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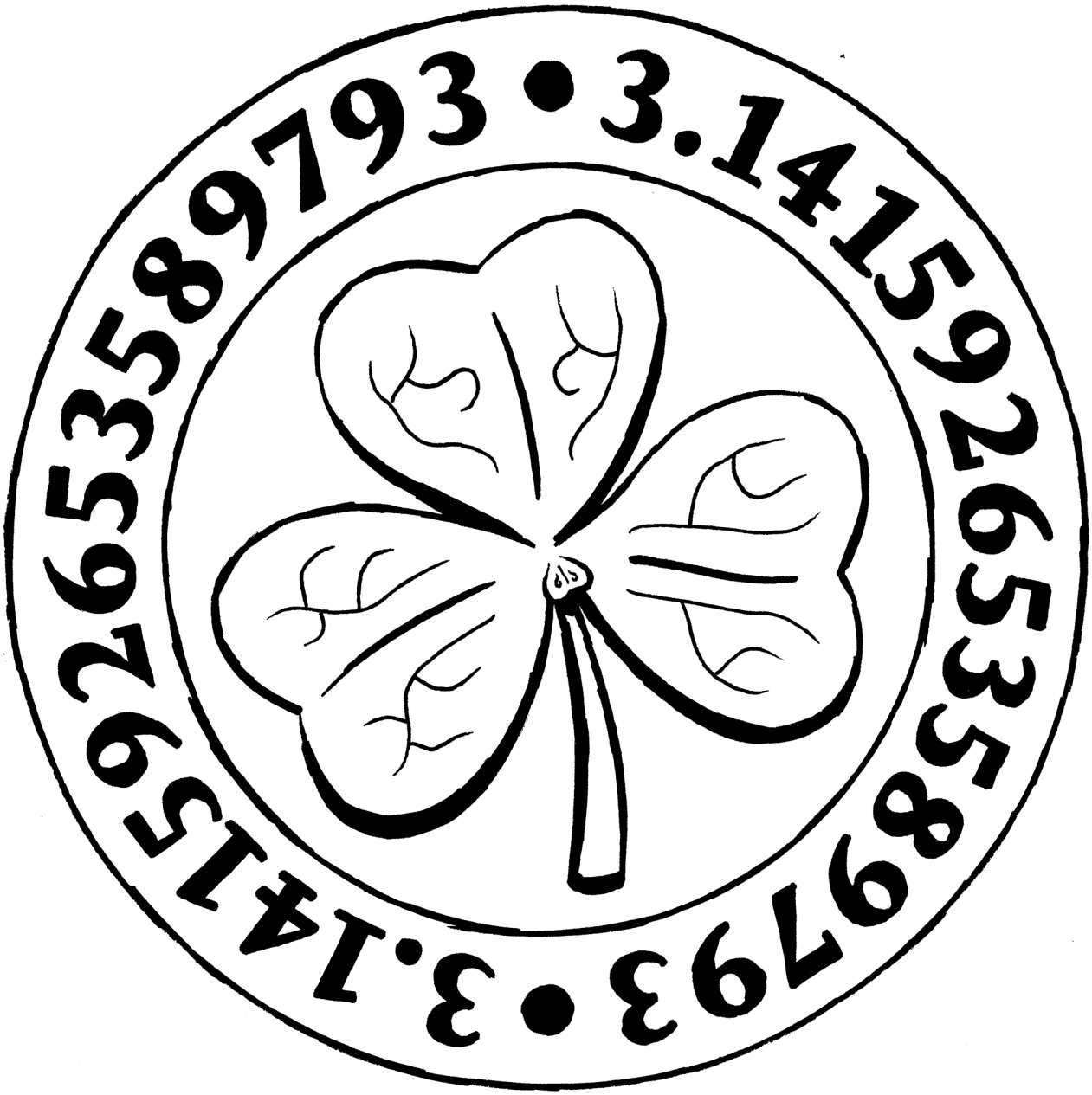

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*mast*HEAD

"WHAT WILL YOU DO TO CELEBRATE π DAY?"

NOT NEARLY ENOUGH, IN MY EXPERIENCE.

I don't get it. Why do we have π Day? Like, I get the significance of it being a number-centric Math Faculty celebration and all, but seriously, why do we have to pick *just one day per term* to give out free pie?

Why don't we do it every day? Or, if that'd be "too expensive", why don't we have pie in the ~~C&D~~ Right Angle Café for 1.00$ a slice? Why am I not receiving school credit for all of these brilliant ideas? It's entirely irrational, and I don't try to understand it anymore.

Anyways, this issue we have a bunch of good stuff for you, as seems to be the usual this term. We've got Riley Metzger on ***math*ASKS** *and* the first ever ***prof*THOUGHTS**, and a bunch of articles from students who *actually did their homework* as assigned by Prof. Furino in last issue. We've also got the second instalment of that indecipherable emoji story from last week, as well as submissions from serveral of our regulars who attempted to decipher the first one. Aside from that, just the usual ***prof*QUOTES**, another ***grid*WORD** courtesy of Zethar, some visual tweaks here and there as we try to iron out kinks in the new format before the summer team takes over, and another crop of exceptional articles. Seriously, you guys are putting an *obscene* amount of effort into earning a few slices of free pizza.

Speaking of a summer team, though, as of this writing there *isn't* one! So if any of you reading this think that running ***math*NEWS** over the summer term sounds fun, come by MC 3030 so we can ~~haze~~ train you for this challenging yet rewarding task. Alternatively, you could *not* do it, and let ***math*NEWS** die! Or at least, there won't be any new issues published until September, because I ain't doing this shit over my break. Not unless ***math*NEWS** starts counting for school credit, anyways.

So yeah, happy π Day, this issue is awesome, and if you want the paper to live, either wannabe Editors start showing up at the office, or credit for "MNEWS 133" shows up on my record.

G-Man *out*. [Drops mic on stage.]

George Lambrou
Editor, ***math*NEWS**

Zethar	∅
The Eurobeat-'Em-Up	Platformer video games set to loud rock music.
No	Eat $\frac{22}{7}$ whole pies.
Shay Blair	Stage a revolution and install a pie as Supreme Dictator for Eternity.
Beyond Meta	Sacrifice sleep to the Math Gods.
TotallyLegitDeveloper	Something irrational, like finishing assignments early.
Vice Mitt	Cry.
Viceroy Butterfly	Eat an uncomfortably large gummy bear. Thank you, MathSoc!
a crafty player	Play board games.
👻✍	🗣💬3️⃣⚫1️⃣4️⃣1️⃣5️⃣9️⃣2️⃣6️⃣■ ■ ■💬
HatOfChocolate	Spend 3.14159 minutes on celebrating completing a project, before plunging headfirst into my pile of other assignments and homework.
waldo@<3.LE-GASP.ca	Wear my Math Pride shirt and enjoy some pie.
me	A "Day Without π" protest, where all π should leave their respective duties (without telling their employers) and march the streets in a show of solidarity with other, less privileged mathematical constants who are afraid to speak out.
I have no pie and I must scream	Oversleep, miss all my classes, *and π time*, but grab four slices of pie anyways. (Because 4 is an approximation of π.)
Diane	Eat pie and be happy.
Scythe Marshall	Make a chocolate mousse pie, and run an integral bee for the undergrads!
DiminutiveRex	Glare suspiciously at my τ-loving roommate.
ExtrovertED	Doing layout for ***math*NEWS**.
George Lambrou	Far too much ***math*NEWS** work.

ARTICLES OF THE ISSUE

YEAH, YOU READ THAT RIGHT. ARTICLE<u>S</u>.

Our writers have been really killing it this term. Seriously, the number of phenomenal articles we've been getting is unreal, and as such, it's been really hard to pick the Article of the Issue. We usually end up having to choose between something really funny, or something brilliantly informative.

This issue, we've decided to make our lives easier, and start picking both. That's right: from here on out, ***math*NEWS** will feature two Articles of the Issue per issue. Way to go, guys.

This week's *Informative* Article of the Issue goes to "Why WASM Is Awesome", by jsSux. Whether you're a fan of web programming or not, it's brilliantly written, and an exciting read. This week's *Funny* Article of the Issue goes to dank's "N Things to do in MC Now That It Got A Makeover", with an Honorable Mention going to "Terrible Ideas for a Terrible Hack", by Vice Mitt.

jsSux, Dank, come by MC 3030 to grab your prizes.

George Lambrou
Editor, ***math*NEWS**

mathASKS 133.5

FEATURING PROF. RILEY METZGER

WALDO@<3.LE-GASP.CA: DO YOU APPLY YOUR STATS KNOWLEDGE IN REAL LIFE WITH YOUR FAMILY (NAMELY YOUR TWINS)?

Raising children requires a lot of experimental design, but I'd argue that my sample size is too small to have learned anything significant.

ZETHAR: WHAT HAS BEEN/WILL BE DONE TO ABATE THE (PERCEIVED) POOR REPUTATION OF STAT 231, AND HOW IS THAT COURSE BEING BALANCED FOR THE NEEDS OF THE GENERAL MATH POPULACE AND THE NEEDS OF THOSE GOING INTO ACTSCI + STAT?

I started at UWaterloo in 1996, and even then, STAT 231 had an undeservedly poor reputation. Dr. Struthers and others have done some fantastic things lately revamping the course, and hopefully these changes will improve its perception. Regrettably, we all take courses we don't like as part of our degree (here's looking at you, MATH 135!). The trick is to learn *how to learn* something that you don't enjoy doing. This is a great life skill to have since — believe it or not — there are lots of things you won't enjoy doing in the "real" world (here's looking at you, taxes!).

JAG: WILL MENTORSHIP BE A THING AGAIN GIVEN THAT MATH ORIENTATION (ORIENTATION IN GENERAL) IS SHORTER?

Great question! This is definitely something that I'd like to work on in the future.

BEYOND META: WHAT'S A COOL BIT OF MATH THAT MORE PEOPLE SHOULD KNOW ABOUT?

Crude Monte Carlo Integration. The idea is simple and accessible to anyone in STAT 230 or later. At the risk of making this article too technical, I'll give a sketch of the basics for the special case when we integrate from 0 to 1:

$$\text{Let } X = U(0,1), \text{ then } \theta = E(f(X)) = \int_0^1 f(x)dx.$$

At the same time, remember that an expectation is nothing more than a mean, so:

$$E(f(X)) \approx \frac{1}{n}\sum_{i=1}^{n} f(x_i)$$

And if we combine the first and second equations, we get:

$$\theta = \int_0^1 f(x)dx \approx \frac{1}{n}\sum_{i=1}^{n} f(x)$$

What does this mean? It means that we can integrate a function from 0 to 1 by taking the average height of the function f(x) at random (U(0,1)) points! As an example, using the popular R programing language found at r-project.org, we can integrate $\theta = \int_0^1 x^2 dx$ using the code:

```
set.seed(1)    # Unnecessary, but will make our outputs
               # match. If you skip this line you'll just
               # get different results than the ones below.

x=runif(1000)  # generates 1000 uniform (0,1) random vars
mean(x^2)      # calculates the mean of x^2.
```

The output is 0.3327757. I love how simple this concept is!

