

math

NEWS

Volume 131, Issue 4

Friday, June 24th, 2016

im NEWS

VOLUME 131 • ISSUE 3

FRIDAY, JUNE 10TH, 2016

SUMMER SEASON* EDITION



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***math*NEWS** abandons new format
after discovering it has the same performance
guarantees as MongoDB

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lookAHEAD

mathNEWS

June 24	Issue 4 is seen lurking on campus
July 4	Writers produce issue 5 content
July 8	Issue 5 emerges from the shadows

MathSoc

June 27	Free candy at MathSoc office
June 28	Free candy at MathSoc office
June 29	Free candy at MathSoc office
June 30	Free candy at MathSoc office
July 1–7	Free candy at MathSoc office
July 16	Beach Day

University

June 27	Last day for online students to change exam location
June 30	Petition to the Registrar to Register Late form required to become fees arranged after this date
July 1	University holiday: Canada Day
July 8	Drop, penalty 1 period ends

Miscellaneous

June 24	Take Your Dog to Work Day
June 27	Sun Glasses Day
June 29	Hug Holiday
July 1	Canada Day Celebration at Columbia Lake Fields
July 7	National Strawberry Sundae Day

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ISSN 0705—0410

Founded 1973

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Zishen Qu (a lonely editor)
Katherine Tu (no longer an editor)

mastHEAD

Today we bid goodbye to a great many things. First off, you many have noticed our return to our old portrait layout. Our experiments with landscaping went about as well as my yard work (how was I supposed to know it was poison ivy?). [*Yeah, but it looks so much better.—bunniED.*] Secondly, we bid goodbye to SketchED and bunniED. It is rare to find a pair of editors so perfectly balanced between empathy and masochism. Both of your contributions have been massive and impactful. bunniED, your sketchy bunnies and bunny sketches will be sorely missed. SketchED, where will we be without your lordship stepping upon us?

This brings me to an important point. We now only have one editor remaining: quizED. In fact, I am not editor and you don't know who I am. To solve the editor shortage, we currently have an editor-in-training (not me).

In the spirit of goodbyes, this week's *mastHEAD* asks our *mathNEWS* writers: "What are you retiring from?"

Zethar ("Hopefully, MathSoc finances."); arabesque ("retiring? I'm not even tired. WoooOOooOh!"); Daae ("I'm retiring from being retired from being an opera singer"); Shay Blair ("Not killing people"); Diminutive Rex ("Are you saying I look old enough to retire?!?!"); Pockets ("Essay writing"); Beyond Meta ("will try to stop insulting my co-workers"); TheUndecided ("Multiple midterms per week"); Element ("Methamphetamines this week, opiates next"); Scythe Marshall ("SIGMAS Tea Chancellor and Poet Laureate. No, seriously. There are... four of you who know what I'm talking about?");

aN0rMalWr1tEr("whatever this is")

Games Sez

Hey Mathies!

Just want to remind you that our termly Games with Profs is coming up on July 31st at 6:00 PM at the C&D. If you know any instructor cool enough to play the nerdiest board, card, and strategy games, please invite them to come.

More sophisticated refreshments may be provided.

Over and out,
Joseph Plumber
Games Co-Director, Spring 2016

Article of the Issue

The Article of the Issue for v131i4 goes to Shay Blair for her Kickstarter! Funding for your campaign will be provided in the form of a gift card. The Editors are also willing to throw in a free bucket of tears for the purpose of testing your prototypes, which will be ready for pick-up at the next proof-reading session.

The Editors

Another One Bites the Dust

For the past five years, *mathNEWS* has meant a great deal to me. I published my first bunny comic in v114i3 (October 22nd, 2010) and finally became an editor in v124i6 (March 28th, 2014).

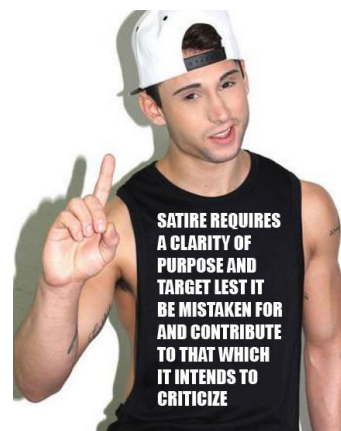
During my relatively short reign of terror as editor, I have tried to make *mathNEWS* kinder. Perhaps kindness seems out of place in a satirical paper, but it is important to at least extend kindness to those who need it most. Kindness is not synonymous with niceness; we need not be polite or well-mannered. Part of this kindness is ensuring that we do not tread upon those already stomped on by society.

As a reader of or writer for *mathNEWS*, you should know that not all forms of mockery are harmless. Mere words may seem inconsequential to you, but that is likely because your very existence has never been made the butt of jokes, nor has your identity been stifled by the limitations of language. These words do not exist in a vacuum, free of context; disparaging remarks about white people do not carry the same weight as those about black people because they are not treated equally in society. Neither is mockery mere name-calling: it is belittling, trivialization, objectification, erasure, and everything in between. Words can do all of this.

To quote Molly Ivins, "Satire is traditionally the weapon of the powerless against the powerful. When satire is aimed at the powerless, it is not only cruel — it's vulgar." If you make a mockery of trans people, binary or non-binary, that is not good satire. If you make fun of disabled people, that is not good satire. If you jest about women being oppressed by men, that is not good satire. Society already does a good enough job taking jabs at minorities and writing that does the same is nothing but ignorant

garbage. "But it's just a joke!" and "But I'm *actually* making fun of children who are exploring their identities!" are invalid excuses for producing toxic trash, and although you are free to litter in the privacy of your own home, do not be surprised when you receive complaints when the garbage spills into a public forum like *mathNEWS*.

Citing Twitter user @kemilumin, here is a reminder about satire in the form of a meme (a language we millennials can all understand):



As a reader of or writer for *mathNEWS*, you should know that words have an impact on the world around you. *mathNEWS* provides an outlet for people to express themselves in a medium that, for better or for worse, is not always taken seriously. And, since you have this power, you should use it for good.

Thank you, and good night,
Katherine Tu (formerly known as bunnyED)

