mathNEWS

Volume 128, Issue 2 *Friday, May 29th, 2015*

In Memory of John Nash
(June 13th, 1928 – May 23th, 2015)

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*look*AHEAD

***math*NEWS**	
May 29	Issue 2 publishes pleas and threats
June 8	Issue 3 PLEASE COME WE HAVE PIZZA
June 12	Issue 3 GETS LOTS OF NEW WRITERS

University	
June 8	On-campus final exam schedule released
June 8	Online exam schedule released
June 8–29	Adjust online course exam location
June 9–13	Spring 2015 Convocation

Miscellaneous	
May 29	Learn About Composting Day
May 31	National Macaroon Day
June 1	Flip a Coin Day
June 2	National Rocky Road Day
June 4	Hug Your Cat Day
June 8	Best Friends Day
	Name Your Poison Day

[Can't choose which? Don't combine them.—ConvolutED]

Image from http://ripleeforensicpsych.umwblogs.org/2012/08/02/overcoming-paranoid-schizophrenia-the-inspiring-case-of-john-forbes-nash-jr/. Cover image from Wikipedia Commons.

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Thomas Baxter (Gryffindor), Amy Li (Slytherin), Elizabeth Liu (Ravenclaw), Julie Sturgeon (Hufflepuff), Katherine Tu (House Targaryen)

*mast*HEAD

Every second Monday. That's all we ask. We provide lots of notice in case of forgetfulness [*Well, at least 12 hours. That's enough right?—GingerbrED]*; we put up posters and send out emails. We just want a few hours on the least interesting night of the week. And we always, ALWAYS provide pizza, cookies, and drinks.

Please tell us, then: why do some of our writers hate us? Why do they not show up to Production Night? Why do they not write us quality content for publication? Why do they not write us terrible content for publication? WHAT CAN WE DO? DO WE NEED TO RENT A BOUNCY CASTLE? WE'LL DO IT. WE WILL FIND A WAY TO JUSTIFY THE FINANCES—WE WILL RENT THE BOUNCY CASTLE.

Ahem.

It is at this time that I would like to remind our readers that Production Nights are open to anyone who wants to contribute.

This issue, we (rather spitefully) asked our authors, "What did you have to do that's more important than *math***NEWS**?"

This group attended Production Night: wibblED("sleeeppp"); darshwanda ("my calc assignment"); Beyond Meta ("Get therapy instead of writing articles about my issues"); fiorellz ("Do things for my own faculty"); tesseract ("I don't even go here. This question actually applies to me"); m4thatcher ("Riding roughshod over unionized coal-workers' rights"); RT_STUDENT ("TRAAAAAAAIIINSSSSS"); usèdname ("BRAAAAAAAIIINSSSSS"); TotallyLegitDeveloper ("Running a Minecraft server, unfortunately"); xoxo ("Doomsday plans"); GingerbrED ("I have 6 courses and 3 jobs. The sadness is real"); Zethar ("Maintaining the veil of conspiracies in the backdrop"); Pockets ("Nothing"); Soviet Canadian ("Get a haircut, get a job, get a high score in [insert obscure game here]");

This group DID NOT attend this issue's Production Night. Shame them. If you see them in the hallway, be sure to let them know how disappointed in them everyone is, including grandmothers everywhere. They might try to pass themselves off as dedicated contributors, but they are not. They might try to give excuses, but there are none. There is only *ressentiment*. Should they continue to abscond with "their" creativity, we will have no recourse but to make our next issue's filler out of their names, emails, deepest secrets, and creepiest fetishes. Unless such publication is said fetish, because then the 'punishment' doesn't serve as a functional threat. Actually, we'll publish anyway because we need the filler. But it will be filler in the places nobody ever reads, like after page 11.

bunniED ("Pet bunnies") *[Truly the most heinous criminal on this list. The betrayal hurts more than any wound.—ConvolutED];* Tubes Jr. ("Myself."); lp0onfire ("Smashing the stack for fun and profit"); Scythe Marshall ("There's something more important than *math***NEWS**?");

ConvolutED
("Contemplate the fragility of time").

Prez Sez

Greetings Mathies! It's your Prez here, writing her first Prez Sez!

Now, I was researching how to make a Prez Sez by reading a few older editions of *math***NEWS**, and learned that they mostly contained things about the General Meeting. Since we don't have a GM for a while, I figured I may as well update y'all about some other important bits of info. Here's what I've got so far:

- The office is almost always open from 9 AM–5 PM, Monday to Friday. There are still a few spots absent of office managers/workers. And yes, volunteer opportunities are still available.
- The balcony is almost always open from 9 AM–5 PM, Monday to Friday. By almost, I mean closer to 9 AM–4 PM, because I struggle with memory and time occasionally.
- THE COMFY HAS FINALLY BEEN RENOVATED! It looks like people are enjoying the renovated space. A reminder to thank those who started the Comfy Renovation project: former MathSoc execs Lauren Hurley and Ty Rozak, and the Math Endowment Fund and the Dean's Office, who funded it.

Also, elections are coming up for council positions, so stay posted for that!

Mizz Prezzie Dee (My street name)
a.k.a. Deanna Darby Barton

FoC Sez

Hi everyone!

We have officially now released the theme for Math Orientation 2015: Math's Got Game (`http://tiny.cc/OWeekVid`).

All interviews are done for all Orientation Leaders; however, you can still get involved by applying to be a {Handbook, SoftEng, Sponsorship, Fun} Coordinator at `http://tiny.cc/MathCoord`.

If you have any questions, suggestions or comments, feel free to email `mathorientation@uwaterloo.ca`.

Cheers,
Andee, Ford, and Jazbel
MathFOC 2015

CSC Sez

Roses r red
Violets, they're blu
I can't write poems I can't tie my shoe

Chris "Dante" Hawthorne
Calum T. Dalek

Thanks to all our fans for making this possible! *[You're both terrible.—bunniED]*

Feds Sez

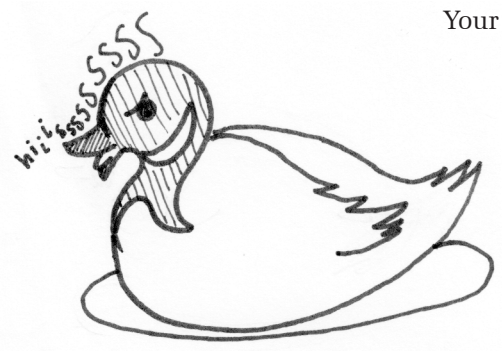
Math is infiltrating Feds council. Our agents are Fatema, Patrick, Anna, Deanna, Tristan, and Alice. You can read the files on each of our agents on the poster board across from the Comfy.

Here is fresh intel from our agents:

- The health plan is expanding to include 70 more prescriptions and is raising its fee as a result.
- OSAP is separating loans from grants.
- Feds supports Bill 64, entitled "Protecting Interns".
- Exam policy is changing to only allow unlabeled water bottles—no food or other drink.
- Dental plan fee is decreasing a small amount.