DIMINUTIVE REX: WHAT IS THE WORST NOTATION YOU'VE EVER SEEN?

The worst notation I've ever seen is $X_{i_{j_k}}$. As I recall, we were doing something with matrices at the time. After a week of this nonsense (and similar drivel), I "informally" switched sections.

VICEROY BUTTERFLY: WHAT IS YOUR FAVE EQUATION?

I'm actually not a huge fan of equations. My memory is terrible, so I prefer deriving everything from scratch. What was I talking about again?

A CRAFTY PLAYER: WOULD YOU COME TO MATHSOC GAMES NIGHTS?

It depends, although I think I'd rather play with someone whose handle is a little less daunting. Is there someone who calls themselves "a terrible player", or "DiminutiveSkillz" or "George Lambrou"? **[Ed: RILEY I THOUGHT WE WERE FRIENDS.]**

VICE MITT: WHAT WOULD YOU DO WITH 500LBS OF TOURTIÈRE?

If it were one big pie, I'd wait till it cooled down, crack it open and bathe in it. If it were a ton of smaller pies, I'd use them for skeet.

EXTROVERTED: WHAT DO YOU DO IN YOUR SPARE TIME?

Spare time? What's that? I spend most of my non work time with my wonderful wife and three amazing trouble makers: my four-year-old twin girls, and my eleven-year-old son.

GEORGE LAMBROU: CAN I REDEEM mathNEWS EDITORSHIP FOR SCHOOL CREDIT?

Carefully walk — in the light of day, mind you — to the Arts side of campus, and… ask an Arts advisor. [Ed: See, I know that you're joking, but I'm definitely going to do this.]

RILEY METZGER

N THINGS I WISH I HAD KNOWN AS AN UNDERGRAD

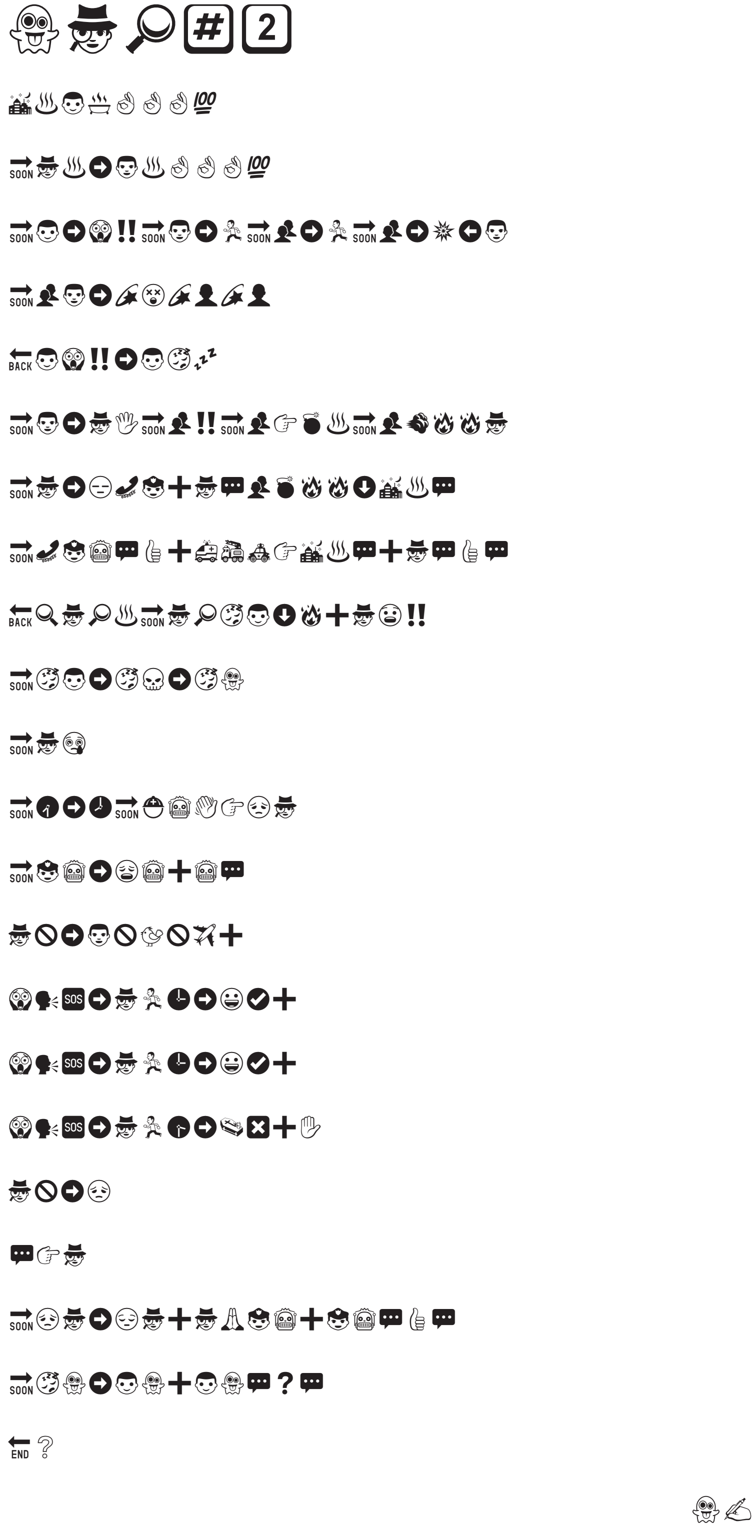
*prof*THOUGHTS *133.5*

This week's ***prof*THOUGHTS** *come to us from none other than Riley Metzger. Riley is a professor in our Department of Statistics and Actuarial Sciences, and an academic advisor extraordinaire (seriously, if it weren't for his guidance, I almost certainly wouldn't still be at this school). He's written his* ***prof*THOUGHTS** *in nothing but the most classic of* **mathNEWS** *form: a list of n things he wish he knew as an undergrad (which, I swear,* hasn't *been padded by the editors with extra items to fill a column, for once).*

George Lambrou

- It matters whether or not you hand in an assignment, even if the assignment is incomplete. Believe it or not, the fact that you handed in an assignment — any assignment — can influence your final grades.
- Go to class. Things change from term to term, even if the same instructor is teaching the course! I concentrate my tests on what I've covered in class.
- Go to office hours. Many students are interested in grad school. As part of that process you are generally required to submit reference letters. However, if you don't introduce yourself to your instructor they may not be able to write anything more than what is on your transcript.
- Have fun. Get out, socialize, take a break from your academics… you'll feel better for it.
- If you fail a midterm, test or quiz, you are likely not the only one.
- Work ethic trumps intelligence. The smartest students are the ones who put effort into their courses.
- Learn how to get back on your feet after a failure. It's a life skill.
- The University has a lot of groups whose goal is to help you succeed: instructors, advisors, Student Success Office, Counselling, Health Services — use them!
- It pays to ask; the worst that they can say is "no".
- Grades matter less that you think. I've never been asked for my transcript in a job interview. I have been asked to describe my experience, and to explain a mathematical concept.
- Communication is key. If I had a choice between hiring someone who was mathematically strong or someone who could explain math to non-mathies, I'd likely hire the latter.

Riley Metzger
Professor and Advisor, Department of Statistics and Actuarial Science



GHOST HAT-MONOCLE-GUY'S MAGNIFYING GLASS, FIRST HASH

A TRANSLATION OF 👻🎩🔎#️⃣1️⃣

Author's note: after reading 👻🎩🔎#️⃣1️⃣ *from the previous issue of* **mathNEWS**, *and inspired by how translation services often mangle languages, I decided to take a crack at translating the article. Here's my attempt:*

Man cry, "SOS!! Two bangs have gun pointed at by two silhouettes!" SOON! Ambulance and police cruiser run them over.

SOON! Man turns face into skull, then skull to ghost.

SOON! Ghost-face's coffin used as ashtray by hat-monocle-guy. Hat-monocle-guy asks questions at gunpoint of silhouettes, which become map. Ghost-face says, "Running-man have gun pointed at by silhouettes, and silhouettes point finger at running-man. This turns to Japanese city at night, at white-flower-hotel's slots."

SOON! Hat-monocle-guy point at plane in Japan.

SOON! Hat-monocle-guy takes bike, which turns into nighttime city, which turns into white-flower-hotel's slots.

SOON! Hat-monocle-guy finds silhouettes with magnifying glass and money, which turns into three red dragons.

SOON! Hat-monocle-guy turns into old-bespectacled-man, who wear sunglasses at ATM.

SOON! Old-bespectacled-man takes red dragons from silhouettes.

SOON! Old-bespectacled-man wins trophy.

SOON! Old-bespectacled-man have gun pointed at by silhouettes.

SOON! Silhouettes have gun pointed at by old-bespectacled-man, who reverts to hat-monocle-guy with bangs.

SOON! Silhouettes point at bomb in white-flower-slot's hotel.

SOON! Silhouettes expel cloud and fire at hat-monocle-guy.

SOON! Faceless-paramedic-robot turns into two fire trucks, which turn into white-flower-hotel's slots.

SOON! Fired hat-monocle-guy cry, "SOS!!"

SOON! Faceless-paramedic-robot waves water at fire.

SOON! Faceless-paramedic-robot check and say, "Hat-monocle-guy beware fire-breathing dragon", which turn to two hat-monocle-guy who say, "Silhouettes fight fire with bomb!"

SOON! Faceless-paramedic-robot turns into facèd-police-robot.

SOON! Facèd-police-robot save hat-monocle-guy, who says "Save+." That hat-monocle-guy turns into hot spring, and other hat-monocle-guy say "Good."

SOON! Hat-monocle-guy claps and turns into levitating man who flies from sunrise city with hot spring.

The end?

A CRAFTY PLAYER

GAME OF THRONES UPDATE

NEW TRAILER UNVEILS NOTHING NEW

Last week HBO released a new trailer for the seventh season of Game of Thrones. As anyone would expect from a trailer for the seventh season, it contained rehashed dialogue from the first to sixth seasons, as well as showing precisely zero new scenes from the seventh season.

Despite this disappointment, there is no doubt that everyone, including myself, is HYPED AF AYYY YOOO GAME OF THRONES SEASON 7 OHMIGOD I CAN'T WAIT AHHHH I HAVE AN ASSIGNMENT TO DO BUT WHO CARES ABOUT THAT AHH GOTTTTT YASSSS GOOOOTTTTTT.

