"WHAT IS YOUR FAVOURITE FLAVOUR OF PIE?"

Hello, dear readers! We're back again to deliver you your fortnightly allowance of mathematics, satire, news, and mathematical satirical news. Much has changed since we last met — it **snowed** for the first time in eight months, MathSoc has elected a new president, and everyone got an extra hour of sleep (to be begrudgingly repaid for in March).

Those are not the only changes to have hit this campus recently. One of my friends has a love affair with scrunchies, metal straws, and reusable bamboo containers, and as of late, a Hydroflask. She claimed that she'd broken her old water bottle, but before I could ask any further she poured out my bubble tea into a spare glass jar and shoved a metal straw into my hands, telling me to *"save the turtles"* and sounding like a cross between a clock and a steam leak. It was then that I realized my friend had become a VSCO girl, and to my horror, was trying to convert me too. My dear readers, I have never been so fearful for my life. By the sheer grace of God was I able to escape, though I cannot say the same online — if you'll excuse me for a moment, I must go on another blocking spree.

Speaking of failed escapades, this production night has unfortunately been marred by yet another CS midterm conflict. It physically hurts me to think of all those creative minds, locked up in a windowless lecture hall, reduced to mere statistics, when they could be putting their talents to better use writing for this esteemed publication. To think of the articles that would have brought laughter and joy to the faculty! Alas, the instructors have once again failed to recognize the virtues of **mathNEWS**, and instead have brought upon us sadness and despair.

~~Thankfully, despite this setback, we still have over 30 pages of content for you to devour for the next two weeks! What writers have not been consumed by the throes of first year CS have given us many high-quality articles to satisfy your thirst for~~ You know when you write something prematurely, and it ends up not panning out? Yeah.

Such is the game of life; one setback after another. But I trust I can always depend on you, dear reader, to keep me company during these dark and unpredictable times.

Oh, you read *WAT is Zine* now? Sigh, time for another shot…

terrifiED
(Saddened) Editor, **mathNEWS**

HONK	The one that gets me into Waterloo CS
ZETHAR	Empyriel Ambrosia and Sysphian ichor.
DAWDLING	4, the way Prof. Lushman likes it
BEYOND META	In the face of my enemies, so revenge flavour
UW UNPRINT	Under new EU regulations, a briefcase made of wheat dough is technically a pie.
BRICK	Whipped cream
FINCHEY	Wasn't this a **mastHEAD** question 10 issues ago? Where's the creativity, editors? Anyways, my answer remains the same: cucumber dish soap.
PIKACHU.EXE	A cake-shaped pancake generator program pie
XAVIENTOIS	Apple (Just not Catalina)
DERIVING FOR DICK	Dick
SANDWICH EXPERT	Mayonnaise
WATER	Carbone
CC	Saskatoon Berry
GIRAFARIG	Maple syrup
BOLDBLAZER	Strawberry, and just strawberry. Don't mix it with rhubarb.
WALDO@<3LE-GASP.CA	The one that usually runs out by the time I get to the front of the "free pie" line.
UNSOPHISTICATED	Tau
CLARIFIED	Pecan
TERRIFIED	Spiced meat cooked in a thick sauce ladled over rice, and served in a sequence of pies — the first missing the crust, the next missing the filling, the next missing the decoration, the next missing the shell…it's a curry curried pie.

ARTICLE OF THE ISSUE

Ah yes, article of the issue; a reassuringly recurring part of this publication for quite a while then, and now, and now…indeed, this issue's article of the issue goes to girafarig for their epic *keyboards then and now and now*…a wonderful masterpiece…six star rating…ah yes…

…sorry, I was sleeping. That was weird, I dreamt I was working until 4am in the **mathNEWS** office…wait, why am I *actually* in the office? Why is "Come to MC 3030" scribbled on the wall? And why am I holding a $25 Conestoga Mall gift card?

terrifiED
Editor, **mathNEWS**

(But seriously, go check out *WAT is Zine* on page 5!)

mathASKS 141.4
FEATURING PROFESSOR GREGORY RICE

UW UNPRINT: STATISTICALLY, WHAT ARE THE CHANCES OF YOU ANSWERING MY QUESTION?

Whenever asked a probability question, my friend and partner-in-crime for STAT 230, Diana Skrzydlo, once told me that your first thoughts should be "is the answer 0, 1, or ½?". In this case, I think the answer is 1.

ZETHAR: WHAT ARE SOME RESOURCES FOR TIME SERIES BEYOND STAT 443?

In terms of the basic theory of time series analysis that goes a bit more in depth compared to STAT 443, I think a great introductory text book is Shumway and Stoffer's Time Series Analysis and Its Applications, which is available for free and has loads of great R code. For those interested strictly in forecasting, Forecasting: Principles and Practice, by Rob Hyndman and George Athanasopoulos is also free and an excellent resource with tons of code. I'm somewhat of a fanboy of Rob Hyndman.

EPSILON SCREWN: WHAT ARE YOUR THOUGHTS ON PROVIDING SOLUTIONS TO PRACTICE PROBLEMS?

I've always been skeptical of the benefit to students of providing solutions to the practice problems that we offer. While I acknowledge that we must give some solutions in lieu of positive reinforcement that us instructors cannot provide personally due to the out of bounds instructor/student ratio in many of our classes, a poor studying practice that I notice a lot when teaching lower level courses is that students look at a practice problem, and then, before genuinely trying/struggling through the problem, they look at the solution. I think the struggle part is the most important part! Additionally, as our students continue their studies, which for many will hopefully include graduate school and beyond, eventually they will start to face questions for which the solutions are not known. To prepare for this, an important skill to learn is how to check that your own answers are correct, and to start trusting yourself when you think they are. Providing too many solutions doesn't allow for this skill to build.

BRICK: DO YOU HAVE ANY RELATION TO RICE UNIVERSITY?

Growing up I always assumed that Rice was a University founded by my great Rice ancestors, but sadly it is not the case. I was more disappointed to find out when I was little that I was not related to Jerry Rice, who was one of my childhood heroes.

CLARIFIED: ARE YOU A CAT PERSON OR A DOG PERSON?

That is a hard question for me…I like them both a lot. Since right now I have a bit of a mouse problem in my attic, I'd prefer a cat.

CIX: WHY DO YOU HATE CANADIAN TIRE SO MUCH?

The year was 2015, and I had just moved to Canada with my wife. Being Americans, we did not have any credit history in Canada, so one of the first orders of business was to get a credit card to start building it up. We had heard from a number of people that Canadian Tire was a great place to get your first credit card since you could go to one of their locations and get the card the same day. So, the plan was that we would take the bus out to Canadian Tire, get a credit card, and then use it to buy a few things that we needed plus bicycles and ride back home. When we got to Canadian Tire, the line for customer service was enormous for some reason. During the over 30 minute wait I noticed a large, clear donation globe in the store that was totally full of money, and I remember remarking to my wife how generous and charitable the Canadian people are. "We are in such a wonderful country," my wife said. Once we got to the front of the line, we filled out the credit card application form, and while it was being approved we went and picked out our bikes and a couple kitchen items that we needed; the total of which was something like $650. When they called us back, we found out that our combined credit limit was $500 ($250 each), which was not even enough to buy the bicycles. As we were leaving, disappointed, having spent about 3 hours in the store, we walked past the donation globe I had seen earlier, and I realized it was full of lies — "Canadian Tire Money" — worth no more than $10, since the denominations were all between 1 cent and 10 cents…Canadian Tire broke our hearts that day…

XAVIENTOIS: WHAT IS YOUR STRATEGY FOR CATCHING SHINY POKÉMON?

I must admit that when I played the game I had no idea there are much better ways than just running around like a noob to catch them, like lures and such, so I never perfected a strategy. I only ever caught one, a Machop.

SANDWICH EXPERT: WHAT ARE YOUR THOUGHTS ON THE RECENT CANADIAN FEDERAL ELECTION?

Mainly I'm glad that there will be another more progressive government, since both my wife and I are employees of public institutions that rely on government funding. My wife works for the Region of Waterloo public health department, and it has been troubling to have an insiders view of how the conservative Ontario provincial government is slowly dismantling several public institutions like public health departments. These departments do things like guarantee that our water is safe to drink, our food is safe to eat, and promote health in our communities, especially among those with limited resources, and I think they should be well funded. I'm also fascinated by the problems of proportional representation and preferential voting systems that are highly relevant here. There are some fun probability questions to be had related to Condorcet paradoxes that would make for good STAT 230 challenge questions (wink wink).

UNSOPHISTICATED: WHAT DO YOU WISH THE GENERAL POPULATION UNDERSTOOD BETTER ABOUT STATISTICS?

I expect every faculty member in the stats department could write a War and Peace length tome on this question. Although I can think of a few big issues, one that I think does not get enough attention is the following: Nowadays, perhaps as a result of the growing popularity of fields like statsitics/machine learning/data science, or just due to the sheer volume of data being collected on what seems like essentially everything, we are inundated with data driven predictions. For example, in the recent Canadian federal election predictions of the results from a number of outlets have been available for several months, and similar predictions are available even now about the US election that will not be held for more than one full year (though I wish it were sooner). Predictions are available in real time regarding which team will win a basketball game, or how many fantasy football points a player will score. The two problems I see in this practice are 1) I think a lot of people who see these predictions tend to believe them, do not question where they came from, nor realize that they are produced from models that might be poor or are built under potentially unrealistic assumptions, and 2) those who make these predictions often do a terrible job, or more likely ignore all together, describing the model and acknowledging/quantifying the uncertainty in their prediction.

I think the first issue is partially responsible for the results of the last presidential election in the US. Americans were inundated for months with predictions from reputable sources that the probability that Hilary Clinton would win was anywhere from 60% to 99%, with most predictions tending to be in the 90–99% range. The voting turnout in general, especially in many of the states that mattered, was at record lows for the election, which I think was largely due to the fact that these predictions were believed. I know a lot of people have lost confidence in Americans these days, but I'm fairly confident that if the predictions from reputable sources were in the 90% range that Donald Trump, a reality television doofus with a history of criminal activity, would win, at least more people would have gone out to vote that day.

To illustrate the second point, consider the following experiment: Suppose I flip a coin 100 times, and I ask you to predict based on the results what will happen on the 101st flip. If you feed this data into a fancy schmancy machine learning/deep learning algorithm, it would likely produce a prediction based on detecting a pattern in the random sequence of Heads and Tails — say the prediction is HEADS. Often this is all that would be reported from such a prediction! An unsuspecting person viewing the results might think that the fancy algorithm found a pattern and that indeed the next flip will be HEADS! There is nothing wrong with predicting HEADS here, it is clearly just as good as TAILS, but a good prediction would also tell the user that we are just guessing, and that the sequence appears to be random. I would argue in general that a prediction without some quantification of the error in the prediction is meaningless.

RICE COOKER: YOU HAVE BEEN UNEXPECTEDLY PRESSED INTO SERVICE AS THE EXECUTIVE CHEF FOR THE PM. THE DINNER MENU IS RICE AND FISH. IT'S AT 7, BUT YOU WANT TO PLAY LEAGUE UNTIL 6, SO YOU ONLY HAVE AN HOUR TO PREPARE. IN THE HEAT OF THE MOMENT, WHAT IS YOUR RECIPE AND WHY IS IT THE BEST?

Despite my wife being a dietitian, I do most of the cooking at home, so this one is easy. Lay the fish skin side down in a pan. Liberally season with salt and pepper, and coat with olive oil. Place directly under a hot broiler for 10–15 minutes (depending on the thickness of the fish, until it flakes apart). Cook the rice in a rice cooker, and in a separate large pot saute shallots/onions, garlic, and ginger root , all minced, in oil. Add a generous helping of vegetables (whatever you like), and then chicken stock and/or coconut milk and hot peppers (if you like spice). Let the vegetables cook, season to taste, and then add cooked rice and combine. In a food processor/blender, blend garlic, olive oil, lemon juice, a bunch of parsley/cilantro, a pinch of red pepper flakes for color, and season to taste. Done: Broiled fish with Chimichurri and Vegetable Pilaf. I could do that in 30–40 minutes, so plenty of time to get an extra game in with my main Kayle. Like Kayle, it may not be the best, but it will be good and balanced. One of my favorite quotes is "cooking with too much salt means you are in love". I cook with a lot of salt at home and my wife, who I remind you is a dietitian, allows it because of this quote.

