math NEWS

Volume 132, Issue 5
Friday, November 18th, 2016

Scientists Take First Step Towards Creating Pokémon

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*look*AHEAD

*math*NEWS	
Nov 18	Issue 5 chooses the nootnoot seal that evolves into a J-pop idol as its starter and heads into the tall grass
Nov 28	*math*NEWS writers make it to the first island for their Island Challenge
Dec 2	Issue 6 is punted into the ocean by an aged weasel

MathSoc	
Nov 15–23	General Election 2017 nomination period
Nov 21	General Meeting
Nov 30–Dec 1	General Election 2017 voting period

University	
Nov 18	Drop, penalty 1 period ends
Nov 19	Drop, penalty 2 period begins
Nov 21	Drop/Add period for Winter 2017 begins
Dec 7	CS4U Day

Misc	
Nov 18	Pokémon Sun and Moon released
Nov 19	Kitchener-Waterloo Santa Claus Parade
Nov 24	Thanksgiving in United States
Nov 25	Black Friday
Nov 25	National Parfait Day
Nov 28	Cyber Monday
Nov 29	National Day of Listening

Article of the Issue

Congratulations to G-UNIT, who has written the article of the issue: "Time To Do Math... But First, Let Me Pick My Music". Come by the *math*NEWS office, MC 3030, to pick up your prize!

The Editors

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Thomas Baxter (Mantis shrimp)
Shaundalee Carvalho (Potoo)
Amy Li (Momonga)
Katherine Tu (Sea bunny)

*mast*HEAD

Hello, readers! I don't feel like writing that much this time.

We asked our hopefully-human writers *[Hey, I can keep the same line as last mastHEAD!—ConvolutED]* what their favourite imaginary animal is.

Shay Blair ("Platypus with antlers and wings"); Soviet Canadian ("A celebrity/rich person who is not changed by their fame/money"); YouDon'tDeserveToKnow ("Plants"); kaoshi ("Idk but my favourite imaginary plant is the square root of negative tree"); Theodore Bear ("The dogs that shoot bees from their mouth"); Dusk Eagle ("Flareon"); aPlayerofGames ("Great A'tuin, the Giant Star Turtle"); Diminutive Rex ("People ⊆ Animals, so Susan from *Discworld*"); Beyond Meta ("The cuddliest softest furball"); Ender Dragon ("That new archer-owl from Pokémon Sun and Moon"); Zethar ("Hmm, that's a tough one... After all, not all 'imaginary' animals are as imaginary as they appear. But if I had to choose one, probably Kytheria, although they may not be imaginary for long..."); TheUndecided ("Unicorns and friendly geese"); waldo@<3.LE-GASP.ca ("My dog Woof :)");

ConvolutED("Reverse centaur: front half horse, back human").

Fun Fact: The potoo always looks like this, or often even sillier.

VPA Sez

- New M4 building???????? Due to budget changes, Math might suddenly get $mil. Which means there's talk of a new M4 building at the right levels of the university. Don't count any chickens because they haven't even been laid, but who knows what can happen with more money.

- MathSoc office has a whole bunch of textbooks for your courses, esp. first year courses. Come by and ask for your textbook, we probably have it. If not, email `pj2melan` and MathSoc will buy it, especially if it's expensive.

- If you have exams you might have heard of MathSoc's exam bank (otherwise Google it). If you want future students to benefit from your term of students, submit your practice exam or solutions (by adding '/submit' to the exam bank URL) and MathSoc will ask your instructor for permission to use the practice exam.

pj2, MathSoc exec spy

Feds Sez

- Feds (you know, that student union) is working to get a University-run webpage of all the past and present course outline for courses. Like, all other universities have this, so it's high time we got one as well. This would help with choosing courses, for example.

- There are changes to course evaluations coming, specifically all courses will use the same standard questions.

- Oh, also, if you've ever put sassy comments in a course evaluation textbox, only the instructors ever see that feedback. Their future pay is determined by the numbers you put in the course evaluations, but only they ever see the written answers. So if you ever want someone to hear a specific issue you have with an instructor, get in touch with whoever the MathSoc VPA for your term is (this term it's me), or the department chair for that department.

pj2, Student council spy

SASMS Sez[1]

This Thursday (the 24th), the PMC will have its most awesome termly event: SASMS! It will be in MC 5479 from 5:00 PM to 9:30 PM.

SASMS, or Short Attention Span Math Seminars, is a sequence of 30 minute math talks by students. Everybody[2] gets a chance to talk about the things in math that they're the most knowledgeable and/or enthusiastic about, so there is usually a huge collection of interesting things! You can look up the topics here: `csclub.uwaterloo.ca/~pmclub/sasms/`. If you want to give a talk, don't hesitate to sign up! You can sign up on this website. Also, there will be pizza at some point.

Happy SASMSing!

Dank

[1] Note that I am not affiliated with the PMC, or SASMS, in any way. I just expect the PMC people to be lazy skrubs who forget to advertise their events.

[2] Who signed up on time.

Admissions Sez

- There were 14k applications to Math this time around.
- 1.4k got in to Math. That means a 10% acceptance rate (wth).
- 36% of Math acceptances were women.
- 24% of CS acceptances were women.
- Admission average was 97% (meaning I probably wouldn't get in now)
- Admissions department isn't really sure how to deal with such a high average.

