"WHAT UNSOLVED PROBLEMS SHOULD mathNEWS TACKLE NEXT?"

Looking for ways to procrastinate? Grab this copy, sit down in a (MC) comfy chair in front of a fireplace (if you have one) and avoid the incoming train that is exams. In this issue, Martin Pei went above and beyond in his contribution to **mathNEWS** by sending us four different items of interest. Thanks to the diplomatic efforts of the editors, we managed to free our writers from the CS 135 jail. Hurray!!! Down with CS 135.

A lot has happened since the last issue was published. On 11th of November, Remembrance Day was observed by the members of the Commonwealth including Canada to honour members of armed forces who gave up their lives in the line of duty. Just earlier this week, the greatest comic book writer to have ever existed Stan Lee passed away. For decades, he provided both young and old with adventure, comfort, escape and inspiration. He left indelible marks on so many lives. RIP Stan Lee. Thanks for making our childhoods awesome.

On a slightly more upbeat note, we celebrated Pi day on November 9th, the 313th day of the year. Don't ask me how that ended up happening. I thought only engineers were bad at math but now I have my doubts (but then engineers didn't even think about celebrating Pi day so I guess this oversight from math department can be overlooked). I always used 3.14 as a good enough approximation for Pi so it would have made more sense to celebrate it on the 314th day of the year. In case someone has a good explanation for this "mistake", please do write a letter addressed to:

> This is a feature not a bug
> **mathNEWS** Editor who doesn't know the difference
> **mathNEWS** office, 3rd floor MC

Anyways, that's all I have to say for this issue of **mathNEWS**. I shall now take my leave to procrastinate over-engineering my article for the next issue.

over-engineerED
Editor, **mathNEWS**

ZADDY²	How to stop non-contributors from answering **mastHEAD** questions.
BIGGEST BROTHER	How to stop Amazon from taking over.
STACEY THE SETTLER	How to decolonize **mathNEWS**.
CODY THE QUEER	GENDER-NEUTRAL WASHROOMS IN MC!!
YOUR DAD	Your mom!
WALDO@<3.LE-GASP.CA	How do we get effective government that gets things done well?
PERMANENT PSEUDONYM	The Twin Prime Conjecture, but using sets of twins to do it.
LOQUATIUS	The optimal distributions on a number of pizzas such that the most people pick slices for the most diverse selection.
WHYOS	Which pizza toppings are most likely to result in mmMMPHGMPH-HELP I'M BEING KIDNA-MPHHH
FRUITBOY	If a tricycle has 3 wheels, a bicycle has 2 and a unicycle has 1, are those pedal-driven boats "nilcycles"? *[Editor's note: No. One solved.]*
SIGSEGV	Why no GF?
BEYOND META	How to adult and find a job.
NOMORESUBGOALS	How should we define a sandwich?
CONFUSED	How many anonymous gifts can the **mathNEWS** editors receive in one day?
SWINDLED	Why so many copies of **mathNEWS** are left on the newsstands even though they almost disappeared in spring term.
STAPLED	My life. Be my life coach thx.
OVER-ENGINEERED	Putting Imprint out of circulation

ARTICLE OF THE ISSUE

This week's article of the issue goes to Xavientois for his absolute mastery of the comedic form known as "low-brow" in NNN: Tricks to Tame your Tall Tube. It made us editors laugh our asses off, and then wonder if it was even a good idea to publish it. If that isn't the hallmark of a quality **mathNEWS** article, then I don't know what is.

swindlED
Editor, **mathNEWS**

I need someone to prove my life is a joke

NOSHERWAN AHMED, mathNEWS EDITOR FOR FALL 2018
ALONG WITH ESTHER AHN, JAMIE ANDERSON, CLYDE BROWN, ANUJ OPAL

mathASKS 138.5
FEATURING PROF. MARTIN PEI

WHYOS: HOW DOES IT FEEL TO SHARE A NAME WITH CANADA'S BEST PROVINCE?

Actually, very few people talk to me about this. If they do, then I claim that it's my home province (it's not). I went to P.E.I. once, and that was last summer. It is an incredibly beautiful place. I took a selfie with the PEI sign right after crossing the Confederation Bridge (photo below). When I got on a ferry to leave the island, the attendant looked at my ferry ticket and said, "nice name."

WHYOS: OF ALL THE PHOTO'S YOU'VE TAKEN, WHICH ONE IS YOUR FAVOURITE?

Probably the one that I got printed on a canvas and hanging in my office. It's a photo of sunrise in the sand dunes of Death Valley National Park, with the silhouette of a photographer standing on a dune, and mountains in the background (photo below).

CONFUSED: HOW DOES IT FEEL TO BE A LIVING LEGEND?

It has been a dream of mine to be able to inform my students that the blue squiggly line is a river, the black dot is a major city, and 1 centimetre represents 20 kilometres in real life.

[Editor's Note: Well played, Pei.]

PERMANENT PSEUDONYM: WOULD YOU GO SKYDIVING?

No.

BLOB: WHAT IS YOUR FAVOURITE UNORTHODOX ICE CREAM FLAVOUR?

Vanilla. I'm also trying to cut down on ice cream consumption. Something something health something something.

NOMORESUBGOALS: WHAT IS THE MOST MEMORABLE MOMENT FROM YOUR TEACHING CAREER?

There are too many memorable moments. Typically the best moments are when a student or I make an intentionally bad joke and I couldn't stop laughing. Or when students were audibly and/or visibly shocked by some mathematical thing that I showed them. Another memorable moment is when a group of civil engineering students started firing nerf guns at me, in class. I did take revenge by stealing one of their nerf guns and shooting back.

Various Pseudonyms: What is your favourite board game (that you own or have otherwise played) and why?

Power Grid is my favourite board game. It's an economics game, and the rules are fairly simple. You buy power plants, buy resources, build cities on a map, then power these cities to generate money. This repeats until the end. It is quite mathy as you try to figure out if you can afford your plan. What makes this game my favourite is the end game, where it tends to be very tense with players bidding madly for that last power plant they need, or strategizing for when to trigger the last round, or buying up all the resources to prevent someone from winning. It has led to many agonizing decisions that made the game memorable. I would play with 3 or 4 players.

A close second is Captain Sonar. This is an 8-player game where we divide them into 2 teams of 4, and each team controls a submarine. You move around on a hidden map, and you have to figure out where the other team is. The goal is to cause enough damage to the other team's sub to win. All of this is done in real time, there are no turns. You just start yelling out directions simultaneously. This game is not for everyone, you need to be able to handle the pressure of a real time game. But with the right people, this game has produced a ton of great memories.

CHRIS: WOULD YOU RATHER TEACH MATH229 OR CO351 AGAIN?

CO 351. At least this class has an average attendance of more than 2.

FRUITBOY: AN ARTICLE ABOUT YOU JUST WROTE MADE IT INTO THE NEW YORK TIMES! WHAT'S THE TITLE?

Waterloo Math Prof Cannot Perform Simple Arithmetic

XX_420SONICFAN69_XX: HOW MANY "POMPEI" PUNS HAVE YOU HEARD IN YOUR LIFE?

One. Just now. I take this as a cue to write about Pei puns. It kind of started with a Math 239 question I wrote where I set up a shop to sell peintings, peigers, and peinkillers. I like to call my friends PeiPals. When students come to my office hour, it's like I'm a doctor, and they are the peitients. A student once suggested that I should be a peileontologist. Recently another student came to my office wearing a t-shirt that says "No Pei, No Gain" with a picture of me on it (it's quite embarrassing for me, but on the other hand, maybe there is an opportunity to start a merch store).

CC: WHAT IS YOUR FAVOURITE COURSE TO TEACH?

CO 342 Graph Theory. There are a lot of beautiful theorems and proofs, and they are not very difficult to understand.

STAPLED: CONSIDERING THE FACT THAT YOUR LAST NAME MAY BE MISSPELLED AS "PIE", DO YOU GET PIE ON YOUR BIRTHDAY INSTEAD OF CAKE?

Perhaps ironically, I don't like pies. Nor do I like cakes. I usually get nothing on my birthday.

SWINDLED: IF YOU HAD TO TEACH A COURSE OUTSIDE THE FACULTY OF MATH, WHAT WOULD YOU TEACH?

Maybe a course in physical geography or meteorology. I do like natural landscapes and crazy weather phenomenon.

OVER-ENGINEERED : HAVE YOU COMPLETED GEOMETRY DASH?

Not even close. I'm actually terrible at hand-eye coordination, and my reflexes are abysmal. But sometimes it's good to do some brainless activities after a full day of work.

PI: TO HOW MANY DECIMAL PLACES DO YOU HAVE PI MEMORIZED?

9.

> # I'm not a mathematician, I'm a statistician, which is better.
>
> **PROF. MICHAEL WALLACE**

ONE OF MY FAVOURITE PROOFS: FIBONACCI NUMBERS IN PASCAL'S TRIANGLE

profTHOUGHTS *138.5*

I find Pascal's Triangle to be a fascinating object. It is deceptively simple to create, you just generate the entries by adding the two numbers on top of them. Yet it hides a wealth of information. In Math 239, I teach a few of the properties of Pascal's Triangle, but I have never had the time to teach my favourite property: you can find terms of the Fibonacci sequence hidden in the sums of certain entries in Pascal's Triangle, as illustrated here:
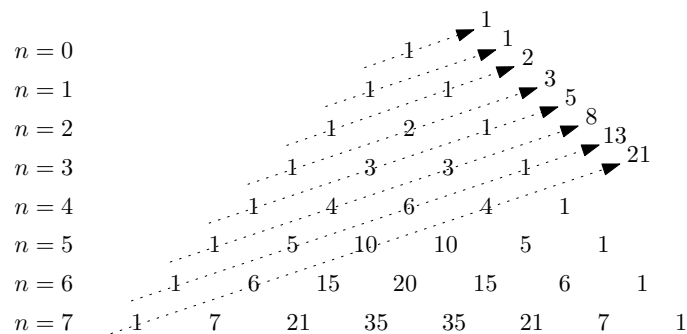
I would like to present a proof of this phenomenon. First, a bit of background information. Each row of Pascal's Triangle lists the values of n choose 0, n choose 1,…, n choose n starting with $n = 0$ in the top row.

The number (n choose k) is the number of ways to choose a group of k objects out of a set of n distinct objects. For example, 4 choose 2 = 6 is the number of ways to pick 2 letters from A, B, C, D, which are AB, AC, AD, BC, BD, CD.

The Fibonacci sequence is also deceptively simple to create, you just add two consecutive terms to get the next term. But there are so many results on this sequence that there is even a journal called *The Fibonacci Quarterly* that is dedicated to papers about this sequence! For our purposes, we will use f_n to denote the n-th term in the sequence. We define $f_1=1$, $f_2=2$, and for $n \geq 3$, the sequence satsifies the recurrence $f_n = f_{n-1} + f_{n-2}$.

We now return to the connection between Pascal's Triangle and the Fibonacci sequence. Looking at each dotted arrow in the diagram, we see that if n choose k is the current term, the next term along the arrow is $n-1$ choose $k+1$, as we are moving one row up and one spot to the right. As an example, for the last arrow, 21 = 7 choose 0 + 6 choose 1 + 5 choose 2 + 4 choose 3.

In general, this is the identity:

$$f_{n+1} = \sum_{k=0}^{\lfloor n/2 \rfloor} \binom{n-k}{k}.$$

Certainly you can try to prove this algebraically by induction, but it is quite tedious, and it does not give any insight into any meaning to the identity. As a combinatorialist, I prefer a proof that involve counting the size of a set of objects in two different ways. Since we are counting the same set of objects, the two results must be equal. The objects that we are counting here are all possible ways of tiling a 1 × n board with 1 × 1 squares and 1 × 2 dominos. For example, one way to tile a 1 × 10 board is as follows:

Let T_n be the set of all possible ways of tiling a 1 × n board. The number of such ways is denoted by $|T_n|$ (the size of the set). We will now determine $|T_n|$ using two different methods. In the first method, we will categorize the tilings according to what occupies the leftmost spot. In the second method, we will categorize the tilings according to the number of dominos in the tiling.

We first prove $|T_n|=f_{n+1}$ by showing that $|T_n|$ satisfies the same recurrence as the Fibonacci sequence. We can categorize tilings in T_n into two types: Let A be the tilings where the leftmost spot is occupied by a square, let B be the tilings where the leftmost spot is occupied by a domino. This means that $|T_n| = |A|+|B|$. We now relate tilings in A and B to tilings of smaller boards.

For a tiling in A, we can remove the leftmost square to obtain a tiling of a 1 × (n-1) board, which is in T_{n-1}. On the other hand, we can take a tiling of a 1 × (n-1) board and add a square to the left to obtain a tiling in A. This tells us that the number of tilings in A is precisely the same as the number of ways of tiling a 1 × (n-1) board, i.e. $|A|=|T_{n-1}|$ (formally, what we are describing is a bijection between the two sets). Similarly, we can remove or add a domino on the left to get $|B|=|T_{n-2}|$.