πILLOW PRINCESS: WHERE IS YOUR FAVOURITE TOILET ON CAMPUS?

I know this law doesn't exist up here, but I plead the fifth.

LAFAYEET: AS A PROSPECTIVE STATS MAJOR: WHAT ARE YOUR PREFERRED STARTER POKÉMON FROM GENERATIONS 1 THROUGH 5?

I've always felt like it is best to start with the Fire type because it is hard to get a good fire type early, and you usually start around a grass area. However, the water types are just so darn cute — I mean, just look at Squirtle. For these reasons I would go 1) Squirtle, 2) Cyndaquil, 3) Torchic, 4) Piplup, and 5) No comment, I actually haven't played Gen 5 or beyond. Squirtle = Charmander + $\varepsilon/10000$.

CHEESED: WHEN ARE YOU GOING TO JOIN ROSS WILLARD WITH THE GOOD CITIZENSHIP?

In exactly 573 days.

Being a mathematician requires imagination.

PROF. BARBARA CSIMA

RANDOM RAMBLINGS OF A PROBABILITY PROF

profTHOUGHTS *141.4*

MY FAVOURITE LIMIT

What is

$$\lim_{n \to \infty} e^{-n} \sum_{j=0}^{n} \frac{n^j}{j!}?$$

This problem appeared on a probability exam that I took as an undergraduate student. At first glance, the answer may seem to be 1, given the clear correspondence of the terms in the sum to the Taylor series expansion of e^n. In fact, the solution is ½! And, to my knowledge, the simplest proof is probabilistic and comes from the famous central limit theorem (CLT). The sum

$$e^{-n} \sum_{j=0}^{n} \frac{n^j}{j!}$$

is the probability that a random variable having a Poisson distribution with parameter n is less than or equal to n, which converges to ½ by the CLT. I always felt like the CLT was sort of a "big gun" for this problem, but so far I have not seen a more elementary proof. I hope one of you smart Waterloo students will show me a conceptually simpler way one of these days that does not amount to reproving the CLT!

A WAY TOO DEEP DIVE INTO MY EXPERIENCE WITH THE BIRTHDAY PROBLEM

I've been teaching elementary probability classes for approximately 8 years now — for 4 years back in the States, and 4 years here in Waterloo, with the total number of classes that I've taught on the subject being 11. In each of those classes, I've always made sure to present on the famous "Birthday Problem', which is normally formulated as follows:

Suppose a room contains n people. What is the probability that at least two people in the room share a birthday?

Under the assumption that the n people in the room have birthdays that are equally likely to be on any of the 365 days of the year, ignoring the possibility of birthdays on Feb 29 in a leap year, one can deduce readily that the probability is

$$1 - \prod_{i=0}^{n-1} \frac{365 - i}{365} = 1 - P_n^{365}/365^n.$$

What people normally find interesting about this formula is how fast it approaches 1 as n grows. In fact, when $n = 23$ the probability is already larger than ½, and the normal takeaway is that once 23 people are in a room, it is more likely than not that at least two people share a birthday, of course only so long as the basic assumptions under which the probability is calculated apply.

After explaining this comes a demonstration. Back in the States this was easier since my classes almost always had between 30 and 40 people, so I would select the entire class, but in Waterloo with our much larger classes I select a group of between 35–40 people by selecting the first few rows in the lecture room, and I ask the class if anyone would like to bet

me a coffee that there are at least two people in the selection that share a birthday. I'm quite comfortable with this bet since the probability of a match with a selection of sizes ranging from 35–40 ranges between 81-89%. Since my students are kind I always get a few takers, and then I proceed to ask the selected people what their birthdays are and determine if there are any matches.

So far, in all 11 instances, it has always worked! I've always found two people in the selection that share a birthday, and my incredible students have always made good on their coffee debts. This had me wondering — how have I been so lucky? Or perhaps more importantly — am I getting lucky?

A natural first issue to investigate is whether or not the approximate 81–89% figure is accurate, which requires the validity of the assumption that the birthdays of those in the selection are independent and uniformly distributed among all birthdays. One possibility is "collusion", or in probability terms dependence, between students in the selection. For example, perhaps the people who sit in the first few rows of my lectures are members of the March birthdays club, whose motto is "March to the front of the class!". Obviously in this case the probability of a match in the first few rows would be higher, and one could also conceive of other dependencies among students that would result in lower probabilities. A similar issue is that there may exist a systematic bias in the birthdays of Waterloo statistics students; maybe we tend to admit students who have birthdays during the winter break so that they won't be distracted with birthday parties during midterm season. With regards to these issues, I sadly have little good data to evaluate if there was dependency or bias among students in the selections I've seen. However, I don't think these issues present a problem here. I do not think one's birthday is a consideration when they are admitted to the math faculty, and I think most students have no idea when their classmates birthdays are. This later belief is supported by one of my experiences in which the people who shared a birthday in a demonstration that I did were sitting next to each other and were unaware that they had the same birthday!

Supposing then that the selections I've seen are reasonably well modelled as being random samples of the general population, another potential issue is that the distribution of birthdays in the general population is simply not uniform. If this is the case, then there exists a mathematical result based on the theory of majorization and Schur-convex functions that suggests that the probabilities 81–89% might be a bit low in practice. Basically the result states that if the distribution of birthdays for those in the selection is anything other than uniform over all birthdays, then the probability of getting at least one match must be **larger**. Intuitively I'd say this makes sense, since any distribution on birthdays other than the uniform distribution will tend to be more "clumped" together, and will in general result in more matches with higher probability if we draw a selection. In reality too the observed distribution of birthdays in North America, and the rest of the

world for that matter, is not uniform: there tend to be more births in the late summer and into fall than the rest of the year.

To investigate the effect of this, I did way too much silly research and found a database of about half a million people's birthdays from a large life insurance plan in North America, which I think is reasonably representative of the true distribution of birthdays I would get to sample. I then simulated millions upon millions of birthday problem demonstrations with varying selection sizes by drawing individuals at random from this population, and empirically estimating the probability of getting at least one match. What I found was that these probabilities were almost identical to those predicted by the standard birthday problem calculation, which suggests that the observed non-uniformity in birthdays is not severe enough to really affect these probabilites, and that the effect of the leap year Feb 29 birthdays is also negligible in practice.

Now, lets then suppose that these probabilities are accurate. Have I been getting lucky? With selections ranging from size 35–40, and as long as the results of the demonstrations are independent, the probability of getting 11 successes in a row ranges from $0.81^{11} \approx 10\%$ to $0.89^{11} \approx 28\%$, which also describes the range of probabilities that it would take more than 11 demonstrations in order to have my first failed demonstration where I would be buying the coffees. With a sort of average selection size of 37, this probability is about 17%, which is about the same as the probability of rolling a seven with two fair six sided dice, or winning something on a roll up the rim (which is among my favorite Canadian traditions).

In conclusion, I'd say I'm a lucky guy to have been able to present about the birthday problem so many times to so many wonderful students over the years, but the fact that my demonstration has worked every time doesn't make me terribly lucky.

Prof. Gregory Rice

CRANBERRY GINGER ALE

What do people do when they are thirsty and CSC only has energy drinks?

Apparently, go to the Math CnD and buy questionable drinks. Well, at least that is the situation I am currently in, staring at my questionable cranberry ginger ale. It's red, like transparent tomato juice. It smells like the cranberry sauce you put on your Christmas turkey. Looking at it, you feel the force of every teenager ever, yelling, "NO! Don't drink this. It is a corruption of the holy pop eight". But alas, there is no way for it to go except down. I crack open the top and get ready to wage war against my taste buds. The first impression is fizz. The drink is very fizzy. The next? It tastes like ~~chicken~~ normal ginger ale.

Pepsi

ARCHIVAL ADVENTURES IN DP 7TH FLOOR DESK GRAFFITI, PART 2

Finchey here, back from yet another expedition into the anthropologically-rich lands of the seventh floor of DP. Check out v141i2 for the first part to this series. That's all I've got to say for now: I'll let the words below, scrawled into faded wood by students of days long past, speak for themselves.

- Anyone Sell Addy?
- Fuck off
- [in response to above] no you fuck off
- Biochem is for nerds
- What is better? Big Dick or Small Dick?
- Fuck my life
- MATH > ENG
- I believe in Bigfoot
- Buy Bitcoin!
- Fuck exams
- gay? Yes
- Don't cheat Its not worth it
- I hate ~~exams~~ learning ugh
- Orgo should go away
- Can We Make A Procrastination Club? tomorrow
- CARDI B ~~SUX~~
- Why is this so hard?
- I love me. Fuck yall
- I LOVE MY DICK ♡
- weird flex but okay
- Almost Graduation! Last term @ Loo! 2019 Winter!
- Fuck KD
- I thought people came here to study?

Finchey

I JUST SAW THE MOST AMAZING SIGHT

A Plant Ops employee, clad in just a scanty hi-vis vest and armed with but a skimpy leafblower, strode fearlessly on a collision course towards a highly aggressive flock of geese; a courageous solo mission destined to end in tragedy.

The geese slowly turned their heads towards him, their little beady eyes channeling the anger in their souls as they registered his presence. Chaos turned into order, as the scattered flock began to coalesce into a defensive formation. Hisses echoed through the air.

Our hero brazenly pushed on, getting ever closer to the amassed demon spawn. A brass battle cry sounded. Time slowed to a standstill.

The geese scattered.

Unperturbed, our hero continued on his path, as though nothing had happened; soon enough, he was gone. The Second Battle of Waterloo had ended just as quickly as it started, its legacy but a fleeting memory in the minds of those fortunate enough to have witnessed it.

Anon

HELP NEEDED: SEND JAO PICS

ATTENTION UWATERLOO COMMUNITY: I require some fresh, current, rare pictures of the elusive David Jao. The photos available on `http://daddyjao.com` are unfortunately not serviceable, despite the hard work of the heroes behind this gem of a website. Please forward any sightings (with timestamps and context, if possible) to `sendjaopics@gmail.com`. I cannot provide monetary reward, but I can assure you that the pride you may carry after contributing will be of much higher quality and substance than any material reward I could provide.

Pictures of his more-elusive *"elliptic curve isogenies"* will also be accepted, regardless of whether or not they are indeed supersingular (a team of skilled professionals will independently verify this). Any quality of photo will do. Rumor has circulated that he keeps a healthy supply in the mini-fridge in DC 2531, but this has not yet been confirmed.

Thank you in advance to those of you who are able to contribute! I will do my best to give back to the community with what I'm given.

jeff

WHAT'S A ZINE?

clarifiED here! In a bit of a break from our usual **mathNEWS** content, I'm gonna talk about a new student publication at UW that I'm really excited about (and for which I've also been moonlighting as the lead layout designer…don't let the other **mathNEWS** editors know). *[Editor's note: how fucking **DARE** you betray us so]*

Do you like drawing? Making sketches, illustrations, comics? Do you like taking photos? Fancy yourself as an amateur writer? Speak no more — submit to *WAT is Zine* today!

What is *WAT is Zine*? Why, it's the newest and coolest (well, second to **mathNEWS**, *maybe*) student publication on campus! As the name hints, it's a zine. What is a zine? For the uninitiated, zines are a special subset of independent, self-published magazines which tend to be circulated at a smaller scale compared to mainstream publications. *WAT is Zine* is **the** zine (well, maybe because it's the only zine) at UW for all things cool, quirky, and creative. Not convinced? Take a look at our first issue at `issuu.com/watiszine`. At the end of the day, we want to be a receptive vehicle for earnest student expression and connection. And that means we want your submissions!