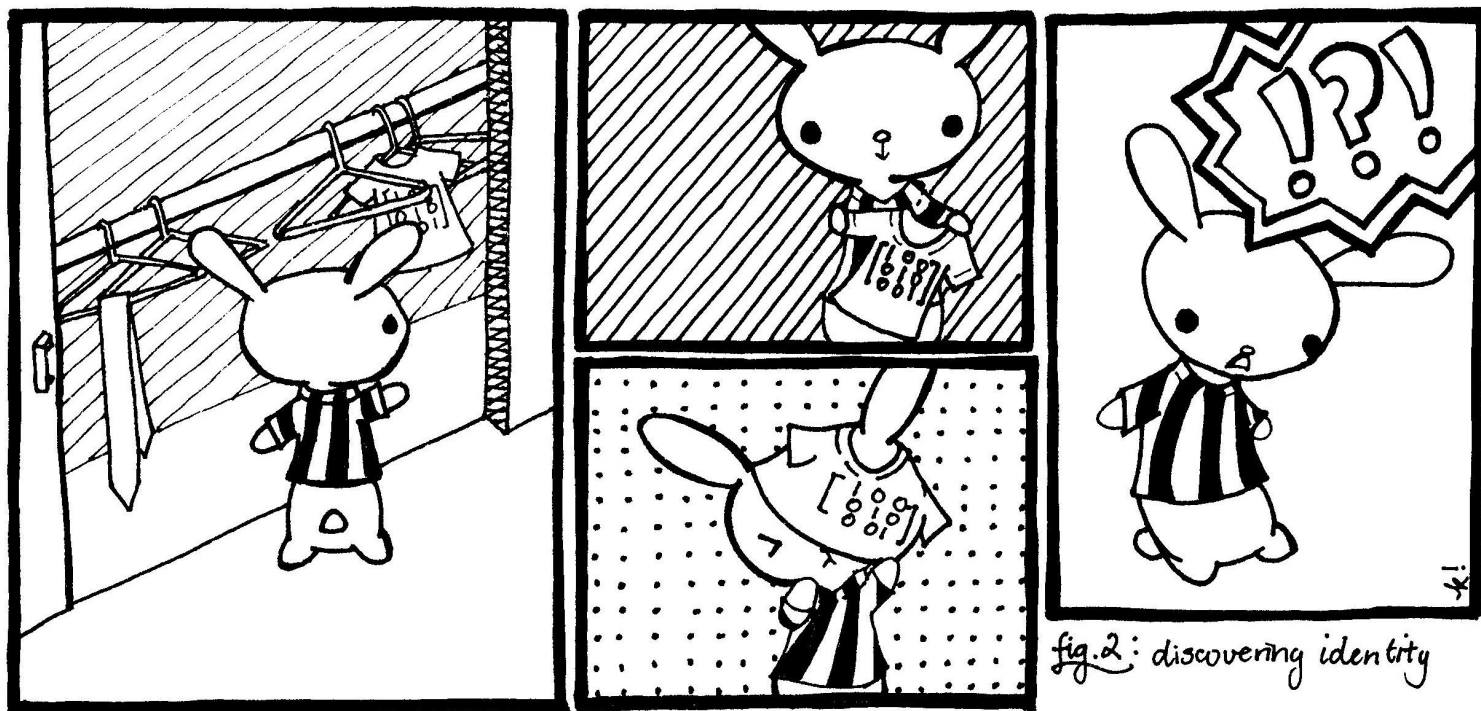


Figure 2. (Above) The second bunny comic, first published v114i5.

The Story Ends, a Journey Begins

Sappy title, but it works. At this point in time, almost all the former *mathNEWS* editors I've worked with will be retired: those who trained me, and those who I trained.

Throughout this journey I have seen the editors through the best and worst of being a *mathNEWS* editor, through the jokes and the sometimes-laidback attitudes, through the hardwork and determination, and through the struggle and collapse as each editor tried working together towards the end goal that is *mathNEWS*.

I admit there were times where we didn't feel like a team and it seemed like we were about to collapse, but we were able to bounce back during the worse moments and were better for it. I have loathed working at *mathNEWS* at times, but at the same time I would never trade the time we all worked together as one.

To the editor whose dedication I sometimes questioned, who ended being one of the most dedicated people to *mathNEWS*, I'm sorry for those thoughts and working with you has been an honour and great pleasure.

To the editor who at times seemed to attack *mathNEWS*, yet turn around and work their hardest even when they could have quit long ago, thanks for sticking with it for as long as you have.

And finally to our Lord Commander editor: even though I did not necessarily see eye to eye with you on certain situations, I would not have exchanged you for anyone else. You were truly a leader among leaders. There were times when I was bitter about it, almost thinking that you acted as the boss of supposed equals that were editors. Instead, you only wanted us to work as equals, sharing leadership and duty in order to keep us together and united. I'm sorry that it took so long for me to realize this, and there is no amount of things I can say that could show just how awesome you are. You were the best editor to work with, with the most dedication, and *mathNEWS* will be lucky to have an editor as strong as you in the future.

To all future editors and current editors, I hope you continue to work towards *mathNEWS* with love and devotion, and know that even if things seem to be falling apart, that editors old and new always have your back.

Since I will never meet you all again, this is goodbye and good luck to all the editors, former and new! To the people who were not editors who helped create *mathNEWS*! To writers now and to the future! The future only holds good things ahead of you all!

The editor formerly known as SketchED

Figure 1. (Right) The first bunny comic, originally published v114i3.

Humans vs Zombies

I first played Humans vs Zombies back in Fall 2011, when the game was starting out. I was assigned as one of the original zombies for the game and I had no clue what I was doing. I just knew that people needed to die.

So, I showed up at V1 at 7:30 in the morning on Monday and went looking for humans. It wasn't long before I spotted someone I would later come to know very well walking casually toward the V1 caf, completely unaware of me. In my overwhelming excitement, I screamed "HUMAN!" and started running toward him, while probably waking up half the nearby students sleeping.

Throughout the rest of that game I met many other players that would become my friends and learned some much more effective strategies for catching players that don't know that you are there. I enjoyed my time during that week so much that when signups opened for the next semester's game, I immediately signed up to be one of the original zombies once again. I even started exercising, something I had never done before, just to be in better shape for the game. I may have been a bit obsessed.

Since then, I've played every single semester I've been in Waterloo, and even eventually played as a human, despite my sworn lifelong devotion to the zombie horde. It feels really good to work together with other players toward accomplishing the mini-missions throughout the day and the nightly main missions. It's also great either trying to survive as a human to the end of the week or working together with other zombies to get a kill on a human, who then joins you to kill other humans. I met the majority of my friends in Waterloo as a result of Humans vs Zombies and the shared experiences we had from the game.

The Spring 2016 game is taking place July 11–15, with signups occurring July 4–8 in the SLC, MC third floor, and possibly other places. If you're at all interested, be sure to stop by one of the signup booths that week, or check the event out on Facebook for more information. Hope to see you playing!

Dusk Eagle

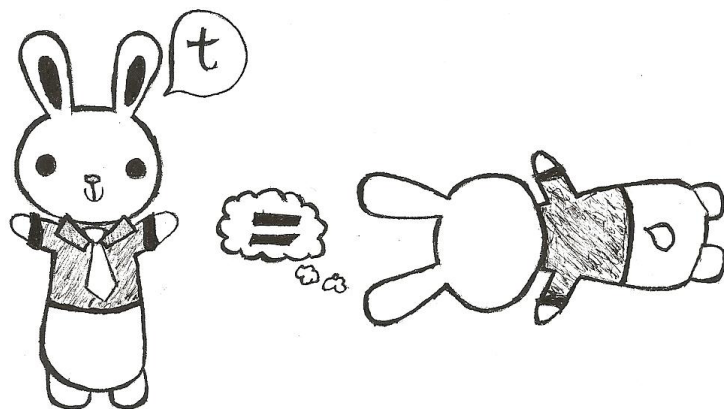


fig. 1 : column bunny transposed..

Large Cardinals, Part 1

Thanks to Chris Eagle for the inspiration for this article, not to mention fact-checking...

In mathematics, sets have cardinality. Hold on, let me try again. According to the Zermelo-Frankel axioms, together with the Axiom of Choice (altogether called "ZFC"), sets have cardinality, and every set with the same cardinality is in bijective correspondence with a particular set called a cardinal, which is actually a particular ordinal. I wanted to talk about cardinality, but it looks like I have to talk about ordinals first.

