mastHEAD

"WHAT SHOULD WE DO WITH THE STOCKPILE OF OLD ISSUES IN THE OFFICE?"

You might've noticed the sudden and abundant appearance of what's likely several metric tons of old **mathNEWS** issues outside our office recently. OK, it's probably not *several metric tons*, but it's a lot. They're heavy. And very space-consuming.

These issues range from 1989 to 2013 or so, but most lean on the newer side. Why are they there, you ask? Well, we're running out of filing cabinet space, and it turns out we had an entire drawer being taken up by stacks of leftover issues. Probably extra issues they put on the stands but that didn't get taken? There were some weird ones in there, so who knows?

We *also* found a bunch of envelopes with a few extra copies of *even older* issues from, like, the early '80s. Not sure what to do with them, but you can really tell they had a hard time getting envelopes: most of them are re-used with some shipping address or professor's name scratched out with marker on the front. Dark times for **mathNEWS**' chequebook.

Hmm—you know what? Maybe this was all calculated by the editors all those years ago. Maybe they stockpiled their issues so that we'd have to get rid of them one day—and, furthermore, they knew we'd feel it a waste to just throw them out, and so they knew we'd inevitably be forced to put them on the stands and hence propagate their words again, ten years after the fact. So clever; they really planned out everything. Maybe *we* should start stockpiling issues too…

Anyway, I hope the old issues help tide your insatiable thirst for **mathNEWS** in the intervening fortnight between new issues coming out. Plus, they make a good collector's item! Maybe you can pawn them off in 20 years for a profit or something. I'm sure once our office burns down and we lose our archives, you'll be able to rake in lots of cash selling those back to us.

Well, enough about our surplus of issues from 2008 with shitty JPEGs plastered on the front cover; *this* issue has it all. If you're in the market for **profQUOTES**, drawings of geese, eldritch programming languages, 6:00 AM bagels, debt collection, or a signature Wink wonk **gridWORD**, read on and try to contain your anticipation. See you again next fortnight!

evaluatED
Editor, **mathNEWS**

Predap	Grind them up and mix them into the food sold at the C&D so that they can truly become part of the Math faculty.
Wink wonk	Reenact Fahrenheit 451
yummyPi	Shred em up for a giant paper mache goose sculpture
normalparameters	make an earth sandwich but the bread is **mathNEWS**
Dick Smithers	(chanting) BONFIRE BONFIRE BONFIRE BONFIRE BONF
lwo	Send them to math clubs in universities around the world!
Xx_420SonicFan69_xX	**mathNEWS** eating contest
molasses	photocopy them. make more. distribute copies to the entire population of new hamburg
Robbot	Build a cubicle with them.
water	put them next to the Finchey memorial on the 7th floor of MC
nazz	i know a great focaccia recipe that calls for old **mathNEWS** issues!
Lars Nootbaar	White out the original date, put April 31st 1856, and sell for profit on Pawn Stars
hotfemoid	1:1 scale paper mache models of all of the editors for permanent display in the cnd.
tendstofortytwo	Put them all on the shelves on April 1 to gaslight everyone into thinking it's 1985.
aphf	make a life sized papier-mache MC
yet another waterloo goose	use it as a convenient **mastHEAD** question topic
boldblazer	Just take a room in MC and create a **mathNEWS** archive and museum.
tr1e	Print new issues on the old issues, and then print the newer issues on those, and keep doing that til its just a black smear of ink
distractED	taste test
evaluatED	Punch cards
awED	Re-publish them, nobody will notice

ART(ICLE) OF THE ISSUE

This fortnight's winner is Not a N*rd for *The Life Cycle of a Goose.* Come claim your prize at MC 3030!

awED
Editor, **mathNEWS**

No pizza better than none pizza.

AWAB QURESHI, **mathNEWS** EDITOR FOR SPRING 2023
ALONG WITH EVAN GIRARDIN AND DANIEL MATLIN

mathASKS 152.2
FEATURING PROFESSOR JEFFREY SHALLIT

JEFF: WHAT IS YOUR FAVORITE BATHROOM ON CAMPUS?

This is Canada. You're supposed to say "washroom". 5 marks deducted.

But what a great question! It's hard to choose—there are so many good ones. One that comes to mind is M3 3902/3903. The design is excellent: spacious, well-lighted, accessible, and (importantly, in this time of COVID) well-ventilated. And the lack of doors means that you don't have to touch anything on your way out, after you wash your hands.

On the other hand, if you want some privacy, there's always DC 1931/1932, located in a rather obscure archipelago of the Davis Centre.

TENDSTOFORTYTWO: WHAT IS A PARTICULARLY FUNNY CASE OF PSEUDOMATHEMATICS THAT YOU HAVE DEBUNKED? (ASKING SO I CAN WRITE MY NEXT ARTICLE SATIRIZING IT/ MAKING A CULT OUT OF IT, WHATEVER SEEMS APPROPRIATE.)

Probably the guy who tried to pass off a bogus self-invented "time principle" as some sort of standard statistical tool, in order to claim that prophecies from the Christian bible are miraculous. See http://recursed.blogspot.com/2008/04/lying-for-jesus-mathematically.html.

JEFF: WHAT'S YOUR FAVORITE COURSE TO TEACH?

My favorites are CS 341, CS 360/365, and CS 462.

I taught software engineering once at Waterloo. But after I covered research papers casting doubt on the usefulness of some things previously taught in the course, they never asked me to teach it again!

LABYRINTH: WHAT'S YOUR BIGGEST CONCERN WHEN IT COMES TO THE FUTURE OF ETHICS IN COMPUTING?

The misinformation crisis, where conspiracy theories and lies are weaponized by coordinated teams of state-sponsored bad actors (for example, Glavset in Russia) to create chaos, sow distrust, undermine needed action (e.g., vaccination, preventing global warming), and manipulate financial markets. In the short term, this is much more damaging than any risk from AI. Unfortunately, I have no idea how it can be easily fixed, since heavy-handed solutions are likely to be even worse than the disease.

PREDAP: HOW DO YOU FEEL ABOUT THE IMPENDING CONSTRUCTION OF M4?

It seems a shame to me that we didn't name the math buildings after the Mathieu groups. We could have called them M_{11}, M_{12}, M_{22}, M_{23}, and M_{24} instead.

LWO: ARE YOU USING THE UNIVERSITY'S COMPUTERS TO FIND A MERSENNE PRIME?

No, but I use computers routinely to do more interesting mathematics than that! One of my recent big calculations was on Ian Goldberg's Ripple cluster, and involved automata with hundreds of millions of states.

FULL OF TEA: COFFEE OR TEA?

Definitely coffee. For me, tea is something you drink when you are ill.

NESCAFÉ HAZELNUT: WHICH ONE DO YOU PREFER FOR MAKING INSTANT COFFEE: MICROWAVE OR KETTLE?

Who bothers with water? I just eat a spoonful of Nescafé with yogurt. Yummy.

NOTAGOODWRITER: PEOPLE HAVE TOLD ME YOU ARE AN EXPERT OF WORDS. ARE YOU A GOOD WRITER, THEN?

Dad published five detective novels and Mom published four romance novels. Maybe that explains why ich bin un vrai expert in several languages.

My favorite English word is "twilight", but "petrichor" is a close second.

JEFF: HOW DOES NUMBER THEORY HAVE ANYTHING TO DO WITH FORMAL LANGUAGES AND AUTOMATA?

There are lots of surprising connections, related to the representation of numbers as strings of digits. We can represent numbers in base k, or in more exotic systems such as Zeckendorf representation. Then automata can process these strings of digits in interesting ways. I wrote a book about this with Jean-Paul Allouche, called "Automatic Sequences".

In some cases, methods based on automata give the best known results for some number-theoretic problems. One that comes to mind is a recent paper of Burns on the number of integers n such that $n!$ is a sum of three squares (see https://arxiv.org/abs/2203.16469).

Even more fun is the fact that there is a decision procedure for automatic sequences that can prove theorems about them simply by stating the claim in first-order logic. This procedure was implemented by my master's student Hamoon Mousavi, and it's amazing how much mathematics you can do with it.

INLAW: HOW/WHY DID YOU GET THE MIDDLE NAME "OUTLAW"?

I once spent the night in jail in Sioux Lookout for dividing by zero.

The real answer is kind of boring. "Outlaw" is my mother's maiden name; it's a somewhat common surname in North Carolina, where her father was born.

I do have a great-uncle who was a safecracker and who escaped from a Virginia state prison in 1928. He was a real outlaw!

#1 mathNEWS FAN: DO YOU READ mathNEWS? WHAT DO YOU THINK OF mathNEWS?

I used to read it very often, mostly for profQUOTES. Not so much these days, because of the pandemic. And besides, since I am an old fogey, I don't understand most of the references.

JEFF: WHAT'S THE BEST PART OF BEING A PROFESSOR? WHAT'S THE WORST PART?

Best parts:

- Working on exciting research problems with students and other profs who are much smarter than I am.
- Walking into the first class on a September morning and seeing all the bright, eager faces.
- Hearing from students years later how much my classes taught them. It doesn't happen that often, but when it does, it's wonderful.

Worst parts:

- Dealing with grade-grubbers who only care about the mark that ends up on their transcript.
- Cheating and plagiarism.
- The increase in the number of university administrators, especially in "rebranding" and finance.

DISTRACTED: YOU WROTE SOME STRONGLY OPINIONED ARTICLES IN THE LATE 90S ABOUT PROBLEMS YOU PERCEIVED TO EXIST AT UWATERLOO; FOR EXAMPLE, "WHO'S AFRAID OF THE BIG BAD NET?" (WHICH MENTIONS FORMER mathNEWS WRITER BRAD TEMPLETON) AND "IMPROVING THE UNIVERSITY OF WATERLOO: A MODEST PROPOSAL". DO YOU FEEL THAT THE ISSUES YOU DESCRIBED IN THOSE PIECES STILL EXIST/HAVE CHANGED? IF THEY STILL EXIST, HAVE YOUR OPINIONS ON THEM CHANGED AT ALL?

I think I didn't sufficiently consider the potential risks arising from disinformation spread by coordinated teams of state-sponsored bad actors (see above). But, to be fair, I never heard that particular risk mentioned in any of the early discussions about Internet censorship.

Class sizes at Waterloo are still much too big!

EVALUATED: WHAT'S YOUR FAVORITE PROGRAMMING LANGUAGE?

Definitely APL. I've used it since 1973. Talking points:

- A functional language based on arrays (and arrays of arrays, etc.)
- Invented by a Canadian — Kenneth Iverson — who won the Turing award.
- Free version available for Macintosh at dyalog.com.
- You can get programs written and running in APL faster than any language I know.

EVALUATED: I UNDERSTAND YOU'RE RETIRING NEXT YEAR. HOW WOULD YOU LIKE TO BE REMEMBERED AT WATERLOO?

There is a rather unimportant constant named after me, with the value 1.369451403993770058435279242… (see https://arxiv.org/pdf/1806.03651.pdf). What I would really like is to have this constant engraved in the stairway of MC, with all the other more famous constants, in the appropriate place between the 1st and 2nd floors. Can mathNEWS make that happen? Of course you can.

HOW TO CREATE A GOOD USERNAME IN JUST TWO EASY STEPS

Most of us have been there. You're making a social media account or submitting a mathNEWS article or what have you, and the stakes are high. Whichever handle you choose will be what everyone knows you by, forever! (Or at least until you change it, probably.) So how on earth do you choose a good username? Well, here's my personal two-step process:

1. Start with one word. It helps if you choose something that will stay meaningful to you for a long time, and that you can be confident representing yourself by. It could be your real name or something else entirely, but try to keep it relatively simple — often, people will just shorten a long name anyway. I chose the word "lynx" because the word looks cool and lynxes themselves are also cool.
2. Here's where you turn it from just a word into something unique: modify it in an interesting way. This could take many different forms — changing some letters, adding a prefix, reversing it, or any combination of those, for example. Personally, I'd stay away from numbers or symbols — often they're not very memorable and can be replaced with something more interesting. This step isn't strictly necessary, but it definitely helps in my opinion. I added a play on words to mine. Hyperlinks/lynx. Haha.

Finally, knowing you have chosen well, you can take a satisfied look at your chosen pseudonym:

MATHSOC SEZ

MATHSOC WRITES AN N THINGS ARTICLE

As the term rolls into its second month, you're probably wondering what MathSoc has been up to, and what we're doing for you. Here's some updates cooked up fresher than CnD's tasty offerings!

N POSITIONS OPEN IN THE MATHSOC GENERAL ELECTIONS

This is on now! This is where you get to vote for the President and VP Academic for next term, as well as the student representatives who sit on MathSoc Council and represent students of all academic programs in our advocacy efforts! Nominate yourself or endorse someone else. Give the students in your program representation!

Nominations and voting happen at `https://vote.wusa.ca/`. Keep an eye out for the candidates' platforms during the campaigning period, and don't forget to vote!

ELECTION TIMELINE

June 5th – June 13th: Nomination period
June 14th: All candidates meeting
June 15th – June 20th: Campaigning period
June 21st – June 23rd: Voting period

N MATHSOC EVENTS TO LOOK OUT FOR

- **Summer Social — June 15 | 6 – 8pm | SLC 1123**
  Join MathSoc for our first-ever summer social, complete with food, Karaoke, and of course, fun! Sing those simmering summer nights away~
- **Party with Profs — July 7 | 5 – 7pm | Grad House**
  Join MathSoc for our termly Party with Profs event! Grab a bite and have a drink with your favourite profs in a chill, non-academic setting. Or, even better, ask your profs to come join in on the fun!
- **Games Nights — biweekly | Math CnD!**
  We'll provide the games and snacks — all you have to do is bring yourself, and an enthusiasm for games and hanging out with friends! Time and date of the event TBD.
- **MathSoc Semi Formal — July 14 | Time and Location TBD!**
  Keep your eyes and ears peeled for the upcoming S23 MathSoc Semi Formal! While ticket sales aren't available yet, they'll be out soon. A wonderful night of dancing with friends, music, refreshments, what isn't there to look forward to? Get ready to rock, MathSoc!
- **MathSoc's GM — July 19 | 6 – 8pm | M3 1006**
  Come to GM. Come to GM. Come to GM. This is where *you* get to vote on important issues in the Faculty of Math, find out about what your MathSoc Execs have been doing, and also get free food! If you're interested in sitting on MathSoc's Board of Directors, this is the place to show up and nominate yourself. Come to GM.

N THINGS MATHSOC IS DOING FOR ADVOCACY

It's not just VPA and President that do advocacy — but all of Council, with the help of everyone that comes to us with concerns. We don't do any of this alone — it's a group effort.

- **Waterloo Works Massive Update:** that's right. Waterloo Works is getting a re*work*.
  - The Search and Apply modules (subpages) are getting front-end and back-end updates.
  - There are a lot of other quality-of-life (QoL) updates such as changes to the Shortlist feature, where users can add tags to specific postings or put postings of choice in folders.
  - CEE is aiming to incorporate UI/UX changes from WaterlooWorks Chrome extensions into the native website.
  - MathSoc is currently looking for student opinions on Waterloo Works so that we can bring them to CEE. Let us know — reach out to `vpa@mathsoc.uwaterloo.ca`.
  - ETA: January 2024 (Winter 2024) for students to apply for the Spring 2024 co-op.
- **PD 8, Intercultural Skills**, is getting rewritten!
  - They're editing and reworking the course content, but the difficulty of the course will remain the same.
  - The current content of the course is informative but presented in a very negative attitude — this is not okay.
  - The VPA is sitting in on meetings about this rework and bringing student concerns to be discussed.
  - ETA: Spring 2024
- **More CEE News:** longer coop periods might be a possibility!
  - CEE mentioned there are potential plans to add 12-month and/or 16-month co-ops onto WaterlooWorks.
  - The VPA is bringing student concerns to the folks about CEE about how this would affect co-op sequences and job searching.
- **Math Strategic Framework Committee x Waterloo at 100**
  - The Math Faculty is looking for student opinions on how the Faculty of Math can proceed in following the guidelines set out for their "Waterloo at 100" vision.
  - The MathSoc President attended this meeting. Some issues brought up involved: more collaboration for Math students, both in and out of class; Math student space; accessibility; Equity, Diversity, Inclusion, Anti-Racism and Indigenization (EDI-R & I) and incorporating it into courses; and the Faculty's mental health support for students, to name a few.