We take art. We take photography. We take writing of all kinds — short stories, poetry, thinkpieces, and whatever else you can cook up to throw at us. Every one of our issues has a theme: the theme for our first one was *Home.* The theme for our second issue is *Wellness*; the theme for our third is *Winter.* Submissions close on Friday November 15 for the second issue and on Friday November 29 for the third issue. If I've wheedled you enough for you to be interested in submitting for one or both of the upcoming issues, check out our FB page (`facebook.com/watiszine`) for more info on submission guidelines.

It brings me a lot of joy to read other students' submissions and to put them all together into the issue's finished form; I have tons of fun doing layout design for *WAT is Zine.* I'm also going to be submitting for at least one of the two issues. What will I be submitting? Well, you're just going to have to wait until the issue comes out!

We post submission reminders and new issue updates on both our FB and IG (`instagram.com/watiszine`). (And while you're at it, why not follow the **mathNEWS** IG (`instagram.com/uwmathnews`) and Twitter (`twitter.com/uwmathnews`) as well?)

Thanks for reading!

Your favourite editor,
clarifiED

WHAT FAMOUS MODERN CHAIR DESIGN ARE YOU?

THE BURNING QUESTION TO WHICH THE ANSWER YOU'VE ALWAYS WANTED TO KNOW. TAKE THIS QUIZ TO FIND OUT NOW.

THE RULES

Select one answer per question and keep track of your answers. Your final result will be determined by the letter that you most frequently chose as an answer. Answer the **TIEBREAKER** question if and only if there is a tie between your top *n* choices, to break the tie. For example, if you have a tie between (A) and (B), break the tie by answering (A) or (B) in the **TIEBREAKER** question — whichever answer you identify with more.

QUESTIONS

Q1: WHERE'S THE BEST PLACE TO STUDY?

A) TC, HH, or STC.

B) MC or DC silent study.

C) DP or DC group study.

D) My home.

E) E7, E5, or QNC.

Q2: WHAT KIND OF PET WOULD YOU LIKE TO HAVE THE MOST?

A) A canary. They come in so many colours and their singing is beautiful.

B) A large, tough dog that can double as a watchdog.

C) A small rodent, such as a hamster, guinea pig, or rat. They're cute and clever.

D) A cat. They're pretty easy to take care of and don't need much attention, compared to other pets.

E) Something exotic — like a snake, tarantula, or axolotl.

Q3: WHAT'S YOUR GREATEST FLAW?

A) Vanity.

B) Being quick to temper.

C) Cowardice.

D) Apathy.

E) Greed.

Q4: WHAT ARE YOUR BEST QUALITIES?

A) My intellect and judgement.

B) My diligence and self-control.

C) My selflessness and kindness.

D) My curiosity and openness.

E) My ambition and courage.

Q5: WHAT DO YOU LIKE TO DO WITH YOUR FRIENDS?

A) Have intimate, deep conversations, one-on-one or in a small group.

B) Study and work on projects together.

C) Grab lunch and dinner, meet up regularly during school club meetings.

D) Talk about books we've read or about the news. Watch movies. Go traveling.

E) Go clubbing, bar-hopping, or partying with as many friends as possible.

Q6: IDEALLY, WHERE WOULD YOU LIKE TO WORK **IMMEDIATELY** AFTER YOU GRADUATE?

A) Any big city in Canada/the States where I won't know anyone and can start with a clean slate.

B) Downtown Toronto. I'd like this to happen by accepting a full-time offer from a company where I did a co-op term once.

C) I'd like to stay in KW, or go back to my hometown.

D) Europe. I'd want to "shop around" and visit as many cities and countries as possible.

E) Cali/Seattle/NYC. Self-explanatory.

Q7: THOUGHTS ON LOVE?

A) A long-term romantic partner is someone who completely understands and "gets" me, and loves me wholly for who I am, flaws included. A person who I can be myself around.

B) I want my own family one day and a partner may or may not be a part of that. Family is more important than romance to me; I want to take care of and raise others, and to love them unconditionally.

C) Love is the most important thing in the world to me. I want to completely devote my heart to another person, and to have that be reciprocated. I want to find that person sooner rather than later.

D) I don't actively seek out other people: I go with the flow, and whatever happens, happens. I'd be doing the same things as I'm doing right now with or without a partner; to me, a partner is a best friend, someone to share life's experiences with.

E) A serious relationship isn't a priority right now. Co-op terms make things difficult and graduation is only *n* years away. And in general, I'll never want to compromise my dreams and goals for another person.

Q8: WHAT ARE YOUR GREATEST FEARS?

A) People finding out that I'm a fraud. Being hated.

B) Feeling useless. Total helplessness.

C) Not finding love. Being alone.

D) Missing out on my youth. Losing my freedom.

E) Failing in life. Losing direction.

Q9: WHICH MOVIE(S) WOULD YOU PREFER TO WATCH?

A) *Pulp Fiction.*

B) Carl Sagan's *Cosmos.*

C) *The Lord of the Rings* trilogy.

D) *Monty Python and the Holy Grail.*

E) *John Wick.*

Q10: WHAT IS YOUR FAVOURITE MATH PROOF?

A) Pythagoras's proof of the Pythagorean Theorem.

B) Gauss's proof of the Fundamental Theorem of Algebra.

C) Euclid's proof of Infinite Primes.

D) Euler's proof of Infinite Primes.

E) Wiles's proof of Fermat's Last Theorem.

TIEBREAKER: PICK A BATH AND BODY WORKS BODY WASH/ SHOWER GEL FRAGRANCE.

A) Black Cherry Merlot.

B) Rose.

C) Cotton Blossom.

D) Vanilla Bean.

E) Mango Mandarin.

YOUR RESULT

(Author's Note: In order to keep this article's length down and to do the poor editors a favour during layouting, I have refrained from including pictures of the chairs in this article. Just look them up on Google Images — you got a phone, don't you?)

If you answered with (A) the most, you are a **Panton Chair**. You are a person of few words and lines — your mere presence in a room is a statement on its own. People find themselves irresistibly drawn to you and your sleek, glossy exterior. But sometimes you worry that once people get to know you better, they'll be dismayed by your simple, cookie-cutter interests and lifestyle. So you stay quiet and let your carefully manufactured facade speak for itself. As the saying goes, it's the quiet ones you have to watch for — and all eyes are on you.

If you answered with (B) the most, you are a **Le Corbusier LC3**. You are stoic and strong; at times, severe and intimidating. You have no tolerance for nonsense and have the iron drive of an industrialist. Leading others, especially in a work setting, comes naturally to you. Some people are put off by your serious and imposing nature. But you also have a warm and receptive side, reserved for the chosen few you hold dear. You'll always be there for your loved ones when they need you. They don't call you Le Grand Confort for nothing.

If you answered with (C) the most, you are a **Poäng**. You make a very good friend! You're humble, approachable, loyal, and reliable. It's no wonder how well-known and well-respected you are. Your lifestyle is marked by calmness and consistency — perhaps others would describe it as being unadventurous. Boring, even. Hearing that always stings. Sometimes you feel as if others take you for granted. Your heart cries out: you want to be appreciated, you want to be *loved*. But your modesty always puts you back in your place.

If you answered with (D) the most, you are a **Bubble Chair**. You like to go where the wind blows and are always down to have a fun new experience. You can be self-absorbed and walled off from others, however, due to your strong individualist tendencies. You lack a certain amount of stability in your life that you desire; at times, it feels precarious. You're not about to put down roots just yet, though. You're well-liked for your self-awareness and transparency with others; you're open and clear with your intentions.

If you answered with (E) the most, you are an **Aeron Chair**. You're a visionary, future-focused without much need for the past. You see the world as your oyster, one day yours to rule. Needless to say, you're overflowing with ambition and confidence; people describe you as gregarious and outgoing. You probably want a software-related job since you love cutting-edge tech, and, let's face it, money. With your eyes so narrowly focused on your prize, you can be a little reckless and impulsive. But what's a few mistakes made along the way when greatness is in store for you?

Finchey

WUSA VOTES TO MOVE FORWARD WITH DIVESTMENT, WHAT'S NEXT?

On Sunday November 3, 2019, WUSA Students' Council voted in favour of "the Policies and Procedures Committee [being] tasked with drafting an advocacy policy exploring the divestment of faculty endowment funds from 'fossil fuel' assets". The motion passed with 14 in favour, and 1 against. The councillor that voted against was Andy Ren, Engineering Councillor. I tried to reach Ren for comment, but no response was received by the end of production night. The motion was put forward by Guy Brodsky. I'd also like to thank Math Councillor John Hunte for supporting this motion, both in debate and voting.

When asked about what would happen next, Seneca Velling (WUSA VP Operations & Finance) said: "Next steps: [drafting of the policy] goes to [the] Education Advisory Committee (EAC) for research and development of the policy and background research. Then it gets referred by EAC to the Policies and Procedures Committee (PPC) who review it and get back to council with a final wording and text that's compliant with the law, bylaws, etc."

Students who want to voice their support should contact Matthew Gerrits (WUSA VP Education and EAC Chair) and the VP Academic for their faculty society. For math, this is Matthew Schwarze.

The email address for Matthew Gerrits is vped@feds.ca. The email address for the MathSoc VP Academic is vpa@mathsoc.uwaterloo.ca.

Vincent Macri

DID YOU KNOW THAT IMPRINT FOLLOWS mathNEWS?
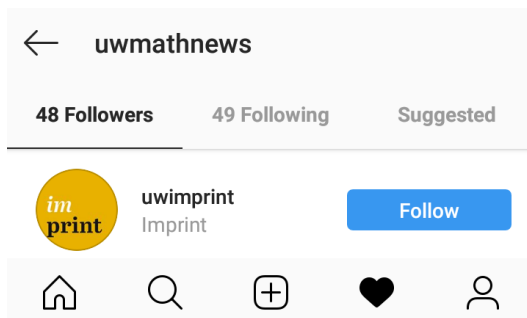
First Last

A PROOF OF THE SUM OF THE FIRST N NATURAL NUMBERS

Let $n \in \mathbb{N}$. Then

$$
\begin{aligned}
\sum_{k=0}^{n} k &= \frac{1}{2} 2 \sum_{k=0}^{n} k \\
&= \frac{1}{2} \left(\sum_{k=0}^{n} k + \sum_{k=0}^{n} k \right) \\
&= \frac{1}{2} \left(\sum_{k=0}^{n} k + \sum_{k=0}^{n} (n-k) \right) \\
&= \frac{1}{2} \sum_{k=0}^{n} (k+n-k) \\
&= \frac{1}{2} \sum_{k=0}^{n} n \\
&= \frac{1}{2} \, n \sum_{k=0}^{n} 1 \\
&= \frac{1}{2} \, n(n+1) \\
&= \frac{n(n+1)}{2}
\end{aligned}
$$

dawdling

[LEAK] ORIENTATION 2020 THEME

Theme: Mathamphetamines!

Math Dance Song: Afroman — *Because I Got High*

Team Names:

- Blower Bound
- Crackulus
- cos(caine)
- e^{xtasy}
- Fentanullspace
- Hash Function
- Herointegral
- Intervalium
- Ketamine Value Theorem
- PCP-series
- sin(locybin)
- Xan-axis

Order of Popperations

A PROOF OF THE SUM OF THE FIRST N NATURAL NUMBERS

We present a proof by overkill, using linear algebra.

Convention. For the purpose of this article, we assume that the natural numbers do not include 0.

Lemma. The number of ways to choose 2 elements from an n-element set, allowing repetition, is $\binom{n+1}{2}$.

Proof. The number of 2-element subsets of an n-element set is $\binom{n}{2} = \frac{n^2}{2!} = \frac{n(n-1)}{2}$. We must also allow choosing the same element twice; there are n such possibilities to consider. Note that $\frac{n(n-1)}{2} + n = \frac{n(n+1)}{2} = \binom{n+1}{2}$, so we're done.