Technically, an ordinal is a set α such that each of its elements is a subset of α , and such that set membership is a strict well-ordering on the elements of α . It turns out that, really, you already know examples of some ordinals. The number 0 is an ordinal, though usually we write it as \emptyset . Each of the natural numbers is also an ordinal; 1 is $\{\emptyset\}$, 2 is $\{\emptyset, \{\emptyset\}\}$, etc. These are examples of successor ordinals; these are ordinals that can be written as $S(\alpha) = \alpha \cup \{\alpha\}$, which is otherwise called $\alpha+1$. Then the whole set of the natural numbers (yes, including zero) is also an ordinal, too! It's called a limit ordinal; these are ordinals which are not successor ordinals. They exist because you can prove that every set of ordinals has a supremum, or the least ordinal which is not in the set of ordinals but which contains all of the ordinals in your set. We usually write the natural numbers as ω ; it is the supremum of the set of ordinals $\{0, 1, 2, \dots\}$. We could write down $\omega+1$: it's just $\omega \cup \{\omega\}$. The next limit ordinal would be denoted as $\omega+\omega$, or $\omega \cdot 2$. We could keep going and get ω^2 , then ω^ω , and so on. There are rules for ordinal arithmetic, and stuff.

You can imagine how "big" these things get. But what do we really mean by "big"? The simplest way to think about this is "counting" the elements. How many elements are there? We say that two sets are equinumerous if there exists a bijection between the sets; the Cantor-Schröder-Bernstein theorem says that two sets are equinumerous if and only if there exist injections from each set into the other. This is all fine, until we prove that for an infinite ordinal α , α and $S(\alpha)$ are equinumerous, and that a set is infinite if and only if it is equinumerous with a proper subset of itself. Whoops; turns out everything just goes to hell. But that's okay; here's where we define a cardinal: a cardinal is an ordinal which is not equinumerous to any smaller ordinal. Every finite ordinal is a cardinal, which is provable by counting; ω is also a cardinal, since it is the first infinite ordinal and therefore cannot be bijective to a smaller ordinal. It is provable that for every set A , there is a unique cardinal that is not equinumerous to any subset of A .

It is, however, not provable, in ZF, that every set is equinumerous to a cardinal. Once you add in the Axiom of Choice, though, this statement is then true, and things are good. The cardinality of a set is the unique cardinal which is equinumerous to that set. Hooray! Things are good now. Mostly; is there a cardinal strictly between \aleph_0 , the cardinal corresponding to ω , and c , the cardinal corresponding to the set of real numbers? The answer to this is independent of ZFC; the assumption that this is true is called the Continuum Hypothesis. Fun times.

So, what do we mean by "large cardinals"? Ordinals can only go so far; there is a limit (hah!) to how large they can be. In particular, the collection of all ordinals is not a set, so it cannot have a cardinality; it's just too big. But ZFC only guarantees existence of certain cardinalities; it turns out that we can assume the existence of things which are much bigger than anything we normally think about, and it does not obviously contradict anything in ZFC. The properties that these things satisfy are called "large cardinal properties", and some of them are so incredibly strong, the only stronger assumption one can make is that $1=0$; yes, the only thing stronger than the "rank-into-rank" large cardinal property "I3" in ZFC is "False". Bonkers.

Let us now describe a simple(r) problem. For each positive integer n , consider the set of integers modulo 2^n , call it X_n . Define a binary operator $*$ on X_n by $m*1 = m+1$, and $m*(n*p) = m*n + m*p$. Let h_n be a function from X_n to X_n , given by $h(m) = m*m$. Clearly, 2^n is a period for h_n , and so it has a least period, denoted p_n . Consider the sequence of p_n . Does it have a limit, possibly allowing infinity?

The only known answer to this problem assumes the property I3, above, and it gives the answer infinity. If you can somehow solve this problem, in what is basically finite combinatorics, then you will revolutionize set theory, in particular if you show that the limit exists and is finite.

There are two main ways to react to this. One, you can ignore it and continue on with your day as usual. Or two, you can take half a minute and stare, slack-jawed, at the words you just read, do as many takes as you need to convince yourself that you just read those words, ask your favourite logician about this, and then continue on with your day, perhaps not as usual, but with the knowledge that no matter what math you're doing, it's not as ridiculous as this.

Scythe Marshall

N Ways to Easily Traverse the ION Construction

- Grappling Hooks
- Hang Gliding
- Parkour
- Pogo Sticks
- An M1 Abrams Tank

mathNEWS Sez: "MathSoc and club execs, please write more sezzes!"

Large Cardinals, Part 2

As a companion to the previous part of this article, I think it's important to really see some examples of large cardinals. Here are some:



A large cardinal.



A large cardinal.



A large cardinal.

What did you expect? That said, "cardinal" is a pretty useful word when it comes to playing Contact. Don't forget about the cardinal directions, the Arizona Cardinals, the birds, the high-ranking Catholic clergy, and the St. Louis Cardinals. I might avoid using the word in the sense of particular ordinals when playing with non-mathematicians, and even then...

Scythe Marshall

Ohio Man Discovers He is Canadian

It was a normal Sunday morning for Jean Mack, waking up at 11 AM to the smell of his mother's pancakes, when he discovered the shocking news. As Jean sat down for breakfast, he asked his father to pass the syrup; and that's when his father, George Mack, broke down. "We don't know how to tell you this, son, but you're Canadian."

Jean had always known he was adopted at the tender age of two. His parents kept no secrets from him growing up, never knowing who his biological parents were. In fact, they didn't know he was Canadian until just a few weeks prior. "We thought somethin' was amiss when he came back to visit from college," said his mother, Lily Mack. It was there that Jean developed an uncanny fondness for maple syrup and the campus geese. "You should see these maj-estic animals," he would tell his parents. "They fight erryone and crap errywhere like the invaders they are. If that ain't American I don' know what is." Well, it turns out, Jean isn't.

That fateful Sunday morning, Jean's parents sat around the kitchen table deciding what to do with their son. Proud Americans ever since their Irish ancestors had driven off the Natives from their Ohio land, they didn't know what to do with their clearly-immigrant son. They decided their best course of action was to be honest, and to exile their son to Canada.

"It was a real shock to me," Jean explained, "knowin' mah parents would adopt without checkin' for American an' stuff. But goin' to Canada makes sense. I don wanna disappoint Ma and Pa by makin' the Mack family name un-American." After some sad goodbyes, Jean headed North of the border.

He just happened to run into one of our field reporters along the way at a hockey game and that's how we got our hands on this story.

That reporter interviewed the Macks the next day and came back three weeks later to meet with the Macks and check up on Jean. It was then revealed that our reporter was the last person to see or hear from Jean.

"We suppose he's with the bears and moosen now," his dad told us. "Boy even packed skates and snowshoes when he left fur Toronto."

CanadianNews



New Conjecture on the Structure of the Language of Mathematics

On Monday, June 2nd, Prof. David McKinnon formulated a remarkable conjecture in mathematical linguistics. The conjecture, henceforth known as McKinnon's Conjecture, is explained as follows.

"I'm sure that most of you are familiar with the phrase 'if and only if', usually abbreviated as 'iff'. I hypothesize that this is an example of a general rule in grammar. If you ever want to add (for any word 'foo') the phrase 'and only foo', you repeat the terminal letter. So this [example on the board] is actually the only exception, so I could say 'except and only except', abbreviated as 'exceptt'. This is useful in politics and other things too, you could have 'then and only then' abbreviated as 'thenn'. You could make up your own, since I know some of you are *mathNEWS* editors." —McKinnon, PMATH 347

Prof. McKinnon's conjecture has opened a cutting edge field in the research of linguistics in mathematical writing. Some students are researching other examples of phrases that fit the McKinnon Conjecture. A mere hour after McKinnon presented his conjecture, student A. B. quickly discovered another example that supports the conjecture: the phrase "when and only when". Using that result, student, R. Z., then generalized this result to "[setting] and only [setting]", where "[setting]" is replaced with words such as such as "now, today, here, there".