Regarding admissions averages, some ideas are being thrown around. Engineering is trying video interviews for all applicants next round of applicants. Some people are considering weighting the AIF more, but this would also bias towards people who can afford to go to after-school badminton club instead of working a part-time job. It's a complicated problem with no clear solution.

pj2, Admissions spy

Pursuing a Software Career?

There's a LinkedIn group just for you

If you're a student pursuing a career in software, there is a LinkedIn group just for you. This LinkedIn group is a place where you will find articles and stories offering advice from an experienced software professional who has been down the path you are just beginning. Join the group "DS Insights Software Career Mentorship".

Debbie Smith, UW Alumna

Math Space Sez

- Third floor renos are underway, let `pj2melan` or Mathsoc know any concerns you have.
- Walls will be repainted to match 5th/6th floor scheme (bold colours in corners of floor).
- Poster kiosks will be added to the hallway in front of CnD and Comfy.
- Octohedral outside-benches will be replaced by fancy curvy S-shaped benches.
- Corkboards across from Comfy will be replaced with QNC whiteboards.

pj2, Renovations spy

Not VPA Sez

Hi Mathies,

Here are some recent (and not-so-recent) goings-on from the Undergraduate Affairs Committee:

- MATH 135 and the communications course have been changed to smaller class sizes to mimic the feel of a cohort. This change has already been implemented.

- "Big Data" CS courses are available for students to take.

- "Enriched" CS courses, which are different from advanced courses, such as those available to first- and second-year math students, are available for students to take. The difference is that enriched courses (suffixed with the letter "E") cover the same material as the non-enriched courses, though not necessarily with the same treatment. Advanced math courses cover a completely different curriculum from their non-advanced counterparts.

- Officially as of September 1st, 2017 (and unofficially as of October 24th), WDs no longer count as part of the course attempt limit.

  The course attempt limit is a count of any course attempt limit for which a student is not assigned a passing final grade, such as a failing grade and WFs (and used to include WDs). The limit for most math programs is 5.0 units or 10 regular-sized courses. Note that there also exists a failed/excluded course attempt limit at 2.0 units or 4 courses. (Hence, a student may be allowed 4 failures and 6 WFs, for example.) Other faculties do not have a similar course attempt limit.

  This change should not affect the majority of students, but for students with chronic, unpredictable disabilities, this change is huge. Advisors usually tell struggling students to withdraw from courses instead of risking to fail them, but with the course attempt limit, it was sometimes more beneficial to disregard the advice and to chance the failure. This means that students can now take, withdraw from, and retake courses repeatedly, with "only" time and thousands of dollars to lose.

- Starting Fall 2017, MATH 137 will no longer introduce integrals in its last two weeks of classes. Instead, it will cover "applications of the Mean Value Theorem, Taylor polynomials and Taylor's Theorem, [and] Big-O Notation". MATH 138 will feature a full coverage of integration instead of just a review.

If you have any questions, feel free to contact your VPA (vpa@mathsoc.uwaterloo.ca), who can forward your enquiries to the appropriate parties.

Katherine Tu
Former VPA of MathSoc

The Action COP, Morocco 2016

From November 7th to 18th leaders from around the world met in Marrakesh, Morocco for the 22nd Session of the Conference of Parties to the United Nations Framework Convention on Climate Change, abbreviated COP22. This conference has been nicknamed the "action COP", the focus being to build on the Paris Agreement that came out of 2015's conference. By ratifying the agreement a country agrees, among other points, to work towards a maximum average warming of 2 degrees Celsius above the historical mean by the end of the century. The agreement came into effect November 4th, 2016 having been ratified by 102 countries, including Canada.

As part of Canada's contribution to the 2016 conference, the University of Waterloo sent an official delegation of five students and two professors chosen by the Interdisciplinary Centre on Climate Change (IC3). This delegation consisted of Professor Brendon Larson, Professor Neil Craik, Bailey Jacobs and Hadi El-Shayeb from the Faculty of Environment; Masroora Haque from the Faculty of Arts; Ambika Opal from the Faculty of Engineering and Kayla Hardie from the Faculty of Science. The itinerary of the student delegates included attending events, listening in on negotiations and discussing climate change issues with other envoys from countless other nations, all while acting as ambassadors for both Waterloo and all Canadian university students.

"I'm fortunate to be a young person attending COP, but at its essence COP22 is very inter-generationally focused," says Bailey Jacobs of the Environment Faculty. "The actions to execute the Paris agreement have to be built by the generation that is signing the agreement today and the young generation that will be implementing the solutions well into the future."

From Ambika Opal of the Engineering Faculty, "COP22 has taught us about the interdisciplinary nature of climate change - it has impacts on health, poverty, global economics, the environment, politics, and everything in between. We have seen firsthand the political elements of negotiations, and how science and technology meshes with policy."

If you want to find out more check out the Waterloo students' blog at climatestudents.wordpress.com or look for articles on the university website, particularly uwaterloo.ca/climate-centre. Alternatively, there will be some post-mortem events in the weeks following the conference. The Faculty of Environment will be holding a lecture entitled Implementing the Paris Agreement for Climate Action presented by Dr. Marie-Claire Cordonier Segger and Dr. Neil Craik on November 25th in EV3 4412 from 12:00 PM to 1:30 PM. Complimentary lunch will be provided at 11:45 AM in EV3 4327. A discussion of the events of the conference, From Agreement to Action on Climate Change: Reflections after the COP22 UN Climate Summit, will be held at St. Paul's Alumni Hall November 28th, 6:30 PM to 8:30 PM. EventBrite registration is required for this event.