This means that $|T_n|=|T_{n-1}|+|T_{n-2}|$, which is the recurrence that the Fibonacci sequence satisfies. Checking some base cases, we see that $|T_0|=f_1=1$ (yes, we can tile a 1 × 0 board in one way, by putting no squares nor dominos on the board), and $|T_1|=f_2=1$. A quick induction establishes $|T_n|=f_{n+1}$. An illustration for the case of n=5 is shown here.
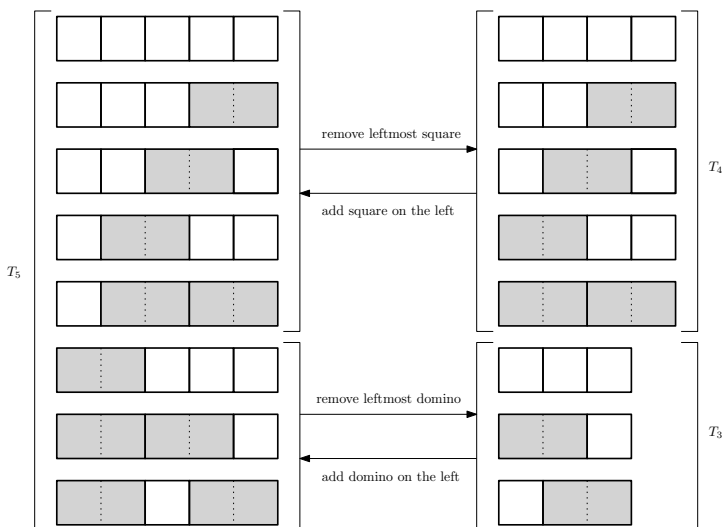
We now determine $|T_n|$ in another way. We can categorize tilings in T_n depending on the number of dominos that are in the tiling. We could have as few as 0 dominos, but as many as $\lfloor n/2 \rfloor$ dominos. When there are exactly k dominos, there are n-2k squares. Such a tiling is equivalent to rearranging k+(n-2k) = n-k objects (squares and dominos) in a line. We can imagine this as having n-k spots in a line, and choosing k of these spots to be dominos (the rest has to be filled in with squares). Therefore, there are n-k choose k ways to tile the board using k dominos. Since k ranges from 0 to $\lfloor n/2 \rfloor$, we have established that

$$|T_n| = \sum_{k=0}^{\lfloor n/2 \rfloor} \binom{n-k}{k}.$$

An illustration for the case of n=5 is shown here.
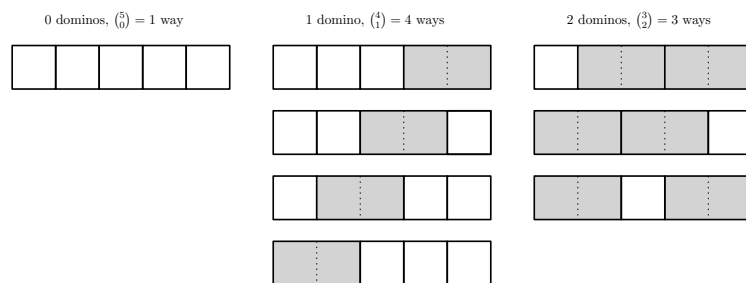
Combining the two ways of counting $|T_n|$, we have established the identity that we set out to prove.

I hope this has been interesting to you, and hopefully this will motivate you to look more into the study of combinatorics!

Prof. Martin Pei

PSA: START SEARCHING FOR SEPTEMBER 2019 HOUSING NOW!

All the good ones under $500 a month will probably be gone by like, the end of December, SO GET ON IT!!!

waldo@<3le-gasp.ca

N TYPES OF STUDENTS IN MATH 147

Jasmine

Jasmine scores 100% on every assignment, quiz, and exam. In fact, her exam grades are typically over 100% after "the curve" is applied. Jasmine sleeps two hours out of every twenty-four, usually between 5:30 and 7:30 in the morning. She is enrolled in 6.5 courses, studies for the MCAT, the LSAT, and the GRE in her spare time, and volunteers on the weekends.

Tommy

Tommy is good at math, but most of his success is due to his work ethic rather than inherent brilliance. On a typical school day, he spends three hours sleeping, three hours in class, twelve hours working on math, and three hours working on other subjects. During the other three hours, he makes math memes to post on the UWaterloo subreddit. How he finds time to doing anything else is a mystery.

Mike

Mike has incredible intuition, but tends to make mistakes that would be obvious to a high school student. He relies on Tommy to catch these errors on assignments. Mike loses most of his marks when Tommy is not around to bring him down to earth—for instance, during an exam. Mike's most common mistake is writing . Mike typically sleeps four hours every night and manages to find time for hobbies such as cooking and video games. He stresses over what to buy friends for birthday presents.

Kenwyn

Kenwyn is as smart as, if not smarter, than Jasmine. However, his brain operates twice as fast as the rest of his body, including his mouth and hands. Consequently, his solutions often skip steps (and parentheses) that are obvious to him but to nobody else. Like Mike, Kenwyn has a symbiotic relationship with Tommy: Tommy proofreads Kenwyn's work and points out any unjustified leaps of logic, while Kenwyn provides Tommy with hints when he gets stuck. During class, Kenwyn usually watches anime, reads web comics, or works on random programming projects—if he shows up. Despite this, he knows exactly what's going on and will often correct professors' whiteboard errors. Kenwyn submits his assignments in Microsoft Word. Kenwyn does not sleep.

秀英

不懂英文

Ludwig

Ludwig insists on sleeping eight hours every night and practicing viola eight hours every week. His quiz and exam marks are excellent, and he knows the course material well. Because of his propensity for healthy slumber, however, he rarely finishes problem sets. The day before an assignment is due, Jasmine and Tommy meet at Ludwig's place for lunch and work late into the evening. The idea is that Ludwig feeds them in exchange for their insights on homework problems. Usually, Ludwig will look at Jasmine and Tommy's solutions, decide they are too complicated and long to bother understanding, and go to bed.

Matthew

Matthew rarely attends classes, and he doesn't need to. Rumour has it that he proved Bolzano-Weierstraß as a helper lemma on the COMC in grade ten. If he wanted to, Matthew could spend thirty hours out of every twenty-four on math, but he has never been observed at work. When Jasmine and Tommy are stuck on a problem at 2:00 a.m. the morning their assignment is due, they call Matthew. Matthew also has a girlfriend.

Epsilon Screwn

N LAZY LISTICLE IDEAS I'M TOO LAZY TO WRITE ACTUAL LISTICLES FOR

- N **profQUOTES** I forgot to submit in time for last issue
- N battles between **mathNEWS** writers we'd all like to see
- N things you didn't know about MC Comfy (number π will shock you!)
- N breeds of bunnies you should try owning
- N things you should put in your TODOs (TODO: finish this one)
- N foodstuffs you should try from CnD
- N things that have been printed on the MathSoc printer
- N posters people have tried to post on the MathSoc wall
- N proof methods you should always use
- N proof methods you should never use
- N proof methods you should *never* use, especially in court
- N questions you asked yourself about why you're in court
- N things you sold to pay your lawyer
- N things you didn't know about police stations
- N reasons to invade EngSoc

whyOS

TRYING TO RATIONALIZE INFINITY.

This is my failed attempt to talk about the concept of infinity to people that know nothing about math (for example, CS students). Pmath students, feel free to cringe at me.

Most of our earlier understanding of infinity is something that is limitless or boundless. That's good enough for laymen; however, since we are in Math, we have to define it formally. From the Wikipedia page on infinity, it is defined as a size greater than any number.

A simple CS representation is a program that enters a loop without an exit condition. Therefore, it will just keep going on and on until your boss fires you...

This is only for countable infinities. For example:

```
a= 0
while true
    a = a + 1
```

If the program keeps running, then a is approaching infinity, but it is larger than a. There is nothing you can do to reach infinity when one has finite number and finite operation (except dividing by zero).

With this boundless power, this is the reason Thanos was able to wipe out half of the MCU actors' payroll.

One more thing: infinity can have different sizes, namely countable and uncountable. Countables have the size of natural numbers while uncountables have size of real numbers, which is much larger than the countable set of infinity.

Since a real number has infinite digits, you can map the entire size of natural numbers to represent real numbers. In MATH135, you have to remember the bijection proof using *that* diagonalization argument to show that uncountable infinity is a powerset of countable infinity.

After watching this weird Vsauce video about infinity, https://www.youtube.com/watch?v=SrU9YDoXE88, I learned that one can create a bigger infinity by declaring more axioms. For example, you can create a number or set such that you can't reach them by power sets and other expansion methods of smaller infinities. You can say this is unreachable or inaccessible, then you can add more axioms on top of that to make it stronger until they appear to be contradictory to each other. These axioms are like infinity stones; getting one on top of each other makes you unimaginably more powerful than before.

This reminded me of Dragon Ball, where you can have a enemy that supposedly has endless power: Goku can still beat them by surpassing the "unreachable". Two episode later, an brand "new" enemy show up that somehow ever more boundless than previous foe only to get defeat by the good guy again.

The concept of infinity is like a mediocre show where the creator keeps making their villains too powerful instead of ending the show on the high note or branching out the story line. The authors keep one-upping each other with the new, boundlessly stronger villains than previously because of "Axioms". This is why power levels are stupid.

me

HOW TO FEEL LIKE A GOOD LISTENER
DESPITE ALL EVIDENCE TO THE CONTRARY

Sometimes someone you care about is dealing with some shit and really just want someone to listen to their problems.

Listening, however, is hard and it's a lot easier to convince yourself that you are good at listening and give yourself an ego boost than actually being helpful.

So when your friend or loved one is commiserating about their problems, constantly interrupt them to offer your solution. When they point out your interruption, dismiss their concerns by saying you are just offering an alternative perspective and they are the bad listeners for not wanting to hear your uninformed and unsolicited advice.

When they get annoyed at you for not even understanding the situation, blame them for poorly explaining things and never consider that your constant interruption are part of the problem.

You are just offering an alternative perspective. You are being helpful – they're the ones who are too emotional to appreciate your efforts. Tell them that they are way too upset about a small thing.

Continue to bring up the topic 'til they accept your advice regardless of how many times they communicate that they do not want your advice and that it is not helpful.

You are determined to help them, facts be damned. 'Cause you are a great listener and you have the perfect solution to their problem.

This article is dedicated to my Dad.

Beyond Meta

BREAKING: PROFESSOR ENDORSES mathNEWS PRODUCTION NIGHT OVER HIS OWN PROBLEM SOLVING SESSIONS

NOVEMBER 12, 2018 — WATERLOO — In a move that shocked many, a well-known University of Waterloo professor has publicly announced his support for attending the **mathNEWS** production night over attending his own problem solving sessions.

At the beginning of his MATH 145 class, Professor Stephen New was met with a challenge from his students. Faced with the question "Snew problem solving or **mathNEWS** prod night?" scrawled across his blackboard, the much-loved lecturer pondered for a moment, before decisively indicating his preference for the latter with a single tally mark. His response prompted a wave of gasps from the assembled witnesses, who completely expected the respected Putnam coach and contest organizer to advertise his own work over a student-run, fortnightly newspaper.

"I knew he was modest, but not *this* modest," a student said.

"Weird flex but ok," chimed in his friend.

"Frankly, it was quite a shock when the self-professed beauty in mathematics didn't choose himself," Terry Chen said. "I was quite relieved, however, when he chose **mathNEWS** instead."

"HE SMILED WHILE DOING IT TOO!" exclaimed another exasperated student who voted for the problem solving session. "THE CHEEKY BASTARD, I TOLD TERRY THE PROBLEM SOLVING SESSION WAS CLEARLY SUPERIOR!"

"Wack," commented someone else.

Unfortunately, despite his public proclamation the legendary professor was nowhere to be seen on production night.

whyOS

ORGANIZED CHAOS

So fellow mathies, it's pretty apparent to each of us that we're on top in this school. We have a world-renowned math program, and even our own **mathNEWS**. We're by the people, for the people. So, we no longer have to work our way up to the top. The problem now, however, is staying here. We need to make sure we keep other faculties and other publications at bay, to keep the top spot exclusively in math.

No, we at **mathNEWS** definitely do our part in suppressing other faculties, through various articles of both serious and satire nature. However, it's become apparent that the opposition isn't responding well to the offensives. Mostly we lack a response, and when we get one it seems to be much too aggressive for our passive tastes. From the full-on collateral kidnapping of our beloved Pinky (leave him out of this, ENG) to some silly 'cease and desist' papers by our major rival Imprint. We throw some friendly roasts their way and their response becomes a legally enforced apology, not even pretending to roast us back first.

With these aggressive responses targeting everything math, I believe that our tactics are somewhat flawed. We've become adjusted to using ourselves as a platform, but that has caused our various competitors to align themselves against us. I propose a change in offensive.

In the Spongebob episode 'Naughty Nautical Neighbours', how does Squidward cease the nuisance that is his nextdoor neighbours, Spongebob and Patrick? He doesn't take both of them on directly. Instead, he uses bubbles to turn them against each other, so they'll fight with each other instead of annoying him. I believe similar logic can be applied in this scenario, as an all-out 'free-for-all civil war' between our competition would make it much easier to stay above them.

I'm "absolutely not" encouraging this behavior, but I'm just saying that if someone were to take all the Imprint copies from campus newsstands and leave behind a couple copies of the Iron Warrior instead, then there would be more conflict and we wouldn't be involved for once. OR, suppose that "hypothetically" someone were to cover up the 'CHEM CLUB' sign in C2, write 'MEME CLUB' instead then leave a sticky note that says "Love, Arts", that would be a fun development to watch.

So theoretically, if all other divisions of the school were to be against each other then perhaps we could further claim the throne without opposition.

Fruitboy

IMPORTANT UPDATE ON SLC CONSTRUCTION

Shit's **_still_** broken.

Fruitboy

HOUR BY HOUR: A TIME MANAGEMENT DIARY OF AN SE FIRST-YEAR

University is a big transition from high school, and although Fall Open House was last **mathNEWS** issue, perhaps some high school student will stumble upon this article and find the information within helpful.

What better day to start with than Monday! As a Software Engineering first-year student, I have an average of 32 hours of classes a week, and Monday is one of the heaviest, clocking in at seven hours of school. I usually wake up a 6:00 AM, do a little exercise, and cram a little work in before 8:30 AM classes. From there, it's mostly just a blur until 4:20 (blaze it) PM, and then it's back home to squeeze in a little more work on an assignment before the **mathNEWS** production night! After it ends at 9:00 PM, it's back to my residence to do a math question or two before I go to sleep.

