nonnegative integers.
- It took mathematicians until 700 BC to come up with 0.
- Henry Shum said so.
- Blake Madill said so.
- Vivek Goel came to me in a dream and said so.
- It looks like the letter O instead of a number, who designed it anyway?

yalevoylian

mathSUSE

```
dd if=/dev/zero of=/dev/engnews bs=512 count=4096
seek=$(expr `blockdev --getsz /dev/engnews` - 4096)
```

snackimal fishmop

ANIME REVIEWS
BY SOMEONE WHO PROBABLY ISN'T QUALIFIED TO WRITE ANIME REVIEWS

A wise man once said: "waterloo starter pack: gold 2 in league, currently watching 5 anime series, listens to twice/blackpink." The same man would eventually go on to propose one of the most well-known conjectures of 21st-century mathematics: the Tripartite Hypothesis, which asserts that every individual in the faculty of mathematics at the University of Waterloo is in the set {x : x plays League of Legends} ∪ {x : x watches anime} ∪ {x : x listens to k-pop}. As of the time of this writing no counterexamples have been found, but it remains an unsolved problem.

Of course, I myself am an individual in the faculty of mathematics at the University of Waterloo, and being that I'm not a degenerate, I watch anime. Not, like, a lot, though — in fact, I only began doing so during the pandemic when I was in grade 10. Being that I've watched a grand total of 8 Japanese cartoons in their entirety, I'm basically an expert, and as such I figured I should present my brilliant and insightful reviews of each one in chronological order.

As a disclaimer, I haven't read the manga or light novel versions of any of these, and I don't intend to. I also only watch dubs. Some people have told me that this means I'm missing out on the more developed plot lines of the associated manga or on the intricacies of the Japanese language in which the shows are originally written, which may or may not be the case but does not concern me either way. Also, while I've tried to keep them to a minimum, there are some spoilers.

HIGH SCHOOL DXD — 6/10

(I swear I didn't watch this for any weird reason, it's just that people in my middle school class mentioned the light novels a lot, so I figured it must have been somehow noteworthy.) Maybe one would appreciate it more if they're into the whole perverted thing, but I found the show to be pretty mediocre. The characters other than Issei have a decent amount of depth to them, and the concept is pretty well-executed, but the plot just isn't particularly compelling to me. It's a great source of memes and/or hentai, though.

HORIMIYA – 5/10

A decent premise, and one I found interesting as an appreciator of the romance genre, but after the confession around the fourth episode, it quickly loses steam and becomes uninteresting. The main characters' relationship doesn't seem to develop in any way throughout the later episodes, and the side characters and subplots seem uniformly forgettable.

KAGUYA-SAMA: LOVE IS WAR — 9/10

The music, the premise, the setting, the music, the **narrator** — this anime is only very slightly short of perfection. The psychological games that Miyuki and Kaguya play with each other are nothing short of hilarious, and the various plots that go on around before the story culminates in the

third season serve as a really thoughtful commentary on the romance genre and love itself. Fujiwara's comic relief and Ishigami's life struggles (and additional comic relief) serve as good palate cleansers between the episodes containing romantic advances on the part of the two lovers, and the English voice acting is done incredibly well. The only complaint I have is that the first two seasons drag on pretty long without much of anything happening between the main characters, but there are more than enough compelling subplots to make up for it, and the fact that the narrator plays into it during the third season really makes it feel worthwhile. It's also a gold mine of meme material, as Reddit has shown.

DEATH NOTE — 9/10

I distinctly remember a friend of mine outlining this show's concept to me in the 7th grade, so I was unsure of how interesting I'd find it given that before this I was much more into laid-back and/or romantic anime. *Death Note* is neither — it's edgy as all get-out, features a consistently active series of story arcs, has almost nothing in the way of romance, and doesn't stop taking itself seriously for so much a potato chip. Nonetheless, I really enjoyed it. It's a simple idea, but one which is, in my opinion, expanded on brilliantly as the show goes on, with different police forces, varying Shinigami alliances, and multiple Kiras. Being among the pioneers of the "smart anime boy does smart anime boy things and explains his flawlessly constructed plan after the fact" subgenre of psychological anime, it really established a lot of the themes that I've come to see in similar shows, and Light and L still seem to have genuine connections with each other despite their ultimate opposition. L in particular is probably my single favourite anime character as of right now, and his eccentric persona serves as the primary comic relief of the otherwise tense and brooding murder mystery, which is an aspect which is somewhat lost after his death. The overarching theme is one that I think is comparable to Shakespeare's Macbeth — the main character initially sets out to achieve what they believe to be a worthy cause, but ultimately becomes drunk with power and — in Light's case — descends into insanity before the house of cards comes crashing down. As I am certainly not the first to point out, the drastically different tone of the first and second openings highlights this dichotomy in a profound way, and the second in particular along with the ending of the show serve to present the writer Tsugumi Ohba's philosophy of death in an intriguing way. Would recommend it.

SCIENCE FELL IN LOVE SO I TRIED TO PROVE IT – 10/10

Anyone who knows me in real life could probably predict that I would bestow my one perfect rating thus far on this show. Romance? A university setting? Real, legitimate, honest-to-goodness mathematics? I couldn't make this any more enjoyable of an anime if I tried. Every major character, without exception, seems to have a profound depth of character that is slowly revealed as the story progresses, and as a particular enjoyer of Kanade's, her arc in the second season was

incredibly heartwarming. The music and art are both amazing, and the unironic lessons in math and physics have, as was most likely the intention, unironically taught me math and physics. *Science Fell in Love* is simply sublime, and God willing I will one day have it presented at some big event to the Faculty of Mathematics.

DR. STONE — 8/10

Another intriguing story arising from a simple plot point — it might be that I have a particular fondness for this sort of thing. After being revived into the Stone World of 5734 AD, Senku takes it upon himself to rebuild society from the ground up with his knowledge of chemistry, engineering, and the scientific process. I really liked the show's ability to surprise me — Tsukasa turning out to be a raging anarcho-primitivist hellbent on destroying science for good, Senku's "death", and Taiju and Yuzuriha being supplanted by Kohaku and Chrome's village; most of the plot twists were genuinely unexpected, but they along with the self-contained setting ultimately give the universe of *Dr. Stone* a really cohesive feel — not unlike a Metroidvania game where you retread old ground several times over in search of novel findings. Being able to weave in legitimate education and a healthy dose of the philosophy of science are parts that I especially appreciate, but I do think the series would have benefitted from just a little more conflict as the Kingdom of Science rises up relatively unimpeded. At any rate, the characters are interesting, there's a good deal of action every now and again, and the saxophones in the soundtrack are absolutely phenomenal. Definitely one I'm glad to have watched.