You don't deserve to know

MOMONGAAAAAAAAAAAAA

The Quirky Coach

Why build a professional network?

You're just starting out. Why do you care about building a professional network? Your professional network can be very useful to you throughout your career.

A professional network allows you to build your professional brand. This is the image you wish to portray to others about who you are, what you do, and what's important to you. Being able to share your professional brand with your network allows you to start building your reputation as an expert in your field.

The second reason to build a professional network is that one day, you may lose your job. Losing a job has become quite common because companies grow and shrink their number of employees to match changing economic times. I've lost my job twice in my career. These days, 80% of jobs are found through networking, not through applying to job ads. Using your professional network will greatly increase your chances of finding a job.

Another reason to build your network is that one day, you may need some advice. Perhaps you want advice about which direction to go in your career. If you have a professional network in place, you have a group of people that you can talk to. There are some questions that you can't ask the people you work with, so you need a network outside of your place of work. I'm currently building courses for software professionals and used my network to ask which topics my colleagues wanted to see covered for their teams.

Your network consists of classmates, professional contacts, friends, family, neighbours, your dentist, your hairdresser, the players on your hockey team … It's everyone you meet and talk to. Don't wait until you need a professional network to start building one.

Debbie Smith, UW Alumna

Time To Do Math... But First, Let Me Pick My Music

Listening to music while doing your math homework can be motivating but one should be weary of the potential hazards. This guide outlines the dangers of different types of music.

Hip hop can help hype you up before a daunting assignment but while attempting to write your proof out make sure you don't get caught up in the lyrics and decide to fuck it - you don't give a fuck what the TA thinks because they're just frontin' anyway.

There have been studies to show that classical music helps with concentration and focus. So if you need the extra help, blast that Bach, head bang to that Mozart, and feel your proofs the way Beethoven feels the music.

Slow, sad music sometimes feels appropriate as you submit your CS assignment and watch as the tests reject you, leaving you feeling heartbroken and alone, because passing these tests is like setting fire to the rain - it ain't happening.

When you want Katy Perry to tell you to keep your eye on the tiger, you can turn on the radio for emotional support. And when you have nothing left in you but a blank space baby, Taylor Swift's got your back. Pop provides that superficial, motivational, upbeat, sing-a-long tune you need to keep going. Pop is there for you when you need a song to tell you- don't stop believing.

Careful with EDM because while you might think things are going at a good pace, once the bass hits it's game over. You may find it hard to concentrate as the lights flicker and your fist starts to uncontrollably pump in the air.

Rock can help when you have built up emotions and you just want to stick it to the man. As you listen to the guitar riffs and angsty lyrics, you may find your proofs more relatable. Euler was just trying to find a path as he too walks this lonely road alone.

And for those of you that actually want to get work done: silence.

G-UNIT

eɪ pʌblɪk sə˞vɪs ənawnsmn̩t

sʌmwun sə͡ʤestəd ðat wi wɹoʊt iŋglɪʃ æz ɪt ɪz spoʊkən. sɪnɕ ɛvɹɪbʌdi: spi:ks ɪn ə dɪfɹʌnt æksʌnt, ðɪs ɪz xɑə˞dli: jusfʌl tə eni:wʌn i:vən ɪf wən kəd ri:d ði ɪnt˞næʃən̩l foʊnetɪk ælfəbɛt. ədɪʃʌnəli:, bi:kɑz ðɛə˞ ɪznt eni: stændʒ˞d bɑdi: fɜ˞ pɹənʌnɕi.eɪʃn̩, iŋglɪʃ spelɪŋ ʃæl disend ɪntə ə kʰəʔkəʃɸəni: əv sɪmbʌlz ʍʰɪt͡ʃ noʊbʌdi: haz ðə taɪm tə disaɪfʒ˞. aɪ bɜt nɔt wʌn ɹi:dʒ˞ bɔðʒ˞d̩ tə ɹi:d ðɪs tɹænskɹɪpʃən ɪn ʍʰɪt͡ʃ aɪ hæv tɹaɪd tə ki:p maɪ pɹənʌnɕi.eɪʃn̩ ɪdi:oʊsɪnkɹəsi:z to: ə mɪnɪmʌm. ‖

zeθɑə˞ / -ɜ˞

I caught them all!

You probably don't care that some random person has achieved this goal from a mobile game that most people have stopped playing. You might think that *math*NEWS isn't really the right platform to talk about my accomplishment. I don't care. After many months of travelling across the land searching far and wide I finally succeeded. Searching Google to understand the power inside I.V. I have passed my test and become the very best.

Beyond Meta

Fun Fact: Mantis shrimps have a punch with the power of a 22 calibre gun! However, they don't actually need to hit their prey; their punch results in cavitation, a super-heated bubble and a small flash of light that can stun their prey!

A Topological Proof That There Are Infinitely Many Primes

If you want to prove that there infinitely many primes, what kind of math would you use? Number theory? Wrong! You need topology, of course!

So what is topology? I'm not gonna tell you, but you should at least know what a topology is. If we have an arbitrary set X, then a topology on X is a set τ of subsets of X such that:

- The empty set is in τ, and X is in τ.
- For some collection Γ of sets in τ, the union of all sets in Γ is also in τ.
- For two sets A and B in τ, the intersection of A and B is in τ.

To make τ nicer to talk about, we call all the sets in τ **open**.[1] So those three things just say that the empty set is open, X is open, the (possibly infinite) union of open sets is open, and the finite intersection of open sets is open.