- **The VP Academic has multiple review sessions planned** to help ensure you get all the practice you need!
    - Finals review sessions: MATH {128, 136, 138, 235, 237, 239}
    - Midterm review sessions: MATH 239
    - More details to come—check out the MathSoc socials for more!
    - The VP Internal and President have mental health events and initiatives planned for the term, including destress workshops and campaigns on social media.
- **The President is working on making MathSoc more friendly to the average student** that wants to get involved or know more.
    - Some of these initiatives include: creating a document that will explain the big concepts of MathSoc to newcomers on Council and to the average student who wants to learn more, and hosting a town hall — an informal meeting — where students can learn about MathSoc, the people behind it, and get to know what MathSoc does!
- More to come, as always!

MATHSOC(IAL)

In Person: MC 3035 and MC 3038
Our Website: https://mathsoc.uwaterloo.ca/

Email us: info@mathsoc.uwaterloo.ca
Instagram: @uwmathsoc

Grace Feng (MathSoc President, S23), on behalf of the S23 MathSoc Executive Team

AN OPEN LETTER TO A CERTAIN T&T APOLOGIST
YOU KNOW WHO YOU ARE

Long have I said that T&T is always missing one thing I need, and long have you excused T&T from my criticisms. You'd say cheese isn't Asian, so why would the Asian grocery store have a good cheese selection? You'd say that wraps aren't a part of Asian cuisine, so why would I expect the Asian grocery to have wraps? Every time I complained of T&T's poor selection, you'd always tut at me and espouse that I simply wasn't Asian enough to appreciate T&T. If I was Asian, you said, T&T would hold all that I desired. T&T was the oasis of Asian culinary ingredients, you said.

Tell me then, why was Huy Fong Chili Garlic Sauce not at the T&T I was most recently at.

aphf

SALAD. THE BEST TIME TO EAT A SALAD WAS TEN YEARS AGO, THE SECOND BEST TIME IS NOW

INGREDIENTS

- Feta cheese
- Tomato
- Cucumber
- Black pepper
- Bowl

Disclaimer: this recipe is not for feta cheese haters. Nor is it for tomato haters… Or cucumber haters. Or… you guessed it, bowl haters.

If you substitute any ingredient in this recipe, a gecko with heterochromia will begin materializing in your room immediately.

STEPS

1. Chop feta cheese into desirable chunks.
2. Chop the tomato into desirable chunks.
3. Chop cucumber into desirable chunks.
4. Place desirable chunks into a desirable bowl.
5. Add black pepper and mix.
6. Eat :D

Anyway, I've been eating this salad every day for the past 5 days because:

1. I simply cannot resist fresh summer produce and
2. I am in a big cooking slump. Very uninspired recently. This salad is colourful and makes me feel healthy, plus I need calories to live (or some nonsense like that).

The trick to making this salad extra tasty is to not drain your feta cheese completely—leave some of that brine in there and you will feel like one of those Himalayan goats that scale cliffs for a mere lick of salt. As I am writing this, I realize that maybe, just maybe, I might need more sodium in my diet in general.

But yeah, now you too, can make the yummyPi yummy salad.

yummyPi

LISTENING TO THE RADIO AT THE GYM

I have semi-recently (since February) started going to the gym. When I'm not with a friend, I'll listen to something to distract myself during downtime and pump myself up during uptime. The question always is: what do I listen to? I have a music playlist, the potential to listen to a podcast, or the radio. I'll go through each and analyze them, to hopefully shed insight on which option is right for you.

MUSIC

It's a classic. The main advantage is how short each music entry is, so you get a lot of variety. Listening to the right song(s) can also get one in the mood to work out. I'd say that other than hearing loss, a drawback could be lack of awareness of surroundings. Also, if you're not feeling a song you have to try and find a new one to get back into the mood. A personal disadvantage is that when I listen to music, I like to lip sync to the song, but lipsyncing in public makes you look a bit strange to onlookers. I personally only care a little, so I listen anyway and when there aren't many people I start lipsyncing anyway. Lastly, one other weakness I've found is that, as much as I like lipsyncing, I hate the predictability at times. A bit of chaos keeps me more enthralled at times. That's where we can get into…

PODCASTS

You get to listen to a topic of your choosing, but you never really know where the discussion can truly head within a topic. In that sense, it adds an element of suspense and randomness that can be thrilling, especially if workouts have become monotonous. You can also change the speed as you like. However, at the end of the day, a podcast is mostly talking, which is a lot more calming compared to high-energy music that people tend to enjoy. Also, topic selection is a huge detraction for me personally. I don't really like listening to the same podcast on two different days, so I switch up the show and episode. But sometimes I read the titles and get indecisive if none of the episodes are particularly appealing to me on that day. However, if I'm feeling indecisive, I can always fall back on…

RADIO

It has most of the advantages and disadvantages of podcasts. It has the added advantage of being almost truly random if your gym and radio listening schedule is irregular like myself. The randomness can help so that you're clued into the topic at hand, or you can use it as white noise to zone out to. Additionally, you don't have to undergo the grueling process of topic or podcast selection when you could just tune into CBC Radio One. An additional drawback, however, is that radio is done live. Thus, you can't adjust the speed as you would like compared to a podcast. However, if none of these have appealed to you, you can also listen to…

NOTHING AT ALL

I've never done this without a friend, because I need the distraction/extra motivator, but kudos to you if you do this! The main draw for this option is that you can really focus during a set, and you also have the added benefit of limited hearing loss by the time you're 35. Some disadvantages are that: between sets it can be easy to lose focus, and sometimes if you're not feeling up for the gym, listening to something can be an extra motivator. Without listening to anything, it can be hard to get yourself to do something that's good for you. I call it the "monkey trick" method; the monkey inside your brain needs instant gratification but the human needs to do a long-term gratification task, so you sneakily give the monkey a treat while also doing the human task. It's like when parents sneak vegetables into mac and cheese (sorry if this ruined your childhood mac and cheese memories)!

I hope this evaluation of different listening options helps you! While I focused on the gym here, you could use it for just listening (or not listening) to something for personal enjoyment and killing time, or maybe while doing a chore or commuting! Either way, I hope to have elucidated the grand world of listening to stuff while doing other stuff.

Xx_420SonicFan69_xX

FTPWND PART 1: SILENT BUT DEADLY
ORIGINALLY WRITTEN FOR CS 458

On a quiet Sunday morning in April, upon returning from a week-long vacation, I woke up to a flurry of pings on IRC (Internet Relay Chat). The words "pwned", "breach" and "mirror", three words that I never expected to see in one message, are still freshly imprinted in my mind. We read about breaches and leaks and "pwn"s all the time, but they always seem to happen to others, and we think we're foolproof. This is the story of how a system I was responsible for was breached.

ACT I: BACKGROUND

I've served on the Systems Committee (syscom) of the University of Waterloo's Computer Science Club (CSC) since Spring 2021, including in the lead role of Systems Administrator (Sysadmin) for the entirety of 2022, and again this term (Spring 2023). One of the largest responsibilities of syscom is the open-source-software mirror that we maintain.

According to the Debian Mirrors webpage[1], mirrors serve content identical to the upstream instance (main source), and serve to both reduce the load on the upstream server and to improve the speed and throughput at which users in the surrounding regions of the mirror can access their data. If you scroll down on the Debian Mirrors list, you'll see mirror. csclub.uwaterloo.ca listed as one of 4 Debian (a popular Linux distribution) mirrors in Canada, and one of 3 serving all supported architectures[1].

If you look at the list of Arch Linux (another popular distribution) mirrors, you'll see the CSC mirror listed as the only Tier-1 mirror (that is, mirrors that sync directly from the original source, and that other mirrors sync from) in Canada[2]. If our mirror were to go offline, that would result in a chain reaction, possibly causing other mirrors to go out of date as well.

In 2022 alone, our CSC mirror served a whopping 1.6 **petabytes** (1600 TB) of data[3]. Considering the files we mirror are at most a couple gigabytes in size and, more often than not, far smaller than that, it gives you a sense of just how much data we serve. For another statistic, we serve more than 100,000 HTTP (Hypertext Transfer Protocol, like normal websites) requests **every hour**, in addition to rsync (a utility and protocol to copy files) and FTP requests.

FTP is a keyword for this post. Standing for File Transfer Protocol, it behaves similarly to Google Drive, OneDrive, iCloud, Dropbox, Nextcloud, and other cloud drives, where you can connect to an FTP server, login, and upload or download files[4]. However, there are some differences that arise from FTP's long history (it was around in the days of ARPANET, the internet's precursor![4]).

Among them, one feature is important: FTP servers can be configured to allow "anonymous" logins, which allow the downloading and uploading of files without logging in[4]. This is commonly used by mirrors like the CSC's, where anyone should be allowed to download mirrored files without logging in. As the title of this post suggests, FTP was the failing link that enabled the breach.

ACT II: CONFIGURATION

The CSC mirror has existed in some form for almost two decades, as has the configuration files of the FTP daemon we use to serve the files from[5]. Over the years, many things have changed, and in the present, mirrored sources are fetched regularly from upstream by "potassium-benzoate", the machine that serves as our mirror, using a golang script called "merlin", developed in-house by syscom. Merlin fetches to the `/mirror/root` directory, and is run by the "mirror" user, which has no password, since potassium-benzoate is only accessible by syscom users, all of whom are trusted.

The ProFTPD daemon, a commonly-used FTP daemon, then serves the files via FTP. The configuration of ProFTPD lives at `/etc/proftpd/proftpd.conf` and looked something like this in April 2023:

```
...
ServerName "mirror.csclub"
ServerType standalone
...
TransferLog /var/log/proftpd/xferlog
...
# A basic anonymous configuration, no upload
# directories.
<Anonymous /mirror/root>
# Limit WRITE everywhere in the anonymous chroot
  <Directory *>
    <Limit WRITE>
      DenyAll
    </Limit>
  </Directory>
</Anonymous>
```

<div align="center">

POTASSIUM-BENZOATE: /etc/proftpd/proftpd.conf
29 APRIL 2023

</div>

Notes: Comments above verbatim; excessive whitespace and unrelated comments removed; " **...** " denotes (many) omitted (irrelevant and mundane) lines.

The config file essentially creates an anonymous chroot at `/mirror/root` that allows for anyone to connect via FTP, without authentication, and download **but not upload** files. It is precisely this configuration that, on a fateful April day, allowed the mirror to be breached.

Next time, on FTPwned…

```
-- 29 April 2023 --
11:44:00 PM <merenber> Also, I noticed that
some random PHP files keep on popping up in the
mirror user's homedir
11:44:04 PM <merenber> Are we getting pwned?
11:51:03 PM <szclsya[m]> I see russian
11:51:10 PM <szclsya[m]> I would say yes we are
pwned
```

FOOD FOR THOUGHT

What do you think is wrong with this configuration? How would you exploit it if you were an attacker?

raymo

1. https://www.debian.org/mirror/list
2. https://archlinux.org/mirrors/tier/1/
3. NGINX statistics from potassium-benzoate
4. https://www.investopedia.com/terms/f/ftp-file-transfer-protocol.asp
5. Comment in `proftpd.conf` left by dtbartle circa 2006–2008

DESCRIBING MY OUTFITS WITHOUT TALKING ABOUT THE ACTUAL CLOTHES

1. Wore this one to uptown for another stamp on my Kinton bowler card and a trip to Lost Vessel. To describe this one in one word, I would say "avant-garde". Not only because it was a bit experimental, but I felt French and regal wearing it. This one featured some classics in my wardrobe, but in an esoteric combination, creating a never seen before outfit. The overall shape of this outfit is a "balloon".

2. Flipping the first outfit on its side, I wear this next outfit when I'm in a rush and want to show off some grit and 2000s teenage angst. If this outfit were a personality, it would knock you out with a stare. This outfit is not for everyone but, in the same way that your rebellious teenage son is uniquely yours, this outfit is all mine.

3. When I think about this last outfit, I think about "all style, no substance". From the outside, this outfit looks like it'd be great for a camping trip, but if you tried to go into the wild, you'd probably come out tattered and worn. You would definitely blend into the nature, though. This outfit was an experimental combination of a bunch of earth-tones and varying textures. It definitely looks stylish, but offers absolutely zero functionality.

Try to guess what kinds of outfits these were! Keep dressing and styling!

tr1e

THE LIFE CYCLE OF A GOOSE
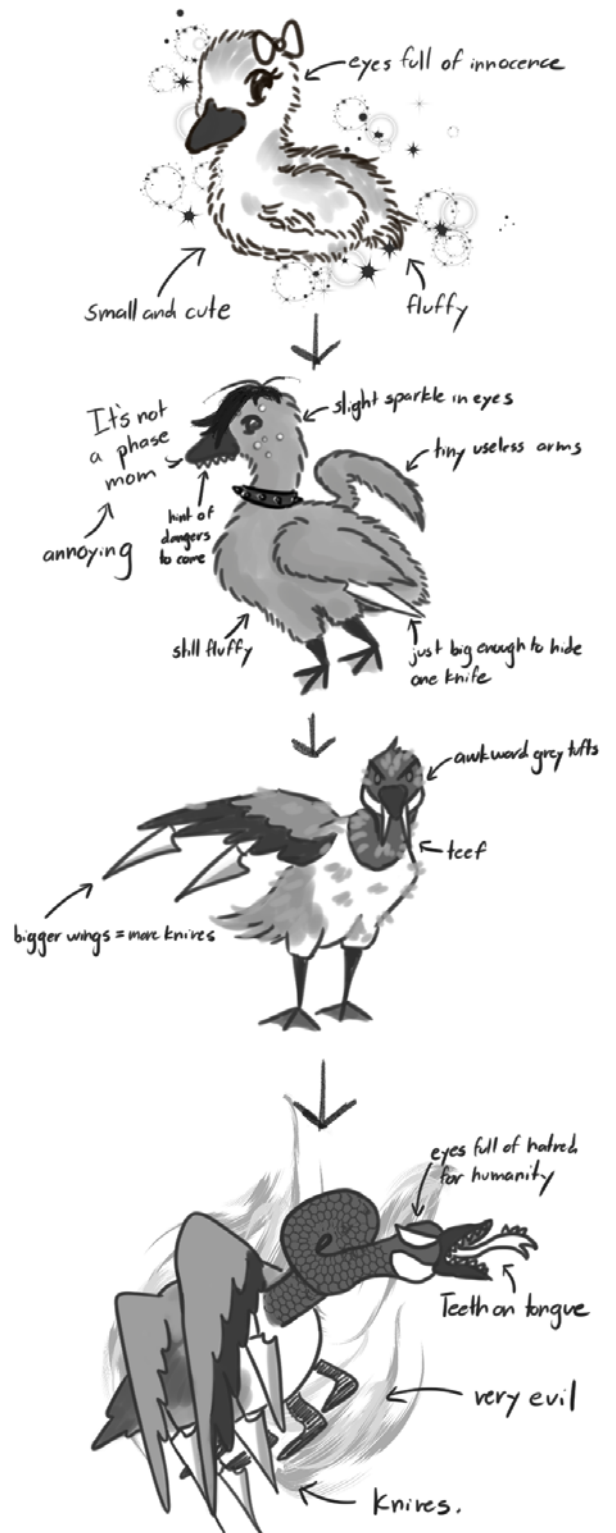
Just wait a few more weeks until the hatchlings grow up, they're coming for you. Oh god. Oh god they're here. In their true form. There's so many legs and it has a deep growl of a honk and arethoseknivesohmygodlookatitsteethitscomingrightat-

*Not a N*rd*

PIAZZA

UW REVIEWED 2

"Posting on the verge of a mental breakdown," begins an article titled "Piazza" written by Anonymous Poet in **mathNEWS** volume 143 issue 5. It's my article, of course, Anonymous Poet was me, during my first fully online school term at the beginning of the lockdowns, living in my high school bedroom with the walls painted black. I'd just gotten into an argument with a professor and made some very emotional posts and received a chastising email about it—yes, I'm one of *those* people. I wish I could say I submitted that article because I was mentally unwell, afflicted by all the isolation and the anxiety of the pandemic and the dimness in my room, but truthfully I was not[1]. That's just what happens when I talk to people.

