*math*NEWS

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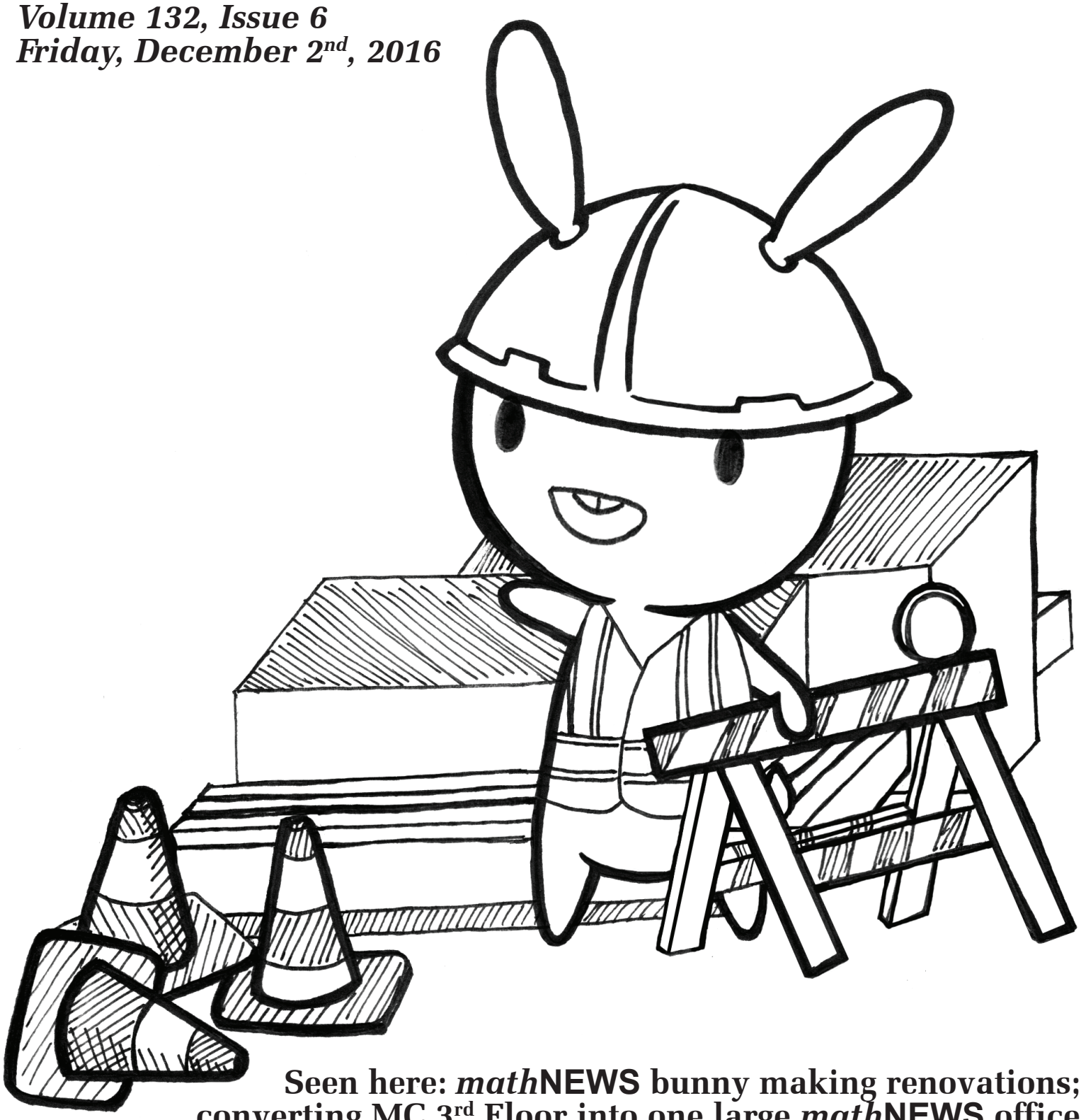
Friday, December 2nd, 2016



Seen here: *math*NEWS bunny making renovations; converting MC 3rd Floor into one large *math*NEWS office