The authors of this article expect that McKinnon's Conjecture will have a profound impact in the pure and applied studies of mathematical linguistics. It is expected that as a result of McKinnon's formalization of the conjecture, its use in mathematical writing will significantly increase as mathematicians will find it convenient to use such abbreviations due to its concise definition. Moreover, as Prof. McKinnon stated, his conjecture is useful in real-life applications such as politics, where a tactful candidate can use this abbreviation in character-limited settings such as social media to gain an advantage over their opponents in concise formulations of policy.

While there seems to be fervent research in finding examples to support McKinnon's Conjecture, little research has been done towards disproving its use for certain classes of words. The authors hypothesizes this is because there are few useful results to be gained in disproving this conjecture, thus research projects towards disproving this conjecture are less likely to be funded.

While some mathematicians are trying to find more examples of this rule, others are studying the implications of various ways of generalizing it. They are in the process of exploring a mathematical theory of abbreviations that is almost as rich and deep as mathemathics itself.

For example, one big field of research is about how to generalize this field to phrases instead of words. For instance, how should one abbreviate "This multi-word phrase and only this

multi-word phrase"? By saying "Thiss multii-worddd phrasee" or by "This multi-word phrasee"? Proponents of the former argue that the latter is ambiguous, since it could also mean "This multi-word phrase and only phrase".

But the proponents of the latter have the following argument. Consider the phrase "and only". This matches the pattern "[x] and only [x]", where [x] is the empty phrase. Now, if your rule is to repeat the terminal letter of *every* word, you just get [x] back, since [x] has no words, so you abbreviate "and only" to "". Clearly, having an empty abbreviation doesn't make any sense! If, on the other hand, your rule is to repeat the terminal letter of *the last* word, you know that you can't abbreviate the phrase "and only", since the empty phrase has no last word!

There are some other difficult cases:

- What if you borrow a word from a right-to-left writing system? Should "מם and only מם" become "מממ" or "מםם"?
- What if you use mathematical notation? Should "≠ and only =" be abbreviated "≠=" or does that look too awkward?
- What counts as a character? Should "(a + b) and only (a + b)" be abbreviated "(a + b)"?
- What do you do if this rule leads to ambiguities? For example, can you replace "My fiance and only my fiance" by "My fiancee"? Should "f and only f" be the derivative of f' be replaced by "f' is the derivative of f"?

Now while the linguist mathematicians are trying to answer those questions, there are some linguist-mathematician-philosophers thinking about the even broader implications. They are divided into some schools of thought:

The platonists think that the correct abbreviations are out there somewhere and we just have to find them. On the other hand, the formalists think that abbreviating things is just a formal game in which one proposes some set of rules and then rigorously applies them. The intuitionists highlight that all decisions should be made from the perspective of the *ideal mathematician*. While the ideal mathematician can talk arbitrarily fast, they cannot actually say infinitely many things, so reasoning about infinite classes of abbreviations doesn't make sense. Also, they think that, although one hopes that every abbreviation rule will eventually be shown to be valid or invalid, we don't immediately know that there aren't any abbreviation rules that are neither valid nor invalid.

But there are even stranger schools. For instance, the so-called finitists say that there are only finitely many cases where this grammatical rule applies. An even more extreme part of this movement, the "ultrafinitists", actually reject all applications of this rule except for the good old "iff"! They are currently trying to stop everybody else from laughing at them.

The Challenge

The journey from class had been long and difficult, but the destination was in sight. She was so close to the sweet sensation of satisfying her desperate craving that she could almost taste it. She breathed a sigh of relief as she approached the counter. Finally. This was it. She had reached her goal at last. The woman behind the counter began to speak:

“Hi, what can I get for you?”

The words were music to her ears. They sounded like the most beautiful song ever written, performed by a choir of a million angels. She couldn't help but smile as she opened her mouth to respond. The words came, not from her mouth but from her soul, as she spoke her deepest desire out loud:

“I'll have a medium Iced Capp please.”

In that moment, she was naïve. She was blissfully oblivious to the horror and disappointment that were to come just seconds later when the lady behind the counter uttered the most horrid phrase she had heard all week:

“Sorry, we don't have Iced Capps.”

The words crashed into her like waves, pulling her into an undertow of disappointment and drowning her in despair. How could this happen to her? Why had the DC Tim Hortons let her down again? It was as if she had been betrayed by her best friend, brutally stabbed in the back. Et tu, Brute?

But then, she felt something else. From beneath the disappointment and pain and anger rose a sense of determination. She realized this was not the end. While the DC Tim Hortons may have shattered her trust and crushed her faith, she knew she would do whatever it took to get an Iced Capp by the end of the day. So, she walked away, head held high with a new sense of purpose, and ready to face the challenge that lay ahead of her.

TheUndecided

N Reasons Why I Will Fail My Graph Theory Midterm

- I missed multiple weeks of class.
- I was too lazy to copy down any of the diagrams in class.
- My notes are too messy to read.
- I am not getting enough sleep.
- I have fallen asleep in class (in full view of the professor) many times.
- I am not eating sufficiently healthily.
- I am focusing my time on another midterm right before it.
- I am starting to daydream about co-op next term.
- I will be reading this issue of *mathNEWS* instead of studying.
- I make poor life choices (e.g. becoming a math student).

A Student

Review: Hilbert Hotel

The perfect accommodations for a weary travelling salesman, the Hilbert Hotel is tucked into a quiet corner of 3-space. The entrance is awash in greenery, featuring exotic factor trees and lush stem-and-leaf diagrams. You will be greeted warmly by the doorman, if he isn't busy shovelling the Koch snowflakes — a friendly man, if a touch simian, eager to tell you about the Shakespearean script he's tapping out on his typewriter in his off hours.

The elevator will get you to your room in a blink, although they aren't particularly spacious. I crammed in with my wolf and my rabbit, and I tell you, there wasn't even room for another head of lettuce in there!

The rooms are spacious with enough closets and cubbyholes that you'll be able to comfortably fit all the pigeons you choose to bring with you, decorated in four tasteful accent colours to tie the space together. The sheets are always freshly laundered, folded in half, exactly eight times in the corner of the double bed. In the bathroom is a local sink, as well as a luxurious sine wave pool for you to relax in. And to get you up on time for your check-out, the provided alarm clock's chime sounds just like Gabriel's Horn.

They offer a free continental breakfast, featuring pie and juice served in their signature 'Klein' bottles. If you like to hobnob with the elite, you'll sometimes find dining philosophers in their little cafe, courtesy of the local college. And once you've checked out, the doorman even offers a free Euler-change and a complimentary vacuum of your automobile (although you might find it a tad slippery for a while after).

All in all, 4.5/5 stars. It would get a perfect score, except sometimes they make you relocate to a room with double your current room number.

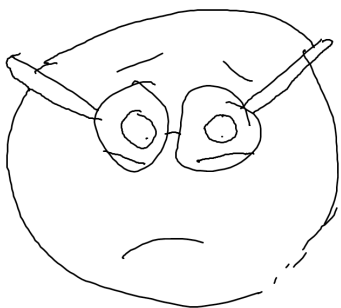
Diminutive Rex

The Cost of Data

Most objects are priced based on how much they cost to make plus a percentage extra for profit. Digital goods have a fundamentally different model and are making up more and more of our economy. Making or distributing an individual copy of entertainment from ebooks, movies, music and games has a near zero cost, and all the cost and effort stems from the initial creation. The market for these has also grown with distribution going international, reaching more and more people. This has led to ebook prices that frequently vary from 25¢ to \$25, or even free, including some popular novels. This has been gradually changing digital economics and innovative examples such as the "pay what you want" humble bundles challenge a lot of traditional economic assumptions. As digital goods and subscription models continue to grow in popularity, it will be interesting to see what other developments take place. The evolving relationship between digital goods and cost is far from over.