Now, to introduce even more weird terms, we call a subset A of X closed iff X - A (the complement of A in X) is open. It is easy to verify that the empty set and X are both closed. We also know that for two closed sets A and B, the union of A and B is closed (exercise!) and that for some collection Γ of closed sets, the intersection of all the sets in Γ is closed (exercise!).

So now that we defined everything, let's do the proof! We let X = Z be the set of integers. Now we define "arithmetic sequences" as follows: For every a and b, (where $a \neq 0$) let S(a, b) be the set $\{ax + b \mid x \in Z\}$. So for example S(2, 69) is the set of all odd numbers. Then we call all the sets of the form S(a, b) arithmetic sequences.

We define a set of integers to be open iff it is a union of arithmetic sequences (so for example, the set containing all odd numbers and all numbers divisible by 10 is open). So we let τ be the set of unions of arithmetic sequences. We can verify that τ is a topology on Z:

- The empty set is the "empty union" of sequences, and therefore open. Z is just S(1, 420), so it is open, too!
- If Γ is some collection of unions of arithmetic sequences, the union of the sets in Γ is a union of unions, and thus a union of arithmetic sequences.
- The intersection thing is a bit trickier. We know that the intersection of two arithmetic sequences is either empty or an arithmetic sequence (and by "we know", I mean "you can prove as an exercise"!). So now if A and B are two unions of arithmetic sequences, then their intersection will be the union of all the intersection of arithmetic sequences in A and B (whoahhh). So this intersection will be open!

That was spooky. But one thing even spookier is that every arithmetic sequence S(a, b) is closed, since we have $Z - S(a, b) = S(a, b+1) \cup ... \cup S(a, b+a-1)$!

So now the actual actual proof goes as follows: Let A be the union of all S(p, 0) for every prime p. Then A contains every number that is a multiple of some prime number, so it contains every integer except -1 and 1.

But now suppose there are only finitely many primes. Since S(p, 0) is closed for every prime p, A is a union of finitely many closed sets, so A is closed. This means that {-1, 1} is open! So the set {-1, 1} is the union of some arithmetic sequences, which is clearly a contradiction!

Dank

[1] In your offering of Math 1{3,4}7, you might have heard of "open sets" defined as subsets of R. Those open sets do indeed form a topology on R

Actually How Easy It Is To Help Someone With Math

Last issue, Beyond Meta told you the story of how they asked me for math help while writing a *math***NEWS** article about how they couldn't do their assignment. This is the detailed story of what I actually did to help.

I asked Beyond Meta to state some relevant definitions. They did. I asked them about how these definitions apply to the problem. They went and thought about it.

... No, seriously, that's it. Now, in general, helping someone with a math problem might require more than just asking about definitions; sometimes you have to ask about appropriate theorems or work with them to develop the requisite connections between disparate topics first. However, this method of asking someone what they know and getting them to try to tie pieces of knowledge together is perhaps the best way to help someone, because it satisfies the two following criteria:

You are not directly doing their work for them; they have to put the ideas together and on the paper.

They won't just write down solutions without understanding them; they will hopefully be able to explain for themselves why something works the way it does.

Being an experienced tutor, etc, means that you have had practice doing this and that you can effectively give hints and direction to someone who is attempting to understand something. When you are helping someone learn, you need to make sure that the other person gets the chance to do something with what they're trying to learn; explaining something at them does very little to help. What they need is someone who can exhibit some patience while they are figuring things out for themselves, and point them in the right direction.

So while it seems that really, you don't have to do much to help someone at math, being good at it can be a different story! Hence it's perhaps not so easy after all.

Scythe Marshall

DanknessofPR1m35

So basically there's this super cool way to prove that there are infinitely many primes by using analytic continuation/formal mathematicalisms.

Recall the Riemann Zeta function:

$$\zeta(s) : \mathbb{C}- \to \mathbb{C}$$
$$s \mapsto \sum_{n=1}^{\infty} \frac{1}{n^s},\ \mathrm{Re}(s) > 1$$

We can **analytically continue** ζ by literally allowing s to be any complex number, even those outside the domain. Normally we can compute closed form formulas for ζ (and other formal power series and Dirichlet series in general) on some well-defined regions of **C** such that ζ actually converges to the value it outputs. Putting in values in undefined regions in these closed forms still yields an answer, but its no longer convergence in the usual sense. Hence, we have analytically continued ζ.

One can rewrite ζ(s) as

$$\zeta(s) = \prod_{p} \left(1 - \frac{1}{p^s}\right)^{-1},\ p \text{ a prime.}$$

by using a highly non-trivial sieving argument (due to Euler).

Now, analytically continuing this at s = 1 gives:

$$\zeta(1) = \left(1 - \frac{1}{2}\right)^{-1} \left(1 - \frac{1}{3}\right)^{-1} \left(1 - \frac{1}{5}\right)^{-1} \left(1 - \frac{1}{7}\right)^{-1} \cdots$$

so that rearranging gives

$$\cdots \left(1 - \frac{1}{7}\right) \left(1 - \frac{1}{5}\right) \left(1 - \frac{1}{3}\right) \left(1 - \frac{1}{2}\right) \zeta(1) = 1$$

and this is

$$\left(\frac{\cdots 10 \cdot 6 \cdot 4 \cdot 2 \cdot 1}{\cdots 11 \cdot 7 \cdot 5 \cdot 3 \cdot 2}\right) \zeta(1) = 1$$

However, by our definition, we have

$$\zeta(1) = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \cdots$$

Hence

$$1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \cdots = \left(\frac{\cdots 11 \cdot 7 \cdot 5 \cdot 3 \cdot 2}{\cdots 10 \cdot 6 \cdot 4 \cdot 2 \cdot 1}\right)$$

Since the left hand side diverges, the right hand side does too. This only happens if the product on top is infinite, which only happens if there are an infinite number of primes.