The full intelligence report was given to MathSoc Council on Thursday, May 28th.

Your Feds Spies



WiCS Sez

Hello, Mathemeticious peeps! We here at WiCS are having a super fun time planning super fun things for you all this term. Things to look forward to:

- **WiCS/CSC Goes Outside**: There will be s'mores (probably) and fire (maybe)!
- **Intersectionality Workshop**: Interested in how different kinds of discrimination interact with one another? Come out and learn with us!
- **Big CSters**: We have some awesome Big CSters events in the works. Keep an eye on the mailing list for details!

Check out our website, Facebook, and Twitter to keep up with what we're doing!

FatBox
ChairWOMAN in Charge, WiCS Ugrad

`agar.io`: Blobfest 2015

Are you studying? Should you be studying? The answer to these questions should be: yes. How do you study? The answer is by not typing `agar.io` into your URL bar. If you were to do so, you would be entering into a world of procrastination and a blob-eat-blob world. If you are somehow done midterms already (or have none), and want your time to be eaten (just as your little blob will be), feel free to play this free little game.

Soviet Canadian

VPA Sez

Howdy Mathies,

Here's some exciting and some not-so-exciting news for you:

- I am coordinating with Dan Wolczuk a campaign for mental health. In the meantime, Professor Wolczuk would like students to know that he is always available to talk about mental health concerns. You can email him at dstwolcz@uwaterloo.ca. If you would prefer to speak to a student, I am also available for contact at ktu@uwaterloo.ca.
- Professor Furino and I are working to have the Standing & Promotions (S&P) be more transparent in their petitioning process, on the recommendation of the previous VPA.
- We are also working to have mental health training for members of the S&P committee (and perhaps beyond), again on the recommendation of the previous VPA.
- PD 5 (Project Management) is being remade, and it looks pretty good. It will be more interactive, and allow students to do an alternate project management survey assignment with your employer.
- The Undergraduate Research Opportunities Conference (UROC) has been changed to October 2–4, since it was originally scheduled for the Thanksgiving weekend. Oops! Its main purpose is to tempt students who want to go into industry to consider a career in research instead. The selection process is likely to be competitive, but everyone is encouraged to apply.
- The MathSoc budget meetings were on Tuesday and Thursday, so clubs can buy things and host events now. Yay!

There will be more things to come! Until then, have a fantastic weekend.

Katherine Tu
Vice President, Academic

A Tribute to Dr. John Nash

It is with great remorse that the world was forced to bid farewell to the beautiful mind and soul of Dr. John Forbes Nash Jr. on May 23rd. Nash won the 1994 Nobel Memorial Prize in Economic Sciences for his contributions in non-cooperative games and his theory of Nash equilibria. In addition, Nash is known for his work in real algebraic geometry, partial differential equations, and singularity theory.

It is also a testament to the prevalence of illnesses of the mind, for even someone so prominent to fall prey to such problems, yet still persevere and succeed. Nash, after dealing with psychiatric facilities, found them lacking and had advocated for their reform and improvement. To many, Nash gave voice to the silent, being a visible vanguard for that cause.

Nash suffered from schizophrenia, a mental disorder characterised by psychosis, or the "loss of contact with reality," and spent considerable time receiving treatment that did not ameliorate his disorder. Even today, despite his work, psychotic disorders are not very well understood and are largely stigmatised.

It is a tragedy that on a dark rainy night Nash and his wife passed away in a traffic accident, and academia is poorer for it. In memorium, here is a payoff matrix for a non-cooperative game:

	A	B	C	D
1	0,2	1,3	2,0	3,1
2	3,0	0,1	1,2	2,3
3	2,3	3,2	0,1	1,0
4	1,1	2,0	3,3	0,2

Nash's Theorem (technically, a special case thereof) states that every finite 2-player zero-sum game with von Neumann preferences admits a mixed Nash equilibrium. The aforementioned game meets such criteria, and by the work of Nash, admits a mixed Nash equilibrium. Finding such a equilibrium is left as an exercise to the reader.

Zethar

Monty Python in Python: Dead Parrot

```
class Parrot:
      def __init__(self,typeOfPlumage,isDead):
            self.plumage = typeOfPlumage
            self.dead = isDead

def petStore(pet):
      if pet.dead == True:
            return pet
      else:
            return

norwegianBlue = Parrot("beautiful",True)
petStore(norwegianBlue)
```

Basics of JavaScript for the C/C++ Developer

You've decided to take CS 349, User Interfaces. You are forced to write in this language called JavaScript. You have no idea what a JavaScript is. Well, you're reading the right article, good sir/madam!

JavaScript was scraped from the bowels of hell itself.

JavaScript is something called a dynamic programming language (they're all the rage these days). This means there are no compiler and no types, and static analysis is not a thing. All errors are run-time errors, which means you have to run the program to find bugs. I realize I may have lost a lot of you—I mean, how can one live without a compiler!—but try to stick with me. I've been there, and we can work through this together. All variables are declared with the same syntax: `var x = value;`. What type is `x`? You don't care!

JavaScript is called an object-oriented programming language. You C developers probably don't understand so you have a lot to catch up on. Types are defined by defining an object's constructor. Instance are created by calling the constructor with the new keyword in front of it. When the constructor is called, the value of this is set so you can set properties for the object.

JavaScript is a prototype-based language, like Lua. You can achieve inheritance by defining an object's prototype. If the object doesn't define a property (what they call a variable/method), the prototype is consulted. If the prototype doesn't have it, then the prototype's prototype is consulted. This continues until either the property is found or the end of the prototype chain is hit, and you get a run-time error. Then you spend hours trying to debug spaghetti code. If you define the prototype of the constructor, then it is given to all instances when the new keyword is used.

JavaScript uses a lot of anonymous callbacks (remember anonymous functions from CS 135?). This will burn you so much. In the context of an anonymous function, this is not defined, so it will always throw an error. What you have to do is store this in a local variable, whose state is kept like in a closure.

JavaScript is horrible, and I'm sorry you're taking that class. I hope these basics help you get started.

TotallyLegitDeveloper

SI Unit of the Issue: The Comically Large Dildo (CLD)

This unit was first used in a paper by Dr. Ben Dover (or "Dr. D" as he likes to be called) in his 2008 sociology paper on the height difference between cisgender heterosexual couples. He first noted that since the average height for men worldwide is 68.11* inches (about 5'8") and the average height for women is 62.99* inches (about 5'3"), the average difference in height between couples worldwide is 5.12 inches. With an error of only 1%, the average difference in height between these couples is roughly the same as the average length of an erect human penis, at 5.17* inches. Dr. D called this the "Dildo Effect" in his work. This effect is found throughout the random samples of the population that Dr. D used in his study.