Pockets

Rainglasses by Shay Blair: Kickstarter



📍 Waterloo, CA

🔧 Technology

These new rainglasses will revolutionize the way you hide your tears by making it easier than ever! Like sunglasses, but sadder.

Campaign

About this project

This revolutionary product is, essentially, sunglasses with wipers on the inside to wipe away your tears. The bottom of the rainglasses sit flat against your cheekbones, and the gentle wipers will tenderly brush against your cheek to brush away any tears that have collected on your cheeks.

In future iterations, we hope to have a version that collects the tears at the base of the glass and drains them through a pipe going through the glasses' arms into a reservoir at the back of your neck.

This disruptive technology can function as a tool for hiding tears and for emotional comfort. You can allow yourself to pretend that the delicate, almost loving, touch is another human being wiping away your tears.

It's also useful when cutting onions!

The Inspiration

We wanted to come up with a startup idea that showed vision and a clear sight of the future. One day, while crying over our utter lack of ideas and business skill, we thought to ourselves, "We would be able to see it if only we could see past these watery barriers."

Risks and Challenges

We've never taken on a project similar to this, but we've got a lot of cool experience in a whole bunch of different fields that we're sure will apply to this project!

We don't have a design yet, we're still working on that, so we can't comment on the viability of the engineering of this product. But we've almost got one, Dusk Eagle has worked very hard on our current draft that you see up at the top of this Kickstarter!

2

backers

\$42

pledged of \$3,283,928 goal

8

days to go

The Team

We have a kickass team ready to take on this project! quizED is our CEO, I, Shay Blair, am the main engineer on this project. The Undecided is our lead marketer, Beyond Meta our project manager, Dusk Eagle is our lead designer, and Pockets heads up our PR/HR department.

Why We Need Funds

Our parents aren't giving us any money, and we're students. Please fund us so we can make our revolutionary vision a reality!

What People are Saying About Rainglasses

TODO: fill out this section once we actually have anyone interested

Stretch Goals

If we raise \$3,283,929, we will offer several different different skins, such as onions or crocodiles.

If we raise \$4,283,928, we will add functionality that collects tears for later use as crocodile tears.

If we raise \$5,283,928, we will add functionality which will separate out the salt from your tears and store it for later.

If we raise \$10,000,00, we will include a "Death Glare" feature: lasers to kill whoever makes you cry.

If we raise \$100,000,00, we will create a rainbow version.

FAQ

We haven't been asked enough questions to know which ones are frequently asked, so just shoot us a question in the **mathNEWS BLACK BOX** that's on the wall between the C&D and the Comfy!

Yours in revolution,
Shay Blair.

The Crazy Test

If you answer 'yes' to any of these questions, you are normal. If you answer 'yes' to more than half of these questions, you are crazy and not normal. If the logical contradiction presented leads you to believe that the only correct solution is to answer less than half with 'yes', you are a Math student.

1. Do you often have conversations with yourself?
2. Do you lose more than half of your arguments with yourself?
3. Do people tell you wild stories about things you have done but have no recollection of doing? (Excluding the ones involving alcohol and drugs.)
4. Do people tell you mundane stories about things you have done but have no recollection of doing?
5. Do you forget your age and name regularly?
6. What were you doing last Tuesday?
7. Are you a Math major in any of the following math disciplines: Pure, Applied, Peanut Butter?
8. Did the previous question make sense?
9. Did you answer 'yes' to any of the previous questions?
10. Did you answer exclusively 'yes' or 'no' to all previous questions?
11. Would you like another question about the previous questions?
12. Is the phrase "previous questions" in the previous questions and the current question not irritating you?
13. Is 13 an unlucky number?
14. Do you own more cats than me? (This is vacuously true as I own -1 cats and it is impossible for anyone to own less than 0 cats.)
15. Do you want to know how I acquired an anti-cat?

MostlyHereMostlyThere

N Ways to Remove a Silica Bead From a Headphone Jack

- Use a pin to shred the bead into pieces, then shake out the resulting debris.
- Attach a bead of glue to a toothpick and glue the toothpick to the bead, pulling them both out when the glue is set.
- Vacuum them out with small vacuum attachment.
- Tape a straw over the port opening and suck out the bead.
- Apply a small bit of pre-chewed gum to the end of an uncooked spaghetti noodle. Insert this device into the port and retrieve the silica.
- Bore a small hole laterally into the end of the headphone jack. Place a drop of honey at the hole and another onto the silica bead. Next, simply apply a drop of glue to an ant and place it at the entrance to the jack. The ant will be attracted to the honey drops, first travelling to the bead and getting glued to it, and then heading out for the second drop with the silica attached— easy!

aPlayerofGames

"Chhhhhkhhhhkhhkhk..." —Guy sleeping in *mathNEWS* office

The Reliance Experiment

I have spent many hours this term looking at global shipping and production (at least partially for fun). These human networks have an interesting complexity. Crops and resources can be harvested in the US, shipped to China or elsewhere in the world for processing, and then back to the US, before being sent around the Americas and to Europe, all subject to the various laws and treaties at each step. The same US grown cotton counting as both a domestic export and foreign import at different times is only one weird example. Car assembly can involve parts from dozens of countries and a hamburger with all the toppings may actually be worse. Attempting to track everything I interacted with for a day was a near impossible task but I tried anyway and it has given me a greater appreciation for everything that underlies and supports our society.

Pockets

Solving Games

Games serve as a way to feel superior to your friends or, if you are lacking in friends, random strangers. This becomes interesting in the case of games which are solved, i.e. where there are strictly correct moves to be made to win. When this happens, the very nature of the game starts to change. Instead of trying new strategies the game starts to become formulaic, it comes down to not making mistakes. Even if the game has a lot of complexity, it loses depth and there is less room for personal thought and style. While some enjoy the mastery of reaching this level, it has become a different game for those who play it. Too much optimization can take away what you enjoy about a game. Have fun and don't demand perfection.

Pockets

Demon Seeking Somebody to Love

Note: Mini spoiler alert for The Conjuring 2

Name: Valak

Seeking: A fun demon partner to do demon stuff with, who's down to indulge in my kinks, and is a screamer in the bedroom.

Hobbies: Possessing living people using the spirits of dead people, scaring the shit out of everyone, showing up in people's visions, flipping through TV channels without ever settling on one thing to watch, throwing stuff, and causing general destruction.

Fetishes: Costumes/role playing-I have this great nun costume I like to use. And I bite ;)

My ideal date would be: Possession and chill.

About me: All you have to do is say my name and I'm yours. Promise I'll do my best to make you scream. Recently starred in *The Conjuring 2*, so hit me up if you're into celebrities. Really just a misunderstood demon looking for love like everyone else.

TheUndecided

How to Acquire Hugs

Hugs are great. They make the hard times better. However, sometimes we are in most need of hugs when we have no access to them. Having no close friends is a good reason to need a hug and this problem is usually accompanied by a sparsity of hugs. Thankfully, there are some very effective methods for acquiring hugs, some easier to implement than others.

Ask an acquaintance for hugs. Perhaps by being vulnerable to this person, it will create an opportunity to become closer to them and get reliably-regular hugs.