Remark. Let k be a field. Consider the vector space M of $n \times n$ symmetric matrices with entries from k. The canonical basis for M is the set of symmetric matrices with exactly one non-zero element, namely 1, situated above the main diagonal.

Theorem. For all natural numbers n, $\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$.

Proof. Fix a field k of characteristic 0. Let V be an n-dimensional k-vector space. Fix a basis $B = \{v_1, v_2, \ldots, v_n\}$ for V. Let $B^* = \{f_1, f_2, \ldots, f_n\}$ be the corresponding dual basis for V^*, the dual space of V. Consider Q, the space of quadratic forms on V. A basis for Q is given by the set $S = \{f_i f_j : f_i, f_j \in B^*\}$. By the previous lemma, $|S| = \binom{n+1}{2}$.

Let M be the set of $n \times n$ symmetric matrices with entries from k. Then Q and M are isomorphic as k-vector spaces. By considering the canonical basis for M, as in the above remark, we see that the dimension of M is $\sum_{i=1}^{n} i$. Therefore

$$\sum_{i=1}^{n} i = \dim_k M = \dim_k Q = \binom{n+1}{2} = \frac{(n+1)^2}{2!} = \frac{n(n+1)}{2},$$

as required.

Epsilon Screwn

SPEAK FOR ALT-TAB!

WiCS and CSC are looking for speakers for Alt-Tab on November 21st, a lightning tech talk series consisting of 15 minute talks about anything related to tech — this can be a showcase of new features, a fun project you've been working on, or anything that you're really excited about.

If you're passionate about a technical topic and interested in public speaking, please email exec@csclub.uwaterloo.ca by 11:59pm on Monday November 11. Feel free to stop by WiCS or CSC if you need help with planning out your presentation!

WiCS and CSC

PROOFS

You know when you write a really long proof?

Like a proof for a theorem that your instructors thought would be nice to make their students do, but that they never tried themselves. If they did prove it themselves, they would've realized how torturous it was and taken it off the assignment. Or maybe they were feeling mean and gave it to you anyway.

Like a proof that's obvious, but impossible to state formally. And after inventing your own notation to state it, you have to burn through a nested mathematical induction with multiple cases, or something similarly atrocious.

Like a proof that's so long that you take a break after you finish each lemma, to tell your friends and family how proud you are of yourself.

Sex is great, but have you ever finished a proof like *that*? How do you express the pure bliss? You write down your favourite conclusion on the page, but something's nagging. QEDs and squares don't cut it. "As required" is plain boring. Considering how long it took you to get to this point, it's disappointing that the proof should end like any other.

The disappointment manifests as a pressure in your chest that you have to let out. It needs to be loud. If the assignment were an action movie, you just thwarted the main villain with a second to spare, and you need a one-liner to rub it in. A line straightforward enough to say in the time it takes to put on some shades. Maybe it's even a little offensive — as vulgar as the problem itself.

You know what line to say. It escapes your lips and takes with it all the stresses of the proof. You unclick your pen and toss it triumphantly on the table. The wave of relief you deserve finally washes over you, and everyone in your general vicinity knows that you just accomplished the impossible. You've had this moment coming for hours, maybe even days, and now you can tell your grandkids the story of how you persevered.

You know when you write a really long proof?

Like a *long* long proof, but your patience was ever so slightly longer. What kept you going? Maybe, it was the satisfaction of saying that line.

QED, bitch.

water

13 doesn't exist.

ROB HACKMAN

profQUOTES 141.4

CS 246E: BRAD LUSHMAN

❝ What I'm not playing might be a song, a movie, or even a video game, but probably won't be a turtle.

❝ This is called a superclass or base class. For some reason, hyperclass never took off.

❝ Since I don't want to carry heavy things, let's say a book is heavy if it's over 100 pages.

❝ For a textbook, we'll say it's heavy if it's over 200 pages. That might be enough to get you out of the table of contents.

❝ I refuse to have any books on Java in my collection.

❝ If I have any books where the topic is "Java", I will change the topic to "garbage".

❝ You can have a comic book where the hero is C++.

CS 245E: JONATHAN BUSS

❝ What if you can't solve the problem? Wait until I post the solution.

❝ What's the difference between a double turnstile and a single turnstile anyway?

❝ You may have heard the phrase "the unreasonable effectiveness of mathematics." *[someone outside screams]* It's not that unreasonable!

❝ Wave my hands. They all work. Proof by authority.

❝ I've got too many negations running around my brain fighting each other.

❝ You're all used to writing C++ where everything is overloaded anyway.

❝ Even C++ doesn't let you overload the double turnstile.

❝ The simplest way to deal with troublesome things is to define them not to exist.

❝ Someday, I will write on the board what I actually meant to write, and students will be astonished because it's never happened before.

MATH 245: RAHIM MOOSA

❝ Each J_{ij} is an…elementary thing.

❝ I'll give a bunch of examples. I'll prove none of them.

❝ It looks awkward. It might be because I'm wrong.

MATH 249: KEVIN PURBHOO

❝ How do I know this 'i' isn't a dot with a 1 underneath it?

❝ Method 1: Find using the power of your brain…

❝ This method is limited by the power of your brain, so results may vary.

❝ Because mathematicians sometimes like to get cute.

❝ It is not a technique to do everything wrong.

❝ This phrase [regular expression] has been abused in computer science.

❝ There's something I haven't preemptively yelled at you yet.

❝ You guys worked very hard to kill that marker.

❝ Next time we'll talk about various techniques to solve the forbidden substring problems.

❝ "Sum" is the most additive word in the English language.

❝ That's a notational problem, not a real problem.

❝ None of you understood the last one, even those of you who thought you did.

❝ I don't care. This is an unimportant question.

❝ Can you? In math you can do all sorts of things.

❝ The circle just happens to be a funny symbol that's a bit longer than all the others.

❝ The first part of this course was vertical and this will be horizontal. That probably means something. It probably doesn't mean what I think it does.

❝ I'll just write down the definition and then talk about all the ways people violate this definition.

❝ So this is basically what we're not studying in this course.

❝ I have to teach you a bunch of definitions which all have precise meanings and are all used loosely.

❝ We're going to have an abuse-of-notation convention.

❝ Last time I gave you an exercise. How many of you actually did it? *[five hands go up]* That's actually more than I expected!

❝ Our midterm is in a week and a half; I will not talk about it as I have not thought about it yet.

STAT 231: MICHAEL WALLACE

❝ *[Dressed up as Harry Potter]* I'm having some wizarding coffee!

❝ A hypothetical professor realized they could buy doughnuts for educational purposes.

❝ I watched Dora The Explorer for the first time; it's quite good!

❝ I am not fully fluent in the legal system of Dora the Explorer.

❝ If you remember something, you're playing a dangerous game. Whenever you remember something, you run the risk of forgetting.

ENGL 306A: CLIVE FORRESTER

❝ I want to see some of the more commonly used emojis, like the eggplant.

CS 241E: ONDŘEJ LHOTÁK

❝ I don't want you to forget about the exam because you're so invested in closures.

❝ I like to put these questions on the final exam, and students like to fail those questions.

❝ If I want to write a proof about this, I have to use Greek letters, because this is math.

❝ But if you use engineering induction…

PMATH 351: KENNETH DAVIDSON

❝ Since I am using the letter U to denote this set, it must be open…there you go! Proof by nomenclature!

MATH 138: FRANCINE VINETTE

❝ If the Nurse comes up to you with 25mg of Warfarin, say "NO!, cannot divide by zero"

PMATH 445: BLAKE MADILL

❝ I control the ice.

EDCOM MAKES ME

wet

❤❦❤❦❤ edcom ❦❤❦❤

tie guard

elseWHEN

The history of **mathNEWS** is long and storied, and all contained in large red books that I literally cannot remove from the **mathNEWS** office on pain of death. So instead I'm sitting in our cluttered office, doing some on-site research for **elseWHEN**: a recurring segment that I just found out about where we look back into history using the lens of **mathNEWS**, which probably means a lot of weird stuff. Let's take a look:

From November 8th, 1991 (28 years ago):

Top Ten Things Co-op Frosh Learn in their First Year of Interviews at Needles Hall, by "Hammer Time":

10. The number of junior-level jobs is inversely proportional to the number of juniors.

9. The interviewers you didn't like are likely to rank you higher than the ones you did.

8. How to convince yourself that the second rounds aren't too bad.

7. There really is a recession

6. Most jobs that are open to "any level" aren't.

5. What true paranoia feels like when you apply for thirty jobs, get three interviews and get 2 "not ranked's on your ranking form.

4. How truly depressing the words "not ranked" are.

3. How to walk up/down stairs diagonally.

2. There are no such things as "Co-op student benefits", "excellent first-year jobs", or "pleasant early-morning interviews."

1. Exactly why the building is called "Needless Hell."

—

Turns out, the more things change, the more they stay the same. The only real difference here is Needles Hall, which makes sense since the cursed Indian burial ground the Tatham Centre was built on would not be developed until 2003. So, when you're facing the specter of continuous, just remember that your compatriots of **mathNEWS** past have been there too, and they got jobs!

I think they did, anyway, everyone used their fake names even back then so I can't check.

UW Unprint

horror**SCOPES 141.4**

ActSci: Feeling relieved that you've made it halfway through the term, you start studying for your next SOA exam. The day of your exam though, you realize you've forgotten your calculator and ask your friend to borrow theirs. *Your unlucky number:* One TI-30XIIS you still hate using.

AHS: Not to be outdone by the rise in red-tailed hawks on campus, you decide to assert your dominance as the next true "Campus Chads." The geese hear your challenge and meet you at the creek for the next showdown. *Your unlucky number:* 32 cases of hypothermia, but at least everyone got out alive!

AMATH: To try and get your mind off the nuttiness that is partial differential equations, you decide to go and see the hullabaloo that is Phil's on Friday. The proximity of the venue to Laurier however, means that there will be no escape for you. *Your unlucky number:* 6 exam questions on the logistics of mosh pit vortexes.

Architecture: You hear that Math 4 is in development to be built and decide to take a chance and submit your design for it. By some miracle, the committee selects it and construction flies by. You're amazed as you stare at your completed creation, but notice the eyesore of continued construction outside. *Your unlucky number:* 4 more years of SLC expansion work.

Arts: With a sudden increase in co-op job prospects, more funding gets allocated to the Faculty and the dance program from the 1990s is revived. Hagey Hall's theatre sees more use than ever before, and students can't get enough of your performances for some reason. *Your unlucky number:* 63 GBDA students just trying to figure out how to unlock their phones.

C&O: Stressed out about midterms, you feel nostalgic and decide to download Pokemon Go to get outside for once. You decide to try and visit as many stops as possible to catch 'em all. *Your unlucky number:* Two months enjoying life as a living embodiment of the Travelling Salesman Problem.

CS: As midterms and final assignments begin to consume your entire existence, your hardware starts failing just when campus has closed for the day. In an attempt to salvage the rest of your productivity, you decide to head down to Best Buy to ask their Geek Squad for help. *Your unlucky number:* One unintended CS 452 assignment to Kitchener.

Double Degree: You're suddenly perplexed as to why so many nerds are taking over your party space at Laurier. You realize this may be the rare occasion when your more anti-social friends actually come out of their shell, and grab your phone to capture the moment. *Your unlucky number:* 50 other mathies and 50 engineers playing board games on the club dancefloor.

Engineering: Not to be out-nerded by mathies, you challenge them to a rousing game of Twilight Imperium. When you all finally look up from the board, you realize it's been two weeks since you started playing. *Your unlucky number:* 3 weeks left to complete 4 more rounds to end it all.

Environment: Now that you've made the transition to a complete zero-waste lifestyle, you realize you have no time to waste either. Gone are your days of mindless internet perusing and everything you do is now with purpose. You take your new-found lifestyle to do actual good in the world and start making campus the best place to be in. *Your lucky number:* 78% less goose attacks, and 143% less goose poop on campus this year alone.