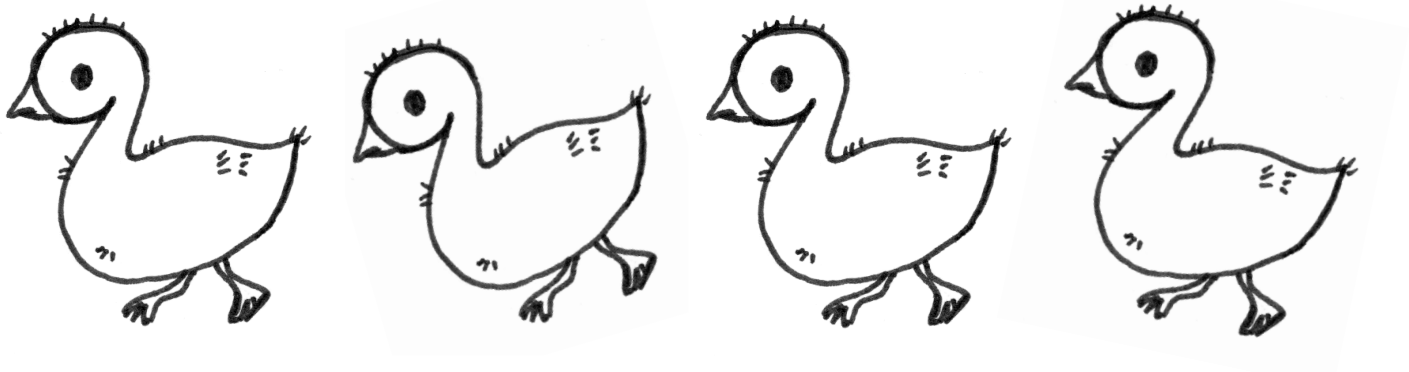
The 95% confidence interval of height differences from this sample was roughly [2.5, 15], in inches. It is interesting to note that the clinical definition of "micropenis" begins at 2.5** inches, but Dr. D was at a loss to relate the upper bound to penis sizes. To be consistent with his hypothesis, he referred to this upper bound as the size of a "comically large dildo", from which we receive our definition.

In 2011, a renowned American doctor, Doc Johnson, caught wind of this paper and became fascinated with the concept of the "comically large dildo" and began experimenting with designs. In 2012, he created the Great American Challenge, a 15-inch phallus with an average girth of 6 inches.

By this time, "comically large dildo" had entered the common vernacular, and became the standard by which people measured everyday distances and object lengths, including laptop screen size and the distance between the tips of Yoda's ears. Needless to say, the Great American Challenge was an astounding success. Due to the unprecedented success of Dr. D's original paper, other scientists began using the measurement to the point where it became necessary to standardize the comically large dildo for the sake of consistent measurement. Today, you can find the International Prototype Great American Challenge in a vault somewhere in France. Activists are now trying to repatriate it back to America.

GingerbrED

* Totally legit numbers, straight up. Seriously, look it up.
** Another number that is totally accurate.



Eureqa!

From Genetic Programming to Commercialisation

Get it, Eur**eq**a? You'll see why this is funny soon.

This is the story of a piece of software, about which the author learned at the recent SIAM Applications of Dynamical Systems Conference; a theme might be "the serendipity of research, involving a random walk through science". This is also a story that ends with a rant about how advertising and marketing seem to dominate many facets of society.

Our story starts in the early 2000s. A young postdoc in Mechanical Engineering at MIT named Hod Lipson was doing research in robotics: his idea was to write a program to automatically design robots that could move around, given a basic set of starting pieces (like arm pieces, joints, and some sort of power source). In the beginning, the program would, at random, piece together some parts, and run a simulation to see if the robot was mobile. At first, none of the robots moved at all. So the program ignored those designs, and continued to put pieces together, in an essentially random fashion. Eventually, the program found something which moved; it would keep this in mind, varying other aspects of the design, to see which of the design aspects actually made the robots move further. Repeat.

Eventually, Lipson made some 3D printings (new, at the time!) of the robots which were further along the spectrum in terms of how far they moved, and showed them off. His work found the front page of the New York Times; Lipson jokes that this circumstance led to his professorship at Cornell University.

Now at Cornell, Lipson's research took a slightly different turn. Instead of building a robot, why not build a controller for an already-built robot? With minimal starting code, he set a program off on its quest to figure out how to make this robot move. While normally, this would be somewhat easy ("Oh, I have four legs, so I should move like a scary four-legged robot spider!"), the catch is that the program has no idea what the robot actually looks like. So as the controller program flails the body around, it gathers data on what happens, and builds a model of what the robot actually looks like. Soon, it learns, by itself, that it has four legs and a central body; it attempts to move in a certainly less-than-optimal method, but move it does. That is, until Lipson disconnects one of the legs. The robot proceeds to flail again until it figures out that one of its legs is gone. Then it tries to figure out a different way of moving around, and continues on its merry way (presumably the robot isn't too unhappy about this fact).

The core idea in this work is that of system identification. Given a sufficient number of data points, the program attempts to identify the underlying structure which produces the data, and builds a model that fits the known data, or as close as it can get to fitting. So, if it works for physical robots and whatnot, why not try the same thing with mathematical models?

This was the next step. Lipson ended up writing a program which performs symbolic regression. Given a set of data points, which function outputs the data? The majority of the old methods for solving this problem used naïve expression trees, which were not only ineffective (as they tended to overfit the data), but were also slow and cumbersome. The new method used a more sophisticated approach: while trying different expressions, identify, in some way, the data points which cause the most disagreement with the model, and figure out how to best fit those points. Repeat.

This, in a roundabout way, is emblematic of science in general. You start with a model. There are very likely parts of it which are wrong; the community argues about the parts which are most wrong, and if those parts can be fixed without changing the model completely, they are. Otherwise, a new model is proposed, which hopefully better fits the available data, and the process repeats until we, potentially, achieve an exact fit, or else have the ability to achieve unbounded precision in our measurements to verify the model.

This isn't to say this algorithm is perfect; it failed at interpreting the stock market, and it failed at finding a formula for the primes, although it did compute a number of polynomials which spit out prime numbers for a large number of inputs. (You may wish to try to show that there does not exist a non-constant polynomial with integer coefficients for which $f(n)$ is prime for all positive integers n.) But it managed to fit some data sets, including some data from CERN. It discovered named theorems! Impressive, it was. Again, however, it struggled at times: modifications to the algorithm involving derivatives by Michael Schmidt, Lipson's student, allowed the algorithm to do much better. At this point, the algorithm had a name: Eureqa, with emphasis on the output equations. With subsequent fixes, Eureqa was even finding basic invariants of the system, though this was still an area to improve, as was its attempts at dealing with data sets with noise, or randomness. Moreover, the equations it spit out were just that: equations. There was never any hint of meaning. Human knowledge and intuition still played a part; only we could make any sense of the output.

That part of the story stops there—Lipson and Schmidt are working on different things now, although they carry along the talents earned and lessons learned from their work on Eureqa. The next part of the story focuses on what happened to Eureqa (to the best of the author's knowledge, based on some Internet research). Around 2011, the company Nutonian was founded, and subsequently acquired proprietary rights to the Eureqa software. Nutonian is a company based on providing high-powered data science tools to businesses. Its website seems intent on selling Eureqa as a product to give your team of data analysts a much easier job—or worse, to replace them. It seems like a miracle product; reading the selling points on the page (`http://www.nutonian.com/products/eureqa/`) feels like you found your way to the debug menu in your favourite video game, where you can find all of the difficulty-eliminating cheats. You couldn't possibly go wrong!