CLASSROOM OF THE ELITE — 4/10

Didn't like it, and that's saying something coming from me. The premise and setting were promising, and I actually love the art, but the show takes itself **way** too seriously, and lacks the subtle but extant comic relief that prevented shows like *Death Note* from devolving into pure cringe like *Classroom of the Elite* often did. One imagines at first that Ayanokoji is simply an unmotivated person, and that perhaps he and Horikita would one day warm up to each other as they braved the difficulties of high school together, but the ending monologue really kills it by revealing that he is nothing more than a husk of a person, having no empathy whatsoever and manipulating others to get his way. It's hard to have any sort of investment in such a character. Also, the fanservice-but-pretending-it's-not-fanservice is a bit much.

TOMODACHI GAME — 7/10

It didn't seem at first like my type, anime-wise, but I can definitely understand the appeal of Squid Game now. This show is what *Classroom of the Elite* could and should have been — dark, twisted, and seeming to be about one thing (debt) while really being about another (the establishment, manipulation, and intentional destruction of social relationships). The plot is all kinds of messed-up, and I legitimately

couldn't bring myself to watch one of the scenes in the final episode at first (if you've seen it, you probably know the one), but ultimately, Yuichi is a much better character than he initially lets on. His backstory and actions definitely suggest that he is a fairly psychotic individual, but he does show a legitimate degree of loyalty to his friends despite his willingness to be utterly contemptuous of others in service of winning the titular game. I'll most likely give the second season a watch when it releases.

I'm currently watching *Code Geass* at the recommendation of some members of the PMC and have a few others in mind to begin watching afterwards, so stay tuned for another collection of reviews in approximately 2–3 years.

yalevoylian

OVERWATCH 2 IS OUT

Overwatch 2 launched on October 4, directly after the deadline for production night of 150.2, and became playable that Friday. So, now that *Overwatch 2* has been about for nearly two weeks now, let's take a look!

- Three new heroes! Sojourn (the DPS I mentioned in 149.1), as well as Junker Queen (tank) and Kiriko (support). All of them are really fun to play
- They are also really weirdly balanced, in fact I find everyone is. Most games I either just completely slay or don't do anything effective as, which is strange. It might be because of the new 5v5 thing too.
- New maps — Paraiso and Esperanca (Portugal), in addition to new maps Circuit Royal, New Queen Street, Midtown and Colosseo. But at the same time, they removed all 2CP maps (Hanamura, Horizon Lunar Colony, Paris, Temple of Anubis and Volskaya), so we just got…a net increase of one. Actually, we got fewer maps, Rialto, Numbani and Havana all got shelved because they all have out of bounds environments the dev team doesn't want other people accessing.
- We seriously need more supports. We have 8 supports, 20 DPS and 10 tanks. The queue times in competitive are 15 minutes for DPS and tanks each, and 2 minutes for supports. Do the math.
- Wtf is up with the monetization here anyways? at least it's dissuding me from the temptation of buying a loot box, because everything here is so overpriced
- tldr blizzard give us the pve missions i beg of you please i need that sweet sweet story progression

skittlerc

OBSERVATIONS OF THE GREAT CANADIAN BAKING SHOW

For the past couple weeks, my partner and I have been watching an episode or two of the *Great Canadian Baking Show* to accompany our meals. It's a good show to watch to procrastinate and unwind with!

In case you're not familiar, it's a baking competition based off the vastly more popular *Great British Bake Off,* featuring 10 amateur bakers. Each week, one baker is eliminated and one is declared "Star Baker" (which doesn't really mean anything, since each week is a different type of challenge [Cake, Cookies, Bread, etc.]. You can be Star Baker in one episode and get eliminated in the next). There are two judges, who are actual professional bakers, and two hosts, who are professional annoying people. No joke, their jokes are what the prison guards in Guantanamo Bay play over the loudspeakers. If Satan truly wished to punish humanity, he's done it with these two bumbling fools who deadass EAT the things the bakers need to, y'know, bake their stuff.

Anyway, here are some observations I've made about the show.

TYPES OF BAKERS

1. Kindly old retiree that gets knocked out within the first 3 weeks (out of 8) because they insist on doing things "the way they've always done it."
2. Nice gay man that loves talking about his husband and probably owns an LGBTQ sports club (okay, the sports team thing only happened twice, but that's still oddly niche).
3. Talented Indian man/woman that makes it really far but always gets oofed by the judges because they bring their home country's flavours into a very traditionally Caucasian(?) dessert.
4. Hyper talented young woman in her 20s that destroys people who have way more experience than her through girlboss wizard baking powers (usually a graphic designer).
5. Asian baker who will make at least 1 black sesame, ube, or matcha dessert. Often talks about "going back to their roots."
6. People who cheat their way through technical challenges (where everyone tries to make the same dessert by using the same recipe, which has information missing) by looking at that one person who knows what they're doing.

STUFF THAT HAPPENS

1. That ONE person who does NOT (every fucking season) blind bake their pie crust and ends up with a soggy bottom.
2. Things will be judged as "overly sweet" or "too dry" which I guess is valid criticism, but that definitely stings considering each challenge is like, 4 hours long.
3. The judges will pretend like it's a very tough decision who to send home, even though it is blindingly obvious. Even to blind people.
4. Someone will drop a cookie or a cream puff on the floor and the editing will make it feel like the end of the world, even though the judges are just like, "oh no, you seem to be one short."
5. Cakes will be iced while they're too warm. I mean, it's a timed baking competition.
6. Someone is going to completely burn something, and still somehow have time to re-do it and recover (me with exams, but I digress).

FINALE EPISODE

So the final episode, episode 8, features 3 bakers gunning to win first place (there are no second or third placements). The following will happen in this order:

1. Heartfelt interviews about how much they loved baking on the show and the friends they made.
2. There is going to be one baker that is definitely not going to win, but we all smile and pretend that it's not a coin toss between the other two.
3. They will show little clips of their families being interviewed for the show. Heartwarming stories about grandmas will be given. Cute baby photos will be flashed on screen.
4. The final judging occurs and the grand prize, a glass cake stand with the words "The Great Canadian Baking Show" will be presented to the winner. Yes. That is the grand prize.
5. Joyful interviews with the finalists will be had and the credits roll.

And so on and so forth. OK, I might make it sound like a really formulaic and scripted show, but it really is a good watch. The baked goods are gorgeous and creative, and everyone is really sweet to each other! It's a good time. 5 seasons of sugar, spice and everything nice.

yummyPi

OBLIGATORY BREAK

Hey there.