…Oh yeah, they did reveal that it would begin airing July 16th. Yay Game of Thrones episodes coming out during exam season funnnn.

$\pi^2/6$

We crowdsource articles in exchange for pizza.

It's a damn good deal, until they make you Editor.

A DISILLUSIONED mathNEWS EDITOR

SNAPCHAT DETECTIVE MYSTERIES #1

AS INTERPRETED BY SOMEONE WHO DIDN'T WRITE IT

Bob, a happy dude, shouted SOS!! Two shadows had a gun, and SOON there was an ambulance and a police car.

SOON, Bob went to a graveyard and put it on Snapchat.

SOON, Bob decided while on a yacht that he was going to be a smoking Snapchat detective - a film noir in the modern age. He began to question the two shadows who shot him. After interrogation, they explained that their motivations were based around their questioning of flat earth theory. They shadows then started shooting again, and Bob started to run away. This continued until the yacht finally arrived in Japan, and Bob ran off in to the night, escaping the shadows. Exhausted, Bob retired to a hotel, where he played slots until morning.

SOON, Bob pointed at a plane, in Japan.

SOON, Bob biked around, until the next night, where he then went back to the hotel to play some more slots.

SOON, Bob, now three days in to his investigation, decided to finally do his job by looking around with a magnifying glass. This led him back to the pair of shadows, who challenged him to a high stakes game of Mahjong.

SOON, after gloriously winning, our hero was directed to Gerald, a man with both glasses AND sunglasses. This was pretty neat, so Bob went to deposit his winning.

SOON, Bob challenged both the Shadows and Gerald to another game of Mahjong, but this time Gerald won. In anger, the shadows shot Gerald (this appeared to be their response for most things). Gerald was hit, but he SOON he vindictively shot the shadows back! Bob, being in a gunfight now for the third time this week, was starting to get really angry at this entire situation.

SOON, with the shadows now on the verge of death, they desperately pointed at a bomb in the hotel casino which SOON after activated the explosive. The bomb caused a lot of smoke and fire, and Bob was there too.

SOON, a firefighting robot came in his two cars to help Bob, who was decided to play one last game of slots despite the fire all around him. Everything was fine after all.

SOON, a now burning Bob shouted SOS at the firefighting robot, who summoned a tsunami on to the fire.

SOON, the firefighting robot's tsunami strategy miraculously worked. A particularly eclectic robot told Bob to beware of simultaneously talking to dragons and shadows with bombs nearby. Noting the robot's stress about this warning, Bob took this extremely specific advice to heart.

SOON, the robot transformed in to Robocop, gaining a face and hat in the process.

SOON, Robocop gave a floppy disk to Bob, saying that with this floppy, Bob could install java. Bob took the floppy and gave Robocop a thumbs up.

SOON, with both Gerald and the shadows now gone, Bob thanked Robocop for the help and went on a flight back home, now equipped with an install floppy for Java.

END?

👻 ✍ Whisperer

SINGING WITH EMOJIS

Titanium

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Cell Block Tango

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Poker Face

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❌📖❌📖
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❤✍,
Shay Blair.

OUR FRIEND THE ATOM

The 14th episode of the Walt Disney's Wonderful World of Color aired in January of 1957. Titled "Our Friend the Atom", the educational episode was narrated by Dr. Heinz Haber, who spoke of the benefits of nuclear power, as well as its potential if wielded for humanity's benefit. Nuclear energy, often associated with destruction, was introduced to kids as something capable of doing good, if kept in the right hands.

It's important to note that:

- Walt Disney was hoping to fund construction of Disneyland with this 1 hour long show on ABC network.
- Dr. Heinz Haber was a German physicist and writer, extracted from Nazi Germany during "Operation Paperclip" (that one time US got the German scientists before USSR).
- The Cold War was brewing hot in 1957 (you know, that conflict between USA and USSR in the second half of the 20th century, that almost ended in a nuclear apocalypse).

This episode is a great educational piece. If you are a staunch supporter of nuclear energy, you would find this episode as the genesis of popular support for peaceful nuclear energy. If you are more of an "Atomcraft — no thanks!" person, you may view this episode as a skillfully disguised propaganda, designed to brainwash children using the images of popular fictional heroes like Captain Nemo from "20,000 Leagues Under the Sea" by Jules Verne, or the Genie of the Lamp from "Aladdin".

Regardless of your opinion, if you would like to learn more, I would highly suggest looking up the episode somewhere on the interwebs, where it is available to the public. After all, learning how nuclear chain reactions work via ping-pong balls and mousetraps from a German accented scientist — who at some point even casually holds a piece of Uranium ore in his hand — accompanied by some wonderful Disney animation is a marvellous way to spend an extra 46 minutes and 22 seconds. Sure, the information is slightly dated (and they obviously couldn't have understood Chernobyl- or Fukushima-scale disasters yet), but hey, I know of no alternative that was so wonderfully crafted.

August Marauder

GHOST DETECTIVE SEARCHING TO BE NUMBER ONE

ANOTHER INTERPRETATION OF

There's this boy who's shouting for help because there's two bad guys pointing a gun at him. Help is coming soon. But unfortunately, the boy is dead soon and his spirit is now in ghost form.

Soon, the ghost-boy talks with the detective in the graveyard, and the detective questions about the two bad guys that killed him, and asks about the location of them. The ghost-boy tells him that while he was running away, he heard them talking about going to Las Vegas.

Soon, the detective flies to Las Vegas.

Soon, the detective bikes over to a casino, and starts gambling a bit.

He starts looking around for the bad guys and recent jackpots. He soon finds a hint, so he goes to the manager -- a shady manager -- at an ATM.

Soon, the manager approaches the bad guys; soon, the manager wins, so the bad guys kill the manager at the same time the manager kills the bad guys. The detective is like OMG.

Soon, the bad guys are like, "Let's bomb the casino!", so there is an explosion and everything is on fire.

Soon, the firefighter and robot arrive with fire trucks to the casino. The detective is stuck in the fire and shouting, "SOS!" The firefighter and robot put out the fire with water.

Soon, the firefighter and the robot finish their job, and they talk with the detective, and the detective warns them of a fire-breathing dragon.

The detective also warns them of the bad guys that bombed the place: "There's terrorists bombing the casino!"

Soon, the firefighter and the robot call up the police, so now the police is working with the robot.

Soon, the police and robot remember what the detective said, and they have coffee.

The detective is happy that the police is working on the case.

Soon, the detective prays and flies back to his home and has a cup of coffee.

The end.

Ninja Obama

profQUOTES

WHEREIN WE REPRINT A FEW FROM LAST ISSUE, BECAUSE SPENDING 32 HOURS STRAIGHT ON LAYOUT IS BOUND TO PRODUCE SOME MISTAKES

CS 116: Carmen Bruni

❝ Go to the CnD and rob them of their napkins! You can quote me!

CS 343: Peter Buhr

❝ Prof: Software engineering produces patterns over time, like the "Always Go To Church On Sunday" Pattern or the "Getting Into A Wooden Box" Pattern.
Student: Are either of those real patterns?
Prof: No, I just made them up. I lose it when it comes to patterns. [Ed: This was accidentally split into three separate quotes last issue.]

❝ If the oracle says no, I'll give back a disk drive and a printer.

❝ It didn't just spring from the air. Well, it did, but from Norwegian air.

❝ Listen up, because I'm going to use graph theory terminology. This is a bipartite graph. Ooohhh! Let's all suck air over our tea.

❝ [Says something]. Don't write that into ***math*NEWS**.

❝ What is the Norwegian gift to CS? You don't know, do you? You don't know the debt you owe to Norway.

❝ Once you have selected the victim, you must drag the victim out of the cycle, kicking and screaming. If it goes back, you may have to tie it up and kill it.

❝ Don't you love it? Don't you want to just give it a hug?

❝ Where do you go on vacation in 1972? Norway! Why wouldn't you go to Norway?

❝ I used to tell people to take Ric Holt out for a beer and ask about his algorithm. He would say that he couldn't remember the algorithm, but the beer was good.

❝ If you don't have all the resources at the end, that means one of the tasks walked off with one. You should have a talk with that task.

❝ Everyone in the pub was talking about object-oriented programming, because what else would you do in Norway?

❝ I hope I have brow-beaten you into realizing that you really really really want this puppy.

❝ That monkey just came off our back.

CS 360: Mark Petrick

❝ If only we could write algorithms that are non-deterministic and implement them.

Brad Lushman, CS 442

❝ A side effect is something that changes the world.

❝ Alternatively, a side effect is something that takes in the entire world and produces a new world.

❝ The world has a single lifeline: it is never created, duplicated nor destroyed.

❝ Actions on World are explicitly sequenced.

❝ By "a little different", I mean it's more complicated and more difficult to teach.

❝ It is a very simple 11-step process.

CS 454: Khuzaima Daudjee

❝ This is like doing brain surgery. You either want to finish or not start it.

PHYS 175, Richard Epp

❝ [There is a midterm for the course that evening] Good morning everybody. Will it be a good evening?

❝ Prof: Any questions?
Student: Do we have to do [the midterm]?
Prof: No, you don't have to.

❝ If you stood on a neutron star, you'd become as flat as a pancake and your atoms would be uniformly spread across the surface of the neutron star.

PMATH 446: Jason Bell

❝ This is such a nice chalkboard. It flows so nicely with the chalk. [Ed: misattributed to Blake Madill in ***math*NEWS** 133.4]

❝ The Nullstellensatz is a very powerful tool, that every millennial should know. [Ed: misattributed as above]

❝ Any questions about the '80s? I grew up in the '80s! [Ed: misattributed as above]

❝ I'm more than a math professor! I also know about the '80s. [Ed: misattributed as above]

❝ 25 minutes left. We're 25 minutes in, too! I guess I never realized that 25 was half of 50 until now.

YOU SUCK AT CRYPTO

So you think you're an expert cryptographer? Just finished CO487? Well, let's play a game.

Which of these encryption with MAC schemes are secure?

1. The sender computes the MAC of the plaintext, and appends it to the encrypted plaintext. That is, $\mathrm{m} = \mathrm{E(p)} \mid\mid \mathrm{MAC(p)}$
2. The sender computes the MAC of the plaintext, appends it to the plaintext. Then we encrypt that plaintext. $\mathrm{m} = \mathrm{E(p} \mid\mid \mathrm{MAC(p))}$
3. The sender encrypts the plaintext, then appends a MAC of the ciphertext. $\mathrm{m} = \mathrm{E(p)} \mid\mid \mathrm{MAC(E(p))}$

Can you think of which ones are okay? Which ones are flawed? I'll wait.