Except that this is all clearly over-the-top. Data science is indeed a valid tool, and it's important in making reasoned decisions in business, but there is no finite set of miracle formulae, no one simple decision to make, no perfectly accurate predictions. Marketing is an affront to human integrity: we lead each other to believe that there is something so incredibly, unbelievably, and impossibly error-free out there, and that we want it, regardless of necessity. Worse yet, we delude each other into believing that we actually need such things.

Eureqa, as an academic concept, is brilliant. Symbolic regression may yet prove itself further be one of the most powerful tools available to scientists working to solve problems spread across every field. But Eureqa, as a product, is just another explosive device buried in the minefield of business, lurking just under the surface, ready to consume your wealth for the false promise of infinite knowledge. Nothing is this perfect; useful, perhaps, but not perfect. It's up to us to avoid the trap.

Good luck.

Scythe Marshall

[Information gleaned from Wikipedia entries on Lipson and Eureqa, the Nutonian website, and personal notes taken at Lipson's plenary talk at SIAM DS '15, entitled "Automating Discovery".]

90% P.O.P.

*N Reasons Why It Never Rains on math**NEWS***
Production Nights Despite the Forecaster's Claims

1. The gods are not pleased by *math***NEWS** production night (for any number of reasons, including but not limited to: bad puns, lack of actual math, and general shenanigans).
2. The *math***NEWS** editors are gods who do not want their pizza to be rained on.
3. The universe delights in deliberately ruining my carefully laid plans.
4. The universe knows that my world domination plans require rain and thus deliberately thwarted them. The world might not be ready for me yet, but it will be. Soon.
5. The university campus has a climate different from that of the rest of Waterloo. This is plausible, as it has been noted that the misery of Waterloo students has resulted in extreme weather patterns directly over the university. This misery usually manifests as storm clouds (90% tears and 10% despair) and thunder.
6. It's a conspiracy concocted by the administration to make university appear more exciting and unpredictable.
7. The geese are holding up the rain, just like they hold up the university traffic. They require the ritual sacrifice of a student from each Waterloo faculty before they start to co-operate.
8. The Environment students are playing jokes on the Mathies. Not cool.
9. Aliens.
10. The Weather Network, like many things in the world, is fallible and not to be trusted.

xoxo

N Things TAs Dock Marks For

- Handing it in late
- Not following the assignment guidelines
- Forgetting to write your name
- Smartass (though technically correct) answers
- Ciphering your assignment so the Soviets can't read it
- Swearing in the comments
- Blackmail that fails
- Bribery that fails
- Letting blood from your human sacrifice drip onto your paper *[It looked like I did this once and didn't lose marks. —Zethar]*
- Illegible writing
- Naming your functions fucktions
- Devolving into a fairy tale halfway through your proof
- Forgetting the cover sheet
- Writing your entire program in Brainfuck
- Blaming bugs on demons
- Channelling the prophecy that foretells the end of times
- Incorrect answers

Yours in marking,

Shay Blair.

Talking about Taboo Topics

There are a lot of topics that are deemed inappropriate for polite conversations. These are often topics that are important to have discussions about. However, people hesitate in bringing them up as they don't want to appear weird.

Well, as it turns out, there is a very simple trick to making these topics become acceptable. You just have to acknowledge the taboo before you start to talk about it. People are more accepting of breaking guideline of society if they know it was done deliberately with an understanding of the rule.

For example, if I were to spend the second half of the article going on a rant on how hard it is to find tampon dispensers on campus, it would seem weird and off-topic. Periods aren't something people normally talk about. The difficulty in finding pads is something that affects a non-negligible portion of the population and this is a problem that the university administration should address.

Last time I checked, I had to go 17 bathrooms before I found one in Needles Hall. The Women's Center and Turnkey Desk also give them out for free. However, no one knows this, because this isn't an appropriate conversation topic.

This article can be used as a convenient segue for a delicate conversation of your choice.*

Beyond Meta

* There are some topics which are going to be weird no matter how you segue them.

The Pastry Genie Rises Again!

It has been brought to my attention that someone did not appreciate being referred to as a 'nerd' in my previous article. As a result I have been forced to change my standard greeting from 'Good day, fellow math nerds' to 'Good day, fellow math nerds and Mark'. For any other issues please direct your concerns to my complaints department located in The Fiery Pits Of Hell, Apartment 17. Just three doors down from Justin Bieber's summer home. Thank you.

Good day, fellow math nerds and Mark. It is I, the Pastry Genie, who is once again here to help you with your baking needs. Now the other week I was kind and shared my favorite chocolate cake recipe with you. Yet, for some reason I got called things like 'mean' and 'evil' and 'horrible'. This hardly seems right. I was very kind and taught you how to make lovely chocolate cake. Walking across campus all I could smell was the cocoa powder in the air. I could see the chocolaty residue lingering at the corners of satisfied mouths. Yet, not a single one of you thought to bring me any. And you called me the mean one. Hang your heads in shame. You are lucky I am the forgiving sort. Unlike most of us Genies, I am not vengeful. I understand that you are only children. Barely into your first three decades of life. I am even willing to look past this awful behaviour of yours and teach you something new.

Today we will be talking about substitutions in baking. Not numerical substitutions, but ingredient substitutions. We are poor university students after all and don't always have those fancy ingredients on hand. Like eggs, or brown sugar or buttermilk. Now before we begin you need to understand that when using substituted ingredients your recipe won't necessarily behave in the same way as the standard recipe. And some things you just can't substitute. You cannot replace the eggs in scrambled eggs with a banana. It just doesn't work. The guide below is for baking purposes with such things as brownies and cakes and cookies. Please use it do your best judgement.

- 1 egg = 1 mashed ripe banana
- 1 cup honey = 1 cup maple syrup or [1¼ cup sugar + ¼ cup liquid (use same kind as recipe calls for)]
- 1 cup brown sugar = 1 cup white sugar + ¼ cup molasses
- 1 Vanilla Bean = 2 Tablespoons vanilla extract
- 1 cup buttermilk = 1 cup milk + 1 T lemon juice or vinegar (mix together and let stand 5 mins)
- 1 teaspoon baking powder = ¼ teaspoon baking soda + ½ teaspoon cream of tartar
- 1 cup Self-rising flour = 1 cup minus 2 tablespoons all-purpose flour + 1½ tsp baking powder + ½ tsp salt
- 1 cup mini marshmallows = 8-10 large marshmallows
- 1 teaspoon fresh grated ginger = ½ teaspoon ground ginger
- ¼ cup coffee (brewed, strong) = 2 tablespoons instant espresso powder in 3 tablespoons hot water
- 1 tablespoon arrowroot starch = 1 tablespoon cornstarch
- 4 leaves (sheets) gelatin = 1 (¼ oz) envelope powdered gelatin

Those are some of the basic substitutions you'll be able to use in the kitchen. Now I imagine some of you are wondering if I will once again give you a delicious recipe. I'm not sure how deserving you are but I suppose I could give you another. I'm feeling kind of loaf-y today. Perhaps like banana bread? I do hope that you have enjoyed today's lesson. Perhaps next time I'll tell you something delicious you can do with leftover banana bread. Ha! Who are we kidding? There won't be any leftovers.