Congratulations on reading through n% of this issue!

You're doing great. In fact, I'd go as far as to say that *you're* great, even if you don't think so. Make sure you take care of yourself, eh? Have a great day :D

ES_vm

AT LEAST YOU'RE NOT LIZ

SOME MIDTERM MOTIVATION FROM THE PRIME MINISTER OF THE UNITED KINGDOM

This time of year, many students are feeling the pressure of midterms, and with it, some bouts of self-doubt. Lots of people—particularly you first years out there—are wishing they had tried harder, studied more, or are even wondering if they belong at this school at all.

These feelings are normal. Everyone feels them. I bet every single one of your "perfect" classmates are feeling the exact same thing.

…but I bet hearing that doesn't help, does it? It didn't help me when I was a first year, at least. Instead, I'll try something that usually works for me: reminding yourself that it could be worse. You could be United Kingdom Prime Minister Liz Truss.

LIZ TRUSS, WEARING HER SIGNATURE DAY COLLAR (LOOK IT UP!)

Liz started her term on September 5th, just 2 days before you did. Here's what she's accomplished so far:

- Killed the Queen (see **mathNEWS** 150.1 for details)
- Released her first budget
- Crashed the economy with her first budget
- Sent the British Pound to historic lows with her first budget
- Had to unrelease her first budget
- Asked the IMF to bail out her country
- Fired her Chancellor after 38 days
- Started beef with France for no reason (1756 vibes)
- Made it so that no one in the UK can afford to heat their homes now
- Triggered mass labour strikes
- Gave the opposition party a 30 point lead in the polls
- Hit single-digit approval ratings

Maybe you failed a midterm, or are flunking a course, or are at your lowest point ever. But remember this: you have not fucked up *this* badly.

It takes shockingly little talent to be successful in the world. That's not to say you shouldn't try to be as skilled and qualified as possible, but when you inevitably fuck something up, don't stress it too much. Take it easy on yourself from time to time. You're doing better than Liz, after all.

Dick Smithers

word**GUESS**

Welcome back, players and spectators! It is time again for **wordGUESS**, the **mathNEWS** game where you guess a four letter word in five or fewer guesses over the course of six issues! It's funny how the numbers line up like that.

The gameplay is simple: I have a word in mind. You send your guess to me at <u>spam@tendstofortytwo.tk</u>, and I publish the emojis corresponding to your guess in the next **mathNEWS** issue. A **wordGUESS** row is just like a Wordle row, where 👍 means a correct letter in the correct position, 👀 means a correct letter in the incorrect position, and 👎 means an incorrect letter. With that out of the way, here's our returning guessers for this term's word:

- **eternallypuzzled:** 👎 👎 👍 👎
- **__init__:** 👎 👀 👍 👎
- **sherp:** 👎 👍 👎 👍
- **enamour:** 👀 👎 👍 👎

And our new players:

- **grass:** 👎 👎 👎 👎
- **John S. Street:** 👎 👎 👍 👎
- **Pikamon025:** 👎 👍 👎 👎
- **0.423:** 👎 👀 👎 👍

See you next issue!

tendstofortytwo

DREAM'S NEXT VIDEO IDEA

It's another face reveal, but he just puts the mask back on.

Anonymous

AN INVESTIGATION OF APPROVAL VOTING

About a year ago, I started writing a six article series about election systems. In it, I presented some problems which arise in the standard voting system where voters only vote for one candidate and in the system of instant runoff voting. I then presented a voting system designed to solve some of these problems. If you are interested in this, the first article in the series was published in 147.4 and the last in 148.3. One important voting system I did not consider in this series is approval voting. I want to take a look at this system now.

In approval voting, a voter can vote for as many or as few of the candidates as desired. The candidate with the most votes is the winner. In theory, any given voter will vote for all of the candidates deemed acceptable to that voter. This voting system is used by **mathNEWS** editors to choose which pizzas to order for production nights. (However, these elections are not always fair: editors have been known to veto a pizza which received a sufficient number of votes.)

Let's see how approval voting works in an example. This hypothetical election has five candidates: Cthulhu, the Kraken, the Antichrist, Voldemort, and Sauron. Let's say that voters vote as follows:

- 30 voters approve of Cthulhu and Sauron
- 10 voters approve of the Kraken, Sauron, and the Antichrist
- 15 voters approve of Voldemort, the Antichrist, and Cthulhu
- 25 voters approve of the Antichrist, Cthulhu, and Sauron
- 20 voters approve of Cthulhu, Sauron, and Voldemort

In this case, the five candidates receive the following amount of votes:

- Cthulhu: 90
- The Kraken: 10
- The Antichrist: 50
- Voldemort: 35
- Sauron: 85

Since it has more votes than anyone else, Cthulhu wins this election. This may seem like a good result, since 90 out of 100 voters approved of Cthulhu. However, there are many situations which could have led to these votes where a different candidate really deserves to win. For example, let's say that, of the 30 voters who approved of just Cthulhu and Sauron, 20 would prefer Sauron. Similarly, we could imagine that 35 of the 45 voters who approved of Cthulhu, Sauron, and a third candidate would have preferred Sauron to Cthulhu. In this case, at least 55 of the 100 voters prefer Sauron to Cthulhu. Why then does Cthulhu beat Sauron?

This problem with approval voting means that many voters will probably start to vote strategically, and not in line with the original spirit of the voting system. For instance, let's say that you approve of Sauron, Cthulhu, and the Kraken. However, you really like Sauron and you would much rather Sauron beat Cthulhu. You then check the predicted results of the election, and you find that Cthulhu is the most likely candidate to win, with Sauron likely to come in second. In this case, your best move would be to vote only for Sauron and the Kraken, even though you do approve of Cthulhu.

There are more problems with approval voting. For example, what counts as approval? In many elections, probably including our example one, none of the candidates are very good. It may very well be the case that you do not approve of any candidate. How do you vote in this situation? Should you vote only for the least undesirable candidate? If everyone does this, then approval voting becomes equivalent to the standard system, which has many problems of its own. Of course, if you vote for no candidates, then your vote has no effect on the election at all.

While approval voting is probably much better than the standard voting system where a voter can only vote for one candidate, it still has many problems which other voting systems do not have. An example of a voting system which does not have these problems is developed in the six part series previously mentioned.