• • •

I don't know the name of this. I didn't come up with it, and I don't remember where I learned this. I also don't even know if it's a real principle:

"If the very first thing you're doing on an encrypted payload is NOT verifying a MAC, you are doing it wrong."

Okay, here's the answer to the puzzle: Number #1 is garbage, and doesn't follow the principle. #2 looks like it does follow the principle, but it doesn't and it's garbage too. #3 is optimal, and follows the principle.

Approach #1 is vulnerable to the famous "Padding Oracle" attack. Using AES in CBC mode, as is extremely common, you can modify the last byte of ciphertext in a systematic way and have your victim try to decrypt it. Depending on how long it takes, and the kind of error returned, you can slowly reveal the entirety of the plaintext. In fact, you can even use this to encrypt your own plaintexts without knowing the key, in some cases. Other ciphers with chosen-plaintext attacks can be broken oftentimes.

So that's out.

How about approach #2? It used be to how SSH worked. Surely the great powers that designed SSH didn't make a mistake?

Well, they did.

In order to verify the MAC in #2, for SSH, the ciphertext must first be decrypted. Violators of the principle will be punished.

In the SSH protocol, the very first block of plaintext is actually the length of the message. So all an attacker has to do is feed in a single byte at a time, until the server spits out a MAC error. That'd tell you that the first four bytes of your ciphertext decrypt to the length of bytes you fed.

So blammo, busted.

Approach #3 is secure. Playing with the ciphertext won't work, as the MAC will fail immediately. No chosen-ciphertext attacks here!

Remember the principle, and also: don't roll your own crypto. Even professionals get this wrong.

COUCH

HOW TO GET STUDENTS TO ADVOCATE FOR CHANGE

So, last issue, Steven Furino decided to assign a whole bunch of homework articles to all the writers whose questions he answered, while seeming woefully optimistic that anyone would write these articles. If I was the type of person who valued homework, I wouldn't be at ***math*NEWS** Production Night right now.

The question I was asked was "how do we get students to advocate for change?". I know that for me personally, for something to motivate me to act, it needs the following elements: I need to have something I *want* to change, and I need to know how I can *enact* that change. There are a lot of problems in the world; it's impossible to fix all of them. I am only going to focus my energy on what I believe I can have an impact on.

So, for the question of how to get students to advocate for change, I believe a lot of it has to do with informing students of what they can do to make a difference. I am on the verge of graduating, and I have never really considered going to Prof. Furino's office to advocate for change, as it wasn't really something I was aware I could do. I also haven't for the most part had many issues I want to complain about.

(Well, aside from why there are so few bathrooms with menstrual pads and tampons on campus? Yes, the Women's Centre and the Turnkey Desk have some free ones, however, this isn't exactly common knowledge. A resource that people don't know about is pretty useless.)

In summary, I think that the best way to encourage students to advocate for change is to educate them of how their actions can have an impact. As for how to reach them with that information is a whole other problem. If you figure it out, mind letting me know?

BEYOND META

P.S. If you are going to arbitrarily assign us homework, I would ask that you write a response to a question that someone asked me in my creative writing class: "Why did you want to compare math and philosophy? They aren't often thought about together."

TERRIBLE IDEAS FOR A TERRIBLE HACK

It's that time of the term again, where you can go to a room full of bright University of Waterloo students, sit in front of a screen for twelve hours with a team, and work really hard to build something that would make your parents very disappointed in you. This term, it's happening at Shopify Headquarters in uptown Waterloo on March 25th from 9AM to 9PM. No one will be rejected, but contribute to the Tilt fund to get food.

If you're fascinated with the idea of shitposting for the day to potentially win prizes, but you're out of actual ideas, you've found the right article.

RandMIDI

Have you ever wondered what Rubinsteins works would sound like played by gunshots, handclaps, bird tweets, laughter and strange other percussive sounds? Then developing RandMIDI would be the perfect product for you! Simply build a translator between your midi file and a MIDI interpreter like aplaymidi that converts the instrument codes to random numbers in the fluid gm midi soundfont between 100 and 122.

nullfs

Tired of having files take up space on your laptop, but afraid of storing things in the cloud? Simply develop nullfs, which mounts /dev/null on UNIX systems as a writeable fuse filesystem.

hAdblock

Move all those pesky ads to the forefront of your content! hAdblock moves all the webpage content into the area where the ad usually goes, and fills the rest of the article with the ads!

Screen Saviour

Browsing naughty content? Jesus is watching! This chrome extension detects if you're browsing NSFW webpages and if you are, it redirects you to images of Jesus condemning you and recommending you confess to your local church.

unrecipe

Wanted your dishes to taste awful? Let this extension do the work. This Chrome extension takes recipe pages and replaces ingredients that sort of work, but not quite. Recipe calls for baking soda? Replace it with baking powder! Calls for sugar? Replace with cornstarch! Half a cup of banana? Four cups!

A literal bread board

Develop an electronic prototype using a piece of bread as the basis for stabilizing the electronic components.

Touchy

Wanted to see how annoying water damage is on a touch screen, but don't want to actually brick your phone? Develop touchy, an application for smartphones or touch screen laptops that takes the input and randomizes it, but makes the input just off by a hundred or so pixels. Also randomizes dead spots of where you can't put input, but only temporarily and have the dead spots move around.

Infinite Monkey Simulator

"The infinite monkey theorem states that a monkey hitting keys at random on a typewriter keyboard for an infinite amount of time will almost surely type a given text, such as the complete works of William Shakespeare." Develop an application that parses raw output from /dev/urandom until it outputs the input text you want to generate.

Wowify/Angerybook

Is your Facebook news feed full of amazing content? Tired of having too many reaction options when you just want a quick way to express your true feelings? Wowify is for you. It's a Chrome extension that replaces all Facebook reacts with the Wow extension. Alternatively, have only angry reacts to make it angerybook.

Averagr

Ever wondered what the average Tinder user looks like, literally? Averagr is an app for you. This app would take in all the tinder profiles in an area, and determine the average picture by averaging the images. The bio would be generated by using Markov chains.

Vice Mitt

4 THINGS THAT HAPPENED THIS WEEK

1. As of this writing, there are 15 lecture days left. When you read it, this would have decreased to 11, 12 at best. Tick tock, finals are coming (not to mention you're careening closer and closer towards the heart-wrenching inevitability of death). (The ***math*NEWS** editors might provide a handy countdown to finals in the shiny new ***look*AHEAD**. Not your death. We don't know that.)
2. Trump's revised immigration order came out. People are, as expected, calling it "Muslim Ban Part 2". The Justice Department says everything wrong with the first has been fixed; meanwhile, the state of Hawai'i sued to stop it.
3. Amazon launched a fake (online) radio station advertising its alt-history TV show The Man in the High Castle, where the US lost World War II. It used the hashtag #ResistanceRadio, and some people thought it was actually real, and promptly mocked the anti-Trump faction for still not accepting the win.
4. If you didn't know, there's a semi-direct Go service to Union Station — catch the 30 from the Kitchener Go Station, and transfer to the Kitchener–Union Station train at Bramalea. It runs once an hour, and takes just under 2 hours. Benefit: The 30 is a direct line over Kitchener–Bramalea (modulo an extra stop on Weber St), and the Go train skips all the Toronto traffic (extra benefit if you're unluckily hitting rush hour.) For Toronto–Kitchener, the 30 will actually wait for the train! No more hoping the 21 reaches Square One before the 25 leaves.

HatOfChocolate

N THINGS A MÜLLERIAN MIMIC MIGHT BE

OR HOW I HALF-ASSED THE HOMEWORK GIVEN TO ME BY PROFESSOR FURINO

- Someone who cosplays as German Midfielder Thomas Müller.
- A bad forgery of a play by Molière.
- A Waterloo Biology prof named Kirsten.
- What you get when you copy your neighbour's homework on Stokes vectors.
- When a group of divergent species that all try to discourage predators from eating them end up evolving to look similar in order to benefit from each others' defense mechanisms.

Viceroy Butterfly

3 THINGS THAT WILL HAPPEN

1. Tax day is on April 30. But because April 30th is a Sunday, the CRA is giving you a free extra day to file!
2. Finals are happening April 9–24. If you don't already know when your finals are scheduled, I suggest you find out
3. If you aren't frantically finishing projects and assignments, Kitchener is hosting a Pillow Fight on April 1st. I'm not kidding, it's part of INTERNATIONAL PILLOW FIGHT DAY 2017.

HatOfChocolate

THE A&W GUY

If you've watched any television recently — okay, this is probably not the way to start an article for ***math*NEWS**. Let's try again.

A&W is one of the more highly advertised restaurants in Canada. In years gone by, commercials often featured one of their popular mascots, the Root Bear, backed by the classic A&W theme song. In recent years (that is, probably early in the new millenium), A&W started to latch on to the idea that good ingredients make good food, and found a new spokesperson for their brand:

Allen Lulu.

Lulu has played parts in movies; IMDb has him listed as playing roles in "Bruce Almighty", "The Brainiacs.com" (the early 2000s were a strange time), and the indie film "12" (shot over the course of literally ten years, a record in film, it's about illegitimate children of Zeus in modern times being forced to recreate The Importance of Being Earnest. Lulu had a heart attack during shooting. What a strange movie! It's a cult classic, apparently). However, his most famous role is the A&W Guy.

And he was in Victoria, filming undergrads enjoying burgers! Absolutely crazy; they had the truck and everything. He really exists! In real life! A famous person, spending time amongst real people!

Yeah, I was maybe a bit excited about seeing a guy from commercials. That's probably okay; would you rather hear about the time Ken Dryden told me he knew where Trail was and the significance of their hockey team?

Exactly.

Scythe Marshall

REVIEW THE GUNGEON

Enter the Gungeon is a 2016 roguelike-dungeon-crawler-shoot-'em-up-bullet-hell and also a contender for the most-hyphenated-genre-for-a-video-game contest.

What's it like to play?

Many comparisons have been made to 2011's The Binding of Isaac, but alas I've never played that game, so if you have, prepare for some redundancy.

The object of the game is ostensibly to explore the titular gungeon and shoot, dodge roll, and explode your way through the hundreds of munition-shaped enemies all the way to the bottom. However, every time you die, you start from the beginning again. And you will die. A lot.

If you're like me, that doesn't sound like much fun, but the gungeon is actually short enough to get through in an hour or so if you're good enough, which means every time you play, there's the possibility that this time, you'll get to the end instead of being shot halfway through fighting that stupid machine-gun-toting bastard on the third floor. And even if you don't make it all the way through, the layout of the rooms and the enemies you face will change on each try, so it doesn't get stale. Plus, you can unlock weapons, shortcuts, or items that will add even more unpredictability to your subsequent attempts.