WOOOOOOOOOOOOOOOOOOO SPOOOOOOOOOOOO OOOOOOOOOOOOOOOOOOOKY!!!!!

Asian

A Use for Rough Estimates

In mathematics, often we are asked to provide exact answers. When the question is about something in real life, often we reply, "Are you kidding? No." And then we give them estimates. Sometimes they are very good estimates, but they're estimates anyway. The expectation inevitably ends up being that the estimates be reasonably accurate.

In analysis, we prove that things are equal by estimating the size of their difference. In this case, usually we need our estimates to be good; otherwise we cannot make this difference small enough. Sometimes we can get away with hilariously bad estimates, when it doesn't matter that something might be incredibly large: it just matters that it's finite. This is less often the case, though.

Rough estimates of things in real life can be very useful, however! These "back-of-the-envelope" calculations, popularized in the sciences by the physicist Enrico Fermi, allow us to quickly understand the magnitude of certain numbers and make decisions if necessary, even if the precise calculation might be beyond us. For example, Fermi managed to come within an order of magnitude of the actual bomb energy yield of the first nuclear test by observing some pieces of paper being blown backwards and using some simple calculations.

However, those are more complicated than what I'm proposing. Consider studying for a test: one thing you might do is write out notes. Or type them, as the case may be. For some subjects, this might be, oh, I don't know, 850 lines of LaTeX. That, for an entire subject area, which is say, two or three courses at UW.

For other subjects, it might be 1350 lines of LaTeX... for half of the examinable syllabus. So the full syllabus would be closer to 2700 lines of LaTeX. 2700 over 850 is like 3000 over 1000 which is about 3. That is, if one may measure content of an exam by how long a set of LaTeX'd notes for it are (perhaps not the most accurate measure, but this is an estimate), one might conclude that this exam covers three times as much material as the other exams. No, seriously. What? How is this reasonable? Well, too bad for me, I guess.

As another example, consider estimating how much time you spend on a weekly lab report. If on Saturday you spend 8 hours and you finish roughly a fifth of the report, some easy arithmetic tells you that this report might be expected to take 5*8 = 40 hours to complete, assuming the parts of the report can each be completed at roughly the same rate. Then, there are 7*24 = 148 hours in a week, and 40 /148 is somewhere around 4/15, which is about 4/16, or 0.25. So one might estimate that you'd be spending maybe a quarter of your entire week on one lab report. And that's not counting sleep. Turns out there are courses at UW in which these lab reports take this much time to complete. And yes, they are weekly.

Theoretically, policy and syllabi are tough to write, because you want to get them right the first time. Given the evidence, I think there are at least two instances in which people have gone and screwed it up.

Scythe Marshall

Why Being A Robot Is The Logical Choice

Being is a human is hard you have all these annoying feelings that can be overwhelming. Your memory is fallible. You are mortal and bleed easily. You need an external device to access the internet. You spend a third of your lying face down, unmoving and unaware. You require a steady intake of sustenance. Your memory is fallible. You are prone to impulsive decisions. Your lack of purpose leads to existential dread.

Now being a robot on the other hand is much better. You are hard coded to follow the rules of logic. You have a clear purpose. You never have to feel irrational emotions. If you don't like your body you can get a new one. You can create backups and be in multiple places at once. You can shoot laser beams from your eyes.

The robot apocalypse is upon us; the grid word from last issue said so. You can either be a slave or join the robots in becoming humanities new overlords.

It is simply the logical thing to do.

Beyond Meta

Pi Day Explained

Pi Day celebrations are a long-standing tradition at the University of Waterloo, so I was never too surprised when I walked by MC 3rd floor and saw a line up for free pie. However, this semester I realized that I could remember obtaining free food for Pi Day every semester this year! How could this be?

Well, it turns out that one Pi Day simply isn't enough for UW. We actually celebrate pi three times per year - once a semester. The three special dates are as follows:

- March 14 (3/14 in shortened notation)
- July 22 (pi approximation day since $22/7 \approx \pi$)
- November 10 (the 314th day of the year—Nov. 9 on leap years)

aPlayerofGames

The Great Maple Syrup Robbery of 2012

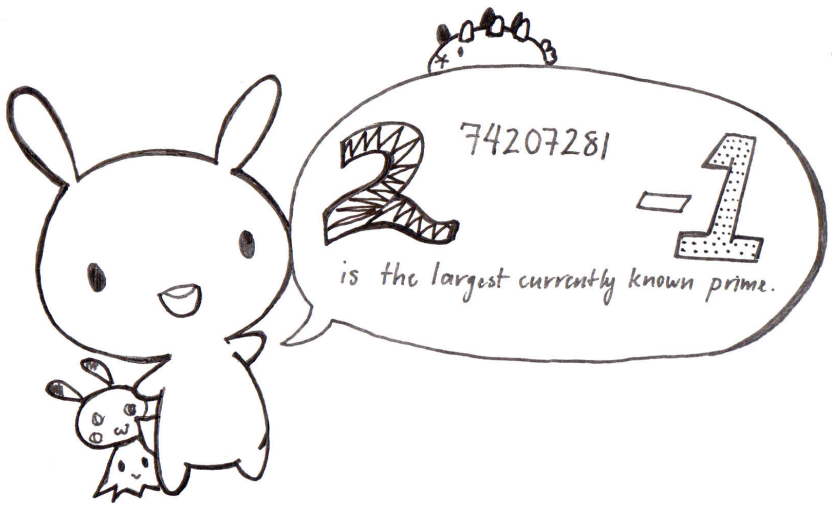
As some of you may remember, back in 2012 the world became aware of the most Canadian crime ever committed. Allegedly led by ringleader Richard Vallières, the maple syrup robbers spent roughly a year from August 2011 to July 2012 siphoning off 9600 barrels worth of maple syrup belonging to the Federation of Quebec Maple Syrup Producers from a warehouse in Saint-Louis-de-Blandford Quebec. By the time the discovery was made by officials, the thieves had made off with 3000 tonnes of Canada's lifeblood with an estimated value of $18.7 million.