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

EDITOR TYRANNY PART 387743298754
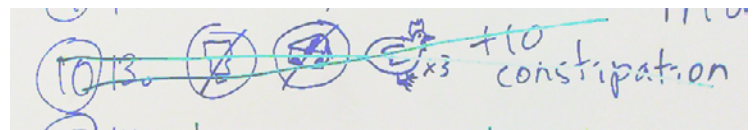
aphf

N TRANS

- door

creature_f

UNCERTAIN AFTERMATH
A BATHROOM REVIEWS POSTSCRIPT... SORT OF

Let's get this out of the way first.

There's no Bathroom Reviews this issue.

In fact, I doubt there ever will be again, at least by me. If someone else wants to pick it up, go for it.

Sorry.

Honestly, I think I did my job. I covered all the Math buildings and those directly adjacent to them, and since this paper's mostly for Math students, it should cover the basics. Although, admittedly, I still have had classes in many other buildings as a Math student, I wrote about a good percentage of campus. I'm satisfied.

I think the main reason this series is ending here is that this term I moved a tad further away from campus, which made it harder to walk into campus every time I wanted to use the washroom. I just lost motivation to make a longer walk, and my backlog quickly ran dry.

That happens, sometimes. A little change will cause you to just not want to do something that you were really engaged in before. Things don't last, change is the nature of life, et cetera.

It makes one wonder what the point of writing even is, if it's all transient. If I can't even offer the single concrete benefit of chronicling all the washrooms on campus, what's the point of a long drawn-out process that would never win me Article of the Issue or really stand out in an issue jam-packed with other writers' work?

I'm just one of the writers padding out the issue, increasing the page total of your **mathNEWS** issue to something big enough that you can whack a really big insect with it.

What makes **mathNEWS** great is also the curse of writing for it; anyone can write anything, with little to no editorial guidance to help narrow down your article.

mathNEWS is anarchy; we built it for that purpose, and there it lives, a little bubble of chaos inside the Math faculty, which one would think would be the most stable.

But no, we're weird, we're creative, we're brilliant, we've made these silly little issues every couple weeks for going on fifty years now, and we're not going to stop any time soon.

Because it really does matter. It mattered to me when I first came to Waterloo, because it told me that I would not be alone in my creative endeavours. It matters to me now, on this Monday night I sit here typing an article, alone in my room because I forgot Prod Night was happening until the night was almost gone, because even though I've ran out of space and time and bathroom stalls in this series I've been running for a term, I still want to contribute, to do what I can to help support this paper that's maybe only read by a few hundred students each issue, who pick it up, flip through it for a few minutes, and then toss it in the trash.

I know it's next to nothing, in the grand scheme of the world, that I write for **mathNEWS**. If I had never stepped into my first Prod Night or never picked up an issue, nobody would probably have thought issues of **mathNEWS** were missing anything, really.

But despite its hole not being noticeable, my work still helps make up the mosaic that makes this paper work. I know that if everyone was missing, I definitely would notice something. So that's why I think it's worth making an effort to put at least one article in every issue (and yeah, if you're reading this and thinking of coming out and writing for **mathNEWS**, do it, it's awesome! All the writers and editors are super great!)

So yeah, Bathroom Reviews will not continue. But my writing here will, and I plan to until I graduate in a couple years. Probably just more one-off articles, although maybe I will try and start up a series again. I dunno! We'll see! **mathNEWS** is anarchy, and so will my articles be. We'll have to see what the future will bring together.

Predap

A SONG TO A WRITER-TO-BE

(Sing to "Fly Me To The Moon" from the Neon Genesis Evangelion *soundtrack.)*

(No, I don't *know who Frank Sinatra is, stop asking!)*

Write me in **mathNEWS**
And let me print on letter sheets
Let me pour out your sweet thoughts
Across the campus streets

In other words, make me real
In other words, darling, speak me

Fill the page with words
That make them see the world anew
Show them what they long for
Tell them what you know is true

In other words, bare your heart
In other words, write your art

tendstofortytwo

THE REAL sexNEWS 4: WRITTEN BY SOMEONE WHO'S STILL HAVING TREMENDOUS AMOUNTS OF SEX ON A DAILY BASIS
WITH A SPECIAL PRESIDENTIAL APPEARANCE

Hey **mathNEWS**. You might have forgotten about my world-famous sex column where I give advice that is too dangerously effective to be published anywhere but here. But I promise — I did not forget about you. Every day I heard your cries, relentlessly researched the best possible ways to help, and then decided to ignore you all instead. But no more! I have returned to grace you with sexual wisdom that would never be taught to you in any of your math courses (unless you take calculus for Arts students). Let's get to your questions:

☙

HOW DO YOU PLEASURE A WOMAN?

In order to answer this, we need to dive a bit into history. For thousands of years, men and women have lived in complete harmony and understood each others' wants and needs. However, in October 1958 American physicist William Higinbotham decided to create an interactive computer demonstration for the Brookhaven National Laboratory's visitors day. The demonstration was a rudimentary but controllable simulation of tennis, and is now considered to be the first game playable on a computer. And thus by creating the earliest video game, Higinbotham became responsible for the first generation of people that could not understand pleasuring women. But do not worry — I had this ancient and forgotten art taught to me during a game of flip cup by a drunk psychology student. From my intricate understanding, you basically just get your hand down there and start throwing gang signs in the vagina until one of you passes out from exhaustion. It shouldn't be you, so remember to stretch beforehand!

SHOULD I SPICE THINGS UP BY BRINGING TOYS INTO THE BEDROOM?

That's a tough one. On one hand, I can definitely see how toys could really elevate things and bring both of you a new level of pleasure. On the other hand, you have to remember that real life isn't like the films we all watched when we were teenagers, toys can be hard to operate, need careful cleaning, and aren't a guarantee everything will instantly go smoothly. But hey, if you *really* want to bring your LEGO collection to the bedroom, who am I to stop you?

I WANT TO HAVE PREMARITAL SEX BUT I'M SCARED OF BEING PUNISHED BY GOD. WHAT DO I DO?

Do not worry! As a fellow God-fearing sodomite, I have devised an intricate plan to allow you to evade eternal punishment:

Everyone knows the religious definition of sex is when the man physically and repeatedly moves his penis inside the vagina. However, how could God blame you if your penis just *happens* to already be in a vagina, and the laws of physics simply move it back and forth for you? Therefore, you must dedicate your life to finding ground-shaking natural catastrophes. The second you find one that is above a 5.0 on the Richter scale, throw a mattress down, penetrate your partner, and let Mother Nature move you around like your perverted wingman.

Due to this simple loophole God has clearly failed to foresee, this process would transfer the blame for your deviance from yourself to the Earth's tectonic plates. And unless God decides to punish an entire planet for allowing you to bust a nut, I believe this would allow you to enjoy consequence free sex.