Pastry Genie's Nummy 'Nana Bread

Ingredients:

½ cup butter, room temperature
1 cup sugar
2 eggs, lightly beaten
4 bananas, ripe, mashed
1 ½ cup flour
1 teaspoon baking soda
½ teaspoon salt
½ teaspoon vanilla extract
1 teaspoon cinnamon
½ cup walnuts (or any nut), toasted (optional)
½ cup chocolate chips (optional)

Directions:

1. Preheat oven to 350 degrees F.
2. Cream together butter and sugar.
3. Add eggs and mashed bananas.
4. In a separate bowl stir together flour, baking soda, salt, and cinnamon.
5. Add dry ingredients to the banana mixture.
6. Add vanilla and nuts and chocolate chips.
7. Stir until just combined.
8. Pour into greased and floured loaf pan.
9. Bake 55-70 minutes or until golden brown and toothpick inserted in centre comes out clean.
10. Cool completely before slicing.
11. I recommend using a bread knife to slice it so it doesn't crumble apart. The bread knife is the serrated blade that reminds of you a little bit of a saw.
12. Enjoy with butter or on its own.(to toast your nuts spreads them evenly on a baking sheet)
13. Bake for 5-7 minutes at 350 degrees until just starting to brown.
14. Let cool.

**Three logicians walk into a bar.
The bartender asks, "Do all of you want a drink?
The first logician says, "I don't know."
The second logician says, "I don't know."
The third logician says, "Yes, please."**

CSIS Announces New Online Dating Service

Are you still looking for that special someone? If so, the Canadian Security Intelligence Service (CSIS) may be able to help. With the passing of bill C51, CSIS gained the authority to utilize mass surveillance and collect data about Canadians' telephone and online activities, which is then analyzed and stored in their databases.

Through this surveillance, what CSIS can tell about you includes your religious and political beliefs, your financial status, and even your sexual orientation and fetishes. While this information is rather ineffective at stopping non-existent terrorist plots, it does allow CSIS to determine whether two people are compatible with each other. With this in mind, CSIS have started their own online dating business.

We reached out to OkCupid founder Chris Coyne, and this is what he had to say:

```
CSIS will, without a doubt, dominate the online dating market. Traditionally, our services require the user to voluntarily give up information that can identify them, their personalities and beliefs. While this works in most cases, a combination of human error and dishonesty can create many false positive matches. With CSIS, this is no longer a problem. They know the truth about the user and their data is extremely accurate. I don't see how other sites will be able to compete.
```

Inspired by CSIS, the NSA also plans to break into the online dating market next year.

theSMURF

How to Be a Dictator

Or "How I learned to stop worrying and start subverting all of my subjects"

You have violently couped the previous government of your nation, and find yourself in the position of ultimate president for life. Unsure what you need to do as leader of this nation? This quick quide will help you become the most glorious leader ever.

- If someone says something you do not agree with, they are obviously either a fool or a traitor. Do not give a second thought to imprisoning/killing/silencing these individuals who would try to undermine your perfect plans/ideals.
- If you feel you are not doing well enough financially, raise taxes. The peasants do not understand how economics work, and are obviously hoarding money, causing your glorious economy to falter. With the money in your hands, trickle-down effects will make the economy so much stronger.
- If there is a nation near you that is stronger militarily, you must seek military equipment from any nation willing to sell it. You cannot trust those vile neighbours not to invade in a moment's notice. If they do invade, demand assistance from the UN.
- If there is a nation near you that is weaker militarily, invade it. The population will welcome you a hero as you protect them from the outside threats of those vile neighbours. Those who fight against your protection are fools and terrorists; deal with them as you would those mentioned earlier.
- Don't forget to also build plenty of monuments of yourself in public spaces; the citizens will be inspired by your glorious image.

With these basic pointers, you will do fine. In no time, your nation will be setting the standards for the rest of the world, and you will go down in history as one of the greatest peoples to ever live.

Soviet Canadian

How to Infiltrate an Event

There are many awesome off-limits events that you would like to attend. Unfortunately for you, you weren't invited. Have no fear, since this handy dandy guide will get you past security.

It's easy. All you have to do is volunteer. Most of these events are run by volunteers. It usually doesn't take too much time, the work is minimal, you get in free, and you now have a brand new T-shirt.

Bonus points if you end up working security.

Beyond Meta

All TV Pundits the Same Person

This week, while watching a Doc Zone episode called *Trouble with Experts*. I discovered a slightly-below-top secret conspiracy. The program was about a bunch of experts declaring with great confidence that most experts are unreliable—even more so if they state their advice with absolute certainty. This is when I realized that all TV pundits are in fact one shapeshifting, teleporting individual who uses their powers to have conversations with themselves in order to address their attention issues. The alternative hypothesis would have us believe that there are thousands of these ignorant people pretending to be experts, and that's too depressing to consider.

Beyond Meta

Let Y be "*math*NEWS rocks." Let X be $(X \Rightarrow Y)$.

$$(X \Rightarrow X) \implies X \Rightarrow (X \Rightarrow Y) \implies X \Rightarrow Y \implies X \implies Y \quad \blacksquare$$

History of the (Hello) World
Part 1

In a course in my first year, I had to interpret history through feminist, Marxist, and humanist lenses. Here I do the same with the history of programming through the lenses of debugging, research, and Marxism.

Part 1: Debugging

Debugging is often the most painful and tedious part of any programming job. What these tortured developers forget is that there is a trivial solution—write bug-free code. One school of thought is that test-driven development is the key to writing bug-free code. Another opinion is that bugs do not exist and every undocumented feature is just that, a feature (see: Windows ME). In reality, writing bug-free code is much easier than these complicated methods: write all code in assembly.

For the unaware, assembly is the code that runs in the CPU. It has a direct mapping from commands to binary. For example: `add r0, r0, #0` translates to `00...00` (32 zeroes in a 32-bit architecture, 16 in a 16-bit, etc.) in almost all assembly languages. It has the unique property that the instruction is exactly what the CPU executes. As a result of this property, every line is literally translated into a computer command; there are no accidental side-effects and no hidden features.

Writing code in assembly is so easy that the entirety of RollerCoaster Tycoon was written in assembly by one person. A game that is completely bug-free; something impossible to achieve using today's methodologies. So why do we not use assembly? Early on in the days of programming, people wanted to reduce the amount they had to write. So languages like A, B, and C were invented to turn into assembly via 'compilers'.