Because I didn't go to orientation, Piazza was my first exposure to anything resembling a social life at this university. I am a natural-born serial poster—I have a lot of things to say, but also the kind of social anxiety and slightly misanthropic personality that makes me want to avoid talking to people in real life. I've probably used every social media website you can think of. So when I found out that many of my classes had a place where you could "post", write messages to my fellow classmates, sometimes even anonymously, that was big. Really big.

I refreshed Piazza constantly. I had the app on my phone. It was another piece of social media to me, one that allowed me feel connected to my classmates though only insofar as I knew what assignments they were struggling with and their grievances on the exams. Hell, I even connected to professors this way. I asked gvc about keyboards and never thanked him. I wrote neurotic diatribes about math and djao tried to cheer me up. This was the classroom for me. (No, I never went to office hours.)

But also I was not *popular* on Piazza, the way some people are, the way I knew the names of all the other regular posters but they didn't know mine, because I posted anonymously. I can't say I ever met anyone on Piazza, that anyone ever recognized me or wanted to be friends with me because of how I posted, but instead it satisfied something else I always wanted: a way to feel like I'm part of a community without ever being known myself. I clung to it even harder during the lockdowns, invested more of my emotional energy into it, opened myself up more, let myself feel a little angry, which is how I ended up sobbing on the soft carpeted floor of my bedroom after posting on the STAT 231 Piazza.

In a later term I was the ISA for a CS course. This was the chillest job you could imagine. I played Minecraft most days, only pausing when I heard the distinctive ping of Outlook email in order to do my favourite thing there is to do at this university: posting on Piazza. We were still locked down and I wanted to build a strong community for my class. The idea was that I would regularly post easy discussion questions to get conversation going. Of course this didn't work out. Of course when you always hide behind math and Racket

and Vim quick-tips you will not learn how to build genuine connections. Posting on the verge of a mental breakdown, indeed.

cy

1. At least no more than I normally am.

ZAP

I strip down, all the way. The first time I came here I was nervous, unsure of how I should act or who would see me at my most vulnerable, but now it's become routine. I place a towel to maintain some modesty (pff, as if I have modesty to preserve), and am slathered with cold jelly; then, it begins.

Every pulse of the gun—sorry, "handpiece"—is a blip of slight pain, but that pain means I'm getting what I asked for. The technician goes over parts of me that few others see, and I wonder if she even registers my nudity, if she's mentally somewhere else as she works her way through the scan lines of my body. Looking at the ceiling to avoid looking at her, I notice that every pull of the trigger causes the lights of the room to dim for just a moment.

Then, after I'm flipped over and the farce of privacy in the form of a towel has been removed, the backs of my legs are the target and the gun switches from blanks to bullets. Each shot is a tiny stab, and she processes me in strips from the knee to the ankle. Each strip starts rough, and ends with me thinking *fuckfuckfuck please stop already*. I turn my head left, and then back to the right as I realize it does nothing for the pain. Thank god I'm short.

And then we're done, after an hour, which felt both longer and shorter than the actual elapsed time. She tells me to not worry about the small circular bumps that appeared without my awareness, and I remember from last time: "follicular edema". I'm slightly pink, and cover it up again with my clothes, but surely it's still there beneath. I am well-cooked; a veritable lobster.

yet another waterloo goose

STANDING ON THE GO BUS REVIEW

it's not great

__init__

STANDING ON THE GO BUS REVIEW: PART 2

I wrote part 1 of this review right after getting home. Now it's like 30 minutes after I got home and I want to elaborate a bit.

Ok, so back in April they started running route 30 GO buses on weekends, and man, a **lot** of people wanted to ride this bus. I was on one of the buses the day they started the weekend route and, by the time we left Kitchener, the seats were all gone and there were people standing!

For context, these are double-decker buses that have 81 seats, plus a little bit of room on the bottom level to stand. Of course, since they're double-decker buses, the ceiling is a little lower than on a normal bus — I can keep my neck straight with my head scraping the ceiling, but anyone taller than me looks really uncomfortable. The route takes about an hour and a half, or longer depending on traffic conditions on Highway 401, where the bus spends most of its time. Fortunately, Highway 401 famously never has any traffic ever, due to it not really going anywhere other than some remote village called "Toronto".

So, if the 30 bus was so crowded on day one of weekend service, then what's it like now? Well, I'm here to report on that. I took the 30 bus this Saturday morning, and by the third stop, where 30 or 40 people were waiting, the driver announced that the bus only had room for one more passenger. The rest were left behind, and 20 more people were left waiting at the remaining stops within Kitchener. After some delay, an extra bus was sent to pick everyone up, but the process to send out a new bus had taken so long that our bus was running late and just barely made the train connection.

I had gotten on early, though, so I was comfortably seated during this whole kerfuffle. On the ride back in the evening, however, I had gotten distracted looking for a drinking fountain at Bramalea and ended up near the back of the line to board the 30. By the time I stepped onto the bus, my fellow passengers had already conceded defeat at finding a seat. For this trip, I would be one of the unlucky Standers.

How was it? It could have been worse. There wasn't much traffic so I wasn't being jerked back and forth as much as I could have. Still, it was crowded — there were several other Standers — and I was tired. After about an hour, we were finally in Kitchener where I could hop off the bus, walk a few blocks to Frederick station, and catch an ION for the rest of the trip.

Overall, standing on the GO bus kinda sucks — would not recommend it. But at least it gets you somewhere. What's more worrying is that every time people have to stand on the GO bus, that's an indicator that the bus is very close to full and people are very close to being left behind. Having to stand on the GO bus beats being stranded at Bramalea station for another hour, a station with (as previously established) no water fountains, and not even a Tim Hortons in a 1 km radius.

At least we didn't leave anyone behind this time. But it was a Saturday evening, which I wouldn't have expected to be this busy. Clearly, there are so many people trying to ride the 30 all the time that the current quantity of buses being run just doesn't cut it.

WHY DON'T THEY RUN TRAINS?

So like the 30 goes between Kitchener and Bramalea, right? But it turns out there's a railroad that also goes between those same two places and GO runs trains on it on weekdays… but not weekends. Trains seat several times more people than buses, they're faster, and they don't have to contend with 401 traffic. So wouldn't making the trains go all the way to Kitchener on the weekends solve all these problems?

Well, yeah, but they can't do it right now because there's a really long section of track where trains going in opposite directions can't pass each other, which makes it impossible to run a train every hour in both directions, and they **are** finally starting to build extra tracks, but that has to be done when passing trains won't run the workers over — i.e. the weekends.

Still, would it be totally impossible to run 1 train each in the morning and evening and keep the buses for the rest of the trips? Just for now? I don't know. I don't have that much insider info. I'd imagine it would mean it would take longer for those sweet, sweet track improvements to materialize so that we can eventually have the perfect all-day train service we're all dreaming of.

WHY DON'T THEY RUN MORE BUSES?

This one I'm not quite sure about. They probably should. It could mean running a bus every half hour, or (as proposed by Waterloo planning professor Brian Doucet in a recent CBC article) having extra standby buses nearby that are ready to step in and carry any passengers that don't fit on the first bus. Maybe they'd need to hire and train a bunch more drivers to do that, which is time-consuming and expensive.

What I find myself wishing is that GO were able to make service changes quicker, or at least anticipate the need for service changes in advance in order to prepare for them. The 30 route, where buses are overcrowded on a regular basis, is a particularly notable example, but I'm sure there are other routes that I'm not riding that have similar predicaments. GO Transit is expanding fast, Southern Ontario, in general, is expanding fast, and while all this is happening GO really should have the flexibility to adjust things — be ready to send out backup buses, improve capacity on an overcrowded route, take fewer than 3 months to reinstate normal train service after in-person classes resume — to make the experience smoother for everyone.

I don't know. Just a thought.

I WOKE UP AT 4:40 AM TO GET BAGELS AND IT WAS THE BEST DECISION I MADE THIS TERM

Recently, Uptown Waterloo got a new store selling Montreal-style bagels — Poppy's. This has made some people on Reddit very unhappy and has widely been regarded on r/waterloo and r/kitchener as a bad move. The Redditors decry the $6 bread-hoops at Poppy and claim that the best Montreal-style bagels in town cost $1.25 at City Café in Kitchener. Flashback to a few weeks ago, an old friend of mine also suggested that I try City Café's bagels, and recommended that I go there as the store opens to get them as fresh as possible. With the combined power of friendship and Reddit on the City Café's side, how could I say no?

Well, uh, one small catch. "As the store opens" is extremely early in the morning (7AM). It's thirty minutes away by train (6:30 AM). The train timings are irregular in the morning (6:00 AM). I must shower before I leave the house (5:00 AM). It takes me at least 15–20 minutes to wake up after the first alarm (4:40 AM).

Oh well. It had to be done.

Determined not to suffer alone, I posted in the #yeetups[1] channel in the math**NEWS** Discord server[2] asking for comrades:

tendstofortytwo   Yesterday at 1:55 PM
bagel yeetup on short notice
I arrive at 6AM at the UW ION station tomorrow, I go to Central Station, and then I walk fifteen minutes to City Cafe, home to the greatest freshly baked bagels in the greater Kitchener-Waterloo region.
you are welcome to join. let me know if you intend to. 👍

THE FIRST PERSON TO MESSAGE ME "OMG YOU'RE A LIGHT MODE USER?????" or something isomorphic to that gets three curses of my choice placed upon them

I was joined in my quest by __init__, sherp, molasses, and The Stickyan. We met up at the UW ION station, whizzed off to Central Station, and arrived at the place 15 minutes before opening time. Right as the clock turned to 7AM, we walked in.

The moment we walked in, we were thoroughly confused. It turns out that City Café has an unexpected form of service — I like to call it Self-Service Extreme. The bagels, croissants, and breads are right there. You pick them up, put them in your plate, walk up to the toaster, toast your your own bread, butter your own bread, and then *calculate the amount you owe them from reading the menu and drop the correct amount of money in the payment jar.* Nobody checks your payment unless you ask them for change — it's completely based on the honor system. Heck, they didn't even ask me to pay at first! When I was trying to shuffle around trying to get my wallet out with food in my hand, the guy behind the counter said, "Just pay after eating, it's easier that way." In awe and admiration (and also not wanting to bother to figure out the required change with them), I left a $1.50 tip on top of my $8.50 bill.

But before I paid, I ate. And reader, these were hands-down the best bagel and croissant I have ever had in my life. This was the first time that I had a sesame bagel and I could actually *taste* the sesame. It added just the right amount of flavor for you to be able to appreciate the flavor without it being overwhelming. And the croissant was incredible as well — the bread was fluffy, tore easily, and was buttered extremely well. I can kinda still taste the croissant, twelve hours after I first chewed on it, and I still relish the experience.

The coffee was also good. Their supplier is the Baden Coffee Company, so if you've had coffee at the Engineering CnD, you know what I'm talking about. Unremarkable, but good.

My sentiments were shared by the other writers who accompanied me:

> Best bagels I've ever had
> — SHERP

> same
> — __INIT__

> incredible atmosphere and quality bagels
> — MOLASSES

> 11/10
> — THE STICKYAN

So, yeah! I agree with the Reddit hivemind. This was the greatest bagel I have ever had, definitely worth the experience. Go have some City Café bagels. There's one at a 15-minute walk from Central and one at a 0-minute walk from Borden. Presumably both are good, but I can only vouch for the former.

I want go to Poppy's soon… when they start selling regular bagels rather than "bagel sandwiches". Stay tuned?

tendstofortytwo

1. the cooler version of "meetups"
2. exclusive access for writers only — write for math**NEWS** to join!

prof**QUOTES**

CS 234: CAMERON MORLAND

❝ If you damage your brain with Racket, learning Forth will damage your brain in a way that it balances out.

CS 240: ÉRIC SCHOST

❝ I am a leaf.

❝ This I refuse to prove, but it's here. I guarantee it will work.

CS 241: GREGOR RICHARDS

❝ You can thank me for this button on the course homepage. *[clicks light mode]* Ewwww… *[clicks dark mode]* Ahhhhh… *[clicks light mode]* Ewwww… *[clicks dark mode]* Ahhhhh.

❝ You will memorize all powers of two. You are doomed to at this point.

❝ *[Amber alert sounds]* That's unfortunately not how RAM works. *[Amber alert continues]* I'm actually concerned about why I didn't receive it on my phone.

❝ The machine code seems to have registers s, t, d, and it's not because MIPS has a sexually transmitted disease.

❝ Kleene *["clean"]* star, pronounced Kleene *["klay-ne"]* for people who can't pronounce their own name, such as Kleene… and yes, I pronounce it "Kleene" *["clean"]* star, even if Kleene *["klay-ne"]* couldn't pronounce his own name.

CS 341: ARMIN JAMSHIDPEY

❝ All good things come with a cost. Think about ice cream: if you want to buy it, you must pay.

CS 370: JEFF ORCHARD

❝ *[Asks the class for factors that affect population; class mentioned birth rate and death rate]*
Student: Sex rate.
Prof: Yeah that affects birth rate. And death rate, a little bit.

❝ *[A student exclaims "fuck"]*
Prof: I assume you're making a comment about the birth rate.

CO 250: KANSTANTIN PASHKOVICH

❝ Oh, for god's sake… Oh, it's fine, I just forgot that 2 times 2 is 4.

❝ A basis is a basis… if there is a basis, then there is a basis… a basis is just a basis. I cannot help you.

PMATH 347: DAVID MCKINNON

❝ Textbooks don't like to use the word hogwash because it sounds uncool, they use terms like *[mocking voice]* "iS iT wElL-dEfInEd?"

❝ And you'll remember—or perhaps you erased it with recreational drugs—from MATH 135…

❝ It's denoted Z(G), because Z is the first letter of the word "centre".

PMATH 351: ALEXANDRU NICA

❝ *[Discussing quiz]* If you say "I was trying to find a counterexample but I couldn't find one, but I think that the course is interesting," that's ⅔ points.

❝ I see that I am less popular today [Friday] than on other days of the week. Perhaps I should make all of my quizzes on Friday.

❝ You know what happened to Archimedes, the Romans came and he tried to use his principle versus them and it didn't end well.

PMATH 450: BLAKE MADILL

❝ Don't say "the dancing argument"; the TAs will be very confused.

❝ Who is U? You are U. No.

❝ Did you get the meat of this proof? Or the meat substitute? Gotta be progressive here.

❝ What a day. Integrated zero.

PMATH 464: RUXANDRA MORARU

❝ I can never make my mind up when using notation. That's why I can never be a mathematical physicist.

STAT 333: SURYA BANERJEE

❝ In 5 years from now, if you remember what you got on midterm 1 in stat 333, I would ask you to go get some help.