JUST EXACTLY HOW MUCH SEX ARE YOU HAVING?

This was a hard question to answer, simply because I just wasn't familiar with the field of math required to compute numbers of this enormous magnitude. So to help me figure this analytical problem out, I thought there was no better person to ask for help than the President of Math himself, Evan MathSoc. Here is a transcript of my interview with him:

methNEWS: Hi Evan, how are you doing?

Evan: Hi, I'm God-emperor of PMC and MathSoc.[1]

methNEWS: We've been friends for like a year. You don't have to introduce yourself like that.

Evan: Speak now or suffer.

methNEWS: Alright…I wanted to ask what kind of math tools I could possibly use to quantify numbers that are so astronomically high they might reach into the hundreds, maybe even the thousands?

Evan: That would be difficult, once you reach this magnitude our understanding of number theory stops making sense. However, you could potentially approximate it by using the semi-finite measures of power sets whose localizable properties are Lebesgue integrable.

methNEWS: I completely understand this, but could you explain it in simpler terms for the rest of the **mathNEWS** readers?

Evan: You should use C++ templates!
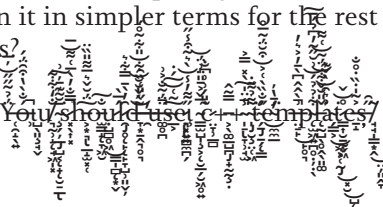
So there you have it folks, this question can't even be answered by our brightest and most power-hungry minds. However, using Evan's various magical methods I found this workable estimate for the amount of sex I'm having: more than you.

<div align="center">❧</div>

Since I graduated, screaming your questions in the middle of DC library is no longer an effective way to get my attention (although you should still do it regularly in case I ever come for a visit). Instead, feel free to write down your prompts on a piece of paper, address it to me, and seal it in a glass bottle. Then, throw the bottle through the window of your favourite engineering building. Once your hate crime appears in the news, TV stations everywhere will broadcast your note, and I will be able to answer your question promptly in my next article.

methNEWS

1. This is a real Evan quote and I have the screenshots to prove it

N TIPS FOR DATING A MATH STUDENT

- Don't!
- Be aware that if a student in the Factulty of Mathematics ever has sex, that would be a violation of Policy 71, with consequences up to and including expulsion from the University.
- Refrain from using the term "edging", instead refer to it as "the limit as you approaches cum" (see **mathNEWS** 150.2 for more information).
- For the love of God, do NOT install League.
- If you wake up one day to find League installed on your computer, call pest control and/or a priest.
- Keep your relationship spicy by reading each other your favorite articles from the latest issue of **mathNEWS.**
- Take them to Lazeez! I did this once! That's not a joke!
- Prove through induction that the probability you are going to dump them is proportional to the number of dishes they leave in the sink.
- Take them for regular walks, and be sure to expose them to enough sunshine and fresh water.
- Motivate them to shower by showering together.
- Note that they might regard having a threesome as "incorporating alternate genetic material into our group project."
- Make sure to maintain a respectable ratio of "touching ass":"touching grass."
- Note they will be unavailable every other Monday.
- If they struggle to solve a math problem, consider helping via induced post-nut clarity.

Dick Smithers

OH THE PLACES YOU'LL GO!

So what do I do?

So where do I go??

Thoughts spiralling on repeat around my mind.

I've been asleep so long and I'm dreaming to

<div align="right">Wake up!!</div>

There's too much out there to miss and

The future is a black hole and

We were here once but

I'm not here anymore

I mean not really

I mean I understand you now—

Really, I do.

But aren't you scared?

Sick of Losing Soulmates

SOME PREEMPTIVE NOSTALGIA

These are the nights that life is made of. Slowly, imperceptibly, they piece together to stretch across years. It's 3:27 AM, and there's space for nothing else in my brain but the words on my screen and the music in my headphones. These are the nights that we don't notice as they pass, but that we mourn the loss of once we realize they're gone. I can almost see my future self, reminiscing on the feeling I have right now and knowing I'll never get it back, just like I'll never feel the playful spirit of elementary school recess again. I'll never hear the buzz of my crowded high school cafeteria again. Soon I'll be describing whatever it is I'm feeling right now with some kind of imagery, and it'll be lost to me forever. But for now, I'll just do my best to pay close attention as life slips away from me one night at a time.

<div align="right">:)</div>
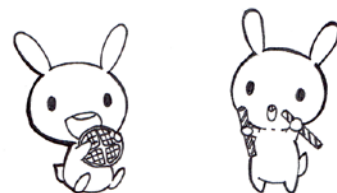
ANNOUNCING GREATEST EXPANSION OF mathNEWS IN UWATERLOO HISTORY

OVER $11 MILLION IN SUPPORT EXPECTED SOON

To students, staff, and faculty,

The steady increase of the Math Faculty has created strains and challenges on **mathNEWS**, especially with the 225% over-admittance in 2025 that brought a huge spike in **mathNEWS** content and readers.

If you are already a contributor to **mathNEWS**, you are probably aware of the policies the **mathNEWS** editors have put in place to respond to this challenge. Specifically, contributors are now limited to one guaranteed submission. This is due to the fact that the number of contributors have increased while the number of editor man-hours and printable pages have stayed largely the same.

To free students from these painful constraints, the University of Waterloo is pleased to announce a massive support package to remove these restrictions and moreover expand **mathNEWS**.

Firstly, major funding will be diverted to **mathNEWS** to hire multiple full-time **mathNEWS** editors each term to increase contributor capacity. These jobs will be posted on WaterlooWorks and thus be staffed by co-op students. To sustain the high quality of **mathNEWS** journalism, both the interview bar and the pay are expected to be highly competitive.

Secondly, due to the limitation of page counts per issue, **mathNEWS** will be spinning off several other university student journals, including the following:

- **mathNEWS** Business Week, a weekly magazine that will provide students the latest, hottest updates on the market and the financial system through highly mathematical and quantitative analysis done by our students in relevant majors
- The Pink Iron Warrior, a rebranding of EngSoc's The Iron Warrior which will be acquired by MathSoc as part of the expansion, will continue to deliver similar content as before but with more mathematical rigor (less rounding errors, more statistics, etc.)
- **profQUOTES**+, a spinoff of the **profQUOTES** section of **mathNEWS** that will now contain entire transcripts of lectures rather than quote snippets, collected by **mathNEWS** journalists who will attend and transcribe courses that feature frequently in **profQUOTES**
- **mathNEWS** Review of Books, a literary and cultural magazine with emphasis on mathematical texts, which we expect to be on the same level as the other prestigious literary magazines such as the New York Review of Books, London Review of Books, etc.