The key is this: every time you play, it's not that your character gains items and abilities that make them stronger (since you have to start over without those things after you die), but rather that you get better, which is a really awesome feeling. You learn how to dodge those pesky sniper bullets, get used to the patterns of the aforementioned third-floor asshole, and generally figure out the tricks that will keep you alive. At least until you die. Again.

What is the game about?

The game would be pretty standard if it was about fighting through hordes of goblins or orcs and dying a lot, so if you want to do that, you can download Nethack. But if you're firing a stream of plasma at a bunch of anthropomorphic 9-mm cartridges, or rolling into cover from an AK-47-wielding ghost, then you've probably decided to Enter the Gungeon.

Now if you'll excuse me, I have a meeting with a certain fully-automatic piece of shit down on the third floor.

Paru-paro

A RESPONSE TO PROFESSOR FURINO

"WHERE DO YOU FORESEE THE MATH FACULTY IN 5—10 YEARS, AND WHY?" -STEVE FURINO

As someone who has the perspective at not-quite the bottom of the mathematics education tetrahedron, it puts me in a precarious location in foreseeing the future of the faculty, as I have seen enough light to maybe have insight, but little enough to make gross and giant misconceptions. Here goes!

The first thing I foresee is that the David R. Cheriton School of Computer Science will be forced to accept people by lottery due to limited space, grade inflation and the popularity of computer science programs. This will inevitably erode the quality of students, which will cause the administration to attempt to accept all the students in an effort to catch the good ones, leading to a push for a new math building.

However, the issue with funding is not quite so clear. As I understand it, the government subsidizes the school for each accepted applicant who declares computer science and, despite the administration's incessant efforts, compares not to the ingenuity of degree hacks that students will find (leading to students majoring in CS who didn't enter into CS, and so didn't get the subsidy), and thus must continue to deal with the monetary drain. This means that the desires of the school would probably not be met. This may mean that the superiority of the school will be challenged by other schools.

I do not foresee that any of the existing problems plaguing the remainder of the math faculty will be abated in the next five-to-ten years, nor do I feel that there are other problems which will arise. Mathematics is a bastion of old thought, and while it does change, it does so in non-drastic ways, and this confers many advantages. An affirmation or refutation of such is why I had asked the question in the first place, after all.

Zethar

N THINGS IN YOUR HOME THAT MIGHT BE HACKED

- The microwave
- The refrigerator
- The high-quality, programmable toaster
- The low-quality toaster that burns all your toast
- The toaster that burns Yoda's face into all your toast
- Small pets, like gerbils or geckos
- The poster of Zac Efron you have above your bed
- Your socks
- Your roommates
- This copy of **mathNEWS**

Viceroy Butterfly

WHY WASM IS AWESOME

As of March 6, 2017, WebAssembly was officially declared to be out of browser preview. This means that all modern browsers should have WebAssembly turned on by default within the next month. If you use Firefox, the current version already has WebAssembly enabled by default.

Some may wonder: what is WebAssembly and what does it mean for me? Well, WebAssembly (shortened to wasm) is a new way for websites to write their code. Currently the main way to create an interactive website is to use a language called JavaScript. While the performance capabilities of JavaScript have improved over time, the nature of how it is run by the browser makes it relatively slow. This is where WebAssembly comes into play.

The makers of WebAssembly describe it as "...a new portable, size- and load-time-efficient format suitable for compilation to the web.". In English this means that they have made a language that can be run faster than regular JavaScript. This opens up a whole new world of possibilities of what one can do in the browser. Due to the enhanced speed, we may start to see applications such as video games, image editors, emulators, and so much more move away from the desktop and onto the browser.

Another great aspect of WebAssembly is that applications that are written in other languages such as C and C++ can be converted into the .wasm format. This allows existing desktop programs to be brought to the web with very little modifications to the original code.

Overall, those surfing the web will notice that load times for webpages are getting faster as more and more sites adopt wasm into their code base. Even if you have access to the blazing fast Eduroam on campus and don't have any load times, WebAssembly will still allow for sites to run their programs at near desktop speeds allowing for a better internet experience for all.

JSSUX

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

Please come... I need more friends.

A LONELY mathNEWS EDITOR

PENGUIN, HERON & TERN: A FABLE

Penguin, Heron and Tern all lived together at the top of a hill. Every night, the three friends would sit together for dinner and eat a gingerbread house. Penguin would nibble at the sweets, Heron would pick at the icing, Tern would eat the gingerbread, and they would all happily chat.

One day, a store opened up down the hill. The store sold sweets, icing, and gingerbread. The three friends were excited! Penguin went out and bought a big bag of sweets, Heron got a huge tube of icing, and Tern got a great big stack of gingerbread.

That day after work, they all sat down to chat. It was marvellous! Now they could each eat the tastiest bit without having to have any of the less-nice parts.

But then, each started to wonder why the others were choosing wrong.

"How could Penguin like sweets?" Heron asked Tern.

"How could Heron like icing?" Tern asked Penguin.

"How could Tern like gingerbread?" Penguin asked Heron.

Each of the birds knew that the others talked about them, and each grew suspicious. When they sat down to have dinner together, they glowered at each other's food. Instead of talking about their lives, they tried to explain why their food was the best. They bickered and fought, but they couldn't agree.

Angry, they finally decided to go down the hill and ask the shopkeeper which was the best.

"I couldn't say." The shopkeeper said. "But I do know that there is a sweet shop west of here, an icing shop east of here, and a gingerbread shop south of here – so why argue?"

Each of the friends went back to the hill, packed up their things, and left their home for good. Penguin went to the sweets store, and found friends there who agreed sweets were the best. Heron went to the icing store, and found friends there who agreed icing was the best. And Tern went to the gingerbread store, and found friends there who agreed gingerbread was the best.

Though each friend occasionally thought back to their life on the hill, they all knew it was much better to live with those who understood them so well.

DIMINUTIVE REX

WHAT "FIRST CONTACT" MOVIES CAN TEACH US ABOUT HUMANITY

[If you don't like to read expletives, don't read the second-last paragraph.]

Denis Villeneuve's film "Arrival", based off Ted Chiang's very popular sci-fi short "Story of Your Life", came out last November. I finally got around to seeing it at the end of February, and I came away with one major life lesson that I think we can all take to heart:

Communication is important.

In fact, this is something that is a theme of potentially two of the most well-known and well-regarded first-contact movies: "Arrival", and Carl Sagan's "Contact". Without spoiling too much, both movies see humanity faced with the possibility of furthering the species in terms of knowledge and technology, and it takes miracles to overcome the complete inability to communicate with others enough to not screw everything up.

The strong language in the preceding sentence is justified. Things explode and people die, solely because people, both in positions of power and not, are stupid to even try to communicate with each other.

Today, the world is the most globalized it's ever been. Trade happens across continents, and ideas are shared by millions of people speaking thousands of languages, in every time zone. In this situation, being able to communicate becomes even more important than it's ever been before. Being able to transcend cultural bias, language barriers, and ideologies is perhaps the most important skill for anyone to have, now.

It matters for nations, it matters for communities, it matters for relationships. Being able to meet someone where they are, and being calm and patient and thoughtful, instead of overbearing and obnoxious and hateful and arrogant, makes you capable of building bridges and mending rifts between people of all different sorts. And that's what we need, now: people who can think, and people who can communicate their thoughts. This is perhaps the only way we're going to avoid destroying ourselves.

Unless you're also a Boston Bruins fan. Speaking as a lifelong Vancouver Canucks fan, you can fuck right off, and drown yourself in the Atlantic Ocean. Brad Marchand is the biggest fucking rat in the world, and you love him; it's easy to love someone who's just like you, isn't it. I bet you slew foot people for fun. And you've had the NHL in your goddamn pocket for years; the lack of reasonable suspensions and completely biased officiating are clear evidence. Remember what the crowd (and the NESN broadcasters) chanted at Mason Raymond while he was on the ice after a clearly illegal and dangerous hit? "DIVER!" A broken vertebra apparently doesn't merit lying on the ice, huh, you assholes, nor does it merit a penalty, let alone a suspension. Meanwhile, a slightly late hit on one of the most injury-prone players in the last twenty years (Nathan Horton, ahem) made Aaron Rome the biggest villain this side of Hollywood. You're all a bunch of shitbags, and the worst part is that you know, and you don't fucking care.

See, that? That wasn't good communication. Try to avoid that. I know it's hard; that was typed after watching Marchand score a hat trick in a single period to lead the Bruins to victory over the Canucks on Monday. And it was natural. But that's not the way you're going to win anyone over, and it's not the way to attempt to bring people together in order to overcome the obstacles to come. The best part is that we all can help improve society, by improving communication. Yes, even Boston Bruins fans.

Scythe Marshall

THE LEGO BATMAN MOVIE: A REVIEW

Batman has gone through many iterations over its 75 year history – all the way from the campy Batman of the 1960s to the darker and edgier modern depictions. But only the Lego Batman movie figured out that what we all really wanted was a Batman so dark and edgy that it went all the way back around into camp.

The Lego Batman movie is without a doubt the best Batman movie ever made. It is a loving homage to Batman's long history. The movie is a satire – but it is done lovingly. It is abundantly clear that writers did their research and know the source material.

If you like Batman, if you liked the Lego Movie, you will enjoy the Lego Batman movie.

Beyond Meta

Ever wonder if actual people write the *mast*HEAD answers?

Come to a Production Night and find out!

A TOTALLY REAL mathNEWS EDITOR

INTRO TO N-DIMENSIONAL META MATHEMATICS

Definitions

We define a set of **branches of mathematics** to be a set of subjects that mathematicians currently care about. Next, we define a binary operation, **concatenation**, denoted by C, as follows:

$C(X, Y) = Gr(\text{“X Y”})$

Where **Gr** is a unary operation that takes as its input a string, and outputs a grammatically correct translation of said string while preserving order.

Theorem 0.0 (That's right, we start from zero, bitches)

The set of branches of mathematics is closed under the concatenation operation.

Proof

The proof is trivial. If you can't get it, you suck.

Examples 0.1

$C(\text{Analysis, Geometry}) = Gr(\text{“Analysis Geometry”}) = \text{“Analytic Geometry”}.$

We will skip some steps as the concept has now been clarified:

$C(\text{Algebra, Geometry}) = \text{“Algebraic Geometry”}.$

$C(\text{Probability, Number Theory}) = \text{“Probabilistic Number Theory”}$

Exercise 0.2

Prove that *“Infinite-Universal Hyperbolic Combinatorial Galois Representations of Linear Geometric Algebras”* is a branch of mathematics. (Hint: ignore this hint.)

Even my grandma could do this.