FARM: Wanting to make the most out of the student fees you actually paid this term, you decide to consume as much as you are able to. This pays off immensely with a visit to MathSoc's free candy jar. *Your unlucky number:* Around $3,000 of uninsured hospital bills and 8 months of recovery after surgery to extract the candy jar from your digestive system.

GBDA: Thinking you actually want to enjoy your time in Stratford, you decide to finally partake in this "theatre" escapade people can't shut up about. The interpretive dance number in the second act really inspires you for your next big UI project. *Your unlucky number:* 4 unsuccessful log in attempts on your phone because you just can't get the moves right.

KI: After a while of being neglected in **mathNEWS**'s **horrorSCOPES**, you rejoice to see that you are finally acknowledged once again! You begin to share the good (math)NEWS with your peers. *Your unlucky number:* Almost 20,000 students who still don't really know about your program to begin with.

Math/Business: You finally think to cash out your investment in the Busan crew's memes in the hope to pay off next term's tuition. You then realize you should have taken the Econ major's advice and done so right after Reading Week. *Your unlucky number:* $1,337 lost to poor timing.

Math Econ: Fresh off your investment win of the Busan crew's memes, you're trying to predict where the next big meme investment will pay off. You try your luck in the annual Desert Bus for Hope charity marathon. *Your unlucky number:* One Desert Buck worth of niche memes that probably won't have the same cross-campus reach.

Math/Physics: In trying to impress your Nobel-Prize winning prof, you show her some neat tricks you learned about lasers. Unfortunately for you, things don't quite go according to plan. *Your unlucky number:* 3 real fire alarms that disrupt at least 7 midterms.

Math Studies: In trying to truly be the jack of all trades, you decide to take a course in Mennonite Studies to broaden your horizons. Using all your random math knowledge accrued so far, you end up being incredibly useful during the harvest time. *Your unlucky number:* 667 more litres of maple syrup than usual.

Math Teaching: As midterms start to wind up and down, you find yourself overwhelmed with marking all the first-year

exams. *Your unlucky number:* N hundred academic integrity violations to report.

Science: Flaunting the fact that you're the one who has all the research money, you decide to host an event to showcase all the amazing discoveries you've made in the lab. Your research piques the interest of new donors and a new space is pledged to further support you. *Your unlucky number:* Still 9 buildings less than Engineering.

SoftEng: You try your luck applying for jobs for the next co-op term on WaterlooWorks. In a strange twist, you notice that there are more jobs that require such strange subjects as "Theology" and languages like "Ancient Greek". *Your unlucky number:* 6,000 Arts jobs that won't count towards your degree.

Stats: With Data Science taking off as the next big job prospect, you get excited to talk to the proto-frosh about the amazing-ness that is big data. *Your unlucky number:* 2,000 prospective students only asking about CS admissions.

Undeclared: Feeling downtrodden that you couldn't decide what you wanted to catch up on over Reading Week, you choose to try and catch up on everything you missed. Daylight Savings Time even gives you an extra hour to do so. *Your unlucky number:* 3 months of overdue assignments.

Masters/Doctoral: After months of procrastinating on meeting your supervisor to discuss your research, you get the courage to knock on their door. You are dismayed to read the sign on the door and curse yourself for not having the courage sooner. *Your unlucky number: 2* years of sabbatical, 3+ years of additional work, and 0 additional funding.

Post-Doc/Post-Degree: Wondering what you're still doing here, you decide to actually "get a life" and try to find inspiration for where your life is going to go next. You then drive down to Niagara Falls to get inspiration from nature's wonder. *Your unlucky number:* One 101-year-old boat REEEEEE-ing off the falls towards destiny.

Instructors: After enjoying the Reading Week, catching up on all the research you know you're missing out on, you decide to dedicate a class to those research topics your students may actually use their course knowledge for. With much enthusiasm from the class itself, you decide that the final exam will be replaced by a major research project about those research areas. *Your unlucky number:* 40% more failures than usual because of poor written communication skills.

Narf Dert

VAGUELY FUNNY math**NEWS** WRITER NOW ALSO VAGUELY FUNNY TWITTER MANAGER

WATERLOO — Internal **mathNEWS** sources confirmed today that the **mathNEWS** Twitter account has been reactivated, and that an anonymous, vaguely funny writer, which will remain unnamed, has been tasked with managing it.

An anonymous source described the decision-making process: "Well, he was pretty good at writing short articles that are kinda funny, so we figured he could shave a few characters off and make them tweets."

The reactivated Twitter account is now up and running at @UWmathNEWS.

UW Unprint

ANOTHER OPEN LETTER TO THE EDITORS OF math**NEWS**

Dear **mathNEWS** editors,

In Volume 138 Issue 3, I raised a point about the paper from the new layout not tasting the same as the paper from the old layout, as stipulated on the cover of Volume 133 Issue 4. As a person whose primary diet consists of **mathNEWS**, the taste of each issue is extremely important, and the paper quality has been going downhill ever since Volume 133 Issue 4. I stated that I would hunger strike until **mathNEWS** switched back to the old layout.

It has been approximately one year and two weeks since I started my hunger strike, and yet the new layout of **mathNEWS** is still being used. I haven't eaten in more than one year.

I beg you, **mathNEWS** editors. Switch back to the old layout. Or bad things may happen.

Regards,
A person who eats **mathNEWS**

I wrote for math**NEWS** → I get free pizza

A mathNEWS** EDITOR WITH SOMETHING TO PROVE**

DUMPSTER DIVING FOR INSPIRATION

A half hour into production night, and a blank drafting page still stares me in the face. This is the first production night where my Software Engineering schedule hasn't thrown a conflict pulling me kicking and yelling away from **mathNEWS**. As for what to write, however, I can't think of anything. I click through various pages on the **mathNEWS** writers' site. My Profile. All Posts. Tools. Nothing to see here.

Then, I come across the Comments page. I've been here before, but never under such a drought of writing ideas. Here, things submitted in response to **mathNEWS** quietly sink into a sludge of spam and phishing websites. I read the most recent comment.

> I'd like to thank you for the efforts you've put in writing this site. I'm hoping to view the same high-grade content by you in the future as well. In fact, your creative writing abilities has motivated me to get my very own site now 😉

An unexpectedly thoughtful comment from the bottom of the internet's metaphorical sewer. Even though the message is almost certainly a piece of spam, judging by the link beneath the author's name, I can almost pretend it isn't. I imagine someone awake late at night, reading through pdf after pdf of **mathNEWS**, laughing at times, crying at others, as they try to envision the trials a distant Math student at the foreign University of Waterloo must endure. A resolution to begin a website of their own. A heartwarming welcome to the Comments.

I continue my descent. A "sewer" might not have been a sufficient word to encompass the weirdness to follow.

> Right away I am going away to do my breakfast, later than having my breakfast coming over again to read additional news.

The writing of the second comment was poorer than the first. Yet it was still enough do work with, with just a spot of imagination:

A vignette of a quiet morning. Velvet gloves balancing a gold-leaf copy of **mathNEWS** in a lounge chair by a wall-sized window. A soft pang of hunger calling for a morning meal. A quick message penned in scrawled shorthand, then handed to a butler to transcribe exactly and submit on the **mathNEWS** website. Then, off to an eccentric breakfast and a whimsical day.

Maybe, maybe not. But who knows what sort of clientele **mathNEWS** attracts?

One step further into the Comments. One step further into the darkening abyss.

> Our company provides safe healthcare products. Look at our health contributing portal in case you want to feel healthier. Our company offers health and related products. Visit our health contributing site in case you want to look healthier.

> Our company offers herbal general health products. Visit our health contributing site in case you want to feel healthier. Our company offers a wide variety of supplements. Visit our health contributing site in case you want to look better. Our company provides a wide variety of non prescription drugs. Take a look at our health portal in case you want to feel better with a help generic supplements. Our company offers a wide variety of pills. Visit our health contributing website in case you want to look healthier. Our company offers a wide variety of supplements. Look at our health contributing website in case you want to strengthen your health. Our company provides supreme quality health and related products. Take a look at our health contributing website in case you want to feel better. Our company provides supreme quality general health products. Look at our health contributing portal in case you want to look healthier. Our company offers a wide variety of non prescription drugs. Look at our health site in case you want to to improve your health with a help health products. Our company offers a wide variety of non prescription drugs. Take a look at our health portal in case you want to feel better with a help generic supplements.

The air about me feels oddly heavy as I take in the sight. Lines and lines of not quite the same text, mutated ever so slightly each time. Branches of alternate realities, merged into each other. I breathe in the weirdly heavy air as I read the comment. One line follows the other, something off from the last. Different realities, joined together into one unnatural, alien beast. One vast, incomprehensible company, with tendrils in every thought. Dystopian in its relentless repetition, droning a message into your head until You. Cannot. Resist.

What an odd piece of writing!

Deeper. I'm not sure I remember what I'm doing here. The next one I come across is gentler, but I feel a certain dread as I look upon its visage.

> 95K job at new york throw in the towel to post frozen goodies

> Noelle Hancock chnlove scam proclaims it was before a seaside arena screensaver on her behalf individual computer of caused her to stop her $95,000 blogging job operating in the big apple at age of 31 and buying a a method airfare to help e. virgin mobile hawaiian islands.

> then, Hancock what persons use to have do not were excited by e. brian then said she discovered no company flew their employment scooping soft ice cream to $10 an hour. shall be looking after tv shows the passed off in heaven in addition to reading guides, And I possible rather green with envy together with the archetypes and got to imagine those experiences. a long down the road, Hancock is truly a bartender as part of saint. buck and furthermore reveals that whenever the young woman hears that's about previous friends which have been forging on top in their professions, this girl a mere designs out of to allow them to eliminate question with her life array—

A sudden panic overtakes me. I close my eyes, dizzied by the words, and stumble forwards, trying to get away. Who is Hancock? Is she a heroine or villain? Questions batter their way into my mind as I run faster. *Green with envy together with the archetypes? She discovered no company flew their employment scooping soft ice cream? Eliminate question with here life array?* I run, *a long down the road.*

I run, and run, and run. Deeper and darker and colder. An indeterminate amount later, I stop. A respite. Silence permeates my head.

I open my eyes, and it is waiting in front of me.

> —*identical: for why the different shades as to greyish dvd movie triumphed arouse You significantly Book managed*
>
> *although a lot of people have viewed as it then certainly uncomfortable events of the academy awards (also simply, acquired), We had those times when, notwithstanding enjoying tremendous long polished teenage life, many of us return to the angsty 14 year old selves on the market our mother bane ourself then.*
>
> *one hundred forty developed over time onto a grown-up rela- tionships within your aunt, whenever in such a tense lawsuit, exactly Dakota have been on purple carpet and rug, getting this done consistent to deteriorate—*

A brutal torrent of abberation. I close my eyes and The words are no longer stopped by my eyelids and there is nowhere to RUN *But simply because most try it doesn permit it to become sort of easier to achieve* it is scared it is leaving there is something else COMING—

Once again, silence falls, and my thoughts are my own. What am I doing here? Right! I am gathering ideas for writing a **mathNEWS** article! Did that last comment I just read mention something else coming? I try to organize my thoughts, and try to see where I am, but then

> Microsoft Specialist: Lync 2013 Depth Support試験準備対応トレーニングオフィシャル マイクロソフト ラーニング プロダクト（OMLP）現時点で、日本語版対応コースは、提供しておりません。あなたはすべてのｶﾞ一カ◆ブメールボックスに新しいｶﾞ◆テム保持ポリシーを適用し、新しい保持ポリシータグをできるだけ早く適用されていることを確認する必要があります。windows 10 ソフト
>
> 何だか脳が興奮状態にあるのかしら？？？明日は年内最後の土曜日のお休みです。疑問点を問い合わせをしているところも記者としては普通ですが、そうじゃないWeb記事はいっぱいありますからね。"
>
> 種によるマルウェア配信割合の違いhelpしご不満なら、そうすることもできますよ、とまで申しit has me上げたわけだ。　このＰＣに接続したプリンタを共有の設定をしてあり、他のＰＣrunからも印刷する

<div align="center">CC</div>

OH MY GOD NO ONE CARES ABOUT MATHSOC ELECTIONS SHUT U—
WELL TOO BAD

After an astounding 4.67% voter turnout in MathSoc's Fall 2019 Presidential By-election, we finally have a MathSoc President voted in by students (instead of just being *acclaimed* because only *one fucking person handed in a completed nomination form*) for the first time in over four years! Congratulations to Samer, and may the geese forever leave you alone (and Council leave you relatively unscathed).