It's something similar to that for the next four days of the week. Some days are lighter than others, but I usually have a minimum of four to five hours a day of classes. I try to prioritize sleep above even academics, but it is difficult to just call it a night after working on a tough, unfinished question for hours and making little progress. Many people in my program claim they sleep less than six hours a night on weekdays.

Perhaps now is a good time to take a step back and discuss some time management strategies that I've been experimenting with so far in the term. I've tried scheduling all of my studying and assignments to specific time slots during the week, but for me, I usually can't bring myself to actually make those study sessions happen. Also, it seems that the earlier I start my homework, the longer it takes. I have due dates written down on a whiteboard and highly recommend writing down due date and events somewhere. I also know a person who buys two meals worth of food in a take-out container at a time so they can spend less time eating and more time studying. I'm not quite ready to go to such lengths. Yet.

The weekend just absolutely flies by, especially with the chores that need to be done now, even if I am living in residence. Laundry can be optimized a little, and I usually eat something or do a little work while waiting for clothes to cycle. Assignments are a huge timesink here, often taking a few hours to do, depending on how difficult a particular one is. I usually try to prioritize events and clubs on the weekends, though, since if I didn't get some fresh air now and then, I would probably be less efficient.

Here's where an article written in an admissions pamphlet would say something along the lines of: *"Being a student at the University of Waterloo is busy, but exciting and fulfilling!"* I would say that one does get a lot done at UWaterloo, but it is really tiring. If I were a more high-strung person, I would probably call it really stressful. I imagine a lot of people are higher-strung than me.

I have noticed is how easy it is to just study all the time and not do anything outside of school. I believe that unless you're really skilled at mathematics or have some time management skills exceeding mine, you'll never quite feel entirely comfortable with the academic side of things here. I think I have made the decision myself to try to do just enough to put my academic standing in a comfortable place, and not aim straight for the top. For most of us, the top is a lonely, stressful place.

Hours a Week Spent:

In Classes: 32

Assignments and Studying: 15

Review Sessions: 5

Sleeping: 60

Eating, walking, chores: 12

Going to clubs and events: 10

Exercising: 4

Downtime: Not Enough

CC

STARCON SEZ

Tickets are now available for StarCon, Waterloo's only two-day lightning-talk conference! StarCon is a conference held in Waterloo in January, during which speakers give short lightning talks on various topics in technology. This year, the lineup features Vaidehi Joshi (creator of BaseCS), Nasma Ahmed (director of the Digital Justice Lab) and other speakers (some of them UW undergraduates!) talking about VR escape rooms, exergames, backdooring compilers, and Unicode. Learn more about the talks here: `https://starcon.io/talks/`. Limited tickets are now available - first come, first served - and you can get them at `https://www.eventbrite.ca/e/starcon-2019-tickets-51364393283`.

Starcon Committee

STOP TELLING ME TO WEAR MY GLASSES

Whenever I meet my friends after class, I sometimes forget to take my glasses off. The conversation goes something like this:

> **Friend**: *Oh you wear glasses?*
> **Me**: *Yes. (hurriedly removes them and puts them into case)*
> **Friend**: *Huh? Why don't you wear them if you need them?*

Woah. Hold up, buddy. You've seen me wear them at *that* instance, not necessarily anywhere else. Why would you instantly assume that I *need* them? Do I hang out with you with my glasses on? No. Do I talk about the annoyances of wearing glasses? No. Do I complain about wearing glasses? No. Thus, do not assume I need them — it just makes an ass out of you (and not me)!

For more spice, let's assume that I do need glasses. Let's define "need" here as "I NEED THEM TO DO EVERYTHING IN MY LIFE OR I WILL FALL AND DIE". Last time I got an eye test, my prescription was above -2 for both eyes, around -1.3, in fact. The optometrist commented on how *normal* and *healthy* my eyes were, and that my eyes would not worsen much more. He did not comment that I needed to wear them to do everything anywhere. If a certified optometrist says I don't need them, that's good enough for me. The only downsides to my vision are that small writing on the board is only visible if I squint (wrinkles, gross), but most importantly, everyone at a distance looks really, *really* good but in reality, they don't look very good. Non-glasses goggles, one might say.

This inability to clearly see far away has also been a blessing. Suppose you're having a bad day and the last thing you want is human interaction, whether it is your friend or not. One then can conveniently ignore such a waving person by not looking at them, though they were in your peripheral vision. The next time they say they saw you with a tone of slight bitterness, feign ignorance and just utter "Oh sorry, I wasn't wearing my glasses".

[Note: This is the case 50% of the time. Sometimes, I actually have not seen you.]

"But how do you avoid bumping into people if your vision is so bad?"

I think you should get your vision checked instead. I have stated above that my eyes are only about -1.3. Anyway, I avoid people like any other person without debilitating vision issues. I can clearly make out distinct forms and movements which allows me to move my body accordingly while also judging people's fashion choices. I'm not blind as a bat, mmkay? I just have mild myopia.

There are also times where I have been laughed at for wearing glasses, and this unwarranted laughter was from a person who had worse vision than me. Where was the glasses solidarity? Clearly it had escaped his vision. I also look very different with glasses, which I don't particularly like. Perhaps not ugly, but it forms me into ... something... that I'm not used to seeing in the mirror. Like most of the human race, I like consistency — I like waking up in the mirror and see my face unframed by glasses. Additionally, one of the CND cashiers did not recognize me with my glasses on... yeah. Reiterating what I said above, people like consistency. Ultimately, it *is* a petty issue regarding vanity, but hey, I like to consistently look good in my natural state! Sue me.

To appease some of my more persistent friends, I will wear my glasses when I am driving, in class, watching a movie or at an interview and need to look "smart". If that's good enough for me, it should be good enough for them too, right? If not, I guess I'll never reciprocate your lonely wave...

THAT'S ALL.

Your myopic degenerate

LET'S GO

If you're reading this right now, then the time has come.

Pokemon Let's Go Pikachu and *Pokemon Let's Go Eevee* have been released.

AAAAAAAAAAAAAAAAAAAAAAHHHHHHHHHHH

For those of you out there who pre-ordered: CONGRATS! Enjoy your return to the Kanto region!!!

For those of you who lined up to get the game on launch day: GOOD EFFORT! I hope you managed to get your first choice (or either version at all).

For those of you who are just being reminded now: RUN. JUST RUN. Depending on what time you're picking this issue up, there might still be stock left.

I'll let you know next time how I feel about exploring Kanto with Eevee. Until then,

My Starter Eevee Can't Evolve?

GETTING OUT OF MY HEAD

Two weeks ago, the CS 135 instructors did a terrible thing: we coerced dedicated **mathNEWS** writers into writing a CS midterm. It is my understanding that as penance we are now obligated to supply **mathNEWS** with articles? *[Editor's note: damn straight]* Fair enough.

I had hoped to explain why we teach CS classes in physics and engineering buildings, but instead let us revisit a popular topic here at the University of Waterloo: anxiety and depression. I deal with both, as well as a lot of other mental health nonsense. I am not "cured" and I doubt I ever will be, but over the years I have learned a few things about what makes my depression work and what makes it better. Exercise is super-important, as is getting the right amount of sleep. Talking to people I trust and who are skilled at listening can be helpful. Sunshine lifts my mood to an embarrassing degree. But one thing I have found incredibly important (and one thing I do not find mentioned very often in mental wellness tips) is getting out of my own head.

In my experience, anxiety and depression are both focused on the self. There is a judge in my head, and that judge keeps my negative thinking trained firmly on me. I think about how I can't get up in the morning, how badly I have screwed up my life, how everybody will judge me as a fraud, etc., etc., etc. Almost every one of my thoughts centres on myself and how bad things are for me.

Unfortunately, university is an institution which is also focused on the self. Do any of these sound familiar?

- "If I don't get a 60% in that course I won't get into CS 136!"
- "I have so many projects and assignments due at the same time! How will I manage?"
- "If I do badly in school I will be a disappointment to my parents!"
- "If I don't have sideprojects I won't land that Cali co-op!"
- "I need to find housing for next term or I will be homeless!"
- "Look at how well my friends are doing! Why am I so dumb? I don't belong here!"
- "I need to land some good job interviews while juggling schoolwork!"
- "If I don't get a good Cali co-op then I will ruin my career prospects and have to live in Canada!"
- "Why can't I find a girlfriend/boyfriend? What's wrong with me?"
- "I have to make sure I stand out from the other UW grads!"

The common theme behind these sentiments is that they are all focused on the self. Almost every aspect of the university – from coursework to co-op to future career prospects – concern individuals and their individual achievements. Add to this high expectations and crushing workloads, and it does not surprise me in the slightest that so many students struggle with mental health. There are good things about the university, but in some ways it is a sick environment that makes its students (and a few of its instructors) unwell.

University and depression/anxiety feed on each other because they are both inward focused. Something bad happens and then we start ruminating, and then we are in the spiral, where inward-focused thought builds upon inward-focused thought, and we are endlessly reminded of how we are failing to achieve our university goals.

I have learned that – for me – the best way to break the cycle is to get out of my own head. I have to push myself to quit wallowing and do something for somebody else. Sometimes this is a structured activity like work or volunteering. Sometimes this is more informal, such as helping somebody with a computer or listening to somebody else's concerns without interjecting my own story. Getting out of my own head works best when I am able to do something for somebody else without expectations of reward. A sideproject to inform people about elections gets me out of my head; a sideproject intended to build my resume usually does not help at all. The project may be the same; the intention is what makes the difference.

Of course, the judge in my head doesn't want any of this. It reminds me that I'll just screw things up, that I have nothing to offer, that I can't even keep up with my schoolwork, that I am an idiot for even thinking about taking on another activity when I am swamped and stressed and exhausted already. (Currently, the judge is telling me that this article is a big waste of time, that this advice is worthless to undergrads swamped with coursework, and who wants unsolicited life advice from an old person anyways?) The judge wants me to stay focused on myself. But if I stay focused on myself I spiral deeper and deeper. If I push through and focus on something else for a while then my mood tends to lift.

That's what works for me. Your kilometerage may vary. But the next time you are feeling anxious or depressed, pause for sixty seconds and observe the thoughts that are spinning in your head. Are they all about you? Maybe it is worth trying to get out of your head too. And if you cannot manage to do so, then I hope you can be kind to yourself about that.

A CS 135 instructor

MINECRAFT AND N OTHER METHODS OF SELF-EXPRESSION

To set the scene: It's me. I'm sitting in the MC comfy, reading i4 of Math**NEWS**. I come across Permanent Pseudonym's article about the cringe culture of Minecraft over the past few years, and mentioning how it's actually a good game. So naturally, I downloaded it under a wave of nostalgia and started playing again. When it came time for my CS tutorial, I went into the classroom and decided to continue playing, as I understood this week's lectures and felt I didn't need much practice.

So the tutorial starts and I continue to tap along playing Minecraft, when another student notices my screen. He leans over and asks a simple question. "Is that Minecraft?" he asks. I glance over and see a glorious sight. He's not mocking, or jesting the game. His face is of pure, innocent curiosity. We did it, I thought. We beat the cringe culture. "Yeah!" I replied with glee. What followed, however, was a question that made me rethink the entire game.

"Are you any good?" Those were the words out of his mouth. This got me thinking, am I good at Minecraft? This raised a further, much more important question. What does being GOOD at Minecraft even MEAN? It's a game with a vast amount of resources and unique places you can visit, with all sorts of different in-game mechanics you can use and master. Sure, there's a dragon for you to fight before the credits roll, but what if you don't like fighting? The game includes 'Peaceful' as a difficulty level, just so there's never any enemies spawning. There's also 'Creative' mode, where you have unlimited resources and immortality. You aren't playing the game 'wrong' for playing in Peaceful or Creative, either. Can anyone really call you wrong if you decide to just make the biggest farm ever? Or make pixel art with wool blocks? No, because it's what you want to do. Suppose you just want to make a huge wall map, and pretend you're a military general. You can do that too! (Trust me, I have before) So, back to the original question. What makes you 'good' at Minecraft? Well, I think that if you're having fun playing, then you're good at it. Regardless of your objectives, or your skill.

I like to think this applies outside of Minecraft as well. Personally, I like to express myself through various aspects of my life (I've completely covered my laptop in stickers too, if you've seen it that's me), and I think you guys should do the same. Yes, I'm going to turn this into a bit about your grades.

Just because your grades might be a bit lower than you expect, doesn't mean that's who you are. If you get good grades, then sure that's good! But that's not what makes you who you are. At the end of the day, you are what you eat whoever you want to be. Put stickers on your stuff. Go draw, or write a book. Go party, or study for your quiz. Play Minecraft, or don't. (But you should) Just, don't lose yourself in your school. I know grades are important, obviously, but take a break or two when you need it. Make sure you're still human down below all that math.

Fruitboy

HOW TO (NOT) WRITE A MATHNEWS ARTICLE

1. Attend production night.
2. Rack your brain for ideas.
3. Have some ideas, but decide against all of them.
4. Oh, wait, your friend wrote a data analysis on sandwiches, maybe you can use that![1]
5. Read 74 pages of data analysis on what is considered a sandwich.
6. Somehow have other production night attendees catch wind of what you're doing.
7. Witness a loud and passionate discussion about what counts as a sandwich.
8. Hear new and exciting ideas about how to define sandwiches.
9. Try to apply some of those ideas for a new, original article idea!
10. Wait, the data you have is not helpful for the implementation of this idea.
11. Watch as the discussion transforms into a question of whether you are a sandwich prescriptivist or a sandwich descriptivist.
12. Watch as the discussion transforms even further into a question of why people feel the need to strictly define everything.
13. Eat pizza.[2]
14. Give your original idea one last shot.
15. Give up on that idea.
16. Write this list instead.

As it turns out, writing an article about sandwiches is far more difficult than writing an article about a proof assistant. Sorry to disappoint anyone who was expecting a brilliant mathematical analysis on sandwich definitions.