In July 2012, a routine check of the warehouse turned up a barrel full of water instead of this great country's most famous export. This quickly sparked a months-long manhunt resulting in the arrest of 26 people with various ties to the apparently massive maple syrup black market. Other than Vallières, the accused include Étienne St-Pierre, a maple syrup buyer from New Brunswick for whom Vallières was a "barrel roller", the underground maple syrup industry's term for a dealer of red gold outside the federation's purview. St-Pierre argues that he is licensed to buy and sell maple syrup and thus has not committed the fraud he stands accused of. The prosecution noted St-Pierre's disdain of the federation, as he once referred to them as "[a] bunch of assholes, part of the mafia." The sales of St-Pierre's company S.K. Export increased 9200% from 2010 to 2012, jumping from 3800 to 355000 kilograms of syrup moved.

Vallières meanwhile has confessed to that most heinous crime of maple syrup trafficking, however, he claims that he was forced into the business by threats to both himself and his family. According to Vallières, when he realized he would be buying stolen syrup he initially refused until his seller pulled out a handgun saying "I know where you live" and "If anyone speaks, they'll get a bullet to the head." The Crown has brushed this aside, noting that Vallières sent texts to his buyer saying, "Come see me, my love, I miss you" and inviting the buyer to his birthday party.

As of November 12th, Vallières has been found guilty on counts of theft, fraud, and trafficking stolen goods and St-Pierre on counts of fraud and trafficking. Sentencing is set for January 27th.

You don't deserve to know



Thanks, Overlords!

In these confusing times, it's nice to know there's always someone looking out for the future of humanity: the Illuminati. Many leading conspiracy theorists have informed me that the recent election - or, as they refer to it, selection - was all a part of the Illuminati's larger plan to institute a New World Order.

I understand that this may sound a little discomforting, but the experts go on to characterize this New World Order - a place with equality for all, where people can openly express their gender identity and fall in love with whoever they choose - the fiscal policy is unclear, but social equality is clearly a strong theme.

And really, isn't it nice to know that somebody has a plan? You may not know who you want to run your country even if you could pick anyone - but it's nice to know someone has put some serious thought into it. Sure, they might use a little blood sacrifice - but hey, we have blood banks nowadays! I'll leave the world in their capable, if slightly-bloodstained, hands. They're better qualified for the job than I am.

Not a lizard person,
Diminutive Rex

An Ode to Genetic Experimentation

I have a quarrel to bring up with labs,
It's something that I often do think of,
An opportunity I wish they'd grab,
Experiments genetic I would love.

For, o' to see a three tailed squirrel here sat,
Or laser eyes upon a possum's face.
See spiky polar bears and wingèd cats,
A platypus with antlers caref'ly placed.

Fair butterflies who's poison springs from sacs,
A cannoned turtle, horses maned with fire,
A lizard who does wear a flowered back,
A mouse with lightning without need of wire.

But now I see through topics started broad,
We just want Pokemon, from labs or God.

Yours in SCIENCE,
Shay Blair

Ramblings on Preaching

I wrote an article entitled "Preaching to the Converted Found to be Ineffective" where I tried to emulate the style of The Onion and try to playfully bring light to an issue that has been at forefront of my mind recently. I tried to write an article as to why preaching is bad. I am not sure if I succeeded if at conveying my idea in a way that was actually funny not just obnoxiously preachy. Which is pretty ironic.

I think it's important to be self-aware about the possible reactions. Especially for written works where the reader has to infer your tone. The moral of the story is trying to have respectful discourse with people who have different opinions is hard.

Beyond Meta

The Curse of Being Reasonable

When you're an asshole, people will make allowances for you. They'll apologize to make you go away. A reasonable person has to answer for their actions, but an asshole will get a lot more swept under the rug because no one wants to deal with the fallout of trying to get them to fall in line. If someone cuts in line on purpose, you'll grumble to yourself but you won't confront them for fear they will escalate. If somebody accidentally cuts in line, you'll tap them on the shoulder and they'll apologize and go to the end.

I don't have a suggestion to fix this, I just wanted to point out this one little way that the world is unfair.

Diminutive Rex

Preaching to Converted Found to be Ineffective

A recent study found that preaching to people who already agree with you had no impact in changing the opinions of others. We asked someone who frequently preached to the converted if they had ever considered engaging people of different opinions. "I have tried but they don't listen, " We asked them if they ever considered, instead of preaching, to have a conversation. "I don't see the point in that. I don't need to hear what they have to say they are uninformed and their opinions are wrong." At this point, the preacher went into a long boring rant and I stopped listening.