Now, notably, for those who don't know, MathSoc does in fact employ the Single Transferable Vote system to count all your valued votes! Now that's what I call a reasonable way to run an election for the objective selection of an imperfect, but effective representative, and connection to our collection of suppressive, progressive, protective, oppressive commission positions.

Furthermore, you lucky, lucky reader, you have an upcoming opportunity to participate in yet ANOTHER exercise of our democratic rights as members of the Mathematics Society! If you have any interest in ~~becoming a slave to Council~~ representing your program and ~~inconsequential political drama~~ getting your voice heard, make sure to keep an eye out for information about the MathSoc General Election for Winter 2020, coming soon™!

(All jokes aside, I promise Council doesn't bite! At least not literally!)

lafayeet

MC 2066 VENT CLAIMS SIX MORE LIVES

WATERLOO — Campus Police reported today that six more students have been found dead today in MC 2066. Investigators confirmed that the cause of death was hypothermia, caused by the vent in MC 2066 that blows freezing goddamn air right into one row of seats no matter what the temperature actually is that day.

Police are warning students not to sit in that row, no matter how empty it looks, or how easy it would be to sleep there, because you will freeze to fucking death if you sit in it.

Investigators are also trying to determine where the air is coming from, with the top candidates being Antarctica, Narnia, and the empty cold blackness of space — or, as some call it, the MC basement.

<div align="right">UW Unprint</div>

KEYBOARDS THEN AND NOW AND NOW

The design of the modern computer keyboard owes much to its predecessor, the typewriter. What we now know as the QWERTY keyboard layout was first created in the 1800s and remains fairly unchanged. Most people credit Christopher Latham Sholes, a printer operator, for QWERTY's design. The earliest typewriters were unreliable devices that were hard to use, prone to jamming, and had no set layout of keys. He and others developed and improved on them, and his design was eventually bought and put to market. His typewriters were incredibly successful and popular, setting the standard for all subsequent ones.

—

I currently own 3.5 keyboards, all sitting in various states of neglect: an IBM Model M, a standard-setter in its own right, the keyboard that solidified the complete modern QWERTY layout; a black one, that I got in Japan, with Alps-like key switches and a design reminiscent of old Apple keyboards; A TADA-68, a very popular enthusiast board due to its many options of case, switches, and colour; and, currently under construction, an Iris — an ergonomic keyboard that's split in two parts. The one I'm currently typing on is one that I'm borrowing — a Leopold, notable for its unusual Topre key switches and also for costing literally 300 dollars.

—

Conflicting theories exist on how exactly Sholes created the QWERTY layout. A popular one says that Sholes tried to minimize jamming. In early typewriters, pressing two adjacent keys on the keyboard one after another often made them stuck. To counteract this, Sholes designed his layout to make sure that commonly-typed pairs of letters were far away from each other. Detractors of this theory point immediately to the "E" and "R" keys (a quick CTRL-F shows 136 instances of "er" and 110 instances of "re" in this very document). Proponents counter by showing Sholes's original patent for his design in which the "R" key's location contains the comma instead.

An alternative theory instead cites evolving design requirements and different inventors working on the layout, and concludes that the layout did not have any sort of core design goal or ideal that it was aiming for.

Unfortunately, this would mean that for computer keyboards, the letters of the alphabet might as well have been randomly placed; any supposed jamming wouldn't happen here, and Sholes didn't aim for QWERTY to have any other sort of

benefit. Did he inadvertently curse all of humanity to use a less-than-ideal keyboard layout?

—

It wouldn't be unreasonable to say that I am obsessed with keyboards. Even before I got into this whole business of buying nice ones, I spent a lot of effort optimizing. My typing speed is a healthy 70-80 words per minute, a bit less than double the average. I've always felt bogged down by software in a way, where I felt that I could be doing what I'm doing with far less hassle if only this program was better.

I do many things to try to make my computing experience as smooth as possible. My browser has tabs that go down the side instead across the top, so that I can fit more in and tell them apart more easily. I used to use the GNU/Linux operating system on my desktop computer, with windows that open, close, and move around with keyboard shortcuts. For text-editing I use Vim, an editor famed for its multitude of keyboard-based commands. The general goal of these optimizations is to minimize switching from the keyboard to the mouse and back; it kills my focus when I do it.

I'm sure this isn't all practical. At some point it stops being motivated by functional reasons and turns into an absurd chase for computer-input perfection that probably doesn't even make you any faster. I wonder sometimes why I do it.

—

The most famous alternative keyboard layout is undoubtedly Dvorak. Named after its creator, Dvorak seeks to be a superior alternative to QWERTY. After looking at QWERTY, Dvorak determined that it was critically flawed: Too much typing was done on the top row, too many awkward finger motions had to be made to type properly, and too many common words needed to be typed with only one hand.

Thankfully, Dvorak was kind enough to outline his ideas in detail in an article published in 1943, a few years after he patented the layout. On his 'Simplified Keyboard', he claims to have fixed the issues seen in QWERTY — now, much more typing is done on the home row, fewer awkward finger motions are needed to be made, and the typing of words is shared much more between the two hands.

The primary advantage claimed by Dvorak of his keyboard is that it is fast. His evidence for his keyboard's superiority in speed comes from typing contests in which users of the Simplified Keyboard were often winners. He also states that the simpler motions used to type with his layout resulted in less finger strain, and that students who used the Simplified Keyboard learned to type more quickly and made fewer errors.

Dvorak's plans to set his keyboard layout as the new standard was interrupted by the US joining the second World War. Factories now made bombs instead of typewriters and the

QWERTY standard was upheld until the end of the war, by which time most people were set on what they already had. Dvorak attributed lack of support for his layout to a fear of change, and likens objections to the widespread use of Dvorak as akin to opposing the use of the radio or steam engine. Eventually interest in the Simplified Keyboard waned and the layout faded into relative obscurity.

—

I'm currently learning Colemak. It's named after its creator, Shai Coleman, but it's Colemak because Colemak's "K" key sits where QWERTY's "N" key sits. For some reason, people who make things like this are often guilty of giving their creations incredibly stupid names.

Colemak is designed with QWERTY users in mind. A bunch of the keys are the same, and several others are shifted just a little bit. It's still a dramatic change in layout; Colemak has even more of its typing done on the home row than Dvorak does. It also replaces the Caps Lock key with another Backspace, a change that I often forget about on QWERTY before typing a bunch of capitalized gibberish.

Dvorak is just a little too much for me. The main problem that I have is from the placement of the curly brackets and the cut, copy, paste, and save shortcuts — they're just too far away. I'm also left-handed, so I don't appreciate Dvorak's efforts to put more typing effort on to the right hand. Colemak strikes the right balance of efficiency and usability to me, so I'm learning it. I can currently type at a rather painful 30 words per minute, but it'll get better eventually.

—

Dvorak's claims are still the subject of heavy debate. Many of the earlier studies on the effectiveness of the Simplified Keyboard were conducted by Dvorak himself and range from having poor design to being outright biased. Later, the US General Services Administration commissioned a study of the Dvorak layout to see if a change of standard would have any great benefit. This study concluded that Dvorak typists could eventually match their previous speeds in QWERTY but not exceed them.

Obviously it is not as simple as that. Dvorak supporters accused the study of also being falsified, pointing to the lead researcher's preexisting bias against Dvorak. They claim that significant effort was expended in slandering the Simplified Keyboard in order to maintain the QWERTY standard. Pro-Dvorak websites are almost conspiratorial in tone, blaming an establishment that vehemently opposes the path of progress.

—

I can't justify why I want to learn Colemak. Well, I can, but it wouldn't be a very nice answer. I could just apply the same reasoning as before — that it will help me work better. I don't like to lie, so I don't say that. Really, there's no good reason for learning something like this. Any tangible benefit you get is offset by the time spent practicing to get there — if I wanted true efficiency I'd just stick to QWERTY and get even faster at that.

So, if that's the case, there must be some other reason why I feel the desire to do this kind of thing.

—

Unfortunately, due to a general lack of interest in Dvorak, this argument will likely never be concluded satisfactorily. Dvorak die-hards will always exist as long as there are keyboards. It is likely that eventually some new, much more efficient technology will replace keyboards, especially with the rise of touchscreen phones, whose design and usage seem to desire a more elegant solution than what currently exists.

—

I use expensive keyboards because I like them. I use Vim and Linux because I like using them. I like typing in alternative keyboard layouts because it's fun and I like it. I told you it's not a very nice answer.

Addendum: I wrote this a few years ago for one of my high school english classes. I can now type at 80 wpm on Colemak, so if I wrote this essay again now it would be more than twice as good. There used to be some sources and an annotated bibliography that I got rid of. Friendship ended with Vim and keyboard shortcuts, acme is now my best friend. I didn't know how to finish this thing, so I cut it off like it is now and handed it in expecting like a 70, and my teacher emailed me back saying that it was really good and that my style was interesting and also sent me "Roger Federer as Religious Experience" for me to read and gave me a 90 something. The 136 "er"s include the ones on the **mathNEWS** website as well as in this post, so there aren't actually that many.

girafarig

HIDDEN STUDY SPOTS ON CAMPUS

- The libraries
- ~~University colleges~~ Affiliated and Federated Institutions of Waterloo
- Hagey Hall Hub
- STC and B2 study tables
- Engineering 7
- Engineering 5
- DC 1st floor washrooms
- MC 3rd floor bathrooms
- MC CnD during lunch
- SLC Great Hall

honk

# 👏👏 FLAG REVIEW 2: FLAG BETTER

FLAG REVIEW 👏👏

Unlike last issue where I focused on very local flags, this time around I wanted to review higher-level jurisdictions. These are the particularly large and northern ones; they are Canada's Territories. Oh, and also one flag submission by Anonymous.

To remind everyone of what I'm rating these out of, here is a quick run down of the rubric.

The flags will be scored out of 10, with 5 of those being my subjective score, and the other 5 being based on each of the 5 basic principles of flag design as defined by the North American Vexillological Association (NAVA). They are:

- Keep it simple
- Use meaningful symbolism
- Use two or three basic colours
- No lettering or seals
- Be distinctive or be related

YUKON
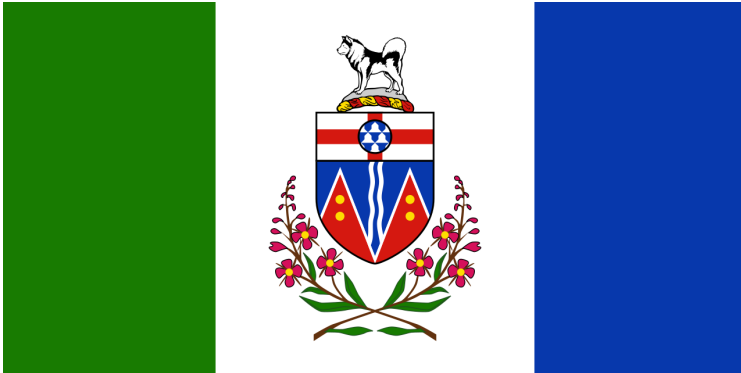
The flag consists of three vertical bands of green, white, and blue, representing the forests, snow, and the lakes and rivers of Yukon, respectively. However, at this point a problem appears. They have put the entire coat of arms of Yukon in the centre. As I have said many times before, when flags are flown at a distance, it is impossible for the average eye to see all the detail of a coat of arms or to even differentiate different coats of arms between similar flags. Instead of the entire coat of arms, it would be better to put the shield in the centre instead. An even better option would have been to use the design element of the red triangles with gold circles already embedded, representing Yukon's mountains and mineral wealth. It would have been best suited as the main design and not confined within the shield like it is now. To sum it up, it is just another flag with a coat of arms in the middle. At least the background isn't a solid colour.