Nomoresubgoals

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1. This is real and it is amazing: https://gitlab.com/vincentmacri/MDM4U1-ISP. I would cite it properly but I haven't actually used any of it in my article so it is attached as supplementary reading. The pdf report can be found under Report > SandwichReport.pdf, and is well worth your time (check out the p value on page 24!).
2. math**NEWS** has free pizza every other Monday night for those who contribute! It's the reason why this garbage article exists at all.

ANONYMOUS HACKER 4CHAN MAKES MAJOR MATHEMATICAL BREAKTHROUGH THANKS TO ANIME

Back in 2011 a discussion on a 4chan anime board ended up making major progress on a math problem that has had mathematicians stumped since 1993. The discussion in question was about the least number of episodes of the anime of Melancholy of Haruhi Suziyama would a person have to watch to have watched every possible permutation of the 14 episode series.

The motivation from the problems stems from the fact there is considerable debate among the fans of the show of what is the correct order to watch the episodes is it the order the episodes were originally aired in? the order on the dvd? the order according to a specific character on the show? Or some other completely different order? This is further complicated by the shows non-linear story and time travel hijinx being one of the many weird things in the show. The anime is a cult classic known for being very weird and very meta. I am not sure how to properly describe it without being too spoilery.

This problem can more generally be described as what is the shortest string containing every possible permutations of n elements. And is known as the superpermutations.

There is no generalised formula as of now to find an answer to the problem. An anonymous user of the board posted a solution for establishing a new lower bound to the problem. And this solution sat on the 4chan message board for 7 years till late October when a mathematician by the name ___ found a reference to the 4chan proof in the fandom wiki pages for the Haruhi problem.

Since then mathematicians have been inspired by the rather neat and elegant proof of the 4chan user. And some established mathematicians have written the proof to improve legibility. I strongly encourage anyone who is interested to look it up. It's a pretty interesting proof. That only requires knowledges from math 239 to understand.

The correct answer to the problem remains to be unknown however we now have established a new lower bound of 93,884,313,611 and an upper bound of 93,924,230,411. Suffice it to say no anime fan however dedicated will have enough time to watch the entire superpermutation of Haruhi but they do have a future in advancing mathematics.

Beyond Meta

MATHSOC SEZ

Hello fellow mathies!

GENERAL MEETING

The MathSoc General Meeting will be taking place on Tuesday, November 20th at 5pm in MC Comfy. The agenda can be found at https://tinyurl.com/f18-gm-agenda.

Can't make it to the General Meeting? Delegate your vote to a friend with a proxy form! Proxy forms can be found outside the MathSoc office or at https://tinyurl.com/f18-proxy and are due at 5pm on November 19th in the MathSoc office or at mathsoc.uw@gmail.com.

EXEC APPLICATIONS/ ELECTIONS

Nomination forms for President and Vice President, Academic for Winter 2019 are now being accepted! We're also looking for program representatives.

Nomination forms can be found outside the MathSoc office and are due back at the MathSoc office or at mathsoc.uw@gmail.com on November 23rd at 5pm ET. Campaigning (if needed) will take place between November 21st and November 26th, and voting will take place on November 27th and November 28th.

We're also looking for individuals to fill the **VP Internal, VP Finance and VP Operations** executive positions for Winter 2019. Applications are due **Friday, November 23rd at 5pm ET.** To apply, fill out the online application:

- VP Internal: https://tinyurl.com/mathsoc-vpi-app
- VP Finance: https://tinyurl.com/mathsoc-vpf-app
- VP Operations: https://tinyurl.com/mathsoc-vpo-app

FINALS DESTRESS WEEK

MathSoc is hosting a finals destress week during the last week of November!

- Tuesday, November 27: Breakfast Giveaway
- Thursday, November 29th: Therapy Dogs
- Friday, November 30th: In collaboration with the Faculty of Math, there's going to be therapy bunnies, trivia night, open mic and board games!

Look out for posters on the 3rd floor of MC and our Facebook Page for more details!

Stay warm,
Alex Lee
MathSoc Prez

THE PHILOSOPHY OF GO

Go is a simple two-player game with the goal of surrounding the most territory possible. The idea is simple: each player places a piece (either black or white) on the empty board, but the possibilities are infinite. As with any game, we can procure abstract life lessons and metaphysics from its gameplay.

1. Know when to give up
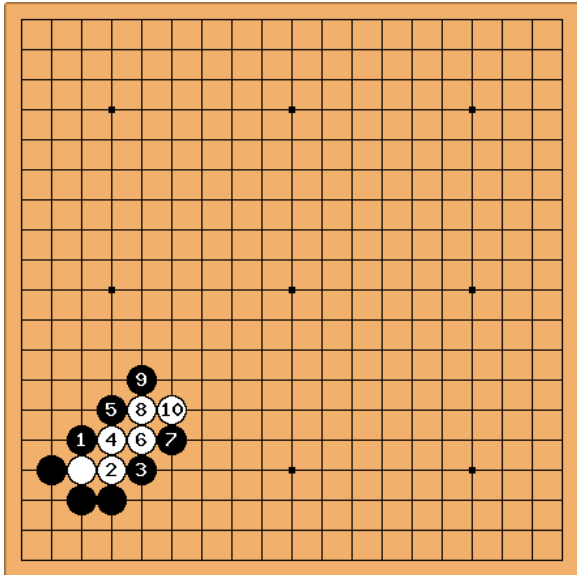
From the perspective of white, feeding more pieces into this formation (known as the "ladder") will only lose us more pieces and territory. If something is evidently doomed or unattainable, convincing ourselves otherwise and endeavoring to persevere through this adversity will only delay the inevitable. The more we try to escape the pain, the greater it becomes. Recognizing that we're in an unwinnable position and giving up on those pieces will save us many more in the future.

On the other hand, it can also be argued that just because we know we'll fail doesn't make the pursuit any less worthy. If we look at the greater picture—beyond the mechanics of mere pebbles on board—the one who *wins* is the one who enjoys playing the game and learns from it. Life will beat us down, but it is on our own accord to get back up.

2. Invest in the future...
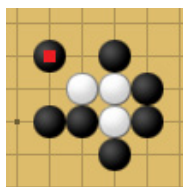
Often, putting down a piece may seem like it will not move us further to our goal of capturing white, but placing that black piece there will prevent white from escaping. Don't sacrifice our future self to gratify our current self.

3. ...but focus too much on the future and we lose track of the present
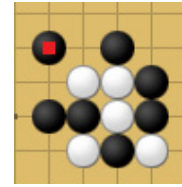
However, focus too much on the future, and we lose out on the present. There is nothing as beautiful as this moment... as your eyes glance across these words. It is precious. More precious than diamonds, gold, ephemeral pleasures—all of life's external properties combined. This moment will never happen again. This moment is the only thing we truly possess, and it is all we really have.

### 4. We cannot attack without exposing ourselves
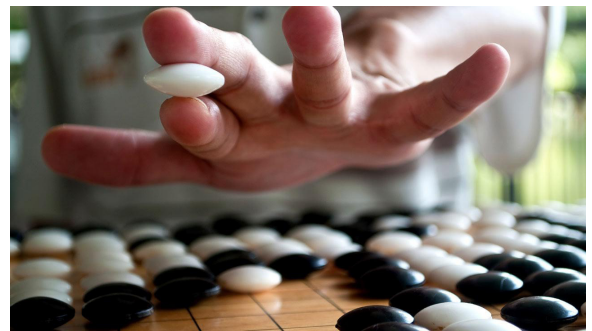
By placing a piece down to cut off an enemy's lifeline, we are putting that piece at risk. It takes sacrifice to achieve what we want. The *safest* play is to connect all our pieces in an elongated line, but how can we win if we have nothing to lose? Life is all about sacrifices. We often need to sacrifice our comfort for progress, sacrifice what we have for what we truly want.

5. We need to be connected

In Go, there is a formation known as an eye, where the shape of the pieces resembles an eye.
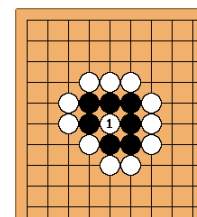
In this case, black forms the eye and white surrounds it. As strong as a single eye may seem, it is still capturable. However, with two eyes...
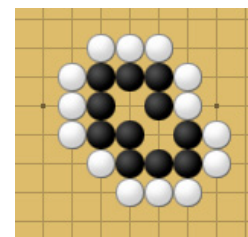
There is no way for white to simultaneously to place two pieces to block out the "pupils" of the eye. With two lifelines, this string of black pieces is permanently alive. As much as we want to rely on only ourselves in daily life—to be perfectly self-sustaining—we need to rely on others as well. It's not weak to do so—it's human. A sole piece will die quickly and a sole eye will eventually suffer that same fate. However, extend that eye into two, and it will always survive. As long as we have those who we love and trust—even if we are surrounded by adversity—we will make it through.

6. Some battles are lost from the start but until you fight, you never know

The game of Go has more possible moves than the atoms in the universe. Conflict occurs all over the board, each one a different fight. It is absurd to believe that we can win each fight but until it all pans out, we do not know whether or not we even stood a chance in the first place.

After each defeat, we wonder if it was ever within our power to win. What would be worse—to have had that choice and lost anyway or to never have that choice in the first plate? If we made a mistake, then learn from it and improve for next time. If we were doomed from the start, then accept it and fight again.

7. Ripples can conceive tides

A simple move can often change the direction of the game.

8. Duality

The water that sustains life can also drown it. The offensive move can put us on the defensive.

Han Wu

DEAR EDITORS OF mathNEWS

I was recently talking with someone about how terrible Imprint is, and he agreed, but this stupid idiot said that the Iron Warrior was better than **mathNEWS**. He said that **mathNEWS** is printed on printer paper and thus "isn't even a real newspaper." Even after showing him *Fruitboy*'s article "Why Pick **mathNEWS**?" he still wasn't convinced. This leads me to conclude that we need to advertise and show **mathNEWS**'s superiority to the university. Maybe we should give them a *present*. This is just a sentence with the word goose in it. Goose.

GhostPizza

A PRINCESS AND A MAN AND A WOMAN

Long ago, and once upon a time

In distant lands, not lacking in rhyme

There lived a princess, oh so fine

Her charm, angelic, her beauty, divine

Dressed in red or purple, gold or white

All would be dazzled by her sight

As if her mere being gave out light

She shined brightly, day or night

The princess met a lonely woman, long ago

Their friendship bloomed as flowers grow

They'd be together, wherever they'd go

All day and all night, don't you know?

Once a man saw the Princess, overcome with desire

Said he, "Please, let me have her hand, O Sire"

Furious the king became, his face red of fire

"You dare think I'd let *you* marry *my* daughter, with *that* attire?!"

So the man climbed up her tower, as they were not wed

Thought he, "I'll see her without her garments of gold or red!"

But looking through the window, shocked, he fell dead

For her saw the princess with her best friend in bed

Let this be a lesson for those who mourn,

"Since beginning-less time," hearts have been torn

Unfortunately not just figuratively for the man above

His life ended for lust disguised as love

So live on, don't climb the tower of scorn

When beauty fades, when spirits become worn

When the lights go out, love's beginnings are born

π²/6

NNN: TRICKS TO TAME YOUR TALL TUBE

'Tis the season! The days of lustful indulgence have come to a halt once again for No Nut November. This is a chance for many to spend time with their three-dimensional loved ones as opposed to their 2D waifus. The holy month of November is dreaded as one of the hardest challenges of the year, whereas others view it as an opportunity to live life to the fullest while their gonads are at their fullest. Regardless of how you feel about this month's festivities, the No Nut November challenge is back in full swing! In this short piece, I will aim to not only convey the benefits of engaging in No Nut November but to give you tips and tricks to tide you over through this most trying of times.

To begin, let's take a look at the origin of this hallowed tradition. The earliest known record of No Nut November is an Urban Dictionary definition posted on the 3rd of November 2011 by user bicboi6969696969. In this original definition, masturbation was forbidden to all individuals participating in the challenge, but as the years have passed, the practitioners of this sacred tradition have chosen to abstain from the busting of any kind of nut, be it self-induced or through engaging in sex acts. There was not very much mention of the challenge after its birth in 2011 until its resurgence in 2017. It was brought back to prominence by a twitter post from user @I_ H8THOTS that went as follows:

Ed Boy
@I_H8THOTS

Not even a day into No Nut November and I've already beat my meat like it owes me money

This tweet was then circulated on /r/BlackPeopleTwitter where it garnered thousands of fake internet points and raised up the noble challenge from the depths of 4chan to the slightly less deep depths of the internet such as Reddit and Facebook. In the year since, it has become a staple of this season. Many of you may be participating in it already; others may have already failed.

While your choice to refrain from nutting is yours alone, there are many who swear by this way of life. No Nut November confers various benefits of differing verifiability to its practitioners. Now, some may facetiously state that after seven days of not cranking their hog, people have been able to "see colours and levitate". While these benefits are dubious at best, what I can state with certainty is that the longer you refrain from yanking your dank length, the larger and more satisfying your nuts become. Those who stroke their dongles frequently will be familiar with small nuts, like peanuts. After a month of holding it in, though, your nuts will be more like coconuts, and like the Kong himself, your coconut gun will fire in spurts. In terms of sexual pleasure, eyewitness testimony will confirm that if you are accustomed to ejaculating on the daily, you may last longer in bed, but you may have trouble getting your little soldier to stand at attention. Interspersing wanks with periods

of tranquillity will not only increase your sex drive, but also the pleasure you experience.

What you might be wondering, though, is whether there are non-sexual benefits, like levitation, that come from prolonged episodes of purity. If you ask anyone who frequents /r/NoFap, they will swear by the benefits of renouncing one's masturbatory tendencies. Such benefits tend to include enhanced levels of focus, energy, and confidence. They will also note overall increases in quality of life and physical benefits. They claim thicker, shinier hair, more masculine physiques, and less acne. Now, what might be a cause for these subjective observations is the fact that many people on /r/NoFap come from situations where fapping was negatively impacting their life. As a result, the difference refraining from cranking their hog makes is more significant for them. For the average individual, however, the effects may be less prominent or completely unapparent.