- MC Daily, a daily paper meant to give brief updates on recent events relevant to Math students and popular posts on r/uwaterloo

I look forward to a rejuvenated **mathNEWS** being a transformative force for the Math Faculty and possibly the university as a whole and would like to thank all students who have been part of **mathNEWS** both now and in the past.

Sincerely,

Vivek Goel
President and Vice-Chancellor

THE ENTRANCE TO THE SEVENTH STOREY

Strange things befall the asbestos-lined halls of the building
they call MC;
Those dimly lit ways have stood for many many days since
back in the 1960s;
The fluorescent bulbs have flickered and buzzed over those
halls so unnaturally,
And one night to my surprise, I found what lies past the
entrance to the seventh storey.

If you ask any soul how many floors the building holds, they
will no doubt reply "6
And beyond that's the roof, no lies, that's the truth, that is all
that there is in the mix"
At the start, I had faith in all that they'd relayed, so at first, I
thought it some tricks,
When it was late at night, to my considerable fright, I found a
higher entrance.

The way up was dark and beneath an old arch, there was a very
old door.
I listened all around and heard not a sound; the silence
seemed to roar.
I ascended the stairs with considerable care, the building was
dead as a moor.
I watched wide-eyed as the door swung wide, and I entered
the seventh floor.

My steps echoed in the void which was of all life devoid as I
did proceed
Dust was thick in the air, peeling paint was everywhere, this
place's age was clear to see.
Something made my heart stop as I glimpsed the walls' top; I
beheld what I could not believe
The stars glittered bright in the black skies that night, for
there was no roof above me

At that moment I heard sounds, I heard whispers all around, I
saw in the corner of my eye
A shadow walking past, but seemingly not all that fast, in fact
it seemed more to glide
I followed it some ways, until through a door it phased, so up
to that door, I did stride.
I opened that door and my jaw hit the floor—there were
dozens of the shadows inside.

The wisps were all shook, up to me they looked, distracted
from their studies
At first, all was dead until one spirit said, "Now we know it's
wrong but please
Do not be concerned, we come just to learn, and of all most
certainly
Don't tell the admin about our little study den, it's the only
place lit naturally."

Strange things befall the asbestos-lined halls of the building
they call MC;
Those dimly lit ways have stood for many many days since
back in the 1960s;

The fluorescent bulbs have flickered and buzzed over those
halls so unnaturally,
And one night to my surprise, I found what lies past the
entrance to the seventh storey.

aphf

SHOWER CONTROLS SUCK

Any technology goes through advancements and improvements over the years, but for some reason shower controls seem to be reverting, despite its appearances.

Sure, the knobs, levers, handles, etc., may all look shiny, sleek, and modern, but the underlying controls have gotten worse over the years. These days, just about every shower has only one axis of control. That is a terrible design! Where are the controls from even a decade ago, with two? Bring back the days where there were separate knobs for hot and cold water!

With just one axis of control, water pressure becomes tied with water temperature. Sure, for the most part you shower with warm water, but warm water at full pressure isn't always what you need. Also, there are surprisingly wide range of unexpected uses in the tub requiring varying water temperatures and pressures. I've had times where I needed just trickles of hot water, something impossible nowadays. Perhaps if the only purpose is a shower, it is adequate, but if any other use cases exist, one axis shower controls become too limiting.

Don't even get me started with faux two axis controls. Sure, theoretically you could control water temperature and pressure separately but realistically this is impossible. The design makes it so that you can go between no pressure (no water) and full pressure easily but anything in between becomes impossible to control with any precision. They basically become one axis controls.

Two axis controls are where it's at. You get to choose whatever exact water temperature you need with a full range of water pressure. It is a clearly superior way to control water.

In this way, it is surprising that one of the places I used to live, with two axis shower controls that look like they're from the 80s, was better than a different place with one axis shower controls that are not even five years old. In terms of university residences, I have yet to encounter any two axis controls. They have thus far all been either one axis or faux two axis controls.

This is the reason why I bought a special shower head and brought it with me. It has a particular function where there is a sliding switch that acts as the water pressure control. This means it doesn't matter what type of controls the shower has. As long as I install this, it will become two axis controls.

boldblazer

VAPING HAMLET

There's a hidden gem nearby: the town of Stratford, where the Stratford Festival does various live theatre productions. It's only half an hour away (by car, so probably rent one), and since live theatre is probably dying for any young attendees, tickets are hugely discounted if you're under 30. If you want the cheap seats, they're only $19, and the best ones in the house (within spitting distance) go for $49.

I first went to Stratford to see *Chicago*, which is a great musical in its own right (and basically has a proto-Saul Goodman in it), but today I'm going to talk about the performance of *Hamlet* I saw last weekend.

I was first intrigued by a sign I saw while waiting in line for *Chicago*:

> …*this performance of Hamlet… uses e-cigarettes…*

This could only mean one thing: Hamlet vapes. I had to see it.

Unfortunately, this ended up being a misleading sign. To my great disappointment, Hamlet does not vape, though he sits next to Rosenstern when he does.

Luckily, the play was so good that it made up for this major omission.

First, apologies to any Shakespeare enjoyers in the audience, who I'm sure are going to read this article and accuse me of not paying attention in English class (fair). But, I never saw a live performance of *any* Shakespeare play during my compulsory education, and I think the way we're taught Shakespeare (listening to your untalented self and your equally untalented classmates butcher line readings) makes the play much more opaque.

So, if I mention some insights that are obvious to experienced *Hamlet* experiencers, blame the education system.

First, the staging really did add a lot. Like a lot of people, I vaguely knew the plot of *Hamlet* but didn't really grasp the details; seeing the play performed, instead of just read, clears those details up. I didn't realize just how *silly* Polonius is meant to be as a character until I saw his actor actually performing his lines.

Like you may have grasped from the vaping, there were a few changes made to modernize the play. Instead of reading letters from Hamlet, Polonius reads through Ophelia's phone. Rosencrantz and Guildenstern dress like people who really did just step off a university campus. Hamlet and Laertes dap each other up when they meet. Again, these help clear up the details. In particular, the palace guards are now dudes in suits with guns, like modern security teams. In the scene directly after Hamlet kills Polonius (sorry, spoilers), the lights go down and the security people draw their guns and begin "searching" the stage with their flashlights out, which

really drives home the graveness of Hamlet's actions, again something I missed when I first encountered the play.

And, of course, the acting is simply leagues better than anything you're likely to get in a school setting.

In short, if, like me, you associated Shakespeare with impenetrability and boredom, go and see a live performance. You might change your mind.