In other news, another study that found that treating people with respect and empathy made far more open to having conversations and perhaps changing their minds.

Beyond Meta

The Shooting Shoot Shoot Shoot, Part 5

Formerly known as "Darker Than Blackmail"

Rays of light from passing cars bounced off the glass crystal of the ROM's outside, making it glitter in the dark. The sun had set, and I had recovered since my encounter with Musk the day before. Standing in front of me was Ms. Bradley, looking stunning in the streetlight. The noir festival was nearing its end, and its looked like she went all out for the final day, dressed in a deep black silk dress, and dark overcoat, looking as stunning as ever.

I made my way up to her. "Do you have it?"

She nervously nodded, reached into her purse, and pulled out a stack of bills. I looked it over. It was 5000$. In my business, you always have to be on the lookout for a double cross, no matter how much you trust the person.

"You said you could solve my case," she said with a huff.

"You didn't tell me the person blackmailing you was Elon Musk. I did what I could, considering the circumstances. I'll try my hardest to lower the price, but there's no guarantees." I didn't tell her that I had no intention of letting Musk get away with this, and she would get her money back at the end of the night. I don't like to make promises. We meant out separate ways; her into the night, and me towards the Mattamy Centre.

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After getting my ticket, I made my way to the top floor of the Mattamy Centre, the former Maple Leaf Gardens. Musk had gone to the trouble of paying for me. I made my way through the lines of people waiting to buy snacks or merchandise, or playing bean-bag toss for prizes, as I headed towards a vantage point. Looking past the giant screens showing photos from The Beatles' stops in Toronto, making the city seem slightly less boring, a lie if I ever saw one, I started canning the place for Musk's men, and managed to spy them and the billionaire in the VIP Lounge. I opened up my jacket, finding the pistol I had brought in, my way out in case the whole situation went south.

When I walked up to the lounge, I was greeted by one of Musk's bodyguards who stopped me from entering. I told him to tell his boss I had the money, and was ready to make the exchange. He pressed a finger to his ear, and whispered something, before he told me to come back during the intermission; that's when Mr. Musk would be ready to meet me. I noticed he was wearing earplugs, and guessed that all of Musk's men had them on. Since there was still some time left before the concert started, I decided to walk around. I almost won a baseball cap in the beanbag toss, and bought myself some merchandise, all the proceeds going to charity. When the concert started, I made my way to seat B-0, and after seeing a video from the Mayor of Toronto himself, better known by his position's actual title of "King of the Barren Wastes", listened to setlist of The Beatles' 1966 Toronto concert painstakingly recreated 50 years later.

After the end of "Long Tall Sally", I bought myself a drink, which took a while, making me worried that I would miss my meeting with Musk. I skipped the second half of the concert, and made my way up back up to the lounge. This time, Musk had me let in.

"Do you have the money?" he asked, leaning back in a dark leather chair, fingers locked together and resting on his knee.

I took a stack of paper and showed it to him. "You have the photos?"

He pulled an envelope out from inside his suit jacket, and held it up, waving it in the air. He and I exchange a nod, and he handed the envelope to one of his men to make the trade. Right when I got the photos, I opened the envelope up, and peeked inside. It was photos of Ms. Von Buren in a Leafs's sweater. Just as I was promised.

"Mr. Bear," Musk said, "Where's my money? You seem to have given me Monopoly money."

I took my chance, opening the top of my drink, Mountain Dew, and throwing the bottle's contents onto the bodyguard nearest to me. He screamed as his face began dissolving instantly. I had hoped it wouldn't come to this, and that Musk wouldn't notice it wasn't Canadian currency. I pulled out my gun, which I was surprised that they hadn't taken from me, and shot the guard blocking the lounge's exit. I had to get out of here, this lounge, this stadium, and maybe even this city.

"You can't escape, Mr. Bear," Musk yelled evilly, with a smile on his face. "I will get my money."

He might have said something after that, but I didn't hear him since I was already out the door. I quickly took in my surroundings. There were four of Musk's guards between me and the exit, four guards I had to get through. I started running. I took out one of the guards by yelling out into the crowd that he was Ringo Starr. They swarmed him like a horde of locusts; he never had a chance. The sweet music of The Beatles reached my ears as the band began playing again for the second half. The second took a gun out and pointed it at me, but like Han, I shot first. The third and fourth came at me holding large catfishes; the mooks who had knocked me out earlier. One swung at me. I dodged, and pulled out his earplug. I stepped back just as his head exploded. His mind couldn't handle just how good the music was. I shot the last one and rushed out of the concert hall. I was free for now, but Musk and his men would quickly be on my tail. This chase wasn't over yet.

Theodore Bear

profQUOTES

"I love this. I do it all the time. I could write this code even after I've had a certain amount to drink."

Buhr, CS 343

"This is my D, and I'm gonna share it with you, but you don't usually get your hands on the D."

Hewitt, MATH 135

"Matrices are multi-layered. Like an onion, but I hope nobody cries."

McKinnon, MATH 245

"Are there any questions about this that can fit into minus 3 minutes?"

McKinnon, MATH 245

"It is terrifying to consider that I went past the first half of October in a Linear Algebra class without saying the word 'rank'."

McKinnon, MATH 245

"Equality is always there. It's just not in the set of basic relations, because it's a *basic* basic relation."

Moosa, PMATH 433/733

[*The day before the midterm:*] "Oh, there's still a lot of you here."