If that doesn't work, ask random strangers for hugs. This works best if you do it in a non-imposing non-creepy way. If you can find theatre people, approach them first. Theatre people have no concept of personal space and are powered by hugs.

If neither of these methods work and you can afford it you could always hire someone to hug you. For about \$45 dollars you can hire someone to cuddle you for an hour. These services aren't always offered in your city and don't use Kijiji.

If all else fails you can always just burst into tears. People will immediately offer you hugs, no asking necessary. Note that this only works if people can see your tears. Do not wear Rain Glasses™ when attempting this.

Virtual Hug,
Beyond Meta

I am a Rocket (#deep)

Rockets often suffer from the problem of fuel requirement vs capacity. The more fuel a rocket has, the farther and longer it can go. However, the more fuel a rocket is carrying, the heavier the rocket is and the more fuel is required to propel the rocket.

Humans function in much the same way. In many situations, humans may want to carry water or other sustenance on their person. These situations arise during things like a marathon, a zombie apocalypse, waterbending, a hike in the desert or because you simply want to splash it on other people.

But here we have the same problem as the rocket ship. The more water a person is carrying, the farther and longer they can go. However, the more water a person is carrying, the heavier the load is, and the more water is required to keep the person hydrated.

The equations for carrying rocket fuel can thus be adapted to form equations for carrying water. This is left as an exercise for the reader.

Therefore, I am a rocket and I can go to space if I bring enough water.

Yours in sssspace,
Shay Blair

The Startling Depths of Superficiality

I recently started a new job and at this new job I have had the opportunity to interact with all sorts of people that I rarely mingle with in my day to day life. This has been a really eye-opening experience. They really care about appearances, something I have never cared much for as I have always viewed it as a shallow topic.

Which is why I was startled to discover the sheer quantity of details in appearances. I learned how to identify a nose job, colour choices when purchasing shoes, appropriate levels of attractiveness for dating, proper etiquette when saying people look alike, and so much more. I have acquired all of this knowledge in the span of a week. I can only hope that next week I will learn even more new information like: what it is like when my co-workers actually do work.

All this exposure to beauty has stirred up an old fire that I had long kept hidden, reinvigorating something that I hadn't felt since my last ex-boyfriend: an irresistible urge to make snarky comments.

Out of practice to ignoring this urge, my poor co-worker has suffered severe burns caused by extremely sharp wit. It's okay though, it hasn't made any visible difference to her attractiveness.

Beyond Meta

Dear Asshole Who Stole My Back Tire

I originally started this letter referring to you as a person, however, I wanted this letter to be precise. I felt that using the word "person" simply does not do justice to your true character.

I can only hazard a guess as to your motivations when you stole my tire and gear shifters. Perhaps you knew how I had always wanted to own a unicycle. For your future efforts, I feel the need to clarify that I have always wanted to own a FUNCTIONAL unicycle AND bicycle.

As récompense for the way you have impacted my life, I want to give you some advice. You can do better. There are better career options than bike thief. A lot less risky and lot more rewarding.

Given that you have chosen this path, I can only imagine how much you are struggling. If you ever need a place to stay, I am sure my friends down at the police station can provide you some nice free accommodations. By providing me with such a service, you've earned them.

A nice tight hug specifically for your neck,
Beyond Meta

profQUOTES

- | | | | |
|--|------------------|--|-----------------|
| "I'm an idiot." | Avery, CS 349 | "With me, you'll never have to worry about revenge." | Weddell, CS 348 |
| "Nobody wants to tell you your product sucks when it's almost done." | Avery, CS 349 | Prof: *Tries to spell auxiliary and fails* "Oh well, doesn't matter. I'm French." | |
| "I've moved your assignment due dates in your favour to Mondays. If you object, feel free to hand them in on Fridays." | Avery, CS 349 | Student: "Voulez-vous coucher avec moi?" | |
| "It's great. I can just hand-wave all these complex and hard topics!" | Avery, CS 349 | Prof: " ... " | |
| "'Squiggle' is the technical term." | Avery, CS 349 | Prof: "Definitely not." | Fahmy, STAT 371 |
| "I will cheerfully support you on this just to get my name in the acknowledgements." | Avery, CS 349 | "On the grounds of making the class more fun, you should be on the lookout for opportunities to make me look bad." | Weddell, CS 348 |
| "There was a bit of a war going on in the 1940s." | Avery, CS 349 | "Money matters way more than your health records." | Weddell, CS 348 |
| "I didn't put in any affine transformations in the midterm. Expect them to come back with a vengeance on the final." | Avery, CS 349 | "I'd give myself full marks." | Weddell, CS 348 |
| "I used to be afraid to be a bitch, but now I just are one." | Branston, BU 491 | "I'll give you a tip: you can probably guess what kind of questions are on an exam based on what the prof finds easy." | Weddell, CS 348 |
| | | "I'm going to ignore you for a minute." | Daudjee, CS 454 |
| | | "It's great when it takes negative time to send a message." | Daudjee, CS 454 |

"CUMC: see you MC"



horrorSCOPES

ActSci: You meet a girl on Tinder, and she thinks ActSci stands for Acting Science. This somehow impresses her, so you go with it.

Your lucky number is: 4 hours reading Shakespeare before the first date.

AHS: Summer is here and as an AHS student this brings certain responsibilities. Waterloo wants to look like a fun and inviting University and you're the only ones who can pull it off.

Your unlucky number is: 6 hour shifts playing ultimate Frisbee on the BMH Green.

AMATH: You've somehow been press-ganged into leading frosh tours around the university. You make up for it by scaring them as much as possible.

Your unlucky number is: 15 frosh who refuse to believe Calculus 4 exists.

Arts: You begin to resent that horrorSCOPES reduce your entire faculty to a single line. You plan to write your own horrorSCOPES for the next *mathNEWS* so Artsies can have proper representation.

Your unlucky number is: 51 programs in the arts faculty.

Bioinformatics: You create a neural network based on UW geese. You connect it to an artificial goose that you release into the wild.

Your unlucky number is: 1 aerial formation of geese spelling out "Skynet."

C&O: You're trying to fall asleep before a midterm so you try counting sheep. You lay there for a while and decide there must be a better way to do this.

Your unlucky number is: 6 new counting algorithms.

CS: You watch a montage of terrible movie hacking and you can't take it anymore. You get together with a group of friends and resolve to make a proper movie that shows how hacking really works.

Your unlucky number is: 8 hours of frantic debugging.

Double Degree: You decide you want to be prepared for when the new light rail system will take you between Laurier and UW, so you enrolled in Trains this term.

Your unlucky number is: 2 hours of free time all summer.

HYPE-ITY HYPE HYPE

ARE YOU HYPED FOR [insert thing of choice here]? I'M SO HYPED I CAN'T EVEN DEAL WITH IT!

WOW. SO MUCH HYPE! I LOVE HYPE! HYPE HYPE HYPE HYPER HYPER HYPE HYPOXIA AND HYPOACID AND HYPE AND HYPOGYNY AND HYPERCAPNIC!

HYPE LEADS TO HYPOTHERMIA AND HYPODERMIC NEEDLES AND EVEN HYPOPLASIAS SO MUCH HYPE!

ENG: You skip all your classes to cram all day and party all night in preparation for Hell Week. Unfortunately, you miscalculated exactly when Hell Week was.

Your unlucky number is: 6 missed exams.

ENV: You plan a guerrilla mission to liberate the llamas in Waterloo Park. Unfortunately, the llamas are quite content in their little barn and do not appreciate your efforts.