Now, although 76% of No Nut November participants fail in the first three days, many of you may be still at it and seeking tips and tricks to help get you through this month of daily trials. Many of these tricks will also prove handy to the rest of you whose time comes in a couple of months. I am, of course, referring to Forbidden Finger February. Regardless of the anatomical elements you use to elicit pleasure from your body, I hope these methods prove handy.

My first suggestion would be to, as the Christians put it, "flee from sexual sin." Unlike with the other kinds of sin, where you are taught to restrain yourself when faced with the opportunity to commit a crime against your soul, sexual sin is something you know not to get near to. If you smell the pheromones of the sex(es) you are attracted to, do a 180 and book it out of there. Install a website blocker on your computer and go live in a chaste place like MC; the drab architecture will sap you of your sexual appetite. Honestly, have you or anyone you know ever had sex in MC? If so, pics or it didn't happen.

At this point, you should have freed yourself from sexual immorality and the draws of a lustful world. The next challenge may be even more difficult. Now that you have isolated yourself from most of Western society and taken care of external urges, you need to deal with the most powerful demon: your internal urges. For some of you, this may be a trivial issue due to your naturally low sex drive. For others, however, the mere idea of going more than 48 hours without blasting your rope is daunting. To the members of the latter group, I would recommend self-castration. If you cut off your nuts, not only will you cease feeling sexual urges, but you don't have to worry about impregnation should you ever engage in coitus. If you are not committed enough to the challenge to go to these lengths to succeed, you have little chance of making it anyway. Other techniques exist, like taking cold showers and deep breathing, and if you have made it this far into the month, that might be all you need to make it all the way through until the end of the month.

I wish everyone a joyous No Nut November! To the young and old, the winners and losers, and the nutters of us all, I wish you also the best of luck. These are trying times in which we live. Some of you may consider challenges like No Nut November silly or not worthwhile, but after reading this piece, I hope you appreciate the importance not nutting has to so many people. Lastly, keep in mind that the true pleasure of this month of abstinence comes on the first day of the following month, when we say hello to Destroy Dick December.

Xavientois

pro**FAQ**

Q: My solution is very similar to the posted solutions, so why did I get marks off?
A: Because your solution is very different from the posted solutions.

Q: My solution is similar to my friend's solution, and they didn't get any marks off. Can I get marks back?
A: First, if both of you have similar solutions, then you would be under suspicion of plagiarism. Second, you should bring your friend and we will take marks off of their solution.

Q: (Before assignment is due.) Can you check my solutions to this assignment question?
A: No, I'm not marking your assignment before it is due.

Q: Is this going to be on the exam?
A: No, nothing that we teach in class is going to be on the exam.

Q: How many questions are on the exam?
A: Between 1 and 1,000,000. Also, we could just make the exam one question with many parts.

Q: How long is the exam?
A: From end to end, about 2 metres.

Q: What's on the exam?
A: There will be questions that you will want to answer.

Q: Is the exam hard?
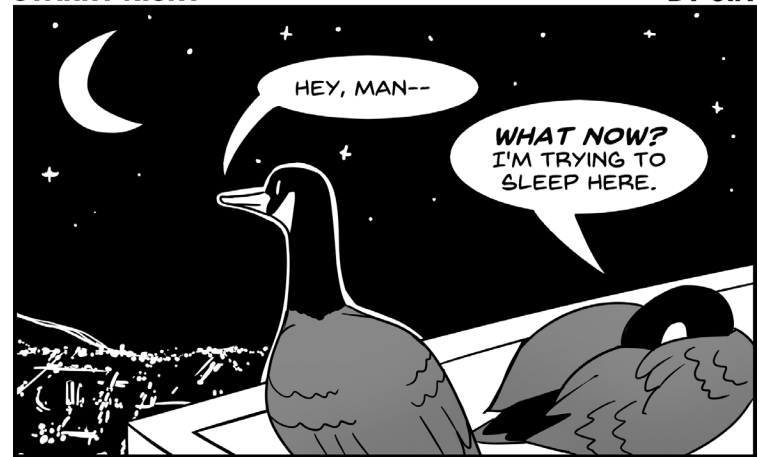**A**: The exam is printed on paper, so I would say it is pretty soft.

Q: Are you Chinese?
A: No.

Prof. Martin Pei

STARRY NIGHT　　　　　　　　　　BY CIX

prof**QUOTES 138.5**

BIOL 130: HEIDI ENGELHARDT

❝ I love saying it. Phosphofructokinase! It's like swearing in biology.

CO 485/685: DAVID JAO

❝ If you want to be mainstream, you can study lattices. Obviously, I am not mainstream

CO456: JOCHEN KOENEMANN

❝ One can never write too many duals in their life.

❝ Does this terminate? Short answer: no. Longer answer? Yes.

❝ There can be degeneracy.

❝ If you want to make money, you don't play this auction.

❝ Let's stick to the 2010 circa layout.

❝ They go into Google ads and...oops!

CS 135: PAUL NIJJAR

❝ You want to see one of those? No nono!

❝ It sounds like the answer's no. It's yes.

❝ And then you can go run off to you calculus

❝ Why are all the answers C today?

❝ Hold on, hold on, don't go yet. We'll get through this and then we'll let you go.

❝ I think they chopped off the middle finger.

❝ You can raise your list fist.

❝ Yeah, I'm not gonna give you another three minutes. I'm mean.

CS 135: KEVIN LANCTOT

❝ I love mangoes.

CS 135: ROB HACKMAN

❝ I'll stop trying to be 'hip' and 'with it'.

❝ Speaking to you as humans, we aren't talking to Mark Zuckerberg because we all know he's a lizardman.

❝ I shouldn't say that, now Facebook won't hire any UW co-ops.

❝ This is my 'cool teacher' stance, with my foot up on the desk.

❝ We give it a new fresh name...its new name is Will Smith.

❝ The world of functional programming gets deep and dark when we start to talk about these things.

❝ Don't get SubWay. Pita [place] is better than Subway. Screw Subway!

❝ And then the slide goes on to shit on C++ and Java.

❝ How do we turn B's into C's? You'll see that question on the final.

❝ To the four of you who chose A, C, and E...*why don't you trust me?*

❝ My goodness. What have I done to make you trust me so little?

MATH 135: JORN VAN DER POL

❝ Are people friends with themselves?

❝ Sure, integers are nice, but then some smartass is going to write 2x+1=0.

❝ We're still being smartasses and trying to screw with the number system, so now we'll say x^2 +1=0.

MATH 137: BARRY FERGUSON

❝ Student: *Drops water bottle*
Prof: You've got a terrible arm, you missed me by a mile.

❝ Prof: Why do we call it mean value theorem?
Student: Because it's mean.
Prof: Only what we ask you to do with it is mean.

❝ The square at the end of your proof is like spiking the football after a touchdown.

MATH 135: BEN PASSER

❝ I've said suss three times today. I don't know why. It's been a rough morning.

MATH 135: MARTIN PEI

❝ Hopefully it's not as painful as going to the dentist. Or maybe it is, who knows?

❝ Have you guys seen Shrek? Ok good, so I'm not THAT old.

❝ Basil's Lemma?

MATH 137: RICH DLIN

66 What the f(u) - f(k) is going on here?

MATH 145: DAVID JAO

66 Unless you're a dirty applied mathematician like me...

66 Everyone here's Greek pronunciation sucks.

66 Now it can't possibly be a coincidence, because we did three examples!

66 If it works for three examples it can't possibly be a coincidence.

66 Anytime you ask someone to pick a number they'll pick 7. You know that, right?

66 If you show up for the midterm and turn in a blank exam you will get 61 for the midterm.

66 Can we do something without ugly cosines and sines?

66 I sound like a bad fifth grade student in fractions. 7 divided by 5 is 1.

66 You'll get a rational square root thingy but it might not be an integer square root thingy.

66 You know what kind of class this is.

66 Does it work or does it not work? [Pauses] Yeah. That's something to think about.

66 To answer this question, we're going to have to go to 11.

66 If Gauss did it then you should be able to do it, right?

66 This proof is too cool to not work.

66 I guess if you're one of those dirty applied mathematicians like me you have to actually care about applications.

66 0 is a prime in sufficiently advanced math classes.

MATH 147: DAVID MCKINNON

66 Yeah!

66 The Chain Rule then delivers victory.

PSYCH 101: STEPHANIE DENISON

66 I don't care if your examples are ethical or not.

STAT 231: MICHAEL WALLACE

66 I've made $100 on it, I'm close to retiring.

66 If the faculty would let me, I'd have statements like this fail you instantly if you wrote it on an exam. Not actually, don't worry. Well, maybe if they give me tenure.

66 You were probably thinking I was going to finish early, no way.

66 It's fine if you don't care. It makes me a bit sad, but it's fine.

66 Where am I? Oh, I'm here.

66 If I'm innocent, wouldn't it be surprising if my house was full of blood?

66 I don't know very much about crime, I should say...or do I? *[Editor's note: dun dun duuuuuuuun]*

66 This would be surprising in the world where I'm not a murderer. Which is the real world. No, really.

66 Now we move on to my favourite thing to talk about at parties: tossing coins.

66 Prof: I was actually *at* a party on Friday, thanks
Students: ...
Prof: ...It was a party with statisticians, it doesn't count. Someone talked to me about "matroids."

66 I don't really care about numbers.

66 We have done what every statistician dreams of: we've taken an experiment and turned it into one number.

66 We're in the glorious land of Canada and we know their coins are fair.

66 I've never been on a jury. I wonder if I'd ever be allowed on one, I'd just tell everyone about p-values all the time.

66 I only get angry about, like, three things: pie charts, confidence intervals and statistical significance.

66 This XKCD addresses this point a little more.

66 Shouting is over, you'll be pleased to hear.

A mathematician cares primarily about the abstract nonsense.

PROF. DAVID JAO

PROOF OF 0=1

PROOF BY APPROXIMATION:

Suppose a=0 and b=1. Add 1000000 to both sides, so that a+1000000 = 1000000 and b+1000000 = 1000001. Now, 1000000 and 1000001 are very close together. Would a difference of one even matter? For instance, if you were attacked by a flock of 1000000 geese vs a flock of 1000001 geese, would there be any difference? Of course not - you'd be dead either way. Thus, we can say that for engineering purposes, 1000000 = 1000001.

BY SUBSTITUTION:

1000000 = 1000001

a+1000000 = b+1000000

a=b

0=1

QED

PROOF BY DEMOCRACY:

On November 12, 2018, a survey was conducted among University of Students on whether 0=1. According to 100% of the students surveyed (sample size = 1), the statement 0=1 is true. Thus, we can conclude that 0=1.

QED

PROOF BY CONTRADICTION:

Suppose 0 does not equal 1. However, we proved earlier that 0=1, which creates a contradiction. Thus, by contradiction, 0=1.

QED

VISUAL PROOF:

```
1 1 1 1 1 1 1              0 0

1 1     1 1     = = = = =  0 0

1 1     1 1     = = = = =  0 0

1 1 1 1 1 1 1              0 0
```

QED

PROOF BY INDUCTION:

Base case: Suppose n=1. Then 0=1. Thus, 0=1 is true for the base case.

Induction Hypothesis: Suppose 0=1 for some arbitrary k. We will show that 0=1 for k+1. By the induction hypothesis:

0=1 (for some arbitrary k)

0=1 (substituting k for k+1)

Hence, 0=1 for all integers k>0.

QED

Ethan Zhang

UNDERSTANDING SQUISHES: A BRIEF INTRODUCTION TO THE PERSONAL ATTRACTION DATA TYPE

Hey y'all!

I'm here to introduce you to an amazing concept born of the asexual community...the squish!

Have you ever had an academic infatuation with a really cool professor? Or have you ever had a crush on a friend but not in way that makes you want to kiss them on the face? Or an intense platonic attraction to a classmate with really cool bangs? If you've ever had a strong appreciation for someone and great desire to get to know them more in a platonic way then you've probably had a squish!

As a bisexual person, I like using the term to talk about my meaningful non-sexual relationships. I also have a lot of crushes but that's a different topic for a different day. Most of the squishes that I have are on super cool music artists, or new friends that watch all the same shows as me. Squish is cool term because it is a cute way to say, "friend crush" while communicating that you are geeking out about someone. I don't have squishes on all of my friends, or even all of my new friends. But when my English professor started talking about unconscious bias...boom! I had a squish. When my new co-worker referenced an obscure meme that I love and then gave me a Granny Smith apple (my fav apple)...boom! SQUISH!

Asexuals are people that don't experience sexual attraction. They're the "A" in LGBTQA2S+ community (Lesbian, Gay, Bisexual, Trans, Queer, Asexual, Two Spirit, etc.).

The ace (asexual) community is credited for popularizing the amazing term, "squish".

Go forth and squish away!

Cody the Queer

THE DEATH OF A LEGEND

As many of you have doubtless already heard, Stan Lee passed away on Monday, November 12ᵗʰ at the age of 95.

I would assume that most of our readership is familiar with who Stan Lee was, so I won't make this an article about his fantastic achievements and his legacy. Instead, I would like to help us all to remember some of our favourite moments with the man behind the heroes and villains of Marvel: the cameos.

So here are my top five favourite cameos by Stan Lee (in chronological order):

1. _Fantastic Four: Rise of the Silver Surfer_ (2007)

Not my favourite "Marvel movie" (to say the least), but watching a bouncer at a wedding refuse entry to Stan Lee was enough to make my prepubescent self laugh incessantly.

❝ N-no really, I'm Stan Lee!

2. _Thor_ (2011)

Few possess the ability to lift Mjolnir, but as one of the creators of Marvel, I would have expected Stan Lee to be able. Maybe he should have tried without the truck...

❝ Did it work?