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*look*AHEAD

*math*NEWS	
Dec 2	Volume 132 makes its grand finale

MathSoc	
Dec 2	Charity Ball

University	
Dec 5	Last day of classes
Dec 7	CS4U Day
Dec 8	Final exams begin
Dec 13	Winter 2017 fees due
Dec 22	Last day of exams
Dec 24–31	Holidays — University closed

Misc	
Dec 2–3	UW A Cappella Club EOT concert
Dec 3	UW Cabaret Club performance
Dec 4	National Cookie Day
Dec 6	Culture Clash Theatre Club performance
Dec 12	National Gingerbread House Day
Dec 21	First day of winter
Dec 24	Christmas Eve
Dec 25	Christmas Day
	First day of Hanukkah
Dec 26	First day of Kwanzaa
	Boxing Day
Dec 31	New Year's Eve

Article of the Issue

The final Article of the Issue award for the term goes to Scythe Marshall for not one, but two(!) full-page mathematics articles, *Euler Factorization* and *Analytic Continuation*.

Email us at mathnews@gmail.com and we will figure out a way for you to obtain your prize!

The Editors

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Thomas Baxter (Sombra)
Shaundalee Carvalho (Zarya)
Amy Li (Mei)
Katherine Tu (D.Va)

*mast*HEAD

The term is drawing to a close, and the cold weather is coming to a head. As the term ends, we at *math*NEWS would like to thank our readers for being such good sports about all this. Despite the previous five issues, you've decided to pick this one up, and even read through the *mast*HEAD, the least interesting article by far. We are always thankful for having such a ~~captive audience~~ dedicated and loyal readership.

As snowflakes fall, students' minds turn toward only a few things: staying warm, and finals. For warmth, I am lucky to have a fireplace at my home, and plenty of kindling. *(Note to self: we should publish an updated N Things To Do With Imprint article.)*

On the coursework front, though: our writers are taking some *interesting* courses this term. So we had to ask them, "What course are you most scared of for the upcoming finals period?"

Ender Dragon ("CO 456: A practical introduction to international nuclear conflicts"); Shay Blair ("Real Life 101: How to Feel Like A Functioning Adult"); Diminutive Rex ("PHIL 373: Nihilism and you (study groups = difficult)"); Pockets ("Xenobiology (Waterloo moon campus)"); Beyond Meta ("BUS 101: Running to bus instead of being run over"); aPlayerofGames (CS 273: How to fix your relatives' computer problems"); Willow ("TN-visa: I don't want to be stuck in Canada with you"); Zethar ("I know my Divination exam is going to be brutal..."); TheUndecided ("AHS 050: Literally just exercise"); waldo@<3.LE-GASP.ca ("All the courses I dropped this term."); G-UNIT ("PHIL 407: What are you going to do in the future?"); trk ("Mathematical phys-ed"); Theodore Bear ("STAT 392: Accurate polling in 2016"); Soviet Canadian ("AHS 381/CO 458/CO 854 Sleep Scheduling; I am losing so much sleep over this exam"); Scythe Marshall ("GRC 201: Advanced Graduate Student Representation");

ConvolutED ("BIOL 274: Introduction to Self-Vivisection, and BIOL 274L, the corresponding lab course")

MathSoc Sez

Hello Mathies!

It's almost the end of term! Hope everything is going well! Here are some things we would like to share with you:

General Meeting

For those of you who missed the General Meeting last night, you missed the opportunity to see all the MathSoc Execs dressed up in animal onesies!

Here are the minutes from the GM:
`https://goo.gl/v4nKQ8`

And the agenda is at:
`tinyurl.com/MathSocGMF16`

Feds General Elections

Federation of Students (Feds) is the student union representing the entire University of Waterloo. Nominations for the 2017–2018 Feds Executives and Students' Council are now open. Nomination forms can either be filled out online at `vote.feds.ca` or in writing from `http://www.feds.ca/elections/nominees/`. You must get your nominations in by January 23rd 2017 at 4:00 PM. Campaigning will occur early February and voting will take place February 13th to 15th. For more information visit `feds.ca/elections` or contact `elections@feds.ca`.

Feedback Form

As the term is wrapping up, we would like to get your feedback on MathSoc. Please take 5 minutes to fill out this survey (`https://mathsoc1.typeform.com/to/z2zoQL`) for a chance to win a ticket to Charity Ball on Dec 2nd (TONIGHT)!