These compilers are the devil incarnate themselves. Over the years growing to monstrous size and complexity in order to squeeze those 100 lines of code into fewer and fewer lines of completely undebuggable assembly. Through a combination of fear tactics and undocumented features these compilers make code smaller and faster with each iteration, including their own code. With no escape from compilers, programmers decided to do the next best thing: invent their own magical meta-CPUs. Thus, the JVM was born. The pinnacle of bug-free, all JVM code is easy to understand and easy to write.

If only they had not invented Java.

```
#ifdef DEBUG
#undef DEBUG
#endif
```

RT_STUDENT

Finding Your Soul Mate

Your soul mate—the person you share everything with, a person you can always count on being there for you, someone who just gets your humour.

After a long time searching, I have found that my soul mate was in my heart (and also in the rest of my body), because my soul mate is myself. I will always be there for myself. Never shall my soul mate and I be apart, even if I may sometimes want to, after the horrible jokes that my subconsciousness inflicts on me. And let's not even get started on the teasing. Imagine a being that knows all your secrets, with no line they can't cross.

Despite these flaws, I will never abandon my soul mate, for without them I would be nothing. They make me whole and I will gladly spend the rest of my existence with them.

The only problem I have with my soul mate is how they have some physical limitations that prevent them in giving me a good hug. Thankfully my soul mate is very understanding and very supportive in letting me see other people.

Yours in mine,

Beyond Meta

How to Be a Playground Bully

- You know a lot more than the other kids. If someone says something you do not think is true (or that you do not understand), don't worry. Just smack them around, which will shake the silly thoughts from their head.
- If you are short on lunch money, look to the other kids in the yard. It's unfair that *they* have so much You need to redistribute the wealth in a manner that is more fair to you.
- If a new kid appears and seems stronger than you, you need to arm yourself with whatever you can. They are obviously not to be trusted, and any edge you can get will be an advantage. If you lose a fight, go running to the teacher and tell on that no-goodnik.
- If there is a kid noticeably weaker than you, make sure to train them into a stronger child by attacking them whenever convenient. They will become stronger in no time and will thank you in short order.
- Don't forget to tell everyone how great you are and the great things you have done. A little exaggeration never hurt, and it will help them look up to your great example.

If you follow these simple examples, you will be a shining beacon of what a child should be, and everyone will adore you.

Soviet Canadian

100 kilopascals go into a bar. So do 0.987 atm and 14.5 psi.

N Pieces of Advice on Running a Minecraft Server

- Don't run the vanilla server. Use Spigot or Sponge which have plugin capabilities.
- Use auditing plugins; vanilla has limited auditing.
- In fact, install ALL the plugins—people love plugins.
- Anti-grief and anti-spam and anti-cheat plugins will be your best friend because they reduce administration costs.
- Rent a VPS and learn to embrace the terminal, preferably one with good internet.
- Be able to give your Java process at least 1024 MB of memory to be happy.
- Take regular backups, at least once a day.
- Follow good practices with backups, like storing them both online and offline.
- Be mentally prepared because you will be dealing with kids from 10–18.
- Create a forum and website, then watch as no one registers and you waste your time.
- Don't, just don't. Take it from me: you are NOT ready to run a Minecraft server. It's not worth it. You will lose your mind trying to deal with the irrationality that is kids of age 10. Much sleep will be lost as you run around, listening to eyewitness testimony related by the most incapable of human beings, in order to track down who killed their HORSES. Except you didn't follow my advice and you have no audit trail so you just sit there, staring at your screen in frustration as you explain to them that they aren't getting their horses back. You try to explain to them to `/trust` no one and they still whine and complain when their diamonds disappear from a chest that is not on land that they own! But they never listen! They never check their mail, never check the website, and never check the forums so that you can't disseminate important information! And then you're so angry that you end up writing a *math***NEWS** article. Don't do it! Save yourself.

TotallyLegitDeveloper

New Music Roundup

The theme this week is good music that came out in the last two weeks. But it's surprisingly tough to find five good tracks that came out in the last two weeks, so I relaxed it to good music that I started listening to in the last two weeks.

1. **Ryan Caraveo - Floating**
Ryan Caraveo is a rapper out of Seattle. He doesn't have a song with over 20,000 plays on Spotify, but he REALLY should. Go listen to his music. *Floating* is his newest single, and it sounds exactly like what a Seattle rap song should sound like (e.g. chill). Also, it's also got an adorable music video.

2. **Cosmo Sheldrake - Rich (ft Anndreyah Vargas)**
Cosmo Sheldrake released their EP *Pelicans* last month and it sounds kind of like a more-scattered *alt-J* (which sounds unbelievable, but trust me). *Rich* is the most polished song on the EP, and it lives up to the potential of the genre.

3. **Big Wild - Aftergold**
I found *Aftergold* while listening to music similar to *ODESZA*, but it sounds more like *Clams Casino* to me: heavy beats and atmospheric synths. It's a good song to inspire you when you've been working on homework for like six hours straight.

4. **LANY - 4EVER!**
4EVER! is a bit of a guilty pleasure song. It's 80's bright and poppy, but that's OK if the sun is shining and you have headphones on. It'll probably get annoying in a week, but for now it's something to dance to on my walk home.

5. **Powers - Beat of My Drum**
Powers isn't big yet (they have just three songs on Spotify) but they're going to be. Why? Because their music is radio friendly. *Beat of My Drum* is clearly the standout, and it sounds like new *Maroon 5* mixed with old JT. And yes, you can sing to it.

[flustered]

** I'm putting these songs on a math***NEWS** *playlist so search for it on Spotify!*

Hipster *math*NEWS

I was randomly scrolling through my Facebook feed when I came across a horrible article. At first, I assumed that it was a Buzzfeed clickbait special. I mean, wouldn't you think so with an article entitled *4 Reasons Why Feeding Bread to Ducks is Stupid*? But no, it was a CBC news article. I had the shocking realization that every medium is adopting this kitschy list structure to appeal to the masses with their short attention spans.

Then I realized that *math***NEWS** has been doing "N Things" for yeeeeears. Go hipster *math***NEWS**! Not only are our lists more amusing than the ones you'll find on viral "news" sites, but there are markedly fewer gifs and pop-up ads. Support the arts—keep reading our shit!

GingerbrED

Is Our Interconnected Society Detrimental to Relationships?

Studies done by some science people somewhere say that the most important thing for a long-lasting, successful relationship is how partners respond to one another's calls for attention. With a world of social media, sharing with people has become a lot easier, to the point where one feels less of a need to reply to these conversations. Here at *math***NEWS**, having only read a brief online article on the topic we can only hope to speculate that this marks the end times for all human interactions.