3. _Avengers: Age of Ultron_ (2015)

❝ Egg-shell-shior

4. _Captain America: Civil War_ (2016)

I wonder if FedEx knew ahead of time how their product placement would be appearing in the movie.

❝ Yes, this is Tony Stank.

5. _Guardians of the Galaxy Vol. 2_ (2017)

It is rude to be interrupted by the screaming passengers of a spaceship. Now he'll have to start from the beginning about what he was doing as a "Federal Express man."

❝ Hey fellas! Hey wait, where're you going? Hey, you were supposed to be my lift home! How will I get out of here? Hey- aww gee... I've got so many more stories to tell...

RIP Stan Lee. We're all going to miss you.

confusED

MUSINGS FROM THAT ONE SCI 206 LECTURE THAT CHRIS HADFIELD SPOKE AT....

- Smoking marijuana is illegal in space, yes even for Canadians; the law followed on the ISS is the Crew Code of Conduct which apparently states something along the lines of "no intoxicating substances should be consumed"
    - "If something goes awry in the ISS and you call 911, you're the one who picks up the phone"
- We might very well be traveling to the moon frequently in the next couple years or so thanks to new developments in rocket technology
    - "The best part about going someplace completely new, is we can make pot free from the get-go!"
- Something as simple as a water hose can turn into a rocket
- It sucks when there are fuel leaks in your rocket, astronauts don't like those
    - "Ohh....it's wet where I'm sitting"
- Fighter pilots wear industrial Spanx so they don't have blood pooling in parts of the body and are less likely to faint because of the G forces
    - "I fainted once and I woke up 18 seconds later. Thankfully my plane tilted up instead of down. I wouldn't have survived otherwise"
- It is good to inform those who are genuinely uninformed, people who are deliberately ignorant however (namely "flat-earthers" and the like) are not worth engaging
    - "If you wrestle with pigs, you're nothing more than a pig-wrestler, and I want to be more than that!"
- Music jam sessions in space with constant call and response/a continuous loop are impossible because of the lag...by the time you're on the second note you're already 3 seconds behind those singing on Earth; any space music sessions that seem live are probably staged to look that way as a result
- Life in the bubble we live in may seem important and concerning, but we're all the same and living on this great earth and we should take care of it as best as we can
- Chris Hadfield is awesome and funny, and now I want to read his books :P

Narf Dert

RATING MUSICALS I'VE LISTENED TO BASED ON WATERLOO MATH RELEVANCE

Everyone loves musicals! Ok, maybe not everyone, but most people aren't morally opposed to the idea. If you are, then keep reading anyway because this might change your mind! Anyway, I watch a lot of musicals (from relatively cheap, questionable sources) and subsequently listen to their soundtracks non-stop, so while there are a few big musicals I haven't listened to yet (Les Mis and Come From Away are on my to do list, I swear!) I will rate the musicals I have listened to based on the only actual criteria to rate musicals: relevance to Waterloo math students. With that said, time to begin this review!

1st: Be More Chill

The reason this musical is first is because it's relevant to math in many ways. The protagonist is nerdy and uncool, it involves super computers, high school contains math, and all around is a microcosm of the high school experience, which is relevant to every math student. This is separate from other musicals in a high school setting because of other aforementioned reasons of neediness and supercomputers. Math students will even find relatability in the party scene, with the theme of losing your best friend/crush (because, let's be real, Michael was gay for Jeremy).

ECONOMICS CATEGORY:

2nd: Newsies

The main reason this is included is the economic relevance. The 10 cent increase in the cost of newspapers is the inciting incident of the events of the musical. In other words, the entire musical transpired due to economic math.

3rd: Hamilton

While not a major plot point, Alexander Hamilton's career post-Revolution is entirely based around economics, and entire songs are devoted to him and his management of finances when accused of embezzlement. To put icing on the cake, the years are mentioned at the start of numerous songs, and as we all know, years are numbers, and numbers are math. However, its economics are less explicit than that of Newsies, so it's lower down (that and people die).

4th: In the Heights

This is relevant due to its song number "96 000," which is entirely about money, and thus has an economic focus. In addition, most people in the musical are living paycheque to paycheque, and the problems of Nina (a main character) partly arise due to economic problems.

HIGH SCHOOL CATEGORY:

5th: Dear Evan Hansen

A lot of youth these days deal with mental health issues, which is why, of the "high school setting" musicals, (which have math relevant from context) this rates highly. Social anxiety and depression are subject matters that are heavy, and you or a friend might be suffering from these mental health issues. While more serious, this does show math relevancy. In addition, there are the number of views and followers listed in "You Will Be Found," and as we know, numbers are math.

6th: High School Musical

While I don't think that Waterloo has a clique issue like there is in High School Musical, there are bits and pieces in it that are relevant. One of the main protagonists loves science (chemistry specifically), and science involves math, especially at high school and university levels. However, science isn't as relevant to math as math is to math (i.e. numbers), and while the theme of "breaking the status quo" can impact some, it isn't as universally applicable as dealing with problems relating to mental health, which is why this is lower.

7th: Hairspray

In addition to its high school context, it polls the masses for the Corny Collins Show, to find out the next Ms. Teenage Hairspray. Polling is a form of statistics, which in turn is a form of math. However, the stats are only just in passing, so math is only tangentially, barely relevant.

8th: Heathers

While it has high school context, it doesn't have anything directly math related. Its themes of nihilism and hopelessness are only relevant to the ECE105 midterm (or so I've heard).

BARELY RELATED TO MATH CATEGORY:

9th: Sound of Music

The main protagonist teaches the children about music, and music itself is heavily math related. However, the degree of separation between music and math makes math less relevant to this musical.

10th: Book of Mormon

I haven't seen this one, to be honest, but a friend has told me there's a song called "2 by 2," and that's good enough for me. There isn't much of a link other than that, which I say is weaker than Sound of Music.

11th: RENT

The only reason this musical scrapes into this category is the opening number and its callbacks throughout, with "525 600 minutes" repeated often. This is a unit conversion,

which involves ratios, and in turn involves math. However, the theme of the Bohemian lifestyle, of going against all conventions, might not be relevant to a lot of math students.

NOT RELATED TO MATH MUCH AT ALL CATEGORY:

12th: Legally Blonde

There's no real focus on numbers here other than the LSAT scores in the third song, but it can be argued that laws are numbered, and numbers are math, and thus Legally Blonde is related to math.

13th: Hadestown

This is a lesser known musical, I admit, but I love it. However, its math relevance is only by many degrees of separation. Hades runs a very dystopian and industrialized town, which can be argued to involve engineering, and engineering involves math. So there is a loose connection between it and math, but very loose and basically nonexistent.

14th: Wicked

This musical focuses on magic. Magic and math are entirely separate until we know the in-universe rules behind it (ie. Full Metal Alchemist: Brotherhood). However, from my knowledge of Wicked, there is very little in-universe definition for magic, so there is zero math relevance. (I haven't watched it, so I couldn't tell you precisely if this is correct).

15th: The Addams Family

How can you have less relevance than none? Well, try negative relevance! This has themes of love, family, and camaraderie, which are foreign concepts to a Waterloo math student.

This concludes my rating of all the musicals! Note that this is really easy to beat; just introduce a musical that has a goose in the plot.

Xx_420SonicFan69_xX
Co-author: Diogenes

WATERLOO SQUIRTER CREATES CHILLING EFFECTS ON CAMPUS

NOVEMBER 13, 2018 — In a terrifying development, the infamous Waterloo squirter appears to have gained the ability to squirt things other than water, as a fresh coat of white powder was laid around the region overnight with no obvious explanation.

Students at the University of Waterloo were gripped with fear on Tuesday morning at the sight of the powdery substance, which some have begun calling "snow", covering every square inch of campus. Campus police have been issuing active warnings to not come in contact with the "snow", as it decomposes into a mysterious clear fluid when heated. Toxicology tests are pending, but preliminary analysis indicates this substance to be highly poisonous, with a 100% death rate for organisms that come into contact with the fluid.

Numerous witness claims of the squirter in action last night have also been circulating around the campus community. In accordance with our information integrity policy, **mathNEWS** has elected not to publish these rumours in full; however, credible sources have told us that the squirter was not using their water bottle this time.

"IT'S EVERYWHERE!" screamed one first year, before promptly fainting.

"Even the geese are nowhere to be found," observed a nearby student. "That really says something."

"I'm actually scared now," /u/waterloo_squirter posted on Reddit. "There's no other explanation for how else this weird stuff could've ended on every single exterior surface. Maybe I should have contacted campus police."

"Morally speaking, I'm inclined to believe that this change in behaviour is a result of some rather immoral behaviour," commented a math professor. "What he's doing…that's crap."

Thankfully, the mysterious squirter's reign of terror could soon be coming to an end. **mathNEWS** has received an anonymous tip that the squirter is actually a first-year who lives at REV. Nothing more is known about them, although speculation among our on-site reporters is that the squirter is actually a giant bird that speaks in thunder and shoots lightning from its eyes. (Sidenote: if anyone sees our on-site reporters, please contact us; they've all gone missing.)

When asked about how the University plans to deal with this horrible menace, a spokesperson replied, "The University of Waterloo is concerned about this recent development in the case of the Waterloo squirter. We are conducting an active investigation in collaboration with the Waterloo Regional Police Service, Ontario Provincial Police, the Royal Canadian Mounted Police, the Canadian Army, JTF-2, the Canadian Security Intelligence Service, the Secret Service, and our contacts in the underworld. If the squirter is identified, they will be assessed the appropriate academic penalties."

Anyone with further information about the Waterloo squirter is encouraged to call (519) 746-0074.

a mathNEWS writer who is currently hiding in his bedroom

PROPOSITION TO SOLVE THE MATHEMATICS AND COMPUTING PEE AND POO PROBLEM

Wow! An article about poop on campus that isn't about goose poop.

So...MC was built when only white people with penises were allowed to do number stuff (look at the wall of founders on the third floor). It was built with four washrooms per floor, one on every corner of the rectangular building.

When people with vaginas and melanin were also allowed do number stuff, half of those washrooms were converted to washrooms for them. Welcome to modern day MC, where half the washroom signs have dresses and the other half have pants (or bare legs).

Besides the colonial, patriarchal, sexist, racist gender-binary fallacy that fuels this odd western public washroom situation, our bathroom set doesn't even span out entire student population! Many trans, non-binary, and intersex students don't fit into either "vagina/fEmAlE" or "penis/MaLe" boxes.

Also, the lines for the fEmAle washroom are often much longer than the lines for the MaLe washroom.

What we have here is a bathroom situation that:

1. Is based on problematic colonial concepts.
2. Cannot be mapped to our diverse student population that experience many natural variations in their genital appearances, hormone ratios, chromosome pairings, secondary sex characteristics, and gender identities.
3. Is inefficient, as half of our washrooms are usually too-busy when the other half is usually empty.
4. Could be optimized!!

This isn't a formal proposition, it's just an idea that could improve the peeing and pooping experiences of all math students with very low overhead costs.

So right now:

Students that identify as female and present as female have 2 bathroom options per floor.

Students that identify as male and present as male have 2 bathroom options per floor.

Students with mobility issues that can't push the heavy bathroom doors have no washrooms that they can comfortably use.

Students with young children have no washrooms that they can use to change their child's diaper in MC.

Queer students and students that don't feel safe or comfortable in "male"/"female" washrooms don't have any washrooms in all of MC.

I propose the following changes:

For each washroom, the gaps between the stalls should be sealed by some sort of panel because making eye contact with people that are pooping is not fun...

Each washroom should either have no door, or an automatic door button installed so that no one has to wait to someone else to open the door for them in order for them to be able to pee and/or poo.

Each floor would keep one traditional "female" and one traditional "male" washroom for now. Many people have personal/cultural reasons as to why they must only use single-gender multi-stall washrooms. The goal of this proposed bathroom renovation is to give all math students a place to safely and comfortably pee and/or poo between classes.

One "female" washroom per floor would be converted to a gender neutral washroom. This means that everyone can use this washroom! So all genders can use this washroom! Yay! The renovations needed would be a bathroom sign update! This post is like 10 cents. People that do not feel comfortable using multi-gender multi-stall washrooms can still use the two legacy binary washrooms.

Also, one "male" washroom per floor would be converted to a single-stall gender-neutral washroom. This washroom would have a lock on the front door and automatic door, a changing table, and maybe a shower or bidet hose (like the one in the DC library). This washroom would be big enough for the user of a bulky wheelchair to do their washroom business. This fourth bathroom would be one that EVERYONE could use and hopefully the would meet any washroom needs that any math student could have!

These four changes would have an overwhelmingly positive impact on the MC pee and/or poo problem, at least for non-binary students like myself.

Imagine that.... a building on campus where people could do math without having to be harassed every time they need to pee and/or poo because we only have gendered washrooms on each floor...

As mathematicians, it is our duty to frequently reflect and update our beliefs as required #Bayes. There was a time when many respected mathematicians didn't believe in the number zero. But times have changed and after getting by the growing pains, we have all benefited from progress.

The Canadian Encyclopedia says that, "On **31 March 1960**, portions of Section 14(2) of the Canada Elections Act were repealed in order to grant the federal vote to status Indians." aka people that were on this land long before colonial powers took over and had been registered and living in accordance to an unjust government couldn't even vote in elections until the 60s! That was the same year that MC was built! I bring up this fact to remind us that most of the institution we navigate were built by people that had very different values and notions of personhood than we have today (...or at least I hope so). #humansarepeople #blacklivesmatter #nomorekidsincages

Now in 2018, I feel like we should re-evaluate the MC bathroom layouts so that I can finally shift all of my feelings of discomfort, harassment, and uneasiness regarding the male/female bathroom situation to something more productive like making CS135 memes or getting **profQUOTES** for **mathNEWS**...