Upcoming Events

Charity Ball (Friday, Dec. 2nd [TONIGHT], 5:30 PM to 10:00 PM)
The Charity Ball is back! This year's theme is `Happily Ever After'.

Tickets will be $35 for a single ticket, $65 for a couples ticket, and $240 for a table of 8 people ($30 per person). Tickets include a formal dinner buffet, dance, auctions (including a lunch with the dean), and a live performance by the Water Boys, our famous a cappella group, at 6:00 PM! Non-MathSoc members will pay an additional $5. At the door, tickets will also be an additional $5. A dance-and-auction-only ticket will be $10. Proceeds will be going to Welcome Home KW, a charity dedicated to making sure refugees to KW have their first home. Buy your tickets online, or at the MathSoc office(MC 3038)! The Natural Log might even make an appearance!

24-Hr Games Night (beginning Saturday, December 3rd at noon)
This term's 24-Hour Games Night will start at noon, Dec 3rd (TOMORROW) and end at noon, Dec 4th. It will be in the MathSoc C&D (MC 3002). Everybody is invited, and you can join or leave whenever you want. Most importantly, there's FREE food!

If you'd like to reach out to the speakers at the Math Kickstarter event last week, these are their emails/contact information:

Shane for CS Side Projects - `fb.com/srcreigh`
Dhonna for Math/Econ - `dmsarell@uwaterloo.ca`
Laura for AMath with Physics Option
- `laura.chandler@uwaterloo.ca`
Larson for FARM - `alcmchan@uwaterloo.ca`
Jun for MathFinance - `jy2tong@uwterloo.ca`
Abina for Double Degree - `a3premac@uwaterloo.ca`
Cheyenne for CO - `xiao.guo@uwaterloo.ca`

Follow us on Twitter, like us on Facebook, and follow us on Instagram to get updates on our activities, events, and more ways to get involved!

Have a fabulous week,

Jazbel Wang, Patrick Melanson, Peggy Zou,
Rosie DeFazio, and WenYu Xu
Fall 2016 Executive Team
Mathematics Society, University of Waterloo

24-Hour Games Night Sez

24-Hour Games Night is this weekend, from Dec 3rd to Dec 4th, noon to noon. During this time interval, come to the C&D[1] and play some games with your friends!

The less competent one

[1] MC 3002, the room number given on the poster is wrong but I don't care

VPA Sez (Clarifiez Lazt Izzue)

The 97% admission average in the last issue of *math*NEWS was after AIF adjustments to high school grades. The high school average is some points less than this.

p2, VPA

Follow us on Twitter (@mathnews), on Facebook (look up MathNEWS), or in person (MC 3030)!

Putnam Sez

The Putnam (a pretty cool math competition) is this Saturday, Dec 3rd! It starts at 9:40 AM and ends at 6:00 PM and takes place in MC 1085. You should come 15 minutes early, since registering everybody might take some time.

You can just show up without warning, but if you can, you should write an email to snew@uwaterloo.ca to ensure there is enough food for you.

All the relevant information can be found at http://www.math.uwaterloo.ca/~snew/Contests/index.html

Also, to relax after (or during) the contest, you can come to 24-Hour Games Night!

Dank

PS: Suppose you have a bijection from R^2 to R^2 that maps circles to circles. Show that it maps lines to lines!

Addendum to v132i5 "eɪ pʌblɪk sə-vɪs ənawnsmn̩t"

It would appear that I have underestimated the IPA literacy of the readership of *math***NEWS** and as such the publication has received two transcriptions of said article, albeit one with mistakes. Thus, when faced with the proof of the fact that some people had read it, I concede my bet stated in the aforementioned article. Some may have even remarked that the exercise was fun, and in the spirit of fun, here's a few more sentences which didn't fit in the self-demonstrating article.

- ðə ʃikθ sɪk ʃiːks ʃikθ ʃiːps sɪk
- twʌz bɹilɪg ænd ðə slɪθiː tɔʊvz dɪd gaɪə- ænd gimbl ɪn ðe weɪb ɑl mɪmziː wɜ- ðə bɔɹəgɔʊvz ænd ðə moʊm ɹæθs æʊtgɹeɪb

Zethar

What Matters to You?