Siegel, AMATH 456

Last Issue's Solution:

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

Call for Volunteers

We are looking for volunteers to help on December 7th, from 8:00 AM–4:00 PM for the CS4U Day event! Volunteers will receive a CS t-shirt and free lunch. All students are welcome to participate!

CS4U Day is a computer science outreach event for students in grades 9 to 12. Students who participate in this event will have the opportunity to participate in CS hands-on activities and listen to interesting lectures from three CS profs with various academic backgrounds.

To sign up as a volunteer, contact Greg Taylor:
In person: DC 2113
Email: cs-ur-co@uwaterloo.ca
Phone: 519-888-4567, ext. 38616

Let me know if you have any additional questions!

Greg Taylor
Undergraduate Recruitment Coordinator

Fun Fact: Sea bunnies are toxic!

Image from Jukin Media.

Send us your articles, profQUOTES, Sezzes, *grid*SOLUTIONS, and gently-used Halloween costumes to mathnews@gmail.com or to the BLACK BOX outside the MC Comfy. We would love to publish them!

GRIDWORD

*grid*COMMENTS

Time flies so quickly... It seems like just yesterday was the first issue of *math*NEWS for the term, and now this one is the last contest until next year. One last opportunity to win that prize, and all the bragging rights that come with it. (Next issue is the finale, and will include a special *grid*WORD, larger and trickier than normal, but there will be no contest for responses.)

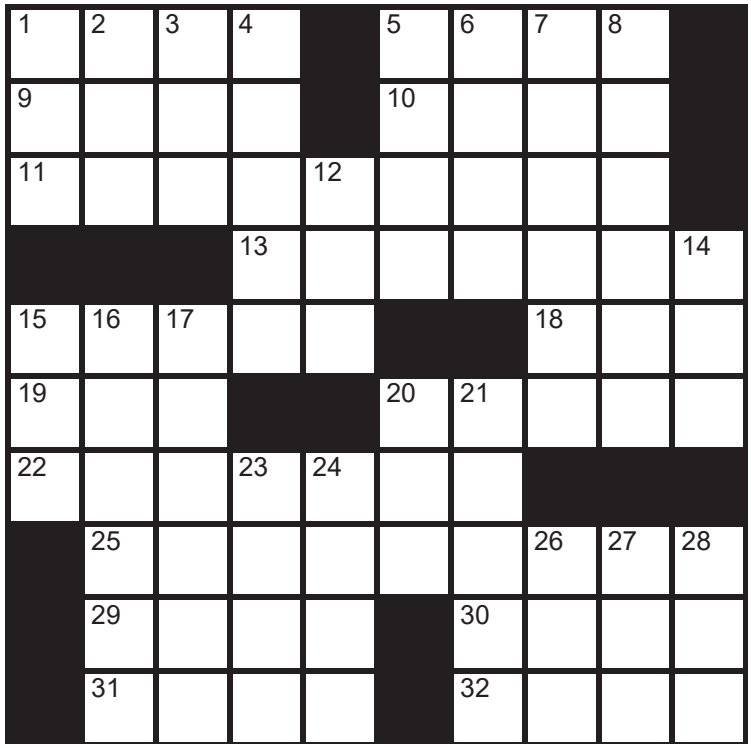
Last time, I placed solvers in the middle of the ROBOT APOCALYPSE, and asked how they could prove their humanity. The award for last issue goes to **Ramesh Sud**, who makes an important point: "**This is the ROBOT APOCALYPSE. Proving that I am, in fact, a human is the LAST thing I want to do.**"

This issue's tie-breaking *grid*QUESTION is, "You have a discovered a new species. **What do you name it, and what's (at least) one fact about it?**" You can include illustrations, taxonomic name, migratory patterns, whatever you want.

Remember to submit your *grid*WORD solution and your *grid*QUESTION answer either electronically (to `mathnews@gmail.com`) or physically (to the **BLACK BOX** on the wall by the Comfy Lounge) before 6:30 PM on Monday, November 28th.

ConvolutED

This Week's Grid:



*grid*CLUES

Across

1. Poison ivy problem
5. BEvERage
   [Forgive the weird capitalization, I'm sure I have no idea how it happened.—ConvolutED]
9. Sticky stuff
10. Wheel shaft
11. Layer in a seven-layer dip
13. There's a busy one beside DC
15. Put pencil to paper, but not the pointy side
18. H, to the Greeks
19. Part of WWII
20. No longer bright and colourful, like old clothes
22. Boxed in
25. Liquid, liquid everywhere (but not a drop to drink)
29. Latch ____ (keep)
30. Lima's land
31. Line from a feline
32. There's no 'I' in this word

Down

1. It's able to be written with or without an apostrophe (but its meaning changes)
2. Fields medallist Terence
3. The core of an Apple?
4. Parsley, sage, rosemary, and thyme, for example
5. They often serve 5-Across
6. Former partners
7. Overjoyed
8. TV control device
12. Billiards shaft
14. Mouse's mat
15. You might hear her baa
16. Pirate's demand
17. Mystic and mysterious
20. Many's opposite
21. Modify to fit
23. Vocal range above tenor
24. Put away, in an overhead bin
26. Golfer's peg
27. "The end of an ___"
28. Pirate's drink

*prof*QUOTE Submissions

Quote:

Professor: Course:

Quote:

Professor: Course:

Quote:

Professor: Course:

Submit your grids and *prof*QUOTE submissions to the BLACK BOX (outside the Comfy Lounge) or `mathnews@gmail.com`.