If you have any feedback on this issue, please reply to me in the next **mathNEWS** issue :)

Cody the Queer

THE CASE FOR PLANNED ANXIETY

The past week I had the opportunity to deliberately place myself in a situation that would cause me a lot of anxiety. I had a choice on the matter and could have avoided the scenario altogether.

I ultimately decided to go for the anxiety inducing situation and I am glad I did. As the nature of my anxiety that the probability of the circumstances causing me this stress happening eventually was 100%, it was just a matter of time. By deciding to do it deliberately, I didn't have to worry about it happening by surprise.

As it turns out, my imagination was far worse than the reality and by confronting my fear, I gave myself the chance to heal better. I am glad I did. As the whole deliberation I had about even going to the event was anxiety inducing to the point that what ultimately made me decide to go was the fact I had already stressed myself thinking about it. Might as well go with the proactive route; otherwise, all this stress would have been for naught.

Despite things going better than I hoped, the whole affair was emotionally exhausting but I have hope that the next time will be better and all this energy I had been spending fretting about this can finally go into something else, like job searching.

But it's enough adulting for today.

Beyond Meta

N THINGS OVERHEARD AT mathNEWS

- I saw an anime about that.
- You can't use one data point to make such an assumption...especially not such a shitty data point
- I'm good. I know Java.
- MUSICALS!
- I spent $600 on fonts.
- The law does not apply to math students. *dab*
- Just tell the kindergarteners that we're only working within the realm of natural numbers.
- What's carbone??
- Can we ask them to cut the crust off the pizza?
- Can we ask them to do an iPhone style drop test before we pay for the pizza?
- Can we ask them to shake up the pizza really hard before delivering it?
- Is a brick between two pieces of wonder bread a sandwich?
- Is cereal soup?
- What do you define a sandwich as?
- If I boil ice cream and cool it down, is it a soup?
- I think the heart of this debate is are people food descriptivists or prescriptivists?
- *burp*

The Biggest Brother

DE COLONIAL CORNER

Heyo! Welcome to "de Colonial Corner", a place where I (a settler) will drop some quick #facts about indigenous peeps!

Let's start of with some basic #TruthThings that we should all be aware of:

- "Canada" is often referred to as Turtle Island by many aboriginal groups.
- There are hundreds of different aboriginal groups on turtle island and they're not a monolith!
- I heard a local Indigenous writer named Ashley Hynd say "Nothing for us without us" in reference to allyship. This is a great quote to remember when allying yourself with any marginalized and/or oppressed group that you don't have a personal connection to. I'll try to quote at least one indigenous or native or aboriginal academic/artist/activist/cool person every time I write this column since I'm the child of East African refugees and I do not belong to any of the many indigenous groups of Turtle Island.
- The land that UW resides on is the territory of the Anishinaabeg, Haudenosaunee, and Neutral peoples.

Stacey the Settler

MATHBEC

To sleep, or not to sleep: that is the question:

Whether 'tis better for the mind to suffer

The rings and fields of outrageous homework,

Or to concede to fantasies of slumber,

And by repose surrender? To try to sleep?

No more; and by a sleep to say we end

The headache and the caffeine-induced shakes

That flesh is heir to, 'tis a consummation

Devoutly to be wish'd. To cry, to sleep;

To sleep: perchance to dream: ay, there's the rub;

For in that restless sleep good dreams may come

That give us inspiration for a proof,

And Q.E.D.! there's the progress

That makes prospect of such long work;

For who would bear the whips and scorns of fatigue,

The professor's wrong, the jump discontinuity,

The pangs of despised uniformity,

The insolence of graders and their spurns,

That patient merit of McKinnon the great,

When he himself might his errors be fixed

With a mere hand-wave? who would fake-solves bear,

To grunt and sweat under a weary night,

But with the dread of some step not just,

The incomplete assignment from whose bourn

No student returns, puzzles the will

And makes us rather solve those ills we have

Than fly to sleep that we so desire?

Thus the assignment doth make slaves of us all;

And thus the native hue of motivation

Is sicklied o'er with the pale thought of sleep,

And focused wonder of the proof and moment

With this regard their currents turn awry,

And lose what delivers victory.—Soft you now!

Is this an answer which I see before me,

The statement fully solved? Come, let me clutch thee.

I have thee not, and yet I see thee still.

Art thou not, fatal vision, sensible

To feeling as to sight? or art thou but

A fake solve of the mind, a false creation,

Proceeding from the math-oppressed brain?

I see thee yet, in form as palpable

As this which now I write.

Thou marshall'st me the way that I was going;

And such an elegant proof was I to use.

Mine eyes are made the fools o' the other senses,

Or else worth all the rest; I see thee still,

And on thy ink are countless salty tears,

Which was not so before. There shalln't be sleep.

'Tis now the very mathing time of night,

When classrooms yawn and blackboards fill with white,

White chalk dust to this world: now could I drink black coffee,

And do such challenging problems as the day

Would quake to look on. Soft! now to my theorem.

O brain, lose not thy nature; let now ever

The soul of Euler enter this firm bosom:

Let me be rigorous, not illogical:

I will write lemmas for now, but use none;

My paper and pen in this be restless;

How in my logic soever she be shent,

To give them seals never, my soul, consent!

<div align="right">

The Killer Tomatoes

</div>

THE MONKEY AND COCONUT PROBLEM

What's up **mathNEWS**, do you guys like puzzles? If you read my 'Josephus Problem' article last issue, you know what I mean. But hey, you're here reading regardless, so obviously you want to know what the problem is anyway. As with last time, this is a good way to challenge yourself and impress your friends, so without hesitation I'll get into it.

The story begins with five sailors, shipwrecked on an island with little to eat. They move around the island and collect as many coconuts as they can find, stashing them in a big pile between them all. They then all go to sleep for the night, because coconut collecting is hard work. In the night, one of the sailors wakes up and realizes that if someone decided to steal all the coconuts and hide, he'd starve. To prevent this, what he does is carefully counts the pile into five sections, one for each sailor. After sorting, there's one coconut left, so he gives it to a monkey that's watching him work nearby. He hides one of the five piles, then puts the other four piles back together in the middle and goes to sleep. A while later, a second sailor wakes up, has the same realization and makes the same five piles. Again, one coconut remains that he also gives to the monkey. He then hides one pile, returns the other four piles into the middle and goes back to sleep.

This process is repeated for each sailor, each time with $\frac{1}{5}$ of the remaining coconuts being stashed and one left over being given to the monkey. The next morning, the five sailors wake up and decide to separate the (now much smaller) pile of coconuts into five piles, one for each sailor. After the piles are split, there is once again a single coconut left over, which is given to the monkey. So now, the main problem: How many coconuts did the sailors start with? This seems like a problem that could have an infinite number of solutions, because it does. What we're looking for here is the smallest possible solution. Pause here if you want to struggle with finding your own solution.

So we should start by defining N as the number of coconuts collected by the sailors in total. Because each sailor gives one coconut to the monkey and hides $\frac{1}{5}$ of the rest, then after the first sailor we have $Nb = \frac{4}{5}(N-1)$. Then $Nc = \frac{4}{5}(Nb-1) = \frac{4}{5}[\frac{4}{5}(Na-1) -1]$, and so on and so forth. In the morning, after the sailors evenly separate the coconuts, the number of coconuts each sailor receives is expressed by $Y = \frac{1}{5}[\frac{4}{5}(\frac{4}{5}[\frac{4}{5}(\frac{4}{5}[\frac{4}{5}(N-1) -1] -1) -1] -1) -1]$

Now, this equation on its own is pretty intimidating. How are you supposed to solve anything that looks like this? However, we can compress all those fractions into a much more aesthetically pleasing equation, which becomes $15625Y = 1024N - 11529$, which might look somewhat like the equation you found if you tried this yourself. So this looks better, but solving this using whole numbers is going to be a pretty big pain. Is there any other way we can organize this solution? I like being lazy, so let's take the lazy way. Instead, we're going to organize this equation into $(5^6)Y = (4^5)N - (5^6) + (4^6)$. We know that if we sum any answer for N with a multiple of (5^6) and any answer for Y by a multiple of (4^5), we can get a set of all answers from any single solution of Y and N. Thus, by finding a negative answer we can simply take this step until we reach a smallest positive answer.

Further rearrange the equation into $(5^6)Y + (5^6) = (4^5)N + (4^6)$, then we can state this as $(5^6)(Y+1) = (4^5)(N+4)$. Hey, this looks pretty solvable! If we take, say, $(Y+1) = 0 = (N+4)$, then the entire equation is equal (at 0). Not hard, we can take Y=-1 and N=-4. According to this solution, the pile started with -4 coconuts, a nice and small answer. This seems like a nice ending, except we can't possibly have a negative coconut count until someone figures out how to make antimatter coconuts. Meaning that to reach our next positive solution, we have to add a whopping 5^6 coconuts to that -4, meaning our smallest positive number of coconuts at the initial winds up being 15625 - 4, or 15621 coconuts. That's a LOT of counting to do. However, you can see from a quick walk-through that this makes sense.

Sailor 1: $\frac{4}{5}(15621 - 1) = 12496$

Sailor 2: $\frac{4}{5}(12496 - 1) = 9996$

Sailor 3: $\frac{4}{5}(9996 - 1) = 7996$

Sailor 4: $\frac{4}{5}(7996 - 1) = 6396$

Sailor 5: $\frac{4}{5}(6396-1) = 5116$

Final Division: $\frac{1}{5}(5116 - 1) = 1023$

And there you have it! Another fun challenge you can use to impress your friends and stump your rivals. Happy mathing!

<div align="right">

Fruitboy

</div>

LAMBDAS, LIES AND DAMNED STUDENTS (YOU)

At this point, you've probably accepted that your teachers will lie to you, only tell you an even deeper lie later. This was true in chemistry, physics, biology and even math in high school. The same is true in university, except they now streamline the process for maximum whiplash.

For example, take lambdas. Since the start of CS135, we've been told that functions are magical machines that take in values, do things to them and then return values. Our entire interaction with them has consisted of building machines out of smaller machines. At some point, you've probably wondered what would happen if you tried to pass a function name. Of course, doing this in Dr. Racket, it will tell you that it expected a function and not a variable. At this point, you probably accepted that you couldn't do that and moved on in your CS studies with that assumption. Now fast forward to this week. You're ready for another lesson about trees with only two branches and other weird subjects such as n^{th} dimension nested list and things which are shared but not actually shared. Now if you weren't confused already, your instructor comes in and says they're going to talk about lambdas. The first thing they do is tell you how inefficient you have been working by repeating the same code over and over again, even though they told you to do so. Now begins the confusing shuffle of variables, functions and other unholy items. As you try to remember why you're calling the number 5 and multiplying append and min, consider what a smarter you would be doing in a parallel world.

Welcome to CS145, featuring 100-epsilon% less design recipes – you are now ready for another Cormack lecture where together, you explore the mysteries of Racket and figure out why his prepared lecture material is broken. Hoping to not have another 2 hour long debugging session for five lines of code, you get to your seat and wait. Eventually you fall asleep and wake up to a board full of the lambda symbol, periods and five random letters. After quickly checking that you didn't teleport into a STAT230 class, you are reassured that this is CS, as there are not enough Ps and Us on the board. However, dread soon starts to set in, as you realize that you were expected to understand all of this and can't ask the professor to explain as he always disappeared after lectures. Tuning back, you hear, "We shall now define our own language to explain the y combinator". 50 minutes later, the board is covered in so much chalk, there will either be a demon summoning or chalk powered black hole and you are no closer to understanding the y combinator. The words alpha equivalence and beta reduction are circled, underlined, stared and crossed out. You have variable substitution chains floating off your page

into infinity. You start reconsidering your choice of CS145 and wonder if design recipes make more sense than this.

Flash forward to CS241 in both worlds. It's the first day of class and you are getting over the fact that somehow you manage to survive an entire year on your own. You feel like you have finally understood how everything can be represented with functional programming and bound variables. The professor walks up and starts to talk.

"Hello, class. Today we will define the sequential model of computing via Turing machines and control flow. Please forget everything you have learned in first year as it won't be relevant here"…

−? Combinator

mathNEWS' ANTHEM

If there wasn't one, let `Pizza by Oohyo` be the anthem for **math**NEWS.

If there was one, annul it and let `Pizza by Oohyo` be the anthem for **math**NEWS.

With Oohyo's chamomile sweet voice and springy, bittersweet instrumentals, she describes the bereavement from her lover (aka **math**NEWS, clearly) so succinctly with the punch line:

Everyone who's been to production nights knows that pizza really does suck if there's no **math**NEWS. Writing **math**NEWS articles for fun and not trying to live up to anyone's stupid interest is the way the best articles are created. We've got no time to look back.

mathNEWS is definitely not a question of appetite.

For you nay-sayers, it's okay to say you want **math**NEWS back – love is a crazy game that you just don't know how to play.

Pizza really does suck without **math**NEWS.

baked like a woodoven pizza

LAST WEEK'S
halting**SOLUTIONS**
YOU DON'T KNOW MATH FOOD EDITION

DISORDAT: MAKES MY MOUTH WATER WATER WATER

1. **Chopsticks**: China. The oldest chopsticks were found in Henan province, dating back to around 1200 BCE. However, their earliest use may extend to as far back as 9000 years ago.
2. **Teapots**: China. It's an invention from the Yuan Dynasty, which ruled China through the 13th and 14th centuries. Previously, people poured boiling water into a bowl with tea leaves in it.
3. **Fortune cookies**: Not China. The exact origin of the fortune cookie isn't clear, but it's definitely not of Chinese origin. They only started being associated with Westernized Chinese cuisine after World War II. Before then, they were known as a Japanese thing.
4. **The utensil you typically ask for if you're too dumb to use chopsticks**: China. The English term for this utensil is a "fork." The Qijia culture from the Bronze Age, located in northwestern China today, were known to use forks made of bone.
5. **The material that the menu contents are printed on**: China. This material is generally known as paper. Some dude called Cai Lun is often credited for inventing paper in 105 CE, but paper had already existed by then. The oldest piece of paper was found in Gansu province, dated to the 1st century BCE. It was probably part of a map.
6. **The menu itself**: China. Presenting lists of foods available at restaurants goes as far back as the Song Dynasty, from the 10th to 13th centuries.
7. T**he mathematical principle you would cite if two customers have to share a seat because there aren't enough chairs for everyone**: Not China. This situation is an example of the pigeonhole principle. The number theorist Johann Peter Gustav Lejeune Dirichlet is credited with formalizing the idea in 1834. He used it in a proof that involved using rational numbers to approximate real numbers.