Your unlucky number is: 1 case of berserk llama syndrome.

MathPhys: You want to use your physics knowledge to plan an epic long weekend fireworks display. Unfortunately, you've only learned the theory behind projectiles. That should be enough, right?

Your unlucky number is: 0.5 eyebrows remaining.

PMATH: Your girlfriend said: "If you like it, you better put a ring on it." Apparently, she wasn't talking about a commutative monoid.

Your unlucky number is: 1 failed relationship.

SoftEng: You have been press-ganged into running frosh tours, and you thoughtlessly introduce your program by it's shortened name.

Your unlucky number is: 5 frosh who think you make fuzzy robots.

Stats: You've finally been invited to all the sexy parties this summer, and you can't wait to get your freak on. You make a spreadsheet so that you can optimize your experiences but you need to populate it first.

Your unlucky number is: 9 parties spent in the corner frantically collecting data.

Teaching: Public school is out for the summer! Two full months where you never have to go in a classroom full of snot nosed brats!

Your unlucky number is: 2 months of snot-nosed brats clogging up your MOBAs.

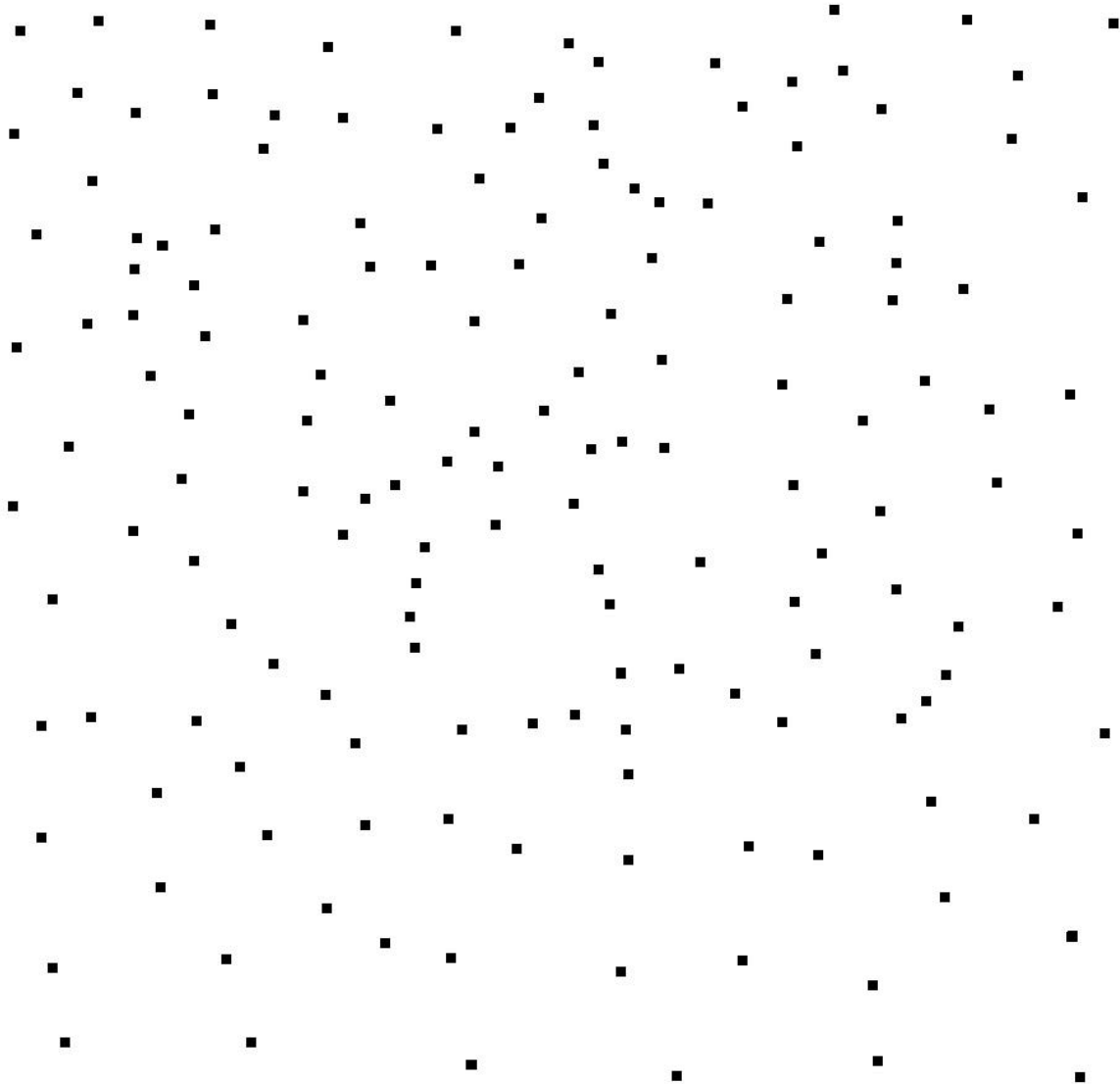
Undecided: You want to go to the beach, but you should probably do your assignments. You want to do your assignments, but you should probably get the groceries. You should probably get the groceries, but you have to fix your car first.

Your unlucky number is: 3 months paralyzed by indecision.

Figure 5. (Below) "The Bunnyhole Principle" first published v120i4.



Connect (At Least 80% of) the Dots to Make a Cat



A Sonnet to Overwatch

Six heroes all alike in what they want
In fair Dorado where we set our fight
Upon the payload enemies do taunt
The countdown starts until you make it right

"Zenyatta is here" is heard from the side
"The cavalry is here" comes from the left
Hear 3, then 2, now 1 and then you ride
Attack the point and execute the theft.

But hark! The chat lights up with change of champs
For all but you have switched to Lucio
And as you come up on the en'mies camp
Despair has fallen on you apropos.

Your turncoat team has erred and lost the day
And now the payload where it was shall stay.

Yours in dumb Overwatch decisions,
Shay Blair.

Another Sonnet About Overwatch

I grasp my weapon tightly in my hand
In base I wait with members of my crew
Indeed! Forsooth! We are a merry band!
Look at this team: how great we are to do!

The clock rings out - it's time to join the fight!
Beside me, Pharah zooms in for the kill
We'll beat the reds with overwhelming might!
I know that I will be king of the hill!

But no! My allies cut down, one by one
(Though they kill many rivals as they go)
I frantically look around but there is none
To save me from the sole remaining foe.

And as she speaks, her words fill me with fear:
"Cheers, love!" she says. "The cavalry is here!"

Sorry I stole your idea, Shay
Diminutive Rex

Puzzle

Phrase: 01234526789 is something that you might be able to find on Hawai'i

Fantasy	405	6324	7131	193168	362367	821367
Animals	440	863	5263	8442	18842	36694
Plants	2448	50621	312847	962240	3120178	6243176
Actions	768	2612	3624	82660	97120	312304

gridCOMMENTS

I have to say, I'm marginally disappointed that I have not received a single solution to my puzzle last issue. Granted, it was a difficult puzzle, but seriously, I would have been very happy to even receive one submission only answering the *gridQUESTION* — this week in particular I had hoped it were the case because I don't exactly have a good novel puzzle for everyone to test their wits against; I was prepared to create a puzzle of the type that a submitter had deemed their favorite.

This issue I made two puzzles: one of a more unusual type and a "regular" crossword; I'm going to talk about the latter first.