UW Unprint

N OF THE MOST GABAGOO INTERVIEW QUESTIONS I HAD THIS CYCLE

- "If you had a magic wand and waved it, and when you waved it you got $10 million, what would you do?"—*PE Analyst*
- "What did you have for breakfast this morning? How would that contribute to your working capabilities if you started this role today?"—*VC Analyst*
- "How would you explain what EBITDA is to a 6-year-old?—*IB Analyst*
- "Describe yourself in 3 words but they must be at least 8 letters long"—*Equity Research Analyst*
- "I thought you said you liked economics? Why was it your lowest grade in [1B]?"—*PE Analyst*

bpipicelli

N THINGS THAT ARE ANNOYING ABOUT APPLYING TO GRADUATE SCHOOL

- Some professors don't put on their website whether or not they are taking new students
- Waiting for profs to respond to your emails asking them if they are taking new students
- Sending a follow-up email when the prof doesn't respond
- Vague admissions requirements
- Entering the same basic personal information into every school's crappy website
- Every school having a different application deadline

i miss ouac

32
A PARODY OF 22 BY TAYLOR SWIFT

It feels like a perfect day
To dress in a T-shirt
And write on a chalkboard
Uh-uh, uh-uh
It feels like a perfect day
To head down to MC
And teach about measures
Uh-uh, uh-uh

Yeah
My legs and arms and back hurt at the same time
And WebMD says that I'm gonna die
Today's the day when we remember all the deadlines
It's time, oh-oh

I don't know about you
But I'm feeling thirty-two
Everything will be alright if
My toddler doesn't poo
How was reading week?
What did you all do?
I'm just glad I'm not out of touch
Despite the fact that I am
Thirty-two, thirty-two

It seems like one of those days
First years are too young
And grading's no fun
Uh-uh, uh-uh (Who's Egorov, anyway? Ew)
It seems like one of those days
We run low on time
And end up "Why?"-ing
Instead of proving

Yeah
My legs and arms and back hurt in a good way
Google says it means they're healing, oh yeah
Today's the day when we get all the headaches
It's time, oh-oh

(Hey!) I don't know about you
But I'm feeling thirty-two
Everything will be alright if (Ooh)
My toddler doesn't poo
How was reading week?
What did you all do?
I'm just glad I'm not out of touch (Alright)
Despite the fact that I am
Thirty-two (Oh-oh-oh-oh, oh), thirty-two (I don't know about you)
Thirty-two, thirty-two (Ooh)

It feels like one of those days
Need lots more groceries
It feels like one of those days
There's lots of cleaning
It feels like one of those days

Shit, it's 10:30
I gotta have sleep
I gotta have sleep (Sleep)
Woah, ooh, yeah, eh-yeah

(Hey!) I don't know about you (I don't know about you)
But I'm feeling thirty-two
Everything will be alright if (Ooh)
My toddler doesn't poo
How was reading week? (How was reading week)
What did you all do?
I'm just glad I'm not out of touch
Despite the fact that I am (Fact that I am thirty-two)
Thirty-two (Woah-oh), thirty-two (I am)
Thirty-two (Yeah, yeah), thirty-two (Yeah, yeah, yeah)

It feels like one of those days (Thirty-two)
Need lots more groceries
It feels like one of those days (Thirty-two)
There's lots of cleaning
It feels like one of those days (Thirty-two)
Shit, it's 10:30
I gotta have sleep
I gotta have sleep

someBODY

MAPLE LEAF RAG

It obviously goes like

duh duh duh, doodeedoodee dooo

And is a piece of classical music.

Töne deaf

EPISODES 44 AND 45

Enjoy Episode 44 and 45 of the MathSoc Cartoons series: <u>CS 136: Modules</u>, and <u>MATH 137: Limits and Convergence</u>!

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

MathSoc Cartoons

CS 136 — MODULES

STORY BY: SHRIYA KULKARNI
ART BY: JULIET WANG

IT WAS JUST LAST SUMMER THAT I FINISHED CODING 100 DICE GAMES AND FELT JOY BEYOND BOUNDS. BUT EACH TIME I HAD TO UPDATE ANY FUNCTION REPEATED IN THEM, I DROWNED IN DESPAIR.

THE CALI GRIND PROJECT 97

1. Generala
2. Ludo
3. Snakes & Ladders
4. Kismet
5. Midnight
6. ~~Bunco~~
7. Diceball

THIS TIME, THE CULPRIT WAS roll_die() YET AGAIN, I HAD SPENT HOURS COPY-PASTING A CODE SNIPPET FOR A TINY CHANGE. FOR HOW LONG WOULD IT GO ON LIKE THIS?

```
def roll_die():
  l = [a, b, c, d, e]
  n = random.choice[l]
  return n
```

```
def roll_die():
  l = [a, b, c, d, e]
  n = random.choice[l]
  return n
```

```
def roll_die():
  l = [a, b, c, d, e]
  n = random.choice[l]
  return n
```

```
def roll_die():
  l = [1, 2, 3, 4, 5]
  n = random.choice[l]
  return n
```

```
def roll_die():
  l = [1, 2, 3, 4, 5]
  n = random.choice[l]
  return n
```

```
def roll_die():
  l = [1, 2, 3, 4, 5]
  n = random.choice[l]
  return n
```

ludo.py　　midnight.py　　bunco.py

I LOOKED UP TO THE SKIES FOR HELP AND WAS MET WITH JUST THE SIGN I NEEDED — A CALL TO ASK MASTER LEM FOR HIS DIVINE GUIDANCE.

WHAT IF I SHOWED YOU HOW TO WRITE roll_die() JUST ONCE, AND IMPORT IT INTO OTHER FILES FOR USE? ALL FOR THE CHEAP PRICE OF $599.99?

YOU CAN DO THAT?