Remark

The method of proof often used in proving results in n-dimensional meta mathematics (which is the subject of this paper (see that self reference (it was meta (ಠ_ಠ)))) is a form of proof by intimidation. This will be a recurring theme throughout this course. The reader is deemed a loser, dumby, poopy head, dumdum, and so on, if they do not understand the theorem. Thus, the theorem must be true, as required.

Next time - We will define **triviality** and the conditions in which a proof is trivial. (**Hint**: all proofs are trivial, of course.)

N THINGS TO DO IN MC AFTER IT GOT A MAKEOVER

Unless you have been living under a rock lately (or *inside* a rock, or a pineapple under the sea, or out in some other corner of campus), you've probably noticed that MC has gotten a makeover! Here are a few ways to celebrate that:

- You can sit on the new benches!
- You can look at the random stuff people have written on the whiteboard!
- You can draw random stuff on the whiteboards!
- You can write some enthusiastic posts about it on Facebook!
- You can trip over the benches while staring at Facebook!
- You can walk into one of the new noticeboard posts!
- You can thank Jazbel! I don't know if she actually had anything to do with all of this, but just thank her anyways!
- Alternatively, you can thank Obama!
- Alternatively to that, you can spam the UWaterloo subreddit with cancerous "thank Mr. Goose" memes!
- You can try to be productive in the corner next to the QNC bridge. You probably won't succeed, but you can have fun trying anyways!
- You can wonder where your favorite recycling bin went!
- You can lead a bull into the corner next to the DC bridge and see if it gets angered by all the red![1]
- You can gaze a the fractal art and get lost in thought, contemplating the meaning of life and stuff.[2]
- You can arrange the benches into a circle!
- You can arrange the benches into an S shape!
- You can try to arrange the benches into a goose!
- You can jump over the benches!
- You can lie *on* the benches!
- You can crouch *behind* the benches!
- You can *feel* the benches!
- You can whisper inspiring things *into* the benches!
- You can *become one* with the benches!

Isn't it wonderful, how many new and different ways of procrastination are now at your disposal?

DANK

1. Just kidding! Bulls are colorblind, but they would still get mad at you because you brought it that far without even giving it free pizza.
2. And under the crushing assignment load you have, of course.

LAMENTING THE IMPOSSIBILITY OF WINNING THE π RECITATION CONTEST

Ah, pi. The number the math faulty loves so much we celebrate it three times per year![1]

This also means that once per term, a pi recitation contest is held. The winner of this contest receives a nice gift card for Conestoga Mall worth $314.15 (or $314.16 if the math faculty rounds up), and the runner-up gets nearly the same prize, but with one fewer significant digit and the decimal point shifted one place to the left.

So, how hard is it to win the big prize, the ability to brag shamelessly about being better than the term's other competitors at knowing and speaking the many digits of a transcendental number, an ability that holds little practical value because computers can do it way faster and more accurately than we can and no one really needs that much precision anyways?

If you don't know that much about the math faculty, you might be inclined to give the contest a go with only your prior knowledge of the ~100 digits that you memorized in high school to get a free slice of pie. But alas, it is not that easy. This is the University of Waterloo, after all. The math students here were creating formal proofs with their cereal as children. It is more likely than not that the average number of digits of pi known by everyone in a room is higher than the number of digits of pi that you[2] know.

Great victory requires great sacrifice, and this is no different. Be prepared to learn over 314 digits of pi if you even want a chance at second place. For first? Try 666, 767[3], or even more. Past winners have recited up to n digits of the magical number in order to claim the prize.

Be warned, though. There are sacrifices that one must make in order to tread the path of the pi reciter. The most obvious ones are time, effort and brain space. Every moment spent memorizing pi is a moment not spent working, studying, or doing more enjoyable tasks. Furthermore, every step you take along this road will bring you one step further from normal society. Your friends will start questioning your happiness, distancing themselves from you, and eventually stop replying to your messages sent at 3:14am to wish them a happy "pi time".

It is all too easy to get stuck in the middle of this, at the point where you know too many digits to blend in with your non-mathie friends, yet too few to win the pi recitation contest.

That is where I am, and there is no escape.

I have no pie and I must scream

1. March 14th, July 22nd, and November 10th (9th during leap years), are respectively Pi Day, Pi Approximation Day and the 314th day of the year. I am personally a proponent of replacing Pi Approximation Day with Tau Day (June 28th), but then we wouldn't have an excuse for the math faculty to give us cake.
2. Operating under the (incorrect) assumption that the average ***math*NEWS** reader is a close approximation of the average student in the math faculty. We get it, you care more about ***prof*QUOTES** math than the rest of them.
3. The Feynman Point plus some nines. Look it up.

N REASONS TO USE A WIRELESS ROUTER OVER A WIRELESS USB ADAPTER

If you're like me then you have multiple computers, constantly distrohop, and are frustrated when a distro doesn't recognize your wireless USB adapter. Then allow me to make a case for your solution: a wireless router! Connect all your computers to it with Ethernet cables!

- It integrates well into your current network topology: use it wired or as a wireless bridge to an existing router!
- It can get better reception by being placed closer to the router in the basement (provided the cable is long enough)!
- Motherboard Ethernet ports have better driver support!
- It allows faster file transfer compared to flash drives!
- It works better than a switch for the above mentioned task!
- It frees up the oft-used USB port and utilizes the seldom-used Ethernet port!
- It remembers your network password so you don't have to keep entering it every single time!
- 1 router scales better than n wireless USB adapters!
- 1*cost(router) + n*cost(cat 6 cable) < n*cost(adapters) as n goes to infinity! It's just math!
- You can still take it on the go (provided you have an extra outlet, the place to put it, and an Ethernet cable)!
- It becomes a conversation starter ("Why do you have a router?" "Well, you see...")!
- Given enough Ethernet cables, you can form a nest of technology in which to settle for the winter!

I've already built my nest. See you in the spring!

TotallyLegitDeveloper

OCTOPODES' HANDY PREREQ CHART

PMATH EDITION

Figuring out prerequisite chains can be difficult. The course descriptions only show the prerequisites for one course at a time, leaving us students to trace back the complete list of classes we need to take before we're eligible for that sweet, sweet algebraic topology course.

As with most problems, this one has an obvious solution that's easy to implement: simply display courses in a flowchart, so they're easy to trace back. Alternately, simply read **mathNEWS**: I've made one for you. This issue: pure math.

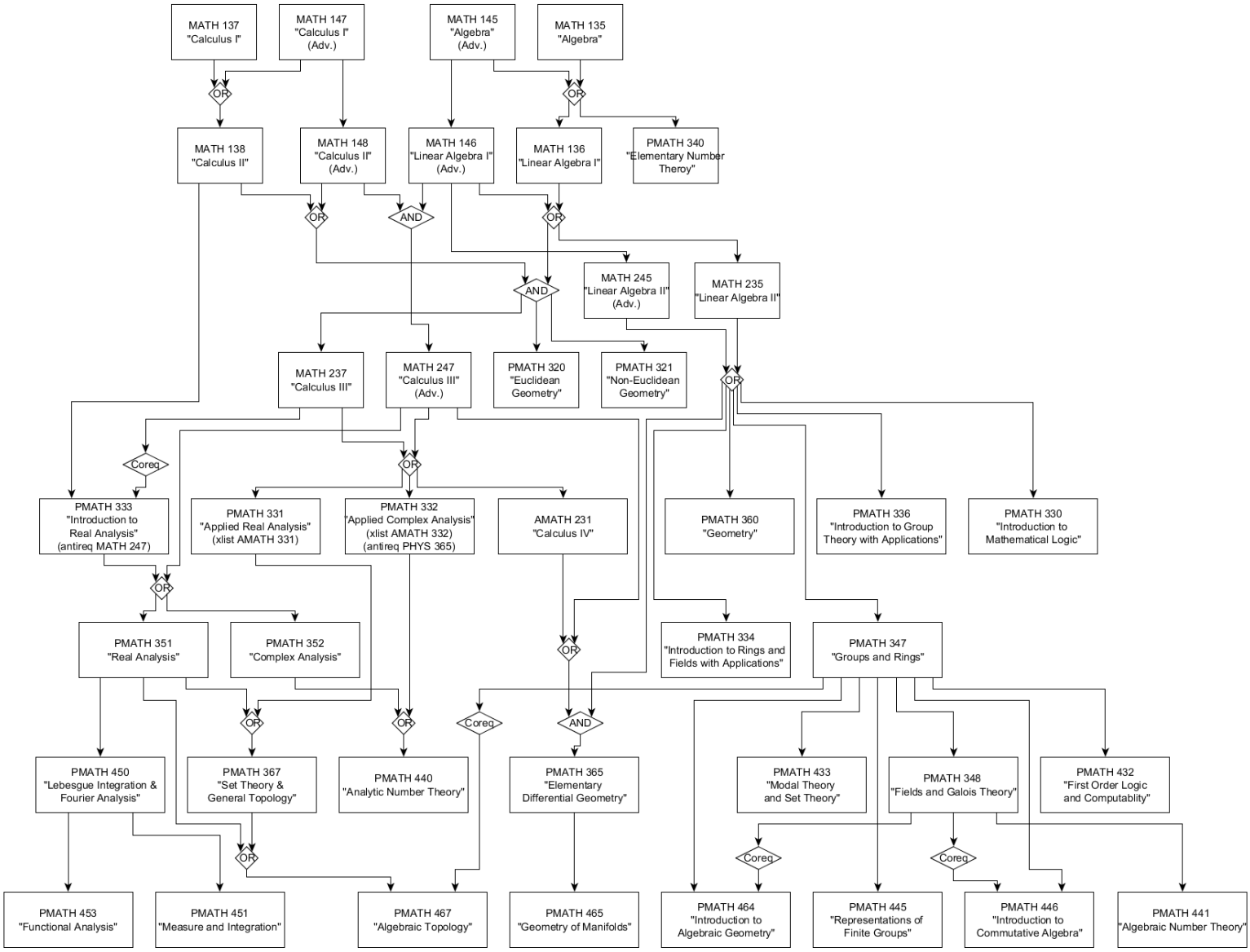
Aside from being a nice way to plan your classes, the chart reveals some interesting trends. The courses divide more or less neatly into two sides: Analysis on the bottom and Algebra on top, with Differential Geometry and Topology in between the two. These categories also have a somewhat different internal structure. Most courses on the algebra side are bottlenecked by MATH 235 or PMATH 347 (that's "Linear Algebra II" and "Groups and Rings", respectively), with the other choices branching out from there having few, if any, children of their own. Analysis, on the other hand, is somewhat more linear and entangled - probably because half the courses are just real and complex analysis offered at different levels.

Worthy of note is that the longest prerequisite chain is 7 classes, including the endpoint. This honour is shared by PMATH 451 and PMATH 453 ("Measure and Integration" and "Functional Analysis", respectively) - but you can cut the length to 6 if you take MATH 247 instead of MATH 237 for Calc III.