This crossword is in a more British style, and for a good reason. Since I don't like writing clues, I chose the British style because there are fewer words in the grid, which in turn means fewer clues that I need to write. The words are a bit more... obscure than what might show up in a regular crossword, so that I can write pretty banal clues. I hope you've got a dictionary handy! (Protip: If you're on campus, you can use the Oxford English Dictionary online via the library)

The other puzzle is a bit more straightforward. I have encoded a short phrase by substituting each of its unique letters with a digit. Then, for each list of words, you know they are all of the same theme. Score is determined by number of distinct letters correct, out of ten.

Since nobody solved the puzzle for the last issue, I can give out a prize for each of the two puzzles this issue. I'm not expecting that I am going to need it, because the crossword is pretty hard. But in the event of a tie, you are to answer the *gridQUESTION*: "How does one stop a rampaging monster?"

(Standard stuff: Submission is via **BLACK BOX** or via email to mathnews@gmail.com before the deadline, which is 6:30PM on July 4th. Please also write a name so I can credit you and something to identify you with so some fiendish felon can't just fly off with your prize. Participant must have had lived somewhere in the vicinity of the solar system sometime in the last 10 years.)

Zethar

gridSOLUTIONS

S c O N i I R
n A p T A C S
C I S r R o A
A O n C r A i
T s O o N P I
a R T S O t C
I P N a C A t

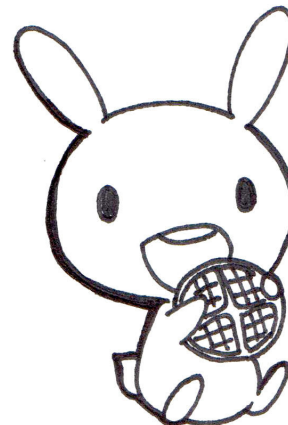
Across

- incisor — The second picnic ails your tooth
- catnaps — Times out?
- corsair — Pirates sounding vulgar shanty
- ocarina — Nothing in a car crash except this instrument
- potions — Elixirs in depot & ION stop
- cottars — Scottish peasants' fasteners
- captain — Murderer outside apartment, commander

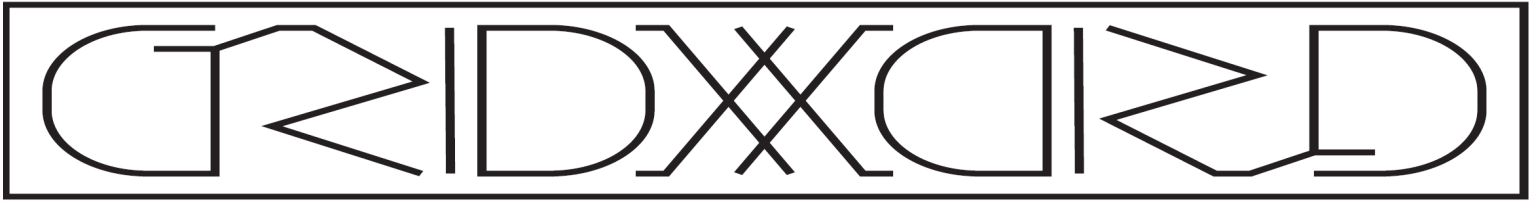
Down

- satanic — Diabolical Saturday with an integrated circuit
- cantors — His skewed argument confuses choirmaster?
- tapioca — Pudding oddly lacking teal poison crab
- prosaic — Dull press release on beheaded mosaic
- carrion — Reportedly handheld luggage has rotting flesh
- nonstop — Direct route in cannon's top
- satiric — Caustic Rita's back being like *mathNEWS*

- procrastination — Crazy or inaction traps!



Submit your articles, *profQUOTES*, *gridWORD*, and puzzle solutions to mathNEWS@gmail.com or to the **BLACK BOX** near the MC Comfy Lounge.... Pretty please?



gridCLUES

Across

- 1 To establish or state (8)
- 5 A quasi-oath; contraction of "by my faith" (6)
- 9 (Med.) Causing rickets (12)
- 10 Shit, or to pass it. (4)
- 12 Where a final iambus is replaced with a spondee or trochee; a choliamb (6)
- 13 Having closely curled hair (7)
- 14 This past tense of tear as a noun means an ornamental knob on furniture. (4)
- 15 An exact copy or transcript (8)
- 16 A Western African harp-like instrument (4)
- 17 Having or using no iron (8)
- 18 To pour water on one's head, usually for a baptism (8)
- 20 Fear of the number 13 (17)
- 23 Able to promote body growth (13)
- 26 Recursive Acronym Syndrome (Alternatively, a chief or governor) (3)
- 28 The 15th century in Italy (12)
- 29 The anniversary of the death of someone, esp. a parent (8)
- 30 A leather whip or strap uses for discipline (4)

Down

- 1 Financial oligarchy; plutocracy (17)
- 2 Fission in biology (13)
- 3 To thin out, esp. an electrical signal (9)
- 4 A tall wave caused by the tide in a narrow estuary, a bore (5)
- 5 Tar oil extract. 4-propyl-2,6-dimethoxyphenol. (7)
- 6 To cook a second time. To overhaul (6)
- 7 (perj.) a Gentile (3)
- 8 A petty trick, or a repository thereof. (5-10)
- 11 The family of the honeysuckle (15)
- 19 A word fossilized in set phrases, by itself it means "truth" (5)
- 21 A dot in Morse code (3)
- 22 Latin for "for" (3)
- 24 Hardwood timber of the iroko tree (5)
- 25 An advance; a loan, a bequest or a grant (5)
- 27 Since. Alternatively, the second half of a feline fairy haunting the Scottish Highlands or a dark order conspiring to take over the galaxy. (4)

This week's grid:

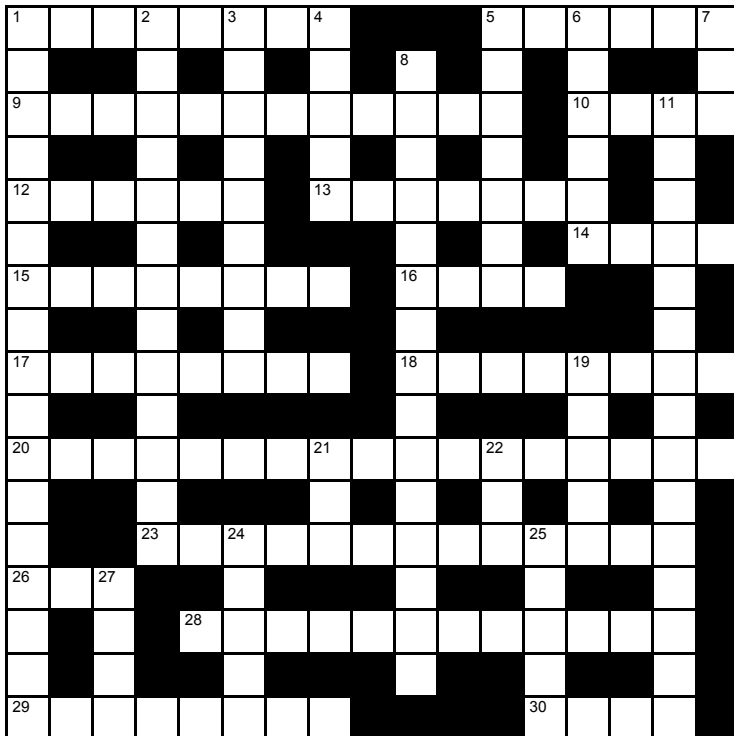


Figure 13. (Below) "You're mathtastic!" first published v117i5.