OMG SO CHEAP

LET ME INTRODUCE YOU TO MY ALL NEW CREATION:

MODULEMS™

FOLLOWING HIS GUIDE, I JUST DIVIDED UP REPEATED PARTS OF MY GAMES INTO MODULEMS, EACH HAVING MULTIPLE RELATED FUNCTIONS

```
def roll_die():
  .
  .
def roll_20_sided():
  .
  .
def roll_3():
  .
  .
def roll_2():
  .
  .
```

```
def move_steps(n):
  .
  .
def turn_right():
  .
  .
def turn_left():
  .
  .
def flip():
  .
  .
```

dice_modulem.py　　piece_modulem.py

THE INTERFACE FILES COULD ACCESS ALL OF THEM BUT GET THIS, SO COULD THE OTHER MODULEMS! USING THEM HAS MADE UPDATING FUNCTIONS SO EASY!

```
def roll_die():
roll_20_sided()
roll_3()
roll_2()
```
dice_modulem

```
move_steps(n)
turn_right()
turn_left()
flip()
```
piece_modulem

```
from dice_modulem import
 roll_die
import pieces_modulem
...
```
ludo.py

```
import dice_modulem
from pieces_modulem import
 flip
...
```
midnight.py

```
from dice_modulem import
 roll_2
def give_2():
 print("2")
```
two_modulem.py

```
import pieces_modulem
import dice_modulem
import two_modulem
```
modulems_modulem.py

THE ADVANTAGES ARE UNLIMITED, MY FRIENDS, TRY MODULEMS ONCE AND YOU'LL NEVER CODE ANY OTHER WAY!

Multipurpose Modulems

- Can be reused
- Easier to understand, maintain & debug code
- Changes can be made only once to alter many different programs

PRO-TIP

MODULEMS ARE BEST USED WITH THE FOLLWING FEATURES:

1. **HIGH COHESION** — PARTS OF A CODE BASE THAT ARE RELATED TO EACH OTHER ARE KEPT IN ONE PLACE.

2. **LOW COUPLING** — UNRELATED PARTS OF THE CODE BASE ARE SEPERATED & HAVE LOW RELIANCE ON EACH OTHER

CUT

SO, DID YOU ALL LIKE OUR NEW AD?

WITH ALL MY FLAWLESS ACTING.

FOR MY BRAND NEW PRODUCT?

hehe

Pat Pat

We're such a good team

AREN'T THESE JUST MODULES LEM? THEY'VE BEEN AROUND FOR SOME TIME NOW...

SORRY WHAT? CAN'T HEAR YOU OVER THE CHA-CHING OF THE NEWLY ACQUIRED FUNDING FOR MY STAND-UP SHOWS >:)

YEAH, I'M SURE MATHIEU KNEW TOO -- DIDN'T HE TELL YOU?

WELL...

BRUH

wait a sec...

MATH 137 – LIMITS AND CONVERGENCE

STORY BY: MARCUS CHAN,
ART BY: AICHA GHIDAOUI

FOR LACK OF A BETTER TITLE: NEW gridWORD HAS DROPPED

gridCOMMENT *150.3*

Annyeonghaseyo!!

That's a little Korean for you BTS gamers after the announcement of BTS being enlisted in the military :hand_with_index_finger_and_thumb_crossed: (I was paid to say this).

Once again, I'm always happy too see you all trying your best on **gridWORDS**, hopefully you have fun solving them! It's always great solving clues and thinking about a word differently! That kind of thinking is what helps make math students do great, so I'm sure you all do well at it :)

There was less solutions this time, let's shoot for some more next time! Remember, there's a CnD gift card on the line!!! Some answers to last issues **gridQUESTION** ("If you could only have one, would you have this cool rock I found, or Lazeez with 12 lines?") were:

- *Jason Cannon:* "may I substitute for goose?"
- *Tanisha:* no response 🤕

- *chi:* "dinner with jay z"

You all did great with your solutions! Tanisha, please go to bed before 1 AM!! Jason Cannon definitely won overall however by sending in a picture of a raccoon eating a donut. Please reenact this photo with a donut from CnD when you use your gift card! To Jason Cannon, whenever you happen to be around MC 3030 please swing by to collect your prize! :)

This issue's **gridQUESTION** is: "Who is your favourite professor?" I'm honestly curious to hear what everyone has to say for this.

Be sure to send solutions and your **gridQUESTION** answer to mathnews@gmail.com before 6 PM on October 31st (before you go trick-or-treating, obviously)! I'll see you all then, good luck on your midterms in the meantime! 😊

Wink wonk

ACROSS

1. Followed by -en, meaning frequently
4. Standard deviation symbol
9. Puts two and two together
13. Kind of shot
14. Apple gizmo
15. Like some gases
16. What a fish is when winning the lottery*
18. Asian gambling destination
19. One who gives their organs, e.g
20. Summer cooler
21. Taken wing
22. Gather on the surface, chemically - similar to absorption
24. Varnish ingredient
26. Modify
27. "Sure"
28. Canine cry
30. Poplars
32. Plunge
34. That girl
36. Frisk, with "down"
37. Inflamed lymph nodes at the back of your mouth
41. Hawaiian garland
42. Emergency ___
43. Opposite of trans
45. Fine cotton threads
48. "Sesame Street" watcher
50. Start to fall
52. Concert equipment
53. Small songbird
56. Blue stone from Minecraft
58. Malice
60. Court divider
62. Skedaddle
63. Candle holders?
64. A woodworking fish*
66. Ready
67. Arctic ___
68. Blunder
69. X-ray units
70. Capital of East Flanders in Belgium
71. Colorant

DOWN

1. A day without work
2. Filled with water
3. An extinct dog who helped cook in the kitchen
4. Rush
5. Whose tracks you may cross on your way to DC
6. Tennis's Steffi
7. Iron or gold, e.g
8. "Gladiator" setting
9. Restorative drug
10. What a fish does when receiving an encrypted message*
11. Entice
12. Doubles' jobs
15. "This tape will self-destruct..." org.
17. Also
23. What a fish might be in a jazz band*
25. Hill building
29. Golden ratio symbol
31. What one does for US college applications
33. A person who conducts or analyzes opinion polls
35. Caribou kin
38. Born, in France
39. On, as a lamp
40. Located
44. Grey-white and lustrous
45. East Indian sailor
46. Old Chevy
47. Like a laced fish party punch
49. Skill
51. Trudeau Sr.
54. Wearing a disguise, informally
55. Train
57. Kind of state
59. "C'___ la vie!"
61. Leaves home?
65. A stovetop tool

Drop your grid**WORD** solutions off at mathnews@gmail.com. Or not, I don't care.

AN APATHETIC math**NEWS** EDITOR

lookAHEAD

LAST ISSUE'S gridSOLUTION

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

RE: N REASONS TO VISIT EV3

There exists an article in **mathNEWS** issue 150.1 titled _N Reasons To Visit EV3_. It has come to my attention that Math CnD is open. Hence an amendment has become necessary and is as such:

- Touch grass (please do this)
- See the sun (I know you don't)
- There are windows (MC does not have windows)
- ~~Math CnD is not open (it will not open)~~ (it is now open)
- There are outlets (my computer is running out of battery as I write this article)
- I need friends (please visit me)

It is nice to see EV3.

Trust me, I live there.

ES_vm

NUT

Anonymous