SOMETIMES YOU SAY BUS BUS

And then there are two bus

normalparameters

THROW YOUR POINTERS IN WITH THE LAUNDRY

What if you could change your worldly form at will? Yes, today, I am a `Base`; but tomorrow — O, tomorrow, my humble student, I am a mighty and powerful `Derived`. Don't believe me? Watch:

```
struct Base { virtual void change(); };
struct Derived : public Base {
  void change() override;
};
void Base::change() {
  new(this) Derived;
}
void Derived::change() {
  new(this) Base;
}
```

This syntax may confuse you, but don't let it. Here, bear with me; let's review our fundamentals. A call to **new** — for example, **new** `T{ ... }` — will:

1. perform memory allocation; this is an invocation of `operator new` which, unless overloaded otherwise, will make a call to `malloc`; and then,
2. construct the `T` object in-place at the memory location returned by the previous step.

The syntax **new**(`p`) `T{ ... }` corresponds to doing *only the second step*, where we supply our *own* memory location, `p`. This is a little-known form of **new** called **placement new**. It lets us construct something in-place without re-allocating memory. This is most practically used for doing your own memory management with large, pre-allocated memory pools. Hey, sometimes that's just faster, don't blame me!

Anyway, placement new can be used for that, **or** it can be used for more *transcendent* things, like re-constructing ourselves as a subtype or supertype object. We can also do something *evil* with this, so we have to be careful. In particular, the cute thing we're doing here works because `Base` and `Derived` have the same size and alignment in memory. If `Derived` were bigger, we'd be in trouble with memory. So, keep that in mind.

Okay, maybe our so-called *transcendence* has some strings attached. We can become a subclass with overridden methods, but we can't meaningfully gain new data. That's fine! Look, it works!

```
Base *b = new Base;
b→change(); // prints "Base::change"
b→change(); // prints "Derived::change"
```

Yes! Yes! But this isn't enough. I am no entity of the heap, *no*, we are performant; we inhabit the stack. Give me stack code:

```
Base b;
b.change(); // prints "Base::change"
b.change(); // prints "Base::change"
```

"Yes," you tell me! You know what's wrong, you say! You tell me it fails because, without using pointers, we fail to leverage the dynamic polymorphism that they afford us. I tell you I love you and you brandish a sinister smile, knowing what must now be done.

```
Base b;
b.change(); // prints "Base::change"
(&b)→change(); // ???
```

You tricked the system and you're on top of the world. That fool of a run-time must think it's dealing with a heap pointer, but you've in fact dealt it a stack pointer! And after striking your all-powerful hammer down upon the unrighteous nail of a foe, you are too blinded to see that, in fact, "`Base::change`" was again printed not once, but twice. Huh?

Fine, GCC is fickle today; try again:

```
Base b;
b.change(); // prints "Base::change"
Base *p = &b;
p→change(); // ???
```

And, running this again, we valiantly see "`Base::change`" followed proudly by "`Derived::change`".

At least, that's on my machine. On yours, it might be "`Base::change`" again. In fact, when I compiled with the `-O2` flag to enable more code optimizations, it went back to printing "`Base::change`" twice again!

At this point, I don't need to bother with kayfabe. It's undefined behavior. We're doing something *really* bad. **In fact, we've been encountering undefined behavior even before the stack was ever involved.** That's right, even that first example with `Base *b = ` **new** ` Base;` was undefined behavior! It *happened* to work out in our favor, but I claim that, indeed, it had no obligation to do so.

Now, even worse, I claim that this code is completely fine:

```
#include <utility>
// ...
Base b;
b.change(); // prints "Base::change"
std::launder(&b)→change();
// ^-- prints "Derived::change"
```

…and that you could do something similar with the heap pointers from the last example to also be completely fine.

I hear you cursing me for that completely unenlightening solution. "Why does *that* fix it? What the hell is `std::launder`? Like, *money laundering?* Why's it called *that*?" Mmm. Let's see if examining the value gives us any clues:

```
if (&p == launder(&p))
  cout << "same" << endl;
else
  cout << "different" << endl;
```

And… it prints `same`. They're the same. *It does literally nothing??????*

It might not look like it, but it *does* do something! The standard describes `launder` as a "pointer optimization barrier". Other places refer to it as a *provenance barrier*. Throughout the standard, there are certain restrictions placed on how and when you can access data through pointers and, in particular, which data you can access through which pointers. Sometimes, these restrictions may seem bizarre and arbitrary, and we might feel tempted to argue that the standard tries to dodge realities of compiler implementations and memory layout. *However*, these strange restrictions are often made in order to secure guarantees about well-formed code so that compilers can make optimizations which are *correct*, i.e., not causing the program to deviate from what the source code said to do. After all, we want compilers to produce efficient, optimized machine code.

When we pass our code to the compiler, the compiler performs static analysis on it and makes tweaks to it which, under the assumption of well-formed code, should not alter the correctness. It's when our code is ill-formed that we run into problems. With that in mind, `launder` instructs the compiler to not apply any such optimizations to the given pointer and to, in some sense, *"launder away"* the source of the pointer and its bundled set of assumptions.

Anyway, here's the undefined behavior in our original code. Here's the relevant standard section, *[basic.life]/8.4*:

> 8 If, after the lifetime of an object has ended and before the storage which the object occupied is reused or released, a new object is created at the storage location which the original object occupied, a pointer that pointed to the original object, a reference that referred to the original object, or the name of the original object will automatically refer to the new object and, once the lifetime of the new object has started, can be used to manipulate the new object, if the original object is transparently replaceable (see below) by the new object. An object o_1 is *transparently replaceable* by an object o_2 if:
> (8.1) — the storage that o_2 occupies exactly overlays the storage that o_1 occupied, and
> (8.2) — o_1 and o_2 are of the same type (ignoring the top-level cv-qualifiers), and
> (8.3) — o_1 is not a const, complete object, and
> (8.4) — neither o_1 nor o_2 is a potentially-overlapping subobject ([intro.object]), and
> (8.5) — either o_1 and o_2 are both complete objects, or o_1 and o_2 are direct subobjects of objects p_1 and p_2, respectively, and p_1 is transparently replaceable by p_2.

And here's *[intro.object]/7*:

> 7 A *potentially overlapping subobject* is either:
> (7.1) — a base class subobject, or
> (7.2) — a non-static data member declared with the no_unique_address attribute.

So, the reason it was undefined behavior is because any `Derived` has a `Base` subobject, so it's potentially-overlapping, and that kills our transparent replaceability, so we need to use `launder` as a provenance fence to nudge the compiler to forget where the pointer came from and ignore any associated lifetimes — in particular, the lifetime of the original object which we ended. And, actually, using `launder` here strips away

the undefined behavior and makes our code *extremely* well-formed! Here's the relevant note from *[basic.life]/8*:

> [*Note 5*: If these conditions are not met, a pointer to the new object can be obtained from a pointer that represents the address of its storage by calling std::launder ([ptr.launder]). — *end note*]

This is all to say that it really *is* like laundering money after all. But with pointers and compiler optimizations instead. Great. Enjoy your standard-compliant self-transformation or whatever.

jeff

1. For an in-depth look at pointer provenance, I strongly suggest reading these excellently-written blog posts, in order:
2. https://www.ralfj.de/blog/2018/07/24/pointers-and-bytes.html
3. https://www.ralfj.de/blog/2020/12/14/provenance.html
4. https://www.ralfj.de/blog/2022/04/11/provenance-exposed.html

N BLESSINGS TO HAVE COME OUT OF THE UNIVERSITY'S RECENT SECURITY BREACH

- Watching all the Arch Linux gamers lose their minds trying to remember how to log back into eduroam

EPISODE 56: LAMBDA CALCULUS

Enjoy Episode 56 of the MathSoc Cartoons series: CS 135 (Extension) — Lambda Calculus!

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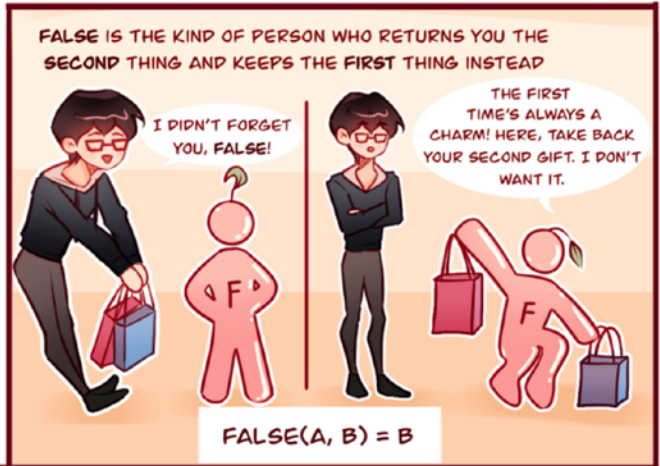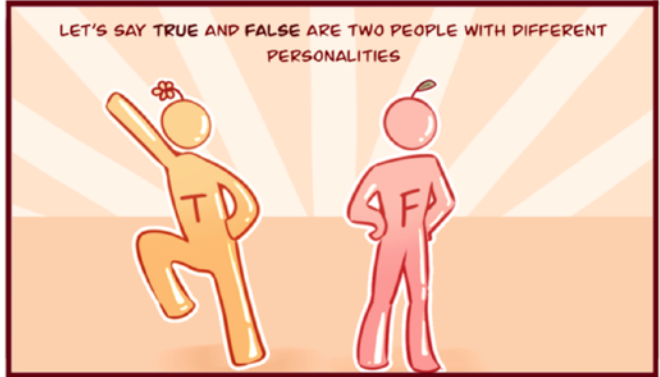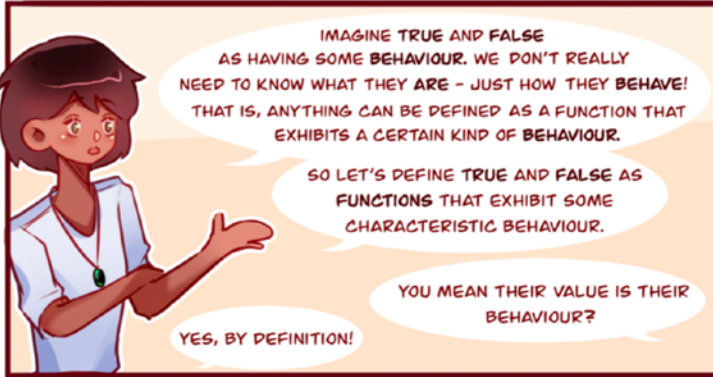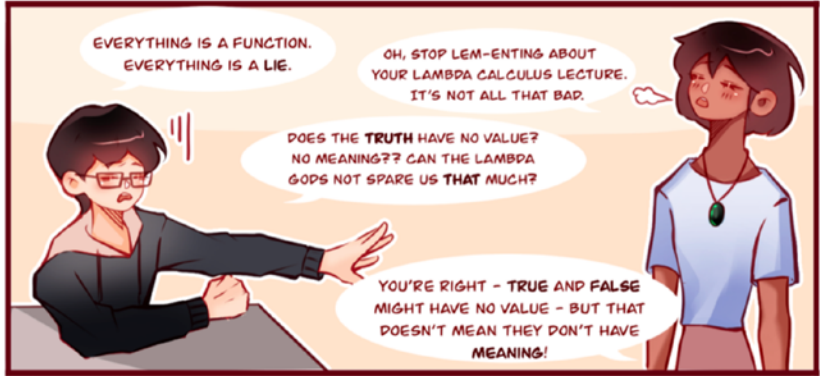
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MathSoc Cartoons

CS 135 (EXTENSION) – LAMBDA CALCULUS

STORY BY: ISHAN SHASTRI | ART BY: BERNICE XIAO

CS 135 (EXTENSION) – LAMBDA CALCULUS

STORY BY: ISHAN SHASTRI | ART BY: BERNICE XIAO

SO HOW CAN I ENCODE THIS USING JUST THE FUNCTIONS WE HAD INITIALLY : **TRUE** AND **FALSE?**

LET'S **NOT**...

...WHAT IF I TRIED THIS

$$NOT(X) = X(FALSE, TRUE)$$

HUH?

LET'S SEE IT IN ACTION

REMEMBER, OUR ARGUMENT **X** IS A **FUNCTION** – IT'S EITHER OUR **TRUE** FUNCTION OR OUR **FALSE** FUNCTION. LET'S SEE WHAT HAPPENS WHEN WE APPLY OUR FUNCTION.

NOT(FALSE)

-> FALSE(FALSE, TRUE)

SINCE OUR ARGUMENT IS **FALSE**, WHICH ALWAYS RETURNS THE SECOND ARGUMENT IT'S GIVEN, SENDING IT (TRUE, FALSE) WILL RETURN:

-> **TRUE**

NOT(TRUE)

-> TRUE(FALSE, TRUE)

SIMILARLY, IF OUR ARGUMENT IS **TRUE**, THEN THE RESULT WOULD BE THE **FIRST** ARGUMENT PASSED TO IT:

-> **FALSE**

HM.. THAT **IS** KINDA NEAT! YOU BASICALLY PUT TOGETHER OUR DEFINITIONS OF **TRUE** AND **FALSE** TO CREATE A NEW FUNCTION THAT EXPLOITS THE **BEHAVIOUR** OF THE **FUNCTION** IT IS PASSED TO RETURN THE DESIRED VALUE.

FIRST IS THE WORST! YOU CAN TAKE IT BACK.

NOT(TRUE)

ARGUMENT

OUTPUT

THE SECOND ALWAYS SUCKS! YOU CAN KEEP IT.

NOT(FALSE)

ARGUMENT

OUTPUT

YES! NOW HOW CAN I DEFINE **AND** IN TERMS OF THE SAME FUNCTIONS? REMEMBER **AND** TAKES **TWO** FUNCTIONS A AND B AS ARGUMENTS AND RETURNS... A FUNCTION!

WELL, IF MY FIRST ARGUMENT IS **FALSE**, I **KNOW** MY EXPRESSION IS **FALSE**, SO I CAN IMMEDIATELY RETURN **FALSE**. OTHERWISE, I JUST RETURN THE **SECOND** ARGUMENT. IF IT'S **TRUE**, THEN BOTH MY ARGUMENTS ARE **TRUE**, AND IF IT'S **FALSE** MY EXPRESSION IS ALSO **FALSE**.

$$AND(A, B) = A(B, FALSE)$$

SO I CAN TRY SOMETHING LIKE THIS:

MY VERY FIRST LEM-BDA EXPRESSION!

AND IT WORKS!

A B   A B
AND(FALSE, TRUE) => FALSE(TRUE FALSE) -> FALSE

A B   A B
AND(FALSE, FALSE) -> FALSE(FALSE, FALSE) -> FALSE

A B   A B
AND(TRUE, FALSE) -> TRUE(FALSE, FALSE) -> FALSE

A B   A B
AND(TRUE, TRUE) -> TRUE(TRUE, FALSE) -> TRUE

WAIT – SO WE CAN APPLY A SIMILAR LOGIC TO ENCODE **OR!**

$$OR(A, B) = A(TRUE, B)$$

IF MY FIRST ARGUMENT IS **TRUE**, I RETURN **TRUE**, OTHERWISE I JUST RETURN THE **SECOND** FUNCTION.

...THERE!

SEE? NOT THAT BAD AT ALL! WE JUST ENCODED **NOT**, **AND**, AND **OR** IN LAMBDA CALCULUS.

IN FACT, **ANY** POSSIBLE COMPUTATION CAN BE REPRESENTED AS A **LAMBDA EXPRESSION**.

YAWN

2AM...

I MUST SAY, I RESPECT RACKET A LOT MORE NOW. THERE **IS** SOMETHING FUNDAMENTAL ABOUT FUNCTIONAL PROGRAMMING AFTER ALL!

SIGH. LOOK AT THE TIME! WHAT IS ALL THIS **RACKET** ABOUT??

LAMBDA CALCULUS!