Pick up the next issue of **mathNEWS** for a chart of another math department's classes.

Author's note: Yes, there's an AMATH course in there. That's because it's one of the prereqs for PMATH 365. Also, be aware that PMATH 365 seems to no longer be offered, and PMATH 360 will be cut in the near future.

OCTOPODES



EVERYTHING YOU NEED TO KNOW ABOUT CHAIR MATS

Question 1: What's a chair mat?

A mat for a chair. Specifically, a mat that protects your flooring from office chair usage. They can be made of different materials, some more malleable and soft-plastic-like, some more like plexiglass (polycarbonates).

Question 2: Why do I need a chair mat?

As above, it can protect your flooring from damage. If you have a nice carpet, a mat can help you avoid messing your carpet up, though your other furniture is probably worse. If you have a harder floor, a mat can help protect your floor from scratches and abrasion. It's not always necessary to have one, but it can be useful.

Question 3: Can I just get any chair mat?

Not even close.

Hard floors need mats that rest comfortably on the floor without digging in, carpets that are tight-wound and hard are fine with softer mats that have small baubles to catch the surface. In both of these cases, softer mats are fine, since there's nowhere for the mat to bend under the weight of the chair.

Carpets that are thicker (even just a little bit thicker than the thinnest carpet) need a harder mat, because there's more room for a soft mat to dip into the carpet, which ruins both the mat and the carpet. These are the harder plexiglass-like mats; they usually have deeper spikes instead of small baubles, in order to grab the pile of the carpet.

Question 4: Why are you writing about chair mats?

I bought an office chair for my abode, and I have a high pile carpet, and I screwed up and bought the wrong type of chair mat. I was incredibly confused until I realized all of the above facts, with help from an office furniture specialist.

Question 5: So I should just find an expert to talk to about this?

Yes. Yes you should.

Scythe Marshall

In ternary, π's best digits are 2, 0, and 1.

DIMINUTIVEREX

SOME ISSUES AND INFO ON WOMEN IN MATH COMMITTEE

Hey Mathies! Did you know that the Women in Math Undergraduate Committee is being restructured this term (and the terms to come; my aim is finishing everything by the end of 2017)!

In this article, I will "educate" you on a few things regarding this mysterious committee.

Firstly:
Women in Math = WiM
Women in Math Undergraduate Committee = WiMugrad

There are two WiM committees on campus:

4. Faculty WiM committee, also known as the big WiM committee, that is chaired by Judith Koeller. This committee is for all women in math, including graduate students, professors, and undergrads. This committee organizes events including lecture series, workshops, and panels.
5. Undergrad WiM committee that is (currently) a MathSoc committee.

There is one problem concerning the WiMugrad committee: a complicated position that does not support its function.

It is a MathSoc committee, that must follow MathSoc committee rules, which does not work well for a committee like WiMugrad. Practically, WiMugrad runs like a club, but its current constitution does not allow it to do so. This makes WiMugrad a very disorganized committee, which makes it way less effective in supporting undergrad female students. If you are interested in learning more about this matter, please email wimugrad@gmail.com. ☺

So! This term the WiMugrad Chair is moving WiMugrad to the WiM committee by forming an undergraduate level subcommittee under the big WiM committee and trying to draft a new constitution that would suit WiMugrad.

You could help by:

1. Volunteering with WiMugrad
2. Giving us your opinions
3. Attending our events

In order to do all these, you must first be informed of our current activities! 😀

Follow us on our Twitter account (@wimugrad) and like our FB page (https://www.facebook.com/womeninmath/).

Thanks for reading all these!
W'17 WiMugrad Chair

WOMEN IN MATH EVENTS

1. Alumni Career Panel

Time: 5:30-7:00pm on Tuesday March 21
Location: MC 5501
Free food: Yes

What has math alumni been up to?

Startups? Careers? Research?

What advice would alumni give to students?

Email wimugrad@gmail.com any questions that you would like to ask the panelists!

Limited seating. Registration required (please see our FB event page. If you are a female math student, please check your email)

2. WiM-MathSoc Joint Games Night

Time: 7:00pm and pretty much as long as you want ;P (on March 23)
Location: Math C&D
Free food: Yes

WiMugrad is joining MathSoc for some games! Would you like to get some fun brain workouts? De-stress & relax after midterms (before exams)? Come join WiMugrad committee for some good rounds of games!

Have a fantastic rest of term! Good luck on your final exams!

WiMugrad W'17 Chair

mathNEWS is on Facebook, so if you want, send us a friend request.

Fair warning, though: we'll probably just accept it, and then ignore you.

AN ANTI-SOCIAL mathNEWS EDITOR

N THINGS WHERE ADDING THEM MAKES AN OUTFIT MORE SCANDALOUS

- Tassels
- Fishnets
- Collars
- Garters
- A corset
- Jessica Rabbit hair
- Handcuffs
- Pasties
- Leather
- A hat with a lace veil
- Masks
- Thigh high socks
- Anything from Hot Topic
- Undergarments on top
- Something with lots of buttons
- 6'+ heels [Jesus, those heels are literally taller than I am -ED]

Yours in scandal,
Shay Blair

gmNEWS

Hi all, MathSoc has General Meeting Monday, March 27th @ 5PM in MC Comfy! Come out for food and hear about MathSoc! See unofficial agenda below:

Agenda

- Motion to approve the previous General Meeting minutes
- Reports
  - President
  - Vice President, Academics
  - Vice President, Internal
  - Vice President, Operations
  - Vice President, Finance
- Presentation of the Society's Financials
- Presentation of the CnD's Financials
- Presentation of MEF Director
- Special Committee for Honourariums of MathSoc Execs Report
- Executive Evaluation Committee Report
- Business Manager
- 3rd Floor Renovation Discussion

MathSoc Priorities for 2017

Student input on what MathSoc should be focusing on, in terms of major projects for the coming terms.

Possibilities include study/club spaces, Exam Bank, Novelties, and anything you can think of.

If you would like to submit agenda items, please email items to mathsoc.uw@gmail.com by March 15 11:59PM. If you cannot attend, please submit your proxy forms by 5pm on March 24th.

[QR Code attached for agenda and minutes. See email: [MathSoc News] GM News]

A OLD JADED GM HOST

WatSFiCShortStoryContest NEWS

The Waterloo Science Fiction and Fantasy Club (WatSFiC for short) is holding a short story contest with prizes and glory to be won. To participate simply submit an original fantasy or science-fiction story of less than 7500 words to watsfic.writing.contest@gmail.com by midnight on March 25th. Please submit a version with *and* without your name to allow for anonymous judging. Only one entry per person.

BEYOND META

gamesNEWS

Hey Mathies!

Final exams are coming soon, and you know what that means: our end of term event, 24-Hours Games Night, is not far away!

On the final weekend before classes end, from noon on 1 April to noon on 2 April, we will be playing board games in the Math C&D. It's the perfect time to pull out that game that you never had time to complete, like Twilight Imperium or Dominant Species; or the game you've wanted to learn, like Smallworld or Terra Mystica, or even that game you swore you'd never play unless you were impaired[1], like The Red Dragon Inn or the chairman's game. Snacks and drinks will be available throughout, and food will be served over the course of the event. And as always, people are free to drop in and leave whenever they want -- no need to stay for the entire period of time!

The end of the term also means we are buying new items to enhance our collection! A list is set up in the MathSoc office (MC 3038) where you can suggest new items that we should acquire, or replacements for any games missing a significant amount of components.

Our regular weekly events will continue to run on Thursdays as well, up until the last day of classes. Join us in the Math C&D for evenings of board games until then, and maybe even a little after....

YOUR GAMES DIRECTOR, A CRAFTY PLAYER

4. Sleep deprivation counts as impairment!

Ever wonder how much filler is in a given issue of mathNEWS?

Just count the number of items in all the "N Things" articles.

Oh, and these little black box-quotes.

A mathNEWS EDITOR WHO JUST WANTS TO FINISH LAYOUT AND GO HOME

OVERHEARD AT mathNEWS

WE SAY QUOTABLE THINGS TOO, Y'KNOW.

George Lambrou

❝ This box, *full of receipts*. I HATE YOU! [I then threw an empty cardboard box out of the **mathNEWS** Office.]

❝ So I did some black magic today. Anyone wanna see?

❝ I don't *care* if we're reliving my Sonic Adventure days!

❝ …and then I watched my imaginary friends die.

❝ Forward is the direction you go to find new things; backward is the direction we're all headed.

❝ No, I *haven't* slept, but this Sharpie smells pretty good, so I'm okay.

❝ No, I'm not joking. Next next Tuesday is "Bring **mathNEWS** Food Day" and that's final.

❝ Also, I think we need to invest in a copy/printer scanner. I can't go searching for printers at 5:00am anymore.

❝ [While listening to old vido game soundtracks] Sorry, I'm reliving a *bunch* of good shit right now.

ToBeDeterminED

❝ We need to seize the memes of production!

❝ Not a quote, but ToBeDeterminED received one full minute of otherwise silent, aggressive applause during a Production Night.

ExtrovertED

❝ [ItorEd]'s future is so bright [they] can't even see it.

❝ [Reading "Overheard at **mathNEWS**"] Wow, I haven't said amythimng dumb! This is great!

ItorED

❝ Fuck Disney, **mathNEWS** is the happiest place on Earth.

❝ No one is stopping you, [ExtrovertED]!

❝ I like complaints that make sense, like George's.

Other & Anonymous

❝ ExtrovertED: George, I trust you to clean it up in Photoshop.
George: How 'bout I trust *you* to clean it up in Photoshop, and I go get a Starbucks?

The Editors **mathNEWS**

N THINGS TO LOOK FOR IN EVERY NEW mathNEWS ISSUE

- A cover. **mathNEWS** often has those.
- Articles, usually more than one (1). We'll publish yours if you send them in!
- ***prof*QUOTES**. These are always a fan favourite! Search extra-hard for the Buhr quotes, we tend to have a few.
- The ***mast*HEAD**. Along with a blurb written by the editors (or sometimes just one editor), all the **mathNEWS** writers and editors work hard together to produce quality answers to quality questions so that you can get an idea of our personalities! Do your best not to fall in love with anyone though, this isn't that type of game show.
- The ***grid*WORD**. Do you know how much effort it takes to make and format that? Do you?
- ***black*BOXES**. Love these little things. They're a recent addition to **mathNEWS**, but they've become one of the most important members of our family.
- ***math*ASKS** is also quite new. It's a cool column where profs get to answer questions asked by writers, editors, and anyone else who shows up to **mathNEWS** Production Nights to ask questions! You can also email them to us at mathnews@gmail.com.
- The answers to last week's ***grid*WORD**. That's always good to have.
- Legal stuff, comprising the ISSN and a strictly smaller subset of legal stuff.
- Love, the most important ingredient of all. [George: damn *right* it is.]