Beyond Meta

profQUOTES

"Yes, I have an eighteen-year-old daughter. I started young."
Campbell, PSYCH 101

"The Dress is clearly black and blue. End of story."
Campbell, PSYCH 101

"Who has MySpace? Don't raise your hand—you'll embarrass yourself."
Attaulah, CS 330

"I could go on at length—and I will."
Terzian, ENGL 108A

"But continuity does not imply differentiability. This is very wrong. If I had a mark to give for how wrong this is, it would be 70. Out of 10."
Clouâtre, MATH 137

"This trick is very simple, so you won't see it on the final exam. But in the real world you might be able to use this. On the mean streets of Kitchener, maybe."
Clouâtre, MATH 137

"You do your hunting and gathering at Sobey's."
Furino, CO 480

"Spear your nachos."
Furino, CO 480

"A mathematical terrorist stops you and asks, 'What's the square root of a?'"
Furino, CO 480

"We say that a face is exposed—and this does not mean that it is on the cover of some cheap magazine."
Levent, CO 471

N Emails from the Spam Folder of mathnews@gmail.com

- Swap Sex Now
- Mathnews offline audio message temperance
- 290$ B HECKONLBO KRHJIOS 3ITJ RJKEKAP...[cmnwup] ($290 in a few clicks it is real...)
- YOUR CANDID RESPONSE NEEDED
- are you happy with your now hair supplier?
- CAN I TRUST YOU?
- An erection always requires the interaction of your brain, nerves, and blood vessels.
- Errorless ways to gratify your girl
- Mathnews. painstakingly new incoming audiomessage: 9:59 astride
- Warning: your Paypal account has been limited!
- Do you want to achieve the perfect bed energy?

[As of the time of writing, the spam folder has 69 unread emails. Hehe. 69.—ConvolutED]

GingerbrED

profQUOTES From 10 Years Ago

"If you put a microscope on it, you couldn't tell the difference between a linear function and a differentiable function."
Redekop, ECON 371

"If an isomorphism has a domain equal to its codomain, then it's an automorphism, named after the Italian mathematician."
Marcoux, PMATH 336

"With a compact set, troubles don't have any place they can escape to!"
Hare, PMATH 351

"The amount of knowledge I have has kernel 0."
Wolczuk, MATH 136

"We're not going to assume anything about the model, except that the engineers are always wrong."
Furino, CO 350

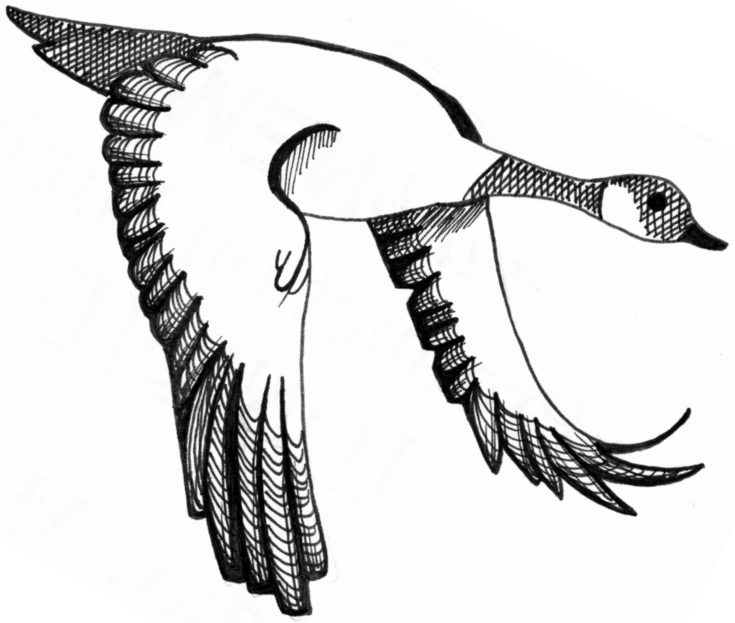
"You get an overflow error on your calculator when it starts smoking on you."
Furino, MATH 135

"What you see as 1 may be (1,1), (1,0), or a nicely shaped gazelle."
McKinnon, PMATH 345

"You all know what RAM is. It was probably the third word you ever said: Mom, Dad, Random Access Memory."
Vasiga, CS 241

"When you're on the bus visiting Aunt Bertha, you can do subset constructions. It kills hours! And people will stare at you!"
Vasiga, CS 241

"The first half of today's lesson will be reminiscent of grade two. The second half will be harder; it will be reminiscent of grade three."
VanderBurgh, MATH 135



Cool Optimization: Part I

When I helped with an open house for the Math Faculty, my capacity to argue that we are better than U of T was greatly expanded. One such argument is that unlike the university whose website once received redirected traffic from `waterlooreejects.com`, we have an optimization department and many fun courses within it. Optimization courses can fit into most math majors and explicitly satisfy requirements for CS and Finance-related majors. I will write a series of articles about cool results you would see within these courses to hopefully encourage the reader to take advantage of these unique offerings.

Most generally, optimization concerns itself with minimizing or maximizing the value of some function (the objective function) over some subset of $\mathbf{R}^n$ (the feasible region). The simplest class of such problems has a linear objective function over a set defined by linear inequalities and is called linear programming. We can solve these problems in polynomial time.

A well-studied NP-hard problem is that of finding a Hamiltonian tour (a cycle that contains every vertex) in a graph. We can model this as a linear objective over quadratic constraints if the feasible set is the set of incidence matrix of cycles in the graph. That the matrix has 0-1 entries is accomplished by checking that entries satisfy the quadratic x^2-x=0, checking that its edges are in the graph is linear, and checking that the matrix is a cycle means that squaring the matrix gives either zero or two paths between two vertices. The objective function is the sum of entries of a feasible matrix. The problem is to maximize this value, and if the maximum is the number of vertices in the graph, then we know that a Hamiltonian tour exists.

Turns out that this is also a linear program! Hold your horses for writing to the Clay Institute though, because we'll see what happens when we do this reduction.

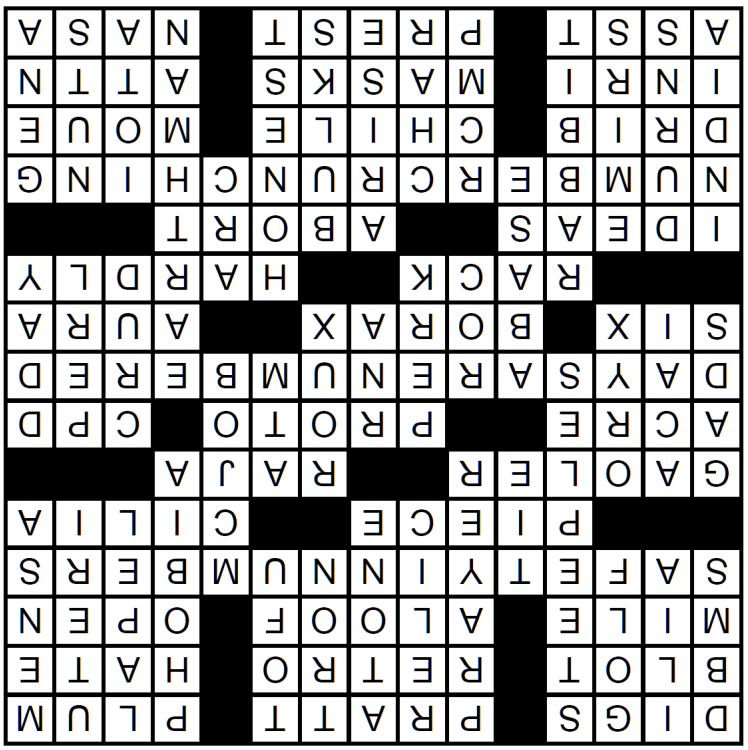
My claim is that every optimization problem ever can be expressed as a linear optimization problem over a convex region. Suppose our problem's feasible region is $U \subset \mathbf{R}^n$, and that the objective function is $f : \mathbf{R}^n \to \mathbf{R}$. Consider $V \subset \mathbf{R}^{n+1}$ defined by $v \in V$ iff $v = (u, f(u))$ for $u \in U$. Projection in the $(n+1)^{\text{th}}$ coordinate is a linear function. Then define $\overline{V}$ as the convex hull of V. Closing the set under convex combinations does not increase the optimal objective value as every new point will have its last coordinate be a convex combination of feasible objective values. Our original problem is equivalent to the problem of optimizing over the linear objective of projection in the last coordinate over the convex set $\overline{V}$. For finite sets (like the feasible region of most graph theoretic problems like the one above), the convex hull will be a polyhedron describable by the intersection of closed half-spaces, i.e. linearly.