COME CHECK IT OUT...
... BEFORE YOU RETURN TO SLEEP :)

*THERE ARE MULTIPLE WAYS OF DEFINING A LAMBDA EXPRESSION. FOR EXAMPLE, TRY TO ENCODE OR AS OR(A, B) = A(A, B) – DOES THIS WORK AS INTENDED?

MATHSOC

MEF
Mathematics Endowment Fund

A BEAVER'S TALE

It was a cool spring evening as the boy opened the door of a taxi and sprinted outside, shouting a hurried "thank you" at the cab driver. He was on an early vacation, visiting his grandparents' farm, and he couldn't wait to see them again. It had felt like forever since he'd last arrived here. The sparkling grass and the scent of springtime urged him on. The flowers beckoned with their quiet, sophisticated hues and enticing aromas. The creek, one of his frequent retreats during previous visits, splashed silently in the corner as he tore across the fields to the red barn house at the other end. He could almost see his grandfather waiting outside to welcome him with his trademark bear hug.

Suddenly, a flash of movement caught his eye, almost masked by the orange glow of the sinking sun. He jerked his head sharply to the left, in the direction of the creek, to where he thought he had seen something. He stared but saw nothing. Shaking his head, he turned back to the barn and was just about to make another enthusiastic dash for it when a furry limb poked itself into view — just for a second, before being consumed by the gentle trickle of the creek.

The boy made his way down to the creek, cautiously. He was unnerved but also curious. Tall trees, older than the farm itself, provided shade from the glare of the descending sun. Approaching the edge and narrowing his eyes for a better look, he found to his surprise a beaver floundering in the shallow water. Moving his eyes further up, he felt sick as his eyes took in the scene: a small rock had fallen, probably from a rubble pile on the other side, and pinned the beaver's tail to the bottom of the creek. All the little creature could was lift its head above to breathe. Its front paws flailed under the surface, not exactly fighting against the weak current, but not able to break the surface either.

Rushing forward, the boy lifted the rock with both hands — it was much heavier than it looked. Immediately, the beaver yanked its long, flat tail forward, finally free of its burden. Soaked and tired after the sudden exertion, the boy sat on the edge of the creek, trying to catch his breath. Out of the corner of his eye, he saw a brown figure slowly shuffling forward — it was the beaver, carrying a stick in its mouth. The boy was surprised but stayed still as the beaver crawled up next to him, before depositing the stick at his feet and looking expectantly up at him.

The boy looked back at the beaver, its nose snuffling in curiosity as it stayed perfectly still. Carefully, the boy raised his hand toward the beaver's head, wanting to pet it. Alarmed, the furry rodent darted away and was soon lost among the bushes. The boy lowered his hand, disappointed, but picked up the stick and put it in his pocket as he got up and made his way to the barn house.

At noon the next day, the boy ambled across the fields in a half-hearted attempt to walk off the heavy and delicious breakfast that his grandparents had made him. Incidentally, his random path took him to the creek, and he sat down by the edge, grateful for the shade on this cloudless and sunny day. He could not tell how long he was there for, but he felt his eyelids slowly droop until he was lost in a peaceful nap.

He awoke to the sound of shuffling and twigs cracking. Dazed, he sat up with a start. To his amazement, the beaver was sitting next to him, watching him with alert yet inquisitive eyes. He moved his eyes to its tail, which was still looking worse for the wear. As he sat up straighter, the beaver dropped another stick by his hand before scurrying back into the thick bushes. Smiling to himself, the boy picked up the stick and headed back.

This continued every day. By mid-summer, the boy would wake up well before sunrise, eager to see his small furry friend again. The number of sticks that he had brought back by this point now numbered in the seventies. However, as time passed, a small knot of uneasiness grew to live in the boy's stomach. It was not until two days before he was due to head back for a new school year that he realized just how much he would miss the beaver.

On the last evening before his departure, he slowly trudged back to the creek, where the beaver was waiting for him. As he sat down, it scurried up to him and buried its nose in his hand, dropping a stick into it. The boy could not stop shaking from dread. He was afraid that he would never see the beaver again. He felt his nose sting and his vision blur. Dazed, he could see only gleams of gold in the evening sky and bright green from the trees — and most of all, a smudge of brown fur sitting next to him. Squeezing his eyes, a single tear fell from his face and splashed on the beaver's nose. It looked up at him, its stomach rapidly expanding and shrinking as it breathed. It ran out of sight for a moment — but only a moment, as it returned with something new: a dandelion, rare in this time of year. It dropped the flower next to the boy and looked at him again.

"Thank you," the boy whispered hoarsely. "It's beautiful."

The beaver climbed onto his leg and, curling up, went to sleep as the last rays of the sun dipped below the distant hills.

eternal_peace

SFC/SCANNOW
POWERSHELL GAMING

PAGE_FAULT_IN_NONPAGED_AREA is the closest thing to a segmentation fault in real life. So far, it has the most concerning Blue Screen of Death that I have seen on my own computer before. I wish this curse upon no soul reading this, simply because if you are reading this, you are cool. Such is life.

AHpache

CYLINDRICAL DAL

HOW TO REPLACE ONE LONG-TERM RELATIONSHIP WITH ANOTHER

It's June 2023. Midterms approach, and Waterloo is enveloped in the smoky haze of burning forests and burned-out students. You and a friend, seeking a moment's respite, venture out into the mid-afternoon orange glow. You walk along familiar paths, until two strange proselytizers stand in your way. "Do you have a moment to talk about our Lord Jesus Christ?"

Although this question may have once paralyzed you, you no longer hesitate to respond. It is the month of June, and given the spirit of the month, you are in a relationship of which their Lord would not approve.

You're in love with tube dal.

Tube dal. Dal, made from a cylindrical cross-section of chickpeas, coconut, candied ginger, and layers of spices, packed into a tube, there when you need it. Spend the most minimal effort preparing it, and tube dal will light the way out of the darkest depression, celebrate your altitudinous achievements, and comfort you through the most malevolent midterms. When your friends are being ground by the grind, tube dal will be your companion. When your free moments fade to dust, tube dal will remain. Take this ingredients list, venture to Vincenzo's or the Fischer-Hallman Sobeys, and accept tube dal into your heart:

- 1 tube of Mitchell's Soup Co Ginger Coconut Dahl Mix ($11.28 with tax)
- 1 box of chicken broth ($2.25 with tax)
- 1 can of coconut milk ($3.38 with tax)
- 2 cups rice (free) (you had it in your kitchen anyway)

Simply boil the entire box's contents of chicken broth, then pour in the tube, and add coconut milk and rice. Simmer for 90–120 minutes. Serve.

You refrigerate the leftovers. The next morning is a blur, and by the time you return home, you are exhausted, wanting nothing more than rest. Reheat some of the leftovers for 4–6 minutes. Serve again.

The next day is worse. You race from event to event, you've become involved — too involved. Your commitments pile up like the stacks your neglected CS courses are failing to make you learn. You need a quick meal, a checkpoint, a bonfire to light before the next wave of responsibilities hit, before you must run the hamster wheel once more, evermore. Serve again.

The next day is quieter. You groggily attend your morning classes, and return home in the afternoon, hungry but with plans to catch up; you have no time for cooking nor money for eating out. The tube dal remains there. Serve again.

It's Friday. Your parents text you, and you're reminded of how long it has been since you've been home. You miss it. You miss your dog. You miss your dad. You miss your mom. You miss every small comfort home provides: people to talk to, everything taken care of, and three meals a day. You miss the taste of home. But you have it here. Serve again.

It's the next evening. You've been able to fill your day with events, shopping, mindless capitalism in fear of thoughts. You get home, and it hits. The loneliness. The homesickness. You go to reach for something to hold, but there's nothing, the lovely stuffed frog that once reminded you of love has been taken; the connection it represented, extinguished. You're alone in the darkness. There's nothing.

The world is cold.

Dark.

Silent.

Your fridge kicks into higher gear. You crack it open to see the contents within, and the fridge is barren, save for one last bowl, bathed in the refrigerated glow: a golden mixture of rice, spices, peas, and memory.

The sixth of six servings. Three dollars each.

One rekindled hope.

Serve again.

molasses

JEWS IN LOO

there are plenty of things to do
if you're a jew in loo
ever heard of chabad?
they have saturday shabbos lunches
and tuesday barbeques
ever heard of hillel?
they have bussin bagel brunches
and challah baking too
and cozy, homely bonfires
with music and s'mores for you
or maybe you should dash
to their next bar mitzvah bash
and get wasted with your friends
nevermind the impending crash
but if there's one thing you can't do
is sit inside a room
with other fellow jews
immersed in philosophical gloom
enjoying the rabbi's wisdom.
rip **mathJEWS**

arabella

RETIRED mathNEWS WRITER REALIZES HE WAS WASHED UP ALL ALONG

HUMBLEBRAG — Looking back at the Articles of The Issue I've gotten, I've never really deserved them. I got lucky twice in v140, but reading my articles again, they are kind of crappy. The ideas are pretty interesting, but I tried too hard to be clever. Pretentious word choice and run-on-sentences ruin the tone. Only later (when the editors added tyrannical word limits) did I start to appreciate that less is more.

Then came *Stairway Constants* in v142, an epic undertaking that got AoTI for the mere effort put into it alone. Take that away — does the writing deserve it? Revisiting the series today, I'm a bit annoyed by how self-important and self-referential the articles became.

And in the final issue last term (151.6), I interviewed graduating **mathNEWS** writers. *Last Words* became Article of The Issue. I can guess at the political reasons — as an editor, you can't just ignore the sudden influx of farewell articles, but you also probably shouldn't pick one over another… so the neutral ground is the article that has a little bit of everyone. And of course, you can't give it to an editor, so clarifiED and god⚡peED were automatically disqualified.

But for *Last Words*, I did more deleting than actual writing — desperately trimming down my fellow writers' answers to squeeze under the word limit. It would be improper to say it's my article. The Article of The Issue should really belong to everyone who contributed. Because of that, I'm passing my prize to a more deserving 151.6 article by a graduating writer.

But… how do I choose? Most of these are deeply personal articles, pouring hearts full of undergrad experiences out onto the page. Recalling good and bad memories going back before the pandemic. Advice for first-years and fourth-years alike. Love and thanks to **mathNEWS**, and friends made along the way. I didn't write a graduation article, but the other writers covered most of what I would have said, and more! In the midst of all that, Finchey celebrated 100 articles right before their untimely demise in Miami.[1] For any other issue, I would be inclined to give my AoTI to Finchey for cashing in on a long-running inside joke, but that would be distasteful given the more serious contenders. Also, dead people can't use Conestoga Mall gift cards.

It is difficult to choose from the more heartfelt articles. I tried for an hour to be objective and gave up. Subjectively, UW Unprint / god⚡peED's *OK* gets my Article of The Issue. I borrow a lot of my writing style from him, so I'm a sucker for one-liner endings. This article has the best one I've seen.

"You're going to be OK."

Ironically, I told that to myself *too often* in first and second year. I wish I had stepped further outside my comfort zone — tried more things, made more friends, went outside more. But I didn't feel the need, because I thought I would be okay with the identity I chose in high school.

I wish I hadn't shied away from **mathNEWS** when the pandemic started. There are so many awesome people here, and I should have recognized that people don't stop being awesome just because things are virtual.

How would things have turned out, had I done all that?[2] The butterfly effect is scary. To think that I'm indirectly responsible for the existence of an entire friend group, because I "dragged" UW Unprint to come with me to my first prod night… Would we still be OK without **mathNEWS**? Would we be more OK?

Am I even OK?

By the time I returned to campus after the pandemic, I was washed up. Graduation was my internal deadline to establish who I am. I flailed around, racing against time to do what first- and second-year me didn't, all while feeling out of place for being too old. It made me inauthentic, and that made me frustrated.

When I graduate next week, I'll officially be overdue on figuring out who I am. But for half my life now, I've seen UW Unprint spit wisdom beyond his years. "You're going to be OK" is a reassurance that life is self-correcting if you listen to what you need and work toward it. So I'll keep at it, at my own pace, and maybe someday I won't be washed up anymore.

Kevin, the Conestoga Mall gift card is all yours.

water

1. For the record, I don't wish to get hit by six buses at the same time. It would be pretty funny though…
2. In the alternate universe where I become **mathNEWS** editor, my editor name would've been hydratED.

ARTICLE BY WATERLOO STUDENT!

H i everyon! i know you probably, like me one week ago, had no money, no bitches, and shit grades! but B O Y do i have a story for you! I was just sitting in v1, penniless, when a US army recruiter politely rappelled through my window and asked me if I was interested in joining some program ! they evenm let me keep studying while odingn my traingiin for them, and now im making 15k! just tap this link on the age with yotu r finger and some1 rappel throuhg your windo!!!

u/xX_nofootball_Xx

JET LAG: THE GAME: THE REVIEW

Jet Lag: The Game is a travel show on YouTube, run by the same guy that's behind *Wendover Productions*, Sam Denby. Five seasons of the show have aired on YouTube, and the first episode of season 6 just got uploaded last Wednesday.

Each season has a different format and a different setting. Sam, along with writers Ben and Adam, are the main contestants in each season. In all but one season, Sam is on a team with a guest (who is also a YouTuber), while Ben and Adam are on another team against Sam and the guest. Season 3 is the exception, which was a free-for-all type of game.

Season 1 was a short, 3 episode season of Connect Four. However, the spaces are the US states west of the Mississippi River, and you claim spaces by drawing a random card at the state capitol, and doing the challenge on the card (e.g.: Get One Team Member Intoxicated). Brian from *Real Engineering* was the guest. The season was a fun start to the format, and the twists and turns to get to the end was fun to watch.

Season 2 was 5 episodes, and its format was to circumnavigate the world. The guest was Joseph from *Real Life Lore*. Teams would have to earn budget by doing challenges from the same deck. This format was fun, however, the game started being broken by the latter half of the season, and a particular team not being able to finish the game was a real downer. It's usually regarded as the least good season of Jet Lag, and I certainly think it's the bottom 2 of the 5 fully released seasons.

Season 3 was a 7 episode game of Tag across Europe. One person is being chased while the other two temporarily work together to tag that person. There was no guest. However, each person has a different location they are aiming for. Sam is aiming for Zermatt, Adam is aiming for Jersey, and Ben is aiming for Borkum. At the end of the three days, if no one has gotten to their location, the win goes to the person who has the closest location to the person that's being chased. It's probably the best season of Jet Lag, and it really stems from the coin system introduced. In previous seasons, they had a monetary budget, and the cost of transport would be deducted. However, season 3 used coins instead, calculated based on a rate per minute that depended on the mode of transport. This was a great change that makes the gameplay much better.

Season 4 was a "Battle for America". The team with the most claimed states wins. The guest was again Brian from *Real Engineering*. Each team has a budget, and they claim states by doing challenges from a hand of 7 cards drawn from a shuffled deck. Some cards, depending on difficulty, have one or two tokens for certain powerups, like swapping cards with the other team, being able to cross a state border in a car (driving or riding in an Uber/taxi), and turning on the other team's tracker for 7 hours. If a team claims two bordering states of the other team's state, they can battle for that state, and the winner locks the state into their possession. Also, there's a 2-point bonus for the team with the most area.

In my opinion, this is the bottom season. I didn't like the battle mechanic, there's no cooldown for swapping back cards (which plays a critical role in the season), and it just felt like a worse version of Connect Four. However, it's still a good watch.

Season 5 is probably my favourite team season. The guest was Toby from *Tibees*, a math channel, and she's probably the best guest contestant. The format was to drive from the top of New Zealand to the bottom, using only the highway system in 5 days. There are challenges at certain cities and towns that have to be completed in order to unlock the path, and doing so unlocks it for everyone. Each challenge gives a certain amount of coins to the team that completes it, and you can use coins for "roadblocks" (tasks that a team behind you has to do if they drive into one), "curses" (penalties to make doing tasks harder), and challenge skips. The intense episodes in Auckland and Wellington made for great viewing, and it was an overall fun season.