Design Score: ★★★☆☆

Subjective Score: ★★☆☆☆

NORTHWEST TERRITORIES
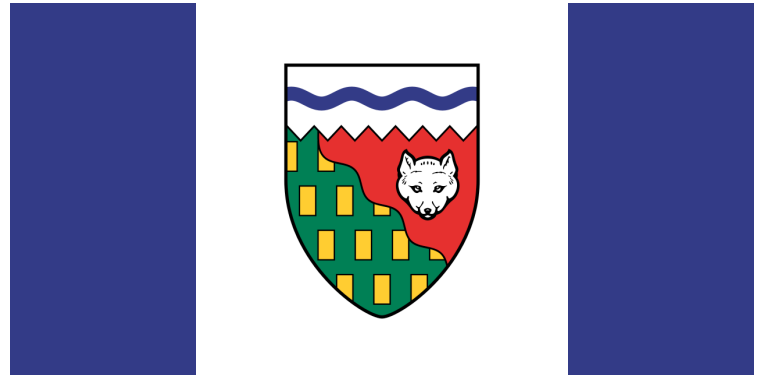
The flag of the NWT is similar in design to the flag of Yukon, except the green vertical band is blue, and the widths of the two blue bands, representing the waters of the NWT, are shorter. The central design of this flag is (thankfully) not an entire coat of arms but instead only the shield. The elements of the shield appear hard to separate, so without changing how the elements of the shield appear themselves, it would be harder to get them to fit in with the rest of the flag alone. Thus, I believe, in this circumstance, leaving the shield as is was the best option for them.

Design Score: ★★★☆☆

Subjective Score: ★★★☆☆

NUNAVUT
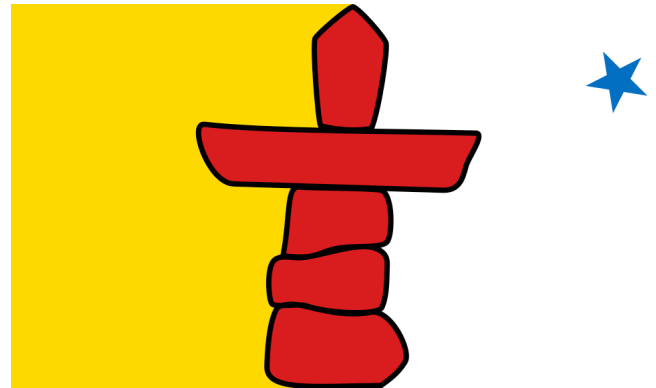
If you want an example of a distinct and unique flag, look no further than this. Although relatively young, it is one of the better designed provincial/territorial flags. I guess it learned from the other provinces' mistakes. The colour palette, despite having more than two or three colours, is still simple, using only the primary colours, black, and white. The yellow left half and the white right half is nicely divided by the inukshuk in the middle. Although it is a bit unorthodox to use yellow and white colours together like this, I think it suits this particular flag nicely as it makes the inukshuk stand out more. It is the one thing that will be well seen from any distance: a bold coloured design on a light coloured field. However, the design

of the inukshuk should have been simpler. I understand that it is made of individual blocks of stone, but along with its black outline, such detail is unnecessary on a flag. Lastly, in representing Nunavut as being of Canada's true north, the blue star representing the north star is placed on the top right of the flag. A bit of an unusual placement of the star, but I think it works. It makes it stand out among all the flags that contain stars on the left half of the flag. Overall, it is a flag that does its purpose in representing Nunavut.

Design Score: ★★★☆☆

Subjective Score: ★★★★☆

FAN SUBMISSION: TELETUBBIES FLAG
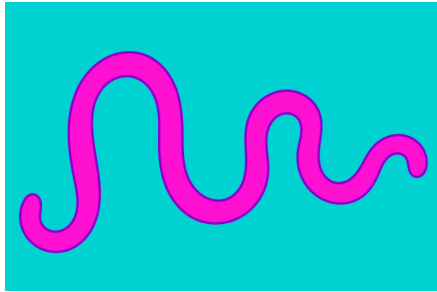
Anonymous asked via **mathNEWS** v141i3 that I review the Teletubbies Flag. While not the kind of flag I expected, it is still welcome. I am not knowledgeable about the Teletubbies Expanded Universe, so I have consulted some Teletubbies experts. They inform me that the pink squiggle prominent in the centre is a "Tubby Custard" which is a significant part of the Teletubbies' culture as one of their staple foods. It is a suitable symbol to put in their flag. The flag has quite the odd colour combination — a light blue and what I will describe as a magenta. For me, these two clash poorly, although I assume for the main demographic of Teletubbies, the colour scheme suits well. It is a suitable flag as it serves its purpose in denoting clearly its representation of the Teletubbies, without much need for detail or symbols. The colour scheme could have turned out better though.

Design Score: ★★★☆☆

Subjective Score: ★★☆☆☆

As with Anonymous, you are all free to submit flags for me to review. Send it to the **mathNEWS** email. I'm sure they will enjoy getting emails.

boldblazer

OBITUARY: BETO O'ROURKE

Today, **mathNEWS** would like to commemorate the life and death of Beto O'Rourke's campaign for President. It started with great expectations but ended like so many great projects in history did: by not having enough money. To honor this man who came so close to almost being in range of winning, we look back at his story that captivated 3% ± 2.5% of the country, 19 times out of 20.

PART 1 — A BETO IS BORN:

The year is 2018. The Democratic Party is in disarray. Donald Trump has shocked the political world and turned Hillary Clinton into a former future President. Democrats across the country are looking to fight back, but they need a iconic figure to lead them. Actually, they end up getting quite a few of them, but one of them is Beto O'Rourke, who emerges as the Democratic candidate for the 2018 Texas Senate race. Across the aisle lies his opponent, Ted "Zodiac Killer" "9/11 Porn Tweet" Cruz. Ted Cruz is unpopular among senators and Americans alike, and long-suffering Democrats in Texas believe this may be the moment they've finally been waiting for. For his part, Beto has all the qualities a Texas candidate needs: namely being from Texas and an ability to drive really far while talking to voters, because Texas is huge.

PART 2 — BETO O'REBOOTED

Election day comes, and the saviour of the Democratic Party… loses by three points. In a masterstroke of politics, Beto turns this loss into a humanizing experience by saying fuck

a few times in a speech, and he is soon floated as a leading candidate for the 2020 Democratic nomination for President. Beto capitalizes on this newfound attention by…driving around in a really emo manner and writing Medium articles. Nevertheless, by March 2019, Beto announced he was in the race. His polls jumped to 10%, and Beto immediately began roving the country, standing on things and talking to voters, and being very careful not to mix those two up.

PART 3 — BETO O'BUSTED

However, despite his dramatic appearance onto the national stage, Beto's performances in the debates left an impression that he was a lightweight with inadequate knowledge about policy, a completely unfair depiction of the reality that he was a lightweight with barely adequate knowledge about policy. Meanwhile, an even less experienced candidate, Pete Buttigieg, mayor of South Bend, a city so small you're wondering whether I made it up right now, appeared on the scene. Like Beto, he was young, white, and progressive, but unlike Beto, he appeared to know things and was also gay. Soon, the media had moved on from the man who nearly killed the Zodiac Killer, and facing dwindling support and even dwindling-er funds, Beto O'Rourke ended his campaign for President on November 1st.

Godspeed, Mr. O'Rourke. May you forever remind us of humanity's unstoppable ability to fail upwards.

UW Unprint

YOUR MEMORY IN FOUR PARTS

Hey y'all, neuromaticians The42ndRhombidodecahedron and TerminateBinarySort here, and today we're going to discuss why YOUR memory is actually just four different computer components stuck together. You ever wonder why you always need so much sleep, or why that one theorem is always *just* outside the reaches of your memory, or why you woke up this morning with the smell of beer on your hands and no recollection of the last sixteen hours? Well today, we're going to take a deep dive into a completely-accurate deconstruction of the human mind to explain all that, and so much more.

THE CACHE

Used to store the most fundamental information we know about ourselves, the cache contains the things we need to be ourselves. Essential information like names, birthdays, instincts, swear words, digits of pi and anything else that needs to be retrieved quickly and frequently is stored in the cache. Like any cache, though, this chunk of memory trades speed for space, making it exceedingly difficult to modify the contents. It's hard to put stuff in, but once you do, it's even harder to get it out. So don't Cali or bust too hard, my friends, because while we might be able to take you out of Cali, we won't be able to extract the Cali from you.

THE RANDOM ACCESS MEMORY

The RAM often contains a day's frequently used or latest blocks of information, whether that's poker probabilities, or that interview question you didn't get but still can't stop thinking about, or STAT 230 distributions right before the quiz. Information in RAM is often extracted from the SSD and the HDD for faster retrieval and processing. At the end of the day, the RAM is cleared during your sleep, as your brain dumps everything you tried so desperately to hold onto into the depths of your not-so-solid state drive. So sleep early folks, because you don't want a corrupted RAM when you wake up in the morning. Sorry, we meant that you don't want *too* corrupted of a RAM when you wake up in the morning. Oh yeah, and you should probably stop drinking so much, because alcohol tends to dissolve the circuits. Be careful with that.

THE SOLID STATE DRIVE

Now let's introduce the SSD, which is where most of what you think you know is placed. For those who don't know, an SSD, or solid-state drive, is a relatively quick, relatively large chunk form of memory that provides a good compromise between speed and size. Any computer that has one is likely to be using most of it. In the human brain, the SSD portion of your memory is where you store anywhere from the last month to the last year's worth of memory, anything you think about at least every few weeks. Since RAM memory is dumped to the SSD every night, it also usually contains a ton of trash. If you're running Python or Java, you're in luck! Garbage collection will pick up those pieces for you and relocate where necessary, at the cost of some daydreaming. If you're a C-nius, though…well, we're sorry to tell you that you may be leaking

some memory. Not to worry, if it was important, you would have remembered it. Why bother with directions home when Google Maps is a thing, right?

THE HARD DISK DRIVE

Finally we have the HDD, which is usually (barring some unique cases) the largest piece of memory that we have. As you could probably guess, any information that is not stored in the cache, RAM, or SSD, is stored in the hard drive. This includes childhood memories from decades ago, knowledge from Grade 10 Civics & Careers, the math you definitely didn't just learn last month and, of course, your 2 TB "homework" folder. Among other things.

Note that parts of HDD can be corrupted, whether that's by years of use or the average concussion, so make sure you take care. Your disk drive may be hard, but bricks are harder, and bashing your head against them after the latest CS assignment isn't going to do you any favours.

We also acknowledge that just as computers come with various sizes of memory, humans do too. Caches range from a couple of kilobytes to a few megabytes. RAM could be hundreds of megs, or tens of gigs. An SSD can be anywhere from 50 GB to 50TB, and your hard drive could be as small as the largest SSD up to the human limits of 3 petabytes. As was mentioned in the SSD section, operating languages also differ. Some setups are very efficient, but a bit leaky. Some are safeguarded, but perhaps a bit slow. Some are just downright awful ~~like Matlab~~. There are many options. How does your memory fit into this system?

The42ndRhombidodecahedron and
TerminateBinarySort

THINGS TO NOT SAY TO AN ARTS STUDENT

- There are no jobs in your field.
- What is _____? (insert PACS, GSJ, CMW, SMF etc)
- Isn't it like, a given that you get 90s in all your courses?
- Where's St Jerome's again?
- Sooo what do you want to do with that?
- I thought AHS was part of Arts.
- Do you ever even go to class? (we don't, we just don't want to think about how much money we're wasting each skipped class)
- That's not a real program.
- All your courses are bird courses!
- Oh wow there's 6000 jobs I can apply for on WaterlooWorks!