The catch is that finding the convex hull is hides all the complexity, so by the time it's an LP we have already solved most of the problem. As such another day without a proof of P=NP goes by; signing off.

Next time I will talk about defining an NP-hard problem and approximation algorithms.

FrozenWinters

Last Issue's Grid:



Tales from Anime North

For my first trip to Anime North, it was an awesome weekend with hard-to-describe scale and atmosphere. Conditions like these can create cultural bubbles where all sense of normality can be thrown out.

Having over 30 000 people descend upon the Toronto Congress Center and the nearby hotels was chaotic. Lines for food snaked through every nearby restaurant and often out and around the building. There were overcrowded hotel rooms and police directing traffic. There were detailed costumes and hair forming waves of colour that I'm sure tall people could have seen better than me.

Being immersed in a world so obviously different was a real experience, and even if this culture isn't your thing, I suggest everyone check out a major convention of some sort in their life.

Pockets

GRIDXGRID

*grid*COMMENTS

If yes, six sieves. (French Italian, Dalmatian Danish)

Hello again, everyone! I am pleased with your tribute of 14 submissions to the *grid*WORD, more than half of which were entirely correct. In fact, I'm overwhelmed! There were so many great and SIlly answers that I can't list them all; so here are some honourable mentions for: "How do you look out for number one?"

"By killing #2"—John Bertoni

"Arnold can look out for himself"—Rob Schluntz

"By checking out #2's butt"—Micca Vergara

They were all amazing answers, but my favourite answer, and thus the winner of thiS Issue's *grid*WORD prize is:

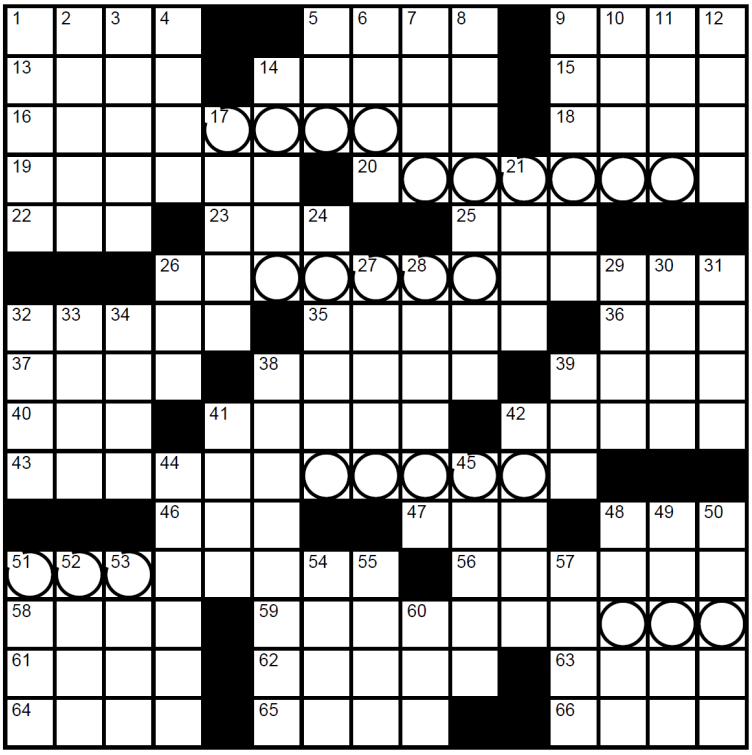
"First, find the set of loneliest numbers..."—Matt Thomason

Matt, please viSIt the *math*NEWS Office when you have a chance and show your ID to receive a $5 gift card to the C&D!

This time, I have constructed a puzzle with a less-than-hidden twist. (Particularly astute solvers might notice an extra group of letters that could be circled, but are not.) Remember to submit your *grid*WORD solutionS In the **BLACK BOX** by the Comfy before **6:30 PM on June 8th**. Ties will be decided by the answer to the *grid*QUESTION: "What is the common unit that is used to measure human motivation?"

ConvolutED

This Issue's Grid:



*grid*CLUES

Across

1. Covered with frosting
5. Miss
9. Barren
13. Something that's not happening
14. Belief
15. Junction
16. It splats pests
18. Boxing Day special
19. Recruit
20. Impeded
22. Colony member
23. Forty winks
25. Modern lambda
26. What 128 is to this *math*NEWS issue
32. Flinches (from)
35. Pinball penalties
36. "___ to Joy"
37. Sassy
38. Small lakes
39. Sense
40. Long time
41. Ceasefire
42. Sentimental
43. Solid floor
46. Tease
47. Danson of "Cheers" and "CSI"
48. Bird call
51. Shocked outcry
56. Coloured annulus
58. Harvest
59. Condition treated with proton-pump inhibitors
61. Mold
62. Heaviest (known) noble gas
63. Slate
64. Barges
65. Residue
66. Flip through

Down

1. Opposite of ultra
2. :
3. Pyramid place
4. Medicinal amount
5. Morsel
6. Precedes amphetamine or adone
7. Creative spark
8. Pesters
9. Author of the first Ontological Argument
10. Laugh out loud
11. Not doing anything
12. Ownership document
14. Ottawa's Rideau
17. Lushes
21. Also
24. Extinguish
26. 60 Down physician
27. Cut into small pieces
28. Firstborn
29. South African War
30. Biblical garden
31. Lean (on)
32. Blueprint detail
33. Life saver
34. Kurdistan country
38. Get on the plane first
39. Watch chain
41. Element of algebraic geometry
42. Corps
44. Chambers
45. What we Desire 2 do
48. Infant illness
49. Bastard wing
50. Pallid
51. Killer whale
52. Discern
53. Camouflage
54. Disney lion
55. Bury
57. Young newts
60. Canis lupus familiaris

Send your articles, *prof*QUOTES, adult geese, and *grid*WORD solutions to `mathnews@gmail.com` or the BLACK BOX on the 3rd floor of MC!