Now, as stated before, season 6 just started being uploaded. I've already watched the first episode via Nebula, and it's a very fun format. The guest is Scotty from *Stranger Parts*, and the format is a capture the flag game using the Japanese rail system! The format is a bit complex to sum up, but basically, there are three rounds (where the game area gets bigger each round, with round 3 being all of Japan!), the flags are certain vending machine items in a certain location, and coins are used to travel by train in enemy territory. Judging by the first episode, this season is going to be a lot of fun! A bunch of mistakes were made made by both teams trying to navigate the complex Tokyo rail map (round 1 is just within the large Tokyo area), and there have already been a bunch of dramatic moments.

All this to say, go and get *Jet Lagged*[1].

lwo

1. HE SAID THE THING!

I WOKE UP AT 6:00 AM TO GET BAGELS AGAIN AND TO BE HONEST IT WASN'T THAT GREAT OF A DECISION

Poppy's bagels are too salty and have not enough flavor… don't bother, I think.

tendstofortytwo

HASKELL IS JUST LIKE C

It's common to think that programming in Haskell is very different from programming in C because Haskell is pure and functional while C is imperative and full of side effects. However, with enough effort, they are more similar than you might think. Consider this simple C code:

```c
#include <stdio.h>
#include <stdlib.h>
struct Node {
    int val;
    struct Node* next;
};
struct Node* cons(int val, struct Node* next) {
    struct Node* node =
        malloc(sizeof(struct Node));
    node→val = val;
    node→next = next;
    return node;
}
int car(struct Node* node) {
    return node→val;
}
struct Node* cdr(struct Node* node) {
    return node→next;
}
void freeNode(struct Node* node) {
    if (node ≠ NULL) {
        struct Node* next = node→next;
        free(node);
        freeNode(next);
    }
}
int main() {
    struct Node* l = cons(6, cons(9, NULL));
    printf("%d%d", car(l), car(cdr(l)));
    freeNode(l);
}
```

Suppose we want to translate this into Haskell. Well, Haskell does have `malloc` and `free` functions as well as `printf`. We need some sort of `null :: Ptr a` so we implement it as follows.

```haskell
import Foreign
import System.IO.Unsafe
null :: Ptr a
null = unsafePerformIO $
    castPtr <$> (malloc :: IO (Ptr ()))
{-# NOINLINE null #-}
```

Not sure what the `NOINLINE` does but the language server suggested it. Dereferencing this is, of course, consistent with what we expect from C because dereferencing null in C is undefined behaviour.

Now we make our `Node` data type and give it a `Storable` instance. (I wish it was derivable but whatever.)

```haskell
data Node = Node Int (Ptr Node)
instance Storable Node where
    sizeOf :: Node → Int
    sizeOf _ = sizeOf (0 :: Int) + sizeOf null
    alignment :: Node → Int
    alignment (Node n _) = alignment n
    peek :: Ptr Node → IO Node
    peek p = do
        n ← peek $ castPtr p
        next ← peekByteOff p (sizeOf n)
        return $ Node n next
    poke :: Ptr Node → Node → IO ()
    poke p (Node n next) = do
        poke (castPtr p) n
        pokeByteOff p (sizeOf n) next
```

Next, it's time to implement `cons`, `car` and `cdr`. We introduce our own infix operators to prove a point on how similar the code is to the C code.

```haskell
val (Node val _) = val
next (Node _ nxt) = nxt
(⟶) :: Ptr Node → (Node → a) → IO a
p ⟶ f = f <$> peek p
(⟵) :: Ptr Node → Node → IO ()
p ⟵ n = poke p n
cons :: Int → Ptr Node → IO (Ptr Node)
cons val next = do
    p ← malloc
    p ⟵ Node val next
    return p
car :: Ptr Node → IO Int
car p = p ⟶ val
cdr :: Ptr Node → IO (Ptr Node)
cdr p = p ⟶ next
```

Look at how similar the code is to the C code. Let's also implement `freeNode`:

```haskell
import Control.Monad
freeNode :: Ptr Node → IO ()
freeNode p =
    unless (p ≡ null) $ do
        nxt ← p ⟶ next
        free p
        freeNode nxt
```

Finally, we can translate `main`:

```haskell
import Text.Printf
main :: IO ()
main = do
    l ← cons 6 =≪ cons 9 null
    a ← car l
    b ← car =≪ cdr l
    printf "%d%d" a b
    freeNode l
```

See, that was pretty similar to the original C code… right?

As a final remark, if you dislike the need to do everything in the `IO` monad, you can wrap everything in `unsafePerformIO`. I'm sure it'll be fine…

terminal

SOURDOUGH FOCACCIA
A RECIPE

I'm feeling pretty tired today after work, so here's just a simple focaccia recipe. I made it yesterday and it was really good.

Note: I used sourdough starter for this. If you only have yeast, here are the adjustments: cut all the waiting times in like thirds, and add a little more water.

For baking, the measurements—specifically, the liquid to solid ratio—are rather precise. If you can't measure things exactly, you are looking for a pretty wet dough. But it should still feel like a dough, and not goo. You want to be able to grab it , but it's going to stick to your hands. You shouldn't be able to knead it. It's okay if it's a little runny.

INGREDIENTS

Flour: 512 grams (I used mostly bread flour with a little bit of whole grain, but you can just do all purpose if you don't have bread flour or whole wheat).

- Classic water: 430 grams
- Salt: a bunch (10 grams?)
- Olive oil: a bunch (15 grams)
- Sourdough starter: 50 to 100 grams
- (optional) Cornmeal: 10 grams
- (optional) Honey or sugar: a tablespoon or two

PROCESS

Put the dry ingredients in a big bowl. Add the sourdough starter and water. Mix them with a big spoon until they're all pretty well mixed together. Look at the texture. Is it roughly like what I described? Good. It's ok if it doesn't feel like a dough yet. If it's a little more wet than what you consider reasonable, that's fine too.

We can't knead the dough, but we can stretch and fold it. Grab one side of the dough and stretch it up, then fold it up on the other side of the dough. Now, grab the other side of the dough (like, 90 degrees from the side you just grabbed) and stretch and fold the other way. If the dough doesn't let you stretch it at all, you might need more flour. Do this 5 or 6 times. Now, cover the bowl and let it rest for an hour.

After an hour, uncover and do the stretch and fold again. Cover and wait another hour.

You've guessed it… stretch and fold and wait an hour.

You can do a few things at this point. You can stretch and fold again. Cover, and wait like 5 hours. Or, you can stretch and fold and put it in the fridge overnight. Keep in mind that after this the bread will still need another like 5 hours to be ready. So if it's near bedtime, maybe put it in the fridge!

After this, the dough should have risen noticeably; good! Grab a baking pan (it has to be a little deep) and coat that shit with olive oil. Whatever amount of olive oil you think is reasonable, double that and maybe add a little more. Also put some olive oil in the dough. Make sure to coat the sides of the pan with olive oil as well.

Take the dough and put it in the pan. Try as hard as you can to spread it across the pan. It's not gonna spread perfectly, but that's ok. Wait an hour, try it again. Wait another hour and do it again…

At this point you can add rosemary or tomatoes or olives or pizza sauce or anything else you want.

Finally, put it in a 450 degree oven for 30 minutes or until it's kinda browned up on the surface.

getThisbread

N DIFFERENT (SURPRISING?) FAILURE MODES IN YOUR DESIGN TEAM
YOUR FRIENDS FROM ACROSS THE ION STATION SAY HI. IF YOU HAVE ANY.

- Assume $sin(x) = 0$ and be surprised when $x = pi/2$.
- Get cancer from the fine-grained particulate room while not wearing PPE.
- Get your test field burned down by a rocket.
- Get your PCB shorted by the moisture in the air.
- Get your PCB shorted by radio interference.
- Get your PCB shorted by falling into the pile of snow.
- Get your laptop shorted by falling into the same pile of snow.
- Get your insurance revoked at competition. (Gee I wonder why.)
- Get your face blasted by liquid nitrogen while opening a valve.
- Get a different result at competition compared to the ideal state simulation you conducted last night.

Next up: N different strategies to cope with failure.

RobbotDT

THOUGHTS ABOUT THAT NEW APPLE AR HEADSET WHICH I EXPECT TO AGE POORLY

So. Hmm.

mathNEWS articles are written on Mondays for publishing on the following Fridays. That means that, as I'm writing this, Apple has just announced their long, *long* rumored AR/VR headset, now officially titled the Apple Vision Pro. I'm sure by the time this is published, we'll have all sorts of think pieces and memes about this thing, but I wanted to get my initial reaction down raw.

Who knows, maybe the goggles will turn out to be revolutionary in the same way the Mac, iPod, and iPhone were — not the first in their category, but the first to make the category accessible and desirable to the average person. Having watched Apple's presentation, that's what *they* seem to think they're doing. Apple is wealthy enough and stubborn enough to wedge this into our lives if they really, really tried. It's been a while since they've launched a flat-out flop, and I expect this to be a moderate success, at least. And you can head to East Campus to see what happens when you bet against Apple.

But I see a lot of major issues with the product as presented this afternoon, and I think it's worth getting these thoughts down today. Who knows, maybe I'll be wrong and this will age like all the people who thought the internet was a fad, and we can all look back in a decade and laugh at me.

Let's get the obvious problem out of the way, the one that everyone seems to be focusing on: that price tag. $3,500 USD. That's $5,000 CAD. I know this is a new product category, I know this is an Apple product — but *man*. There's no getting around how much that costs. Apple had to ease people into $1,500 phones, and even now they offer cheaper options. *Starting* at $3,500 is bananas, and means this first generation is going to be very limited to developers and rich weirdos.

For most first-generation products, that might not *necessarily* be an issue — but Apple is going to want as many people to have this as possible to get people used to how these overgrown ski goggles look. Their demo showed people walking around an office or their home with these on, and it was impossible to take seriously. People mocked AirPods when they came out, but this is going to be a whole lot harder to take seriously when you run into someone wearing them at Starbucks.

Not that you're likely to see that, because the stated battery life is an *atrocious* two hours WHILE physically connected by an obnoxious wire to a mandatory external battery pack. Look — I've been around the block. I know that when a tech company gives you a battery life estimate, you halve it. But even with *2 whole hours,* this is just fundamentally not something you could take into the real world, beyond an outlet.

And that's assuming you'd even want to use it in public anyways, since the stated control methods are "eyesight, hand gestures, and voice". If I want to open Instagram under the table in class, I can do that relatively low-key. If I want to open it on the headset, I need to do some combination of yelling at myself and frantically waving my arms around. I don't know if anyone at Apple has social anxiety, but using this machine in public seems to be impossible without looking like an idiot and/or someone having a stroke.

Those things are relatively minor flaws, though, in the sense that there's a clear path to fixing them. Not that it'll be easy, but "the battery life needs to be better" has a conceptually simple solution- "make a better battery". Apple knows what they need to do.

The deeper issue is the one that's plagued all XR headsets trying to masquerade as "the future of computing": *what exactly does Apple expect me to do with this thing?*

Forget the fact that they only showed the OS as a CG concept video. In those concept videos, the only thing Apple can seem to imagine people using this headset for is… all the things they already do on their phones and PCs. Taking FaceTime calls. Texting their friends. Using email. Watching movies. Playing games. Spreadsheets. Oh boy, they've got spreadsheets on this thing.

Everyone already has a way to do all of this. The fortunate of us have several (and considering the price, Apple is definitely targeting the fortunate of us). It would be one thing if AR was a more convenient way to do these things, but… it isn't! Wearing a headset all the time is tiring and significantly less convenient than using your phone you'll be carrying with you while you wear this anyways.

Apple seems to think that people will want to use AR to do the things they already do just fine because… why? Now you can do it while looking like a jackass, talking to yourself and waving your arms around? It just seems like yet another tech company creating a product they deem to be "the wave of the future" — not because it actually enabled anyone to accomplish anything they couldn't do otherwise, but because it was in science fiction and it's technically possible now to do it.

The iPhone was so successful, not because it gave people new things they could do, but because it took the existing capabilities of other products, combined them, and made it frictionless. The Vision Pro only *introduces* friction.

I want to be wrong. I feel like something *like* this is probably the future *eventually.* And I'd especially love a whole new paradigm of computing to explore, to work in, and to imagine new exciting things to do with. I don't think we'll be using PCs and phones forever.

But I have a really hard time thinking this is it. See you all in a decade for either a good laugh at my expense… or for when another company tries to do this again.

Dick Smithers

RAMBLINGS ABOUT THE ROOM (2003)

It's been 20 years since Tommy Wiseau's cinematic masterpiece *The Room* was released, and it's the best worst movie I've ever seen.

Some facts about the movie:

- The budget for the movie was 6 million dollars, which is a much funnier fact when you see how low-cost the set and props and costumes are. How could they have possibly spent *millions* of dollars?
- Tommy Wiseau's origins are very unclear; no one really knows where he's from, or where he got 6 million dollars (yep, he personally paid for The Room). He has a vaguely Eastern European accent, but details about his age or background have never been confirmed.
- The character Mark (actor Greg Sestero) in the movie who plays Johnny's (Tommy Wiseau) best friend, is Tommy Wiseau's best friend in real life. This is also a funnier fact once you've seen the movie because Johnny's wife cheats on him with Mark, and Tommy Wiseau wrote the movie. I've never wanted to know the personal dynamic between two actors more. Also, Tommy and Greg continue to make films together today, including recent American horror film *Big Shark.*

The movie is made even better by its terrible, terrible acting, dialogue, and plot. Please stop reading if you don't want spoilers, but here are a few of my favourite quotes:

- "It's bullshit, I did not hit her. I did nooot. Oh hi, Mark!"
- "Anyway, how's your sex life?"
- "I got the results of the test back. I definitely have breast cancer." (this plot point is NEVER brought back up)
- "In a few minutes, bitch."
- "Chicken, Peter, you're just a little chicken. Cheep, cheep, cheep, cheep, cheep!"
- "Leave your stupid comments in your pocket!" (apparently this is a common phrase in Polish, and seems to have just been directly translated)

All in all, *The Room* is a beautiful mess/piece of art with endlessly fascinating lore. Please go watch it!

peacelovemath

AN EXCITING CONVERSATION TOPICS WITH YOUR NON-MATH FRIENDS

OR: WHAT I DISCUSSED WITH 4 MED STUDENTS, 2 PHARMACY STUDENTS, AND A NURSE IN 2 HOURS TOGETHER

- Triglycerides
- Saltine crackers
- Filipino-American snacks
- Vietnamese cuisine
- Injecting vinegar into your veins (don't do it, it hurts)
- The water quality in Kitchener
- Mental health
- Beta-blockers
- Braised pork belly
- The oxyhemoglobin dissociation curve
- Nunavut
- New Brunswick
- Toronto
- Calgary
- The spleen
- Britain
- Trans women

treee

THOUGHTS AFTER WATCHING "ALL QUIET ON THE WESTERN FRONT"

This movie is not the easiest to watch. It follows German soldiers fighting in trench warfare during World War I. It amazes me how boys younger than me had to go through what they did during wartime. It really make me feel like my problems are not really problems in comparison. Oh, I'm spending more time than I thought I would finding the correct $\Theta(n\log n)$ algorithm for CS 341 and won't have time to do fun stuff? Well, at least I am not living in a trench right now. It really puts things in perspective.

This movie will have you staring at the ceiling listening to gloomy music. However, it's important to realize that those who went through all the trauma of war should not have had to go through that.