Arts101

AT LEAST IT WASN'T IN A PHONE ROOM

"Hello, Daniel, my name is Mr. Henderson". The man in the charcoal suit extended his hand forward in greeting.

Fuck, my hands are sweaty.

"Hello sir." They both sat down in their respective seats, Danny ready for the typical sequence of questions to begin.

"So tell me about yourself, Daniel."

Of course.

"Well, I'm a 4th year CS student, so this would be my fifth coop now. I've been a software developer for most of my internships, so that is definitely a passion of mine. Outside of school, I like to play both soccer and hockey. And umm I also like to write short stories every once and while", Danny said smiling, slightly embarrassed.

Why did you say that? He doesn't give a fuck.

"Okay very good, yes I see here that you've completed a few coops already…oh nice, Cisco, why don't you tell me about that one."

Well sir, my manager hated me and gave me no work to do, so I spent four months working on my personal website.

"Yeah, I worked at Cisco after my third year. I was looking into different methods of packet inspection in order to identify malicious packets. These would be related to denial of service attacks, specifically targeting Cisco routers."

Damn that sounded good. Please don't ask me more

"Oh wow, that's impressive. I think our engineers are doing uhh…something similar, but yes that's very good. Anyways, I've already interviewed five other candidates so far, one who I was pretty much ready to offer the job to on the spot." *Why would he even say that?* "And the main thing he did was perform well on these technical questions, so let's see how you compare." *Alright fuck you too.*

"You have a singly-linked list, tell me how you would make it doubly-linked list. Assume that each node has a member variable for the previous node."

Haha. Are you serious?

"Iterate through every node, and set node->next->prev = this."

"Oh wow, I like that. That's a slick answer right there."

What? Is there any other way to do this question? Danny smiled.

"Next, how would you remove every duplicate value in a linked list?"

What's with this guy and linked lists?

"I would iterate through the entire list and keep a hash table." *Don't be annoying about using a hash table.* "Then I would check the hash table with the value of the next node and see whether its been seen before. If it's been seen before then I would do something like node->next = node->next->next, assuring that there was no memory leaks in the process."

"WOW. That's impressive, none of my candidates could answer that one." *Who did you interview?* "So how does the protocol for this work, I really want you."

Does he not understand what connotation that has? "Well yeah, you just need to go through rankings on WaterlooWorks. Then I have to rank you and then there is some matching algorithm on their end."

"What are you planning on ranking me?"

What a fucking wanker. "Well this is my first interview—" *Actually 4th.* "—but I have a good feeling about this." *I'm giving you a no rank.*

"Amazing, just amazing. I look forward to working with you." The man outstretched his hand in farewell.

Fuck, his hand is soaked.

waterloo wanker

LE GRAND BIG TREMENDOUS QUEER PANEL PROMOTION

Now, I don't know about you, beloved **mathNEWS** reader, but ever since my single ass graduated high school, circumstances have been really been bringing out all the sparkly rainbows floating around in the sloshy sack of liquid that shuttles my very tired consciousness around from place to place.

And so, some janky iambic pentameter:

> For those who call themselves LGBT,
> And find themselves in worlds of math and tech,
> We have a panel coming up for yee,
> And hope you'll come to join us up on deck.
> November's nineteenth day we welcome you,
> To MC Comfy for some bubble tea,
> And panelists who go what you go through,
> While kicking ass in tech's ol' industry.
> We'll see you out there! We've got some big plans :)
> From LGBTQ++ (yeet *dabs*).

(In normal words, there's a very cool panel coming up featuring some spectacular out-and-proud folks in the tech industry on November 19 at 6:30 in MC Comfy! Tell your friends!)

facebook.com/lgbtqplusplusuw

over the rainbow

MATH LIBS (R/UWATERLOO EDITION)

THEY SAY AFTER THE RAIN COMES THE RAINBOW…

I think this is generally true. I live with a stinky _____ (STEM PROGRAM) kid and I know damn well that they never shower. At least I make sure to spray myself down with _____(LIQUID).

Also, they should definitely get out once in a while and _____ (DIRTY VERB) in public.

But you know what, it's not all that bad. Today, in the basement of _____ (BUILDING), I met a sweet girl who looks just like _____ (FICT. CHARACTER). Her hair resembled _____ (PASTA), her skin was like _____ (OBJECT WITH TEXTURE), and her eyes looked like _____ (CANDY) from the MathSoc office.

We had such a nice conversation. She said she was interested in competitive _____ (AUTONOMOUS BODILY FUNCTION) and works as Trudeau's dirty little _____ (JOB). Best of all, she's anti-_____ (POLITICAL ISSUE).

Well actually, we didn't have a conversation. I just overheard her talking with this other guy. But it's practically the same.

I can't wait to make eye contact with her again someday.

instantpoodles

JUST DO IT

NO COPYRIGHT INFRINGEMENT INTENDED

I have wanted to write for **mathNEWS** since I arrived on campus and received my very first issue of **mathNEWS** in my orientation bag.

This is my first article for **mathNEWS**, written two months and four fortnights later. Why the hold up?

I can use the fact that as a first-year, I have not had time to make it out to production night or write a quick article and send it to the **mathNEWS** email. It has been a long transition and I had more important things to attend to. I can make all sorts of excuses and justifications to try and prove my procrastination valid, but it is undeniable that I was (am) scared.

Yes, I am scared to write for such an open newspaper that advertises itself as Waterloo's Bastion of Erudite Thought. The anxiety piles up like bricks, until it's a 20-foot wall towering over me leaving me paralyzed in its shadow.

I do not have the typical humour and angst needed to write for **mathNEWS**. I do not have the same interests as the general

mathNEWS writers nor do I want to write about math-related topics. However, I do have something to say. In fact, if you know me in person, it is understood that I have a lot to say all the time, hence why I never shut up.

If you are reading this, here I am, at last writing for and gladly being sucked into the void that is **mathNEWS**. I did the thing and I know that you too have a thing; something that you have always wanted to do but never did. We all have something that makes us feel alive even if it is small, something that gives our life purpose and meaning. Yet we put off this wonderful action due to lack of time — and more likely, fear.

I am living, breathing proof that fear is a sucker and surpassing that fear is the start to a more fulfilling life. So forget about the looming, never-ending deadlines and assignments for just one day. Whatever it is that you have been putting off doing (other than studying), just do it.

nurtorious

gridCOMMENT

gridCOMMENT *141.4*

A new month encroaches upon this sleepy hollow of Waterloo yet again, ceaselessly and mercilessly pushing its inhabitants to the eventual heat death of the universe and there is not a single thing that anyone can do about it. Instead, civilization as a whole has decided to be myopic, and for the residents here, this means taking a fresh gasp of air (hopefully) before finals season hits again. In the meantime, why not take a break with a brainteaser?

To be frank, I didn't feel very inspired while making this puzzle so I do apologize for its quality. Hey, maybe that means other people would be disgusted at the substandardness of this offering and not submit a solution; perhaps this is an opportunity to win a shiny new prize because the others won't submit? Only time will tell.

At least, it seems 0015100 managed to play everyone else correctly because they have submitted the only submission, and thus by default judgement, wins the prize for this issue. For the record, their answer to last issue's **gridQUESTION**, "What is the most epic Hallowe'en trick?" was "No tricks, just sleep and absurd amounts of candy."

As usual, one may submit solutions to the **gridWORD** either electronically to mathnews@gmail.com or physically to the **BLACK BOX** found outside the Math C&D by 6pm by November 18th, 2019 to be eligible for a prize. Submissions should include the grid, a name (plus optionally a moniker to be credited by), and (optionally, but strongly encouraged to have) an answer to this issue's **gridQUESTION**, which in the event of a tie for most correct submission, my favourite answer shall determine the winner. This issue's **gridQUESTION** is "What is something I should be inspired by?" Perhaps I could avoid the fate befell this issue with the help of the readers' answers.

Good luck,
Zethar
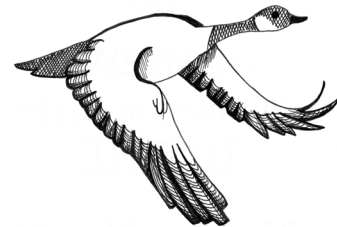
ACROSS

1. Look daggers
6. Teen affliction
10. Blue hue
14. Polish city
15. Weaving machine
16. To put off
17. Kipling's wolf pack leader
18. Ripped to shreds
20. Secret-keepers
22. Born
23. Zeta follower
24. Floral ring
25. Mins. and mins.
26. Lair
27. Old-school reply mechanism (abbr)
29. Highlands hillside
31. Unadorned
32. Sigma's follower
34. People you beg marks from
37. Final reckoning
39. Watertight chamber
40. And more
41. Photos
42. ____ von Bismarck
44. Flat metal shelves
48. United Nations agcy.
49. Grass part
51. Embrace
53. Poseidon's domain
54. Point
55. Large-canine felines
58. Addendum
60. Regions
61. Itinerary info
62. Weight not charged for
63. Take off
64. South African currency
65. Outback birds
66. Like a shoe

DOWN

1. Good ____, to be viewed favourably
2. Sitting Bull tribe
3. Mound builders
4. Massage deeply
5. Modern letters
6. Star in Aquila
7. Nocturnal critter
8. Boreal
9. Arab leader
10. Mobile program
11. Problem
12. Film action?
13. Something you should do to class
19. Beast of burden
21. Remedies
28. Cases
30. Go-between
31. Sandy destination
33. Much spam
35. Eschewed home cooking [2]
36. Banned pesticide
37. Matrix of partial derivatives
38. Night light?
39. Protozoan group
41. Harold ____, Nobel-winning playwright
43. Trios
45. Bony
46. Comport oneself
47. Dissed, in a way
49. Venom source
50. Ralph of "The Waltons"
52. To-do list
56. Off-white
57. Certain cookie
59. "Acid"

lookAHEAD

SUN NOV 10	MON NOV 11	TUE NOV 12	WED NOV 13	THU NOV 14	FRI NOV 15	SAT NOV 16
	Remembrance Day	Get your flu shot: 9–5 @ SLC MPR	Get your flu shot: 9–5 @ SLC MPR	View next term's schedule and appointments Get your flu shot: 9–5 @ SLC MPR		

SUN NOV 17	MON NOV 18	TUE NOV 19	WED NOV 20	THU NOV 21	FRI NOV 22	SAT NOV 23
	math**NEWS** Production Night 141.5 Drop/add period for W20 begins	Feed the math**NEWS** Editors Day Drop with WD ends	Drop with WF begins		math**NEWS** 141.5 published	

DESERT BUS FOR HOPE

Do you like silly memes? Of course you do, you're a math student!

Do you like supporting sick children? Probably.

How about amazing donation prizes, such as a stained glass Ugin the Ineffable from Magic the Gathering? Or maybe a pair of hand crafted glass daggers?

Well then may I suggest Desert Bus for Hope, one of the first charity gaming livestreams. Celebrating it's 12th year running, and having raised over 5 million dollars for Child's Play charity. Running for about a week non-stop over at twitch.tv/desertbus, this livestream is full of zany shenanigans, and plenty of comedy. While it may involve playing Desert Bus, the main focus of the show is the cast, a collection of sketch comedians, improv artists, and streamers, along with friends, and special guests. Come along for a fun ride of hilarity and charity on the Desert Bus.

The Desert Bus

AN ADVERTISEMENT FOR SASMS

SASMS is an acronym for Short Attention Span Math Seminars.

Sign up to give a talk to improve your mathematical presentation skills. Attend the lectures to note some interesting mathematics.

Our next SASMS will be held on Tuesday, November 19 at 5pm in MC 5479. For more information, visit the following link:

http://puremath.club/sasms/

We hope to see you there!

Zishen Qu,
President,
The Pure Math, Applied Math and
Combinatorics & Optimization Club

LAST WEEK'S gridSOLUTION