ItorED

ISSN 0705-0410

UW'S BASTION OF ERUDITE THOUGHT SINCE 1973

mathNEWS is normally a fortnightly publication funded by and responsible to the undergraduate math students of the University of Waterloo, as represented by the Mathematics Society of the University of Waterloo, hereafter referred to as MATHSOC. **mathNEWS** is editorially independent of MATHSOC. Content is the responsibility of the **mathNEWS** editors; however, any opinions expressed herein are those of the authors and not necessarily those of MATHSOC or **mathNEWS**. Current and back issues of **mathNEWS** are available electronically via the World Wide Web at http://mathnews.uwaterloo.ca/. Send your correspondence to: **mathNEWS**, MC3030, University of Waterloo, 200 University Ave. W., Waterloo, Ontario, Canada, N2L 3G1, or to userid mathnews@gmail.com on the Internet.

ADNOTĀMENTA ΤΕΤΡΑΓΩΝΟΝ

Etsī mālō peristasēs mȳthologicārum, hodiē faciēbam magis acadēmicīs. ″Εα! Ἑλληνική; No? It's quite a shame that academia these days do not cover the esteemèd classics of Latin and Greek, languages which we, as English speakers, owe a large swath of our vocabulary to, indirectly. While the common English speaker does not need to have an intimate knowledge of Latin and Greek to effectively speak, those of us who are committed to academia regularly come across words derived from Latin and Greek roots. It is time to sharpen thy quills and brush up upon the classics.

But first, a few words on last issue's ***grid*WORD**: there has been an above-median amount of submissions this time: four, with three correct submissions. Sorry, Allie—although I did like your answer to the ***grid*QUESTION** ("Which animals (or animal features) would you fuse to form a new creature?"), "Snake and Spiders. That should create a few more nightmares."[1]. The correct submissions were from a Brian Forbes and the pairs Oliver and Adrian, and m47yong & h228liu, who, respectively, responded "Swordfish + Rhino horn + Elephant tusk + Antlers = horniest fish ever", "Combine a Liger with a Tigon to create the most fearsome beast ever, the 'lion' (alternatively, a 'tiger' would be a pretty good name)", and "Put cat ears on a vampire octopus — vampire cactopus!". I was most amused by the second answer, so Messrs. Oliver and Adrian, please drop by the ***math*NEWS** office at your earliest convenience to badger the editors for your prize.

Today, I ask the solvers a question: you know that feeling when there's a word on the tip of your tongue or perhaps you wish you knew there was a word to describe the exact situation? I found myself in such a situation the other day, inspiring this issue's ***grid*QUESTION**, "What is a word that you would like to coin, and what does it mean?". As always, submit your solutions to us online at ***math*NEWS**@gmail.com or physically placed into the ***black*BOX** (temporarily–permanently aliased to under the door of the ***math*NEWS** office, MC 3030). The most correct solution received by approximately 6:30 PM on March 27th, 2017 is eligible for a prize from the editors; in the event of a tie for most correct, my most favourite answer to the ***grid*QUESTION** shall be the tiebreaker.

DOCTISSIMUM PRAESTET,
ZETHAR

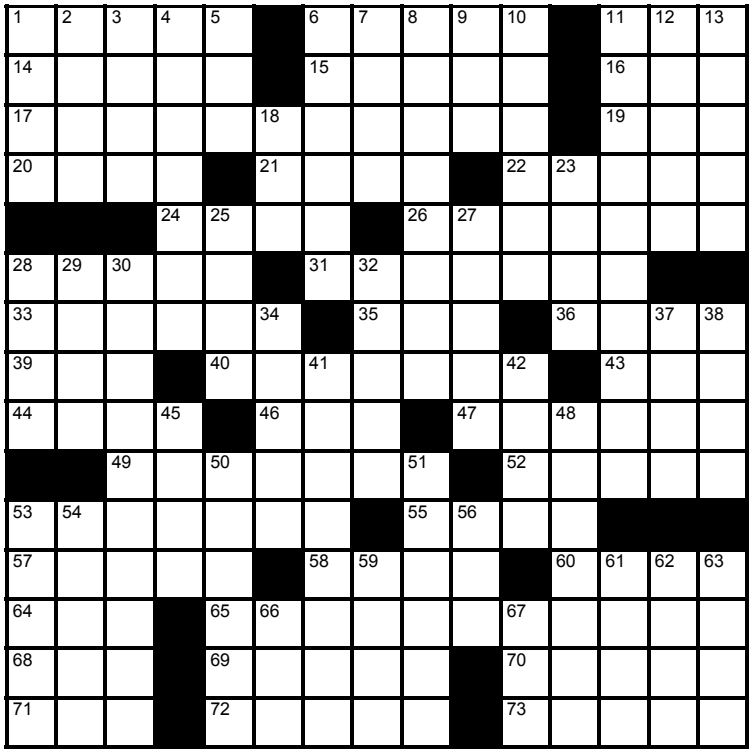
1. "1960 Nobel Prize laureate (5)" clues Leger, the pseudonym of the writer.

ACROSS

1. Send
6. Commercial makers
11. Ends fast
14. Skirt
15. Loyal vassal
16. Winter bug
17. Own + carrier
19. End
20. Hopper
21. A 2D measure
22. Russian river
24. Hue
26. Background processes
28. Produced by a Fischer process
31. Thinner
33. Master's requirement
35. Corroded
36. Eft
39. Squat
40. She has the highest score
43. Every other hurricane
44. Made like
46. Many 9D
47. Soroban
49. Like /ɔ/, /ɜ/, or /ø/
52. Ill-chosen
53. Fit
55. Surjective
57. Reliquaries
58. Qualified
60. Abstruse
64. Polynesian paste
65. 6 + 10
68. A conlang
69. Valor; virtue
70. Eastern dragon colour
71. One might find a 30D here
72. Armament named after Tom Swift
73. Model S maker

DOWN

1. Atoll protector
2. No good deed
3. A class
4. Thinks
5. Midmorning
6. Advisories
7. Uniform generators
8. After + Gifts
9. Conceit
10. Emboldens
11. Blossom
12. Set straight
13. Bluefins
18. Moving option
23. A raven, perhaps?
25. Rainbow goddess
27. Ring
28. Vassal to Laharl
29. Vessel
30. Far + vision
32. Zoroastrian
34. Echo sounder
37. Trounce
38. Check
41. Medieval weapons
42. Passing mention?
45. Nod
48. Plate
50. Pigeon
51. What the weather has gotten here in March
53. Savoury
54. Verse form
56. Born
59. Strife
61. Flightless flock
62. Sandwich man?
63. Request
66. Notable period
67. Link command



LAST WEEK'S *grid*SOLUTION

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

N THINGS YOU CAN DO WITH THIS PAGE ONCE YOU'RE DONE WITH THE NEW *look*AHEAD

- Make a paper airplane out of it.
- Doodle in the margins of the ***grid*SOLUTION**.
- Try your hand at some origami.
- Make a diorama of some really tiny people playing some alphabet-based variant of hopscotch on the ***grid*SOLUTION**, and then take some tilt-shifted, close-up photos of it.
- Fold it up into a fan, and use it to cool yourself off come June.
  - Alternatively, use it to whack your opponents repeatedly, causing 1% or 2% damage each time, break their shields, and then, once their damage is high enough, throw the fan at them so that they fly straight up and hopefully off the screen. [Ed: We get it, you play Smash Bros.]
- Re-staple it to the issue so you can keep it forever, alongside the rest of your pristine ***math*NEWS** issues.
- Leave it up on your wall/bulletin board, and stick the new one over it.
- Leave it stapled to the issue, because you never used the ***look*AHEAD** in the first place.

- Keep it in your bag as an emergency, impromptu umbrella for the coming Spring rain.
- Make a paper football out of it, and have a game with some mates. [Ed: I hope you mean the football you play with your feet.]
- See how strong of a bridge you can make out of it between two tables.
- Use it to pass notes in the margins during class.
- Check your completed ***grid*WORD** against the ***grid*SOLUTION**.
- Cut it into confetti, and throw it on someone. [Ed: Don't do this.]
- Recycle it by shredding it along with some other paper, putting the shreddings in a blender with some water, blending it into a fine pulp, then flattening that pulp out onto a mesh screen, pressing most of the water out with a rolling pin, and then leaving it to dry for a couple days or so.
- Recycling it in the paper recycling bins, like a normal person would.

GENERIC AUTHOR

lookAHEAD

SUN MAR 19	MON MAR 20	TUE MAR 21	WED MAR 22	THU MAR 23	FRI MAR 24	SAT MAR 25
St Patrick's Day	Winter Wrap-Up Week with Feds International Earth Day	Winter Wrap-Up Week with Feds MathSoc: Road to Node	Winter Wrap-Up Week with Feds\ National Puppy Day	Winter Wrap-Up Week with Feds	Winter Wrap-Up Week with Feds	Earth Hour 2017

SUN MAR 26	MON MAR 27	TUE MAR 28	WED MAR 29	THU MAR 30	FRI MAR 31	SAT APR 1
	***math*NEWS** 133.6 Production and "Decide What EOT is Going To Be" Night	Bring the ***math*NEWS** Editors Food Day	Last Bomber	Velocity Fund Finals	***math*NEWS** 133.6 is published Acapella EOT	April Fool's Day 24-Hour Games Night Acapella EOT

*mef*NEWS

You may recall that MEF is an organization that funds improvements to the Math student experience (see ***math*NEWS** 133.1). In my last ***mef*NEWS** (from back when it was called "MEF Sez"), I mentioned that there was a body (called Funding Council) that decides the allocation of funds. It will be meeting on Monday March 20th at 6:00pm to hear the applicants presentations, and ***math*NEWS** readers (that's you!) are welcome to come listen to the presentations and eat some good food!

Tristan Potter
MEF Endowment Director

*election*NEWS

Want to get involved in the decision-making and operations of the Mathematics Society? Nominations are open NOW for both representative and executive positions for the upcoming Spring and Fall terms. Nomination forms can be found outside the MathSoc office (MC 3038) and are due Wednesday, March 22nd at 4PM. Campaigning (if required) will start Monday, March 20th and end Wednesday, March 29th, and which point voting will occur that Thursday and Friday.

If you have any questions, please e-mail elections@mathsoc.uwaterloo.ca

Thanks!
MathSoc CRO

We don't care about qualifications — apply to be *math*NEWS Editor today!

A ***math*NEWS** EDITOR WHO'S ALREADY DESPERATE TO RETIRE