If you are interested in war movies and can handle the extreme violence, I would recommend giving this movie a watch!

yummyPhi

WISDOM ONLY A ~$756 PROFESSIONAL DEVELOPMENT COURSE CAN GRANT YOU

This term I have found myself developing the most important professional skill known to man, Teamwork. I was planning on taking PD 5 for the additional project management certificate to actually try to get something constructive out of it, but alas, it is not offered during the Spring Term. Therefore, faced with either waiting to take PD 5 or choosing a PD course at random to fulfil my last PD requirement, I chose PD 4, Teamwork.

When I started the course, I was informed by my roommates that they completed it without even watching a single lecture. As someone who develops anxiety at even the *thought* of missing information, I decided then that I would watch every single online lecture to ensure that I obtained all the lessons that could be taken from this course. Therefore, I will do something that has never been done in the history of the University of Waterloo: I will write something about a PD course. More specifically, I will share the wisdom I have gathered from watching the lectures, so those even not in PD 4 can rejoice.

- The purpose of a university is **NOT** to make money. That is "**ludicrous and totally wrong**". The real purpose of a university is to produce knowledge. However, that is "not how [the prof] see[s] the purpose of the PD courses in general".
- Teams work better when they like each other. When people on a team collaborate effectively they produce a stronger product. Teams that communicate well find themselves to be more successful. When there are strong interpersonal bonds between group members, they can complete more tasks.
- Beware the **fetish of assertion.** Or any other concepts that involve being an aggressive narcissist to your group members.
- As this course was recorded in 2011, much of the wisdom I have gained was in remembering 2011 through pop culture references from the prof. The 2011 Lebron James Miami Heat, Occupy Wall Street, The Big Bang Theory, and The Sopranos all make appearances.
- Upon researching for this article, I came amongst the biggest nugget of wisdom of all, Robert Danisch, the communications prof who built this course, was the subject of a Fall 2022 controversy in which he was alleged[1] to have berated a student[2]. After seeing a student read a book in his class he called them a "lazy piece of shit" that would be "terrible at life". After the student left the room, he was *alleged* to have stated "That was a pissing contest, and I have to win… I'm not going to lose a pissing contest to a child". When notified that some students were made uncomfortable by the incident he was *alleged* to have said that the post-COVID generation was a "very very sensitive lot," and that the incident would not have registered as an issue

in the past. Soon after, classes and final assignments were cancelled for the remainder of the semester. Using my knowledge obtained in PD 4, I can say that his conduct would not really be befitting of an **Effective Team Member.**

Lars Nootbaar

1. After consulting with math**NEWS** lawyers I have decided to use this phrasing.
2. https://uwimprint.ca/article/student-seeks-apology-from-communications-professor-following-verbal-spat/

FIB O NOT GEEZ EEK QUENCH

o,

i

by

the

beach

grasping

two empty fists

at sleek, teasing minnows

or at else the knowledge i can't hold them,

this's the first time i ever went again and again with empty fists, my

nails gnashin' 'gainst sand grains, this my first vain attempt to play with the impossible, to own a metabolism

so i am all i've ever been, a girl screaming to stay at the beach, foggy & raw red from the sun, coaxing slippery minnow-words out of her mouth until she is compelled to rest on the banks:

say it like it means nothing to get big. you who knows life as the constrictor wrapping tighter with each breath. you will breathe on & on. you at the eye of a spiral which will need less and less of your noticing to spin, to take up space. say it like a kid, by the syllables, *fib o not geez eek quench.*

hotfemoid

SOMETIMES, THE ENDING DOESN'T MATTER

i hate goodbyes.

to avoid them, i used to keep just a   little   distance

so when people pulled away, less of me got pulled with them.

that was lonely.

when i got tired of being lonely, i thought i could avoid goodbyes by clinging to what i couldn't lose. i delayed as long as i could, squeezing so tight i cracked what i kept.

when i got tired of holding on, i tried accepting. i didn't do a very good job.

i spent all my time terrified i would make someone leave. every relationship was a tragedy, the end written before i saw the first page. of course, like every hero, my hubris was determined of the opposite. i convinced myself that, if i was perfect enough, nobody would go. i've always been good at pretending.

moving past pretending was more complicated than just getting tired, but playing perfection was… demanding. weight was gone when i stopped. i still couldn't face goodbyes, though.

i started to look for signs that someone would go. if i saw them, i would make all the preparations to leave first. instead of having part of myself ripped away, i could just excise it. cleaner. simpler. of course, i could never bring myself to do it. after all, i hate goodbyes.

right around that time, i realized that people left your life in lots of ways, not just goodbyes. some drift away, the passage of time pulling people apart. some die.

i had wanted to be anything but alive for *years* at that point, and i thought that was normal, but i also didn't think it would ever happen to anyone else. every denial eventually dies, there came a day where i had to face the incredibly real possibility that a friend might kill themselves.

i couldn't make distance. i tried, because i didn't want to get hurt, but i was too attached and i kept getting pulled back in. too close for space.

instead, i tried holding on. i realized that, my hope that people would survive, my desire for it, my support, it all meant something. i needed it to.

i stopped trying to write happier endings for my relationships, and started trying to write happier endings for other people. goodbyes hurt less, since i hadn't failed, i was just trying something else.

I was sure it could be done. If I was perfect enough, I could save lives. Of course, anyone who wants to be dead will try

to convince you of the opposite. Like a tragedy, their story was written from the start, their desire to die an inescapable prophecy, and any effort to fight fate was ultimately in vain. The story still ends with a knife in vein.

I tried not to let them convince me. I **would not** believe it. My desire for these people to be alive was stronger than anything, and I would let it win. But, over time, i was worn down. I tried to keep up the picture, i tried to keep fighting, but i was getting tired.

eventually someone convinced me. i loved her more than anything. i saved her life and she hated me for it. i had wronged her. she wanted to be dead more than anything and it was going to end that way. there was nothing more to be done.

i wrote a eulogy for her. while she was still alive. i was too close for distance, too tired to hold on, and so i braced myself for what was coming. i grieved the death of someone who was still alive, because that was all that i could do.

our story did end, but not how either of us expected. we tried to say goodbye a few times, but we kept writing. each day, we wrote fewer words, until there weren't any more. time had taken its toll. but, i don't really care, since she's still alive, and so am I.

Since then, goodbyes have gotten easier. Letting go has gotten easier. See, the thing that I could never admit was that, most of the efforts I took to stop the goodbyes *caused them*. I didn't value what I had for what it was, I was just scared of losing it. I tried desperately to make the ending *anything else*, but of course, I don't write the endings. I never did. I'm done trying.

It's time to let myself write a good story.

Golden

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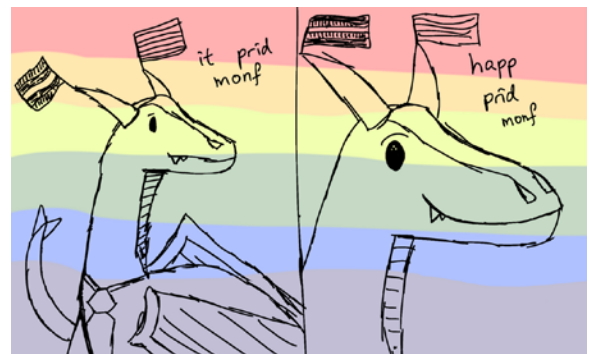
happy pride :)

andoiii

PAYING OFF A DEBT

Okay. So this article is 3 months late. To give some context, I was chilling in one of the offices in MC at the beginning of March. My friend was like "there's free pizza in CnD lulz" and I was like "aight bet" so I stopped by CnD to get a slice of this famous, *glorious* **mathNEWS** pizza. But I ended up arriving right at the tail end of the first **mathNEWS** writing session in March, when everyone had already finished writing and was just viiiibing in CnD. Somehow, I still got a slice (okay maybe two) of leftover pizza and promised one of the editors I would write my first article the next session.

Unfortunately (or maybe not so unfortunately) I had a dinner date that got scheduled on the same night as the next **mathNEWS** session. I missed that week and felt guilty AF — like really guilty — but not until the initial euphoria of the date wore off. Week after week, school stuff came up (shoutout to CS courses for keeping us busy at night, cuz who else would lol) and I never got to sit down and write the article I had promised to write. Frankly, I didn't know what to write about since all the topics I could write about were very personal and I'm not that mathy. Finally, I got a chance to sit down in CnD on this Monday night (albeit in a whole different study term) to write this article — and I didn't take a slice of pizza to make up for my Pizza Debt of one **mathNEWS** session, a.k.a. PD 1.

But this small experience made me think about how we (or at least I) process guilt. I seriously have no idea why or how <\$3 worth of pizza could make me feel this guilty for so long. After thinking about it a little more, I don't think that the value of the pizza has so much to do with the level of guilt I felt. It's more so the fact that the circumstances in which I got the pizza made it seem like I was lying or taking advantage of someone to gain something, which doesn't align with who I think I am (cognitive dissonance). That, and the fact that I was reminded of my unmet commitment each week while I was grinding (read: procrastinating) in MC when I saw the open boxes of pizza lined up against the window of CnD, with the distinctive congregation of **mathNEWS** writers that just told me, "Oh, it's **mathNEWS** editing night again… I should go write an article… but I also have 241 due soon…" made me feel worse.

As even more time went on, I felt like the editors who saw me take the pizza that one session and not come the next would hate me even more, so I was also scared to go back and write an article for that reason. In reality, I'm sure they don't even remember who I am.

In fact, there are times in my life where the guilt of a small unmet promise has festered into an irrational and obsessive pain, and as a result they've all affected my self-confidence in some way. But when I think a bit deeper, each of these instances had these similarities:

1. The image of the person who does not meet those promises is not the person who I thought I was, nor wanted to be.

2. I was reminded of my unmet promise on regular intervals.

I think the second point is the biggest one. Being reminded of your failures, or failure to act, strengthens and refreshes those connections in your brain to the unmet promise you have, and you start to think, "Ah, maybe I'm not who I say I am" a little more. Maybe that's why the thought of just dropping everything and buying a one-way ticket to somewhere far away is so enticing when you're really down; there's nothing to remind you of that thing that makes you feel guilty. You can create a new identity and start fresh. Sometimes, though, we don't have that choice of getting a fresh start. But more importantly, what's best for us most of the time is to fix that thing that's been bothering us for so long. On the other side of guilt is confidence, and foil to the points I listed above, when we face things head on, we:

1. Solidify in us the image of the person that strives for and meets these promises, no matter how long it takes them.
2. Are reminded on a regular basis of the fact that we were able to fulfill this promise.

Sometimes, the window of opportunity to rectify the wrongs we've committed is sealed shut, and for these things, it's often best to learn to move on, lest we become stuck in the past (like Hamlet).

I don't know where I'm going with this, so I'll just end it here (it's getting kinda late).

PD 0

INSIDE OUT MATH 137 EMAIL FROM THREE YEARS AGO BUT TRANSLATED TO RANDOM LANGUAGES 50 TIMES AND BACK.

pipe

Many of you are a little sad. Good grief is a normal human emotion. I recommend you to watch one of the best movies "Inside".

warrior1rules

UNTITLED

They don't tell you, before you go to the hospital, that the toothbrushes there suck, that the bristles get stuck in your teeth, that you can't keep floss in your room. The rules are different on every floor. Sometimes you can ask for floss at the nurses' station; sometimes you'll never be able to get your teeth clean, no matter how long you stand in the bathroom looking at this version of yourself in the mirror, cotton-poly blend, bright turquoise and shapeless.

Do you live alone? they ask. *Yes, I'm taking care of my friend's cat,* I say. *I'll let the social worker know,* and then they disappear. I'm handed a plastic bag for my things. I change into my uniform; they call them pyjamas; the socks slide around on my feet.

In the overflow area — the haphazard signs call it *supertrack* — the nurse itemizes my belongings as they're deposited into another bag. I keep my notebook, something to write with, earbuds, my phone, *Tuesdays with Morrie.* The rest is taken away, to a locked room I'm not allowed to see. I sit, take off my new socks, try to get comfortable, try to read, don't get far, highlight a few phrases, give up. I start the first episode of *Suits.* It is never quiet; you are never alone.

There are two nurses, both young, one still a student. The younger one is called away for a moment. The supervisor stays, typing something, stops, types something again. *Can I talk to the other patients?* I ask. *If they're awake and feeling social,* they say, *go for it.* They turn back to their screen; I try to look without seeming like I'm looking. I turn back toward the strange corner of the hospital I've been assigned to, an oddly peaceful mishmash of beds and dividers that remind me of a church basement that hosts the local Chinese school on Saturdays.

I had thought I might end up here, brought a change of clothes and a toothbrush to the clinic on Thursday. I was surprised, really, when they sent me home with a paper safety plan, an appointment a few days later with a check-in call over the weekend, trusted me to get myself back there on Monday afternoon. It was hot that day; I sat on my friend's couch after, choosing colours to put beside different people's names in my notebook, where I carefully copied over contact info from my phone at the nurse's suggestion. I'd asked earlier, *do I have to tell them why I'm calling, if I call them?* I was relieved, nodded tightly, at the *no, of course not.* If things got too scary, I was supposed to find a seat in the 24-hour McDonald's down the street, weather the storm there. The end of every flowchart read, *If I feel that I can't get to the hospital safely, call 911 and request transportation to the hospital. They will send someone to transport me safely.*

ਠ

It is two weeks later; I'm sitting on the same couch, surprised my fingers remember how to type on a keyboard, remember how to zip up a pair of pants and tie my shoelaces. I took souvenirs with me when I left, a blanket, a prescription, socks, phone numbers littered across scraps of hole-punched paper. In the hospital, there's this smell that you can't really get away from, no matter how hard you scrub yourself, trying to smell like yourself again. After your doctor gives you phone privileges, you can ask to use it in a supervised area, curled up in a waiting-room chair; the only time I signed my phone out, I snuck it into my room and kept it until the next morning. I do not know what I smell like anymore, but I wonder if people can see it when we make eye contact, the two weeks I spent on stretchers, in emergency department corners and then a closet and then a big echoey room, alone but never alone, always watched, always evaluated for my chart.

I realized, the night after I was discharged, that in the real world, you don't have to ask people to bring you leaves. I wrote, *THE WORST PART IS HOW QUICKLY IT STARTS TO FEEL NORMAL.* I wondered how long I could've done it, been there, walked around in those socks, before I felt as abandoned as the others, filing for my review panel and poring over my doctor's notes, tired, lost, betrayed by the people who said they would help me.

I was lucky, in the end. They called me *articulate. Insightful. Too smart to be here.* They said, *we're not sure if a hospital environment will continue to benefit you. We want to focus on outpatient treatment, discharge plans.* I said, *okay.* I thought about my floormates, scared to tell them I'd be leaving soon, because maybe they'd resent me for it, shoot me glares while they were on the phone, stop finding me for games. It went okay; I could hear the resignment in their voices, the *you're young, it's good you're getting out, don't come back.* The nurse rushed me as I scribbled my thank yous into flowery greeting cards, carried my things down to meet the taxi, stared out the window, like a pet store fish released into the ocean, looking behind him, knowing he wasn't supposed to be there but still wondering if they'll let him go back if he asks quickly enough, before they finish all the paperwork. I lay in the sun outside my friend's place, get comfortable, try to read, fall asleep, wake up. Nobody is watching me; I check anyway.

I walk down the street, shoes on my feet. I take the train. I carry a toothbrush, a change of clothes, my new chess set. I feel the wind, I breathe, smell the pollen. I do not go back.

cafe rat

On Monday, May 15th, 2023, I was involuntarily admitted to Vancouver General Hospital under British Columbia's *Mental Health Act.* I spent two nights in the emergency department, three days in the short-term inpatient unit, a week on the fifth floor of the Joseph & Rosalie Segal & Family Health Centre. I was discharged on May 26th, after lunch.

HUH...