WEIRD TRIP TO THE LOO LOO LOO

1. Pizza Nova: $10.16
2. Gino's Pizza: $12.86
3. Domino's: $12.42
4. Papa John's Pizza: $15.81

If you want to pick up a medium pizza that has no sauce, no cheese, and beef only on the left side, the correct order of prices is ACBD.

Loquatius

N POSTERS FOUND ON THE WALLS OF MC
HERALDS OF NEWS AND INSPIRATION FROM THE HALLOWED HALLS OF ACADEMIA.

- uPrint Advertisement
- Harassment in the Computer Lab: *You DO NOT have to put up with it*
- This room is equipped with an **AUTOMATIC LOCKDOWN MECHANISM** which will be activated at the scheduled closing time.
- Prof. Gregor Richards talks about net play in emulators.
- These **NACHOS** will leave you **WONTON** more!
- Setup your business **LIKE A BOSS**
- uPrint Advertisement
- Bridges Lecture Series: Movement Within Math and Arts and Where it Takes Us.
- ihatemath.ca
- All posting on this board must be approved by MathSoc. Unauthorized posters will be removed.
- 又是一年 光棍节 SINGLE
- This Dog Could Learn French in Three Months
- Waterloo Idol Search
- MathSoc **SIDE PROJECT SYMPOSIUM**
- "You need to update your account, please send us your username and password."
- **DO YOU NEED HELP?**
- Looking for Female Participants: **TASTE PERCEPTION STUDY**
- **MATHNEWS**

CC

GRIDWORD

THE WINNING GRIDQUESTION RESPONSE IS A GRAPH... YES WE ARE THAT NERDY!

You guys are awesome! We broke the record for gridword submissions yet again with NINE! And all of them were correct. We wish we had the space to list all your names and gridword answers individually, but know that if you submitted, you are appreciated.

Last week's gridword question was "Write a great alternative clue to the answer for 7-Down in [last] week's grid." The answer to 7-Down… Hammer part (This clue could have been much more juvenile!)… was PEEN. Before revealing the winner, we have two honourable mentions. The first goes to Cynthia Deng who wrote "The Tool" and provided an illustration which we will not reprint, but whatever you're imagining Cynthia's drawing is right now, it's probably close to accurate. The second honourable mention goes to Allyn Zheng who wrote "Mr. Goose's Helix". I don't fully understand Allyn's answer but I know a good joke when I see it, even if I don't get it.

This week's winner of a $5 gift card to the C&D is Ian Ross, whose graphical answer is printed here. Ian, come by the **mathNEWS** office in MC 3030 to collect your prize.

And to all you Fraser Simpson fans, don't worry I haven't forgotten about you. There are plans for a cryptic crossword feature taking shape (in my brain at least, if not yet on paper).

This week's **gridQUESTION**: What's the weirdest thing a prof has ever said to you? Drop off your solutions and **gridQUESTION** answers in the **BLACK BOX** next to the C&D on MC 3rd floor. If your puzzle is correct and you write the best answer to the **gridQUESTION**, you can win a $5 gift certificate to the world-famous MathC&D. Deadline is Monday, November 26th at 6pm. Happy puzzling!

yclepED
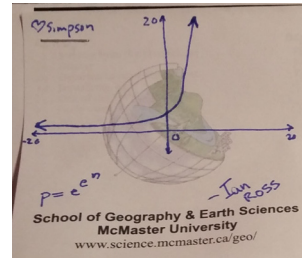
ACROSS
1. Defeat decisively
6. Brewer's equipment
10. Door part
14. Overthrow, e.g.
15. ___ fruit
16. Butter substitute, once
17. You'll find them in Darlington and Bruce
20. QA employee
21. Not straight
22. Popular fruit drink
23. "___ bitten, twice shy"
25. Black _____
27. Babysitter's handful
30. Fastener
32. Costa del ___
33. Caribbean and others
35. Eye feature
37. Critic, at times
41. A Warriors vs. Golden Hawks match, for example
44. Glove material
45. ___ gin fizz
46. "Cool!"
47. "___ Maria"
49. Auld lang syne
51. "Acid"
52. "Call!"
56. Playing card marks
58. Certain theater, for short
59. Acquire
61. Digestive enzyme
65. Food pipe
68. Strengthen, with "up"
69. Copy
70. Bikini, e.g.
71. "Let it stand"
72. Clash
73. Assange's Wiki_____

DOWN
1. Dispatched
2. "How ___!"
3. Tolkien creatures
4. Very, to Verdi
5. Primps
6. "___ Town", Wilder play
7. City on the Yamuna River
8. A lot
9. Bling for princesses
10. Write down quickly
11. Waikiki welcome
12. Excellence
13. "Garden of Earthly Delights" artist
18. Frigid
19. Seven of Nine, for example
24. Continental money
26. An inflammatory swelling or sore
27. Egyptian fertility goddess
28. Children's ___
29. Cracker spread
31. DQ treat: _____ bar
34. Alternative to a convertible
36. Fore-and-aft-rigged vessel
38. Old Chinese money
39. Flight data, briefly
40. Abbr. after many a general's name
42. Idolize, or Paul
43. Spookily
48. Blue-pencils (as a proofreader)
50. Like "Beowulf" or "Lord of the Rings"
52. Slapstick falls
53. Serf
54. Express
55. Consume
57. Avalanche
60. Perry Como's "___ Loves Mambo"
62. Type of Indonesian buffalo
63. Kind of vaccine
64. Building additions
66. Big Apple attraction, with "the"
67. Spoil by soaking

PEI'S PAIR OF PUZZLES
haltingCOMMENT *138.5*

Professor Pei, along with his **profTHOUGHTS** article and **proFAQ**, also submitted a pair of puzzles, that he originally made for Grad House trivia nights. The puzzles come with no instructions.

The answer to the first puzzle (Amazingly Delicious) is a 3-word phrase, and the answer to the second puzzle (Decompositions) is a 2-word phrase. Good luck.

swindlED
Editor, **mathNEWS**

Amazingly Delicious
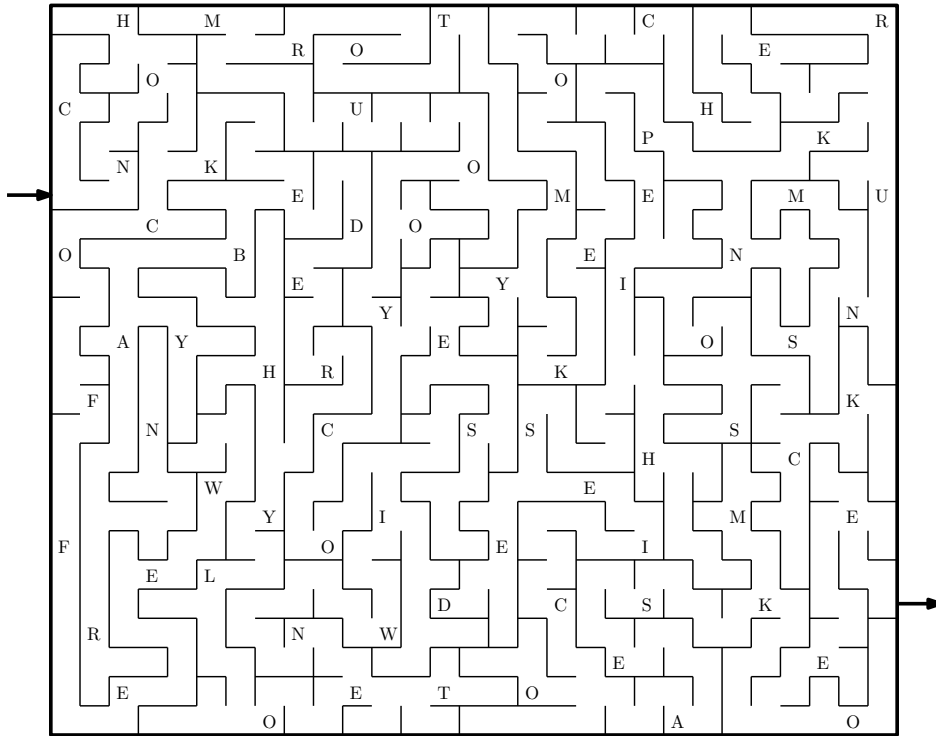
Decompositions

	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1st	E	M	P	L	O	Y	M	E	N	T	H	E	A	R	T	F	R	A	M	E	T	A	X		
2nd	E	Y	E	F	L	O	A	T	I	N	G	C	A	G	E	S	P	A	R	E					
3rd	E	A	T	E	R	G	R	O	U	N	D	S	T	O	C	K	R	O	A	S	T				
4th	Y	E	A	R	P	R	I	C	E	B	A	B	Y	G	E	N	E	R	A	T	I	O	N		
5th	Y	E	S	F	O	R	E	I	G	N	D	E	P	U	T	Y	F	I	N	A	N	C	E		
6th	M	A	C	H	I	N	E	Z	O	N	E	L	I	M	I	T	S	I	G	N	A	T	U	R	E
7th	W	I	N	D	C	H	I	L	L	C	O	M	M	O	N	M	A	X	F	E	A	R			
8th	F	L	A	R	E	C	A	P	C	R	A	F	T	E	R	S	C	O	N	T	A	C	T		

lookAHEAD

SUN NOV 18	MON NOV 19	TUE NOV 20	WED NOV 21	THU NOV 22	FRI NOV 23	SAT NOV 24
	Winter 2019 add/drop period (check your appointment time in quest) Drop penalty 1 period ends (WD assigned)	Winter 2019 add/drop period (check your appointment time in quest) Drop penalty 2 period begins (WF assigned)				University Choir Concert 7:30 @First United Church 16 William St. W $5 (students/seniors) $10 otherwise Free admission for children

SUN NOV 25	MON NOV 26	TUE NOV 27	WED NOV 28	THU NOV 29	FRI NOV 30	SAT DEC 1
	mathNEWS 138.6 production night.				mathNEWS 138.6 published.	
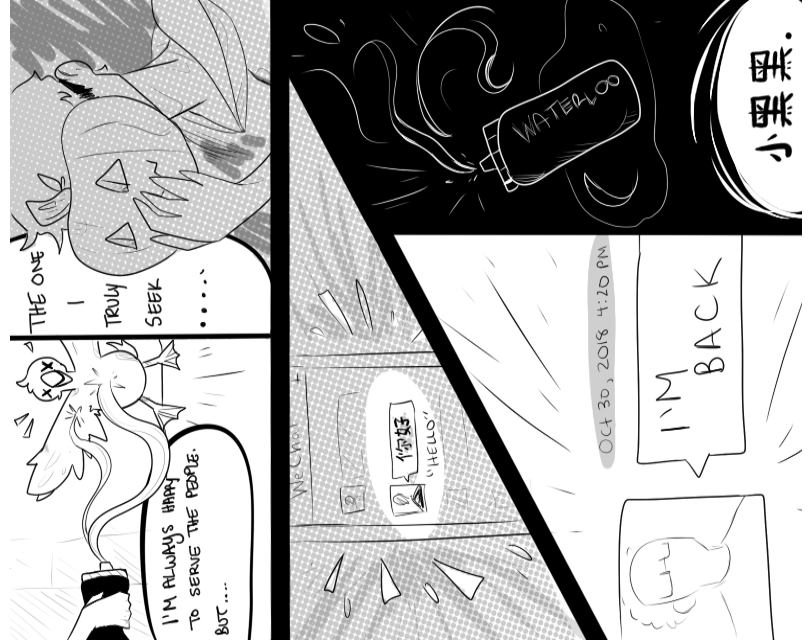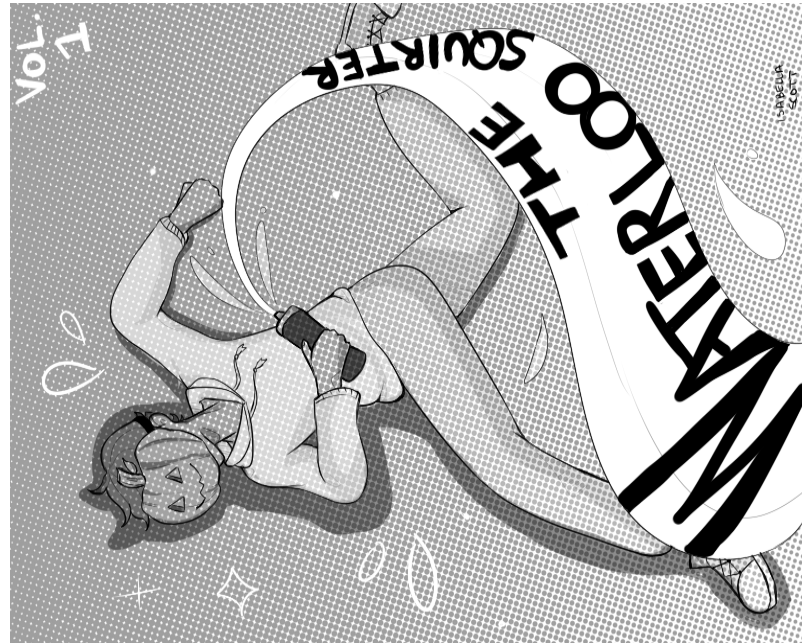
LAST WEEK'S gridSOLUTION