It turns out you *can* finish a math undergraduate degree at UW without ever having to use LaTeX.

boldblazer

mathNEWS EXPANSION
OR, SHORTER ARTICLES

I'm not sure how much the average **mathNEWS** reader has noticed this, but issue size has been getting much longer over the past few years. Like, a lot longer. While back when I started writing for **mathNEWS**, issues would be around twenty pages, these days we've seen issues get up to fifty pages or so.

Because of this expansion and the printing costs of a free paper, the editors have implemented a policy limiting writer output. While, before, you could write whatever you wanted, however long you wanted, and it would basically be guaranteed to be featured in the next issue, now each writer can only write one article of under 1,000 words to be guaranteed publication. Anything over that might not be accepted.

This is, obviously, disappointing. 1,000 words isn't even that much. Checking out a recent issue of **mathNEWS**, an average page of just text contains just under 1,000 words. Now, a writer only gets one page to speak, whereas before writers could go on for pages and pages about whatever topic struck their fancy.

But that makes one wonder… what would the word limit be if we had even more writers?

Let's say we want to keep issues around 50 pages. Take out the front and back covers, both sides (**mastHEAD** and **gridWORD** have to stay) and we get 46 pages. Right now, that implies we have around 46 writers, or 46,000 words.

MATH 137 sections are capped at 120 students. Let's say that next term the entire writer base of **mathNEWS** goes missing under mysterious circumstances and a section teams up to take over for the missing writers. Then each writer would have 383 words, or the length of this article.

According to https://uwaterloo.ca/math/about, there are over 260 full-time professors in the faculty. What if **mathNEWS** was taken over by the profs instead, dissatisfied with their students' performance? Then they'd have 177 words each, or the length of the first three paragraphs of this article.

But what if the students took it back? According to the same link, there are over 9,000 students in the faculty, which would leave each student with only five words, meaning that each article could only be a headline and maybe a subtitle. And that would, truly, be a shame.

Predap
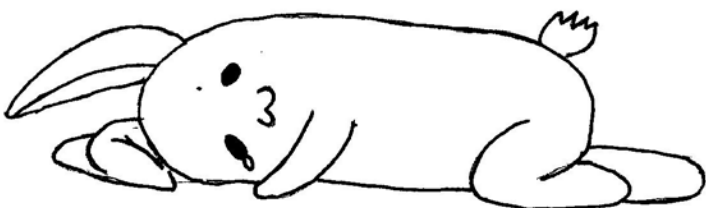
BBW

(over minecraft parkour)

joining vc noise

Drake: Hey guys, should I come to the United States?

Trump: Hell yeah, leave the great white north and come on down to the land of the free! Here's what the liberal media won't tell you, we're making America great again.

Joe: **sleeping**

Trump: You can't just waltz across the border. Build a big, beautiful wall (BBW) around Canada, and make the Canadians pay for it. If they try to sneak in, just deport them back to the igloos they came from. Trust me, nobody knows more about Canada than I do.

Drake: For sure Donald, I know you're always thinking about BBW.

Ben: Hypothetically, if you miss a woman, you should do everything in your power to get her back. Show up at her house unannounced, write her love letters, and text her every hour. Don't take no for an answer, persistence is key.

Obama: Suck her toes if you have to, just don't let this one get away without a fight.

Joe: :skull::people_hugging::bread::people_hugging::eyes::people_hugging::triumph::fire::fire:

you: *REEEEEEEEEEE*

Trump: There was absolutely no collusion. Everybody knows there was no collusion. It was a democratic hoax.

squeakLikesToes

I NEED THE GAYEST CAR POSSIBLE ON A $50K BUDGET
U/BUTTFUCKERTIM

The title is what it sounds like. I'm trying to find a real dick magnet of a car. Something that, when you drive it by, every schlong, dong, and winky twitches because they know the fella' inside will really gape them good if given the chance.

squeakLikesToes

OH NO ARTICLE DUE IN N HOURS
A SLEEP DEPRIVED HISTORY OF MY WRITING

I never liked writing. For years, every English assignment was a time of great pleading to the word count gods.

Just 208 more words and then I can sleep, just 6 new ways to state what I've already said and I'm done.

Then, sometime in tenth grade, I fell in love with writing. I don't know what caused this shift, but writing became a passion and a need for me. Truly an integral part of my life. I slowly discovered that, with a pen, I could express myself in ways I always struggled to do when I spoke. I could edit, tweak, modify. I could clarify and clarify until people got tired of reading. I never again got tired of writing.

It started with diary entries — little truths to myself to get into words what I was feeling so deeply. My diary entries carried me through a lot, giving me a medium to write down my thoughts and act on my creativity. However, my writing journey didn't end with these personal diary entries.

My loyalty to my diary lasted many years, but this treasured diary could compete with the alluring anonymity of social media for only so long. On social media, I could not only speak my truths, but also get attention for them. I was proud of the pieces I wrote, and now, with their likes, other people could tell me that they were proud of me too (or so I choose to believe).

Once again, I really enjoyed writing on my new platform. Once again, I was craving something new. Having built up my confidence through the validation of strangers, I was ready for the validation of my peers. I started new social medias and, this time, I started them with my name. I shared these new social medias with friends and family. I am also still writing on these new platforms and still loving the time I put into them. They're not quite something I'm ready to give up yet and I hope I continue writing on these platforms for a while longer.

Though nothing has pushed me off of my new platforms, something has definitely pushed me towards **mathNEWS**. Maybe I wanted a greater quantity of attention from my most immediate peers. Maybe I wanted to finally join the cool math student club. Maybe that's an oxymoron. What do I know? I'm not even sure what new possibilities I am hoping to achieve in my writing for **mathNEWS**. Regardless, I'm cautiously excited to discover this new leg in my writing journey. See you next time!

chickn strip

BLOND
THE GAY WAY TO SELF HARM

tw for obvious reasons

When I mention self-harm, what comes to mind?
Cuts on wrists or thighs.
Substance abuse.
Eating disorders.
Hair dye?

When I, as a gay person, dye my hair. I want to reinvent myself. Give myself a new look. Usually its accompanied by a haircut or a new style.

When I bleach my head from my roots to my tips, I'm in trouble.
Blond is my cry for help.
I won't admit to it out loud.
I'll laugh alongside the jokes, either about the stereotype, or how it's so fucking bright, like a Sharpie highlighter.
I'll be obsessed with touching and running my fingers through my hair.

But the hair isn't the only thing getting damaged.
My split ends are not the only things getting out of control.
A dry scalp does not raise my concern.
I am actually in danger of myself.
I am lonely, misunderstood, exhausted,
Unheard, unkempt, unwanted.

I am at a breaking point, and rather than acknowledging my circumstances, I pay a shit ton of money at the salon.
I'll sit in a chair for hours, let my scalp tingle where my hairline will eventually recede, and smile as the developer does what I can't do myself.

When I come out the other end, I receive compliments.
I feel noticed, seen and heard.
It becomes my conversation starter as people react to how fresh and youthful my hair now glows.

But few ask me why I did it.
They won't know that I'm in more pain than my scalp.
And that the damage done to my hair is minute relative to the damage I consistently conflict on myself.
They won't see what it takes to keep my hair from falling out, or to keep my follicles from giving up.

The roots may grow back as dark as they were, but my head will be stained and chemically imbalanced.

My hair is a reflection of my health.
Even if I slay my hairdo or serve a new colour.
While it can try, the peroxide isn't whats going to kill me first.

dirty blond gay

A SECOND ADDENDUM TO "RATING EVERY FLAVOUR OF M&M'S I HAVE EATEN"

Hello fellow M&M lovers! I have once again eaten not one, but TWO new flavours that I had never tried before. Without further ado, here are the reviews:

CARAMEL COLD BREW

In terms of size, shape and texture, these are basically identical to caramel M&M's. They have a candy coating around the chocolate with caramel in the middle. As you may recall, I rated the caramel M&M's a 10/10. However, I will not be rating these ones the same, purely because I am extremely biased because I do not like coffee. I can hardly stand the smell, let alone drink any of it. I can tolerate coffee-flavoured things because there's less flavour, but my general opinion of them is that they'd be better without the coffee. That is also my opinion on these, and yet I still ate the whole bag. 6/10.

EGG

Don't worry, they're not egg flavoured, just egg-shaped. It's the M&M's attempt at being festive in honour of the tragic death of my favourite Jewish celebrity. These M&M's are approximately the size and shape of Cadbury mini eggs, but a little bigger. The candy coating is about as thick, and then it's classic milk chocolate all the way down. If you don't think that constitutes a different flavour, well you didn't complain when I did mini M&M's so shut up. Let me tell you about something called the square-cube law (this alone justifies all of my M&M's articles being in **mathNEWS**). Basically, if you double the dimensions of the shape then its surface area gets multiplied by 4 but its volume by 8. So the chocolate–candy ratio of the egg M&M's is much higher than regular M&M's. Personally, I think the ratio is thrown off by this. Not enough to make them bad, but I do think they lose the M&M's magic. And they don't melt in your mouth very easily. Still chocolate though. 7/10.

*some*BODY

ODDS THAT EVERY mathNEWS PIZZA OPTION GETS 8 VOTES

⅛

Xx_420SonicFan69_xX

ALL IN PERFECT TIME

All in time
All in perfect waves
All so delicate sinking
All through the living i weave
All while stepping on ants
All sleeping in

All aiming
All while precarity risking
All in pursuit of places secluded
All i learned to place in names
All remains unwritten
All that spoke

All winter
All the dogs returning
All that can be lost in critical moments
All not tied down will be lifted
All in absence of notice
All knowing all evading
All seeing eye

All love
All this hope i feel
All the loss i'll ever endure
All in delicate balance living
All through waves unsyncing
All in perfect time

χ

LONG TIME NO SEE, HERE'S A SONG FROM THE PSYCH WARD
LYRICS

tell me / tell me a secret / that everyone knows / i can be kind
can't you / can't you remember / how you reacted / i never lied

are you / are you ever genuine / keeping it tidy / how do you feel?
ask me / ask me about me / look underneath it / tell me what's real

in 60 years / when they cut me apart / they will find you
a ring of bark / doesn't know what he's doing / learned to cry in the spring

https://youtube.com/@catherinekdong if you want to listen

cath

IT'S TIME TO DU-DU-DU-DO THE gridWORD

gridCOMMENT 152.2

wahoooo its time to hit the griddy (word)!! thank you all for trying your best at the first **gridWORD** of the semester, and i look forward to seeing you all continue with your excellent work :0000

last time, i asked you, "what, if anything, do you desire most?" and those of you who solved the **gridWORD** had said:

- awmlet: *i desire most to be happy*
- Mr. Goose: *Mrs. Goose*
- spaghettiinhalers: *to be cherished by those i love*
- MJ: *what i desire is a coffee date with you!*
- malia :) : *nothing but u babe <3*
- Coda: *true love <3 (and a boatload of cash)*

ok this is crazy, the amount of love being shared with **gridWORD** is actually so wonderful to see, and i am so happy that you all enjoy them :))))

to you all who have solved the **gridWORD** last time, and those who try their best to complete it, keep doing your best at whatever it is you may do!! and to MJ, i will happily take you up on your offer, check your inbox for my reply :oooo

this time i ask you, "what, if anything, makes you **the most happy**?" please send **gridWORD** solution, **gridQUESTION** answer and pseudonym to mathnews@gmail.com by June 19th at 6pm!!!

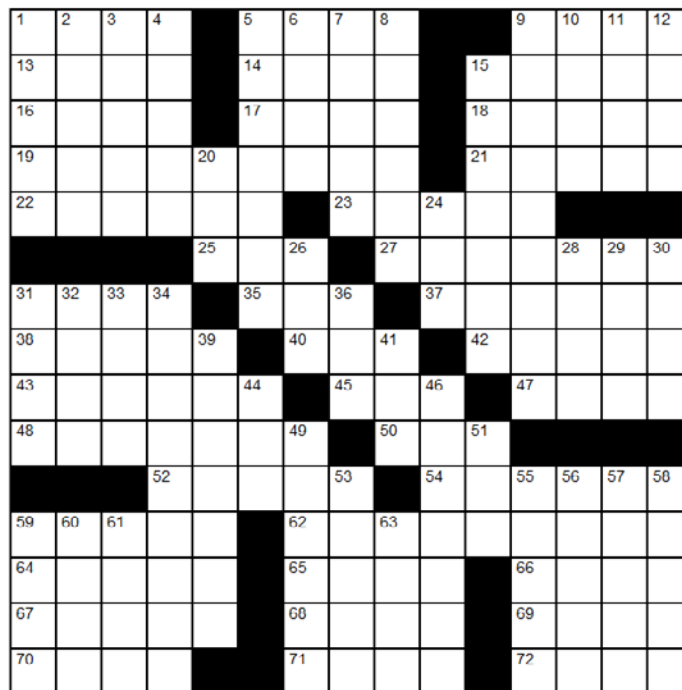i will see you all again next time :0000 xoxoxoxo

Wink wonk

ACROSS

1. Without delay, for short
5. Pile
9. Flying mammals
13. Lady's title
14. Eye amorously
15. Stylist's spot
16. Famous ___, cookies
17. Roman wrap
18. Potential water contaminator
19. Sermon subject
21. Really enjoyed
22. Zen enlightenment
23. Hospital cry
25. Conclude
27. Fragrant Chinese blossom
31. Often confused for Zelda*
35. Do-it-yourselfer's purchase
37. Spring-like toy*
38. Broadcasting
40. Kit mitt
42. Student getting one-on-one help
43. Cold dessert
45. Arid
47. Cuts (down)
48. Ciphertext writer
50. "___ rang?"
52. Contemptuous look
54. Data path to a satellite*
59. Specialty
62. School employee
64. Work ___
65. Istanbul native
66. Additionally
67. Flip one's lid?*
68. Kind of arch
69. Caught in the act
70. Smelting waste
71. Ass
72. Gaelic language

DOWN

1. Washington's successor
2. Pago Pago's place
3. Lifeless, old-style
4. Basil-based sauce
5. Legend of Zelda character in the famous Gerudo outfit*
6. Self-images
7. Emulsifying agent
8. Oil source
9. E. coli, salmonella, e.g.
10. ___ vera
11. ___ balsam, a resin for perfumes
12. Barber's motion
15. Chef's sprinkle, sometimes
20. "___ you nuts?"
24. Hi-___ graphics
26. Decline
28. "I'm ___ you!"
29. Bias
30. Looks at
31. Get checkmated
32. Knowing, as a secret
33. Drug buster
34. Decisively ending or rejecting something
36. Little bit
39. Jeff Foxworthy's kind of person
41. Not straight (happy pride month)
44. Ball supporter?
46. Youngster, old slang
49. Clergyman
51. Bull markets
53. Blush
55. Car dealer's offering
56. More sickly
57. Honkers??!!?
58. Danish money
59. Beaks
60. "___ be a cold day in hell ..."
61. ___ Pet (novelty item)
63. Component used as fertilizer

lookAHEAD

SUN JUN 11	MON JUN 12	TUE JUN 13	WED JUN 14	THU JUN 15	FRI JUN 16	SAT JUN 17
Father's Day **mathNEWS** editors prepare to brave Toronto for five days	Cycle #2 posting #1 applications open	Convocation begins			National Take An Old **mathNEWS** Issue Please Day	Convocation ends World Juggler's Day

SUN JUN 18	MON JUN 19	TUE JUN 20	WED JUN 21	THU JUN 22	FRI JUN 23	SAT JUN 24
mathNEWS 152.3 production night Final examination relief requests due Juneteenth	Cycle #2 posting #1 applications due	Cycle #2 posting #2 applications open			**mathNEWS** 152.3 published Tuition and fee refund deadline — 50% **mathNEWS** editors triumphantly return	distractED's grandma's birthday 🎂

LAST ISSUE'S gridSOLUTION