What do you think is the most important issue for our generation? What are you doing about it?

To me, it's climate change. I'm making a video project documenting the financial and ecological impact of various environmental projects, such as switching to a low flow toilet. My browser tabs are full of tutorials on story-boarding and recording. My head is full of random environmental trivia. For example, did you know that vampire drain is negligible in new appliances but used to draw 10% of your household power? Did you know "vampire drain" is a real phrase?

I think a big reason why environmental movement after environmental movement fall off the public radar is because no one really knows what they should do, nor the quantitative impact of their actions. While petitioning to Congress to implement a carbon tax can do a lot of good, it's dis-empowering to put the capability for change in the hands of a nebulous government entity.

Enough about me. What's the big burning issue for you? What will you do about it? As Shia LaBeouf famously said, "Just do it"!

Willow

The Quirky Coach

LinkedIn and Twitter

The easiest way to build and maintain your professional network is using social media. The most popular social media site for professional networking is LinkedIn. The next most popular is Twitter.

If you don't already have an account on LinkedIn, immediately get one! LinkedIn is to the professional world what Facebook, Snapchat and Instagram are to the personal world. Potential employers and professional contacts will expect you to have a LinkedIn account.

LinkedIn allows you to have both a private and public profile. Your private profile can only be viewed by your LinkedIn connections. Your public profile can be viewed by anyone so make sure it doesn't contain any information that could put you at risk for identity theft.

Also take a look at Twitter. Twitter allows you to follow interesting people. The posts are shorter and you don't need someone's permission to follow them. Twitter is a great tool for keeping up-to-date on what's going on with particular groups or people in your industry.

Before you make any connections on LinkedIn or Twitter, make sure that your profile is in place and reflects the image you want to portray. Your profile is your way of showcasing what you know, what interests you, and what you're passionate about.

As a student, you can begin your professional network by connecting with your friends and classmates. That way you can keep in touch even after you all go in different directions after graduation. If you have work experience through an internship or co-op program, connect with your past and present colleagues. Don't let a work placement slip by without expanding your professional network.

Remember to keep your professional network up-to-date. You never know when you're going to need it.

Debbie Smith, UW alumna

Euler Factorization

Or, "How the hell did Euler think of this?"

Here's another proof that there are infinitely many primes, utilizing the (real restriction of the) Riemann Zeta function, which really is just the sum over all positive integers of 1/n^x, for x > 1. As well, the theorem immediately below will help us understand the article in the previous issue.

Theorem: (Euler Factorization) Let f(n) be a function from the positive integers to the real numbers, such that when a and b are coprime (gcd(a,b) = 1), then f(ab) = f(a)f(b) (f is multiplicative). Assume that the sum |f(1)| + |f(2)| + |f(3)| + ... converges. Then we have:

$$\sum_{n=1}^{\infty} f(n) = \prod_{p \geq 2} \left(1 + f(p) + f(p^2) + \dots\right).$$

Proof: Each of the terms in the product (which is over all primes p), converges, because they are subseries of the absolutely convergent series on the left. Then, look at the truncated product P(x), which is the product on the right but only over primes less than or equal to x. There are only finitely many primes less than any given number x, so P(x) exists and is finite. Then, use an approximation argument to make the difference between P(x) and the sum on the left less than the tail of the absolutely convergent sum in the hypothesis; take x to infinite, and we are done.

Corollary: The above holds if

$$\prod_{p \geq 2} \left(1 + |f(p)| + \left|f(p^2)\right| + \dots\right) < \infty.$$

Proof: Since f is multiplicative, it is relatively easy to see that the sum of the first n terms of |f(1)| + |f(2)| + ... is bounded above by the infinite product. So the hypotheses of the theorem hold, so the conclusion does also.

Proof that there are infinitely many primes: Let f(n) = 1/n, and assume for contradiction that there are finitely many primes. Then the hypotheses of the corollary hold, because '1 + 1/p + 1/p^2 + ...' is a geometric series with p > 1, hence it converges, and there are only finitely many primes. Then, by the theorem, we have this equation:

$$\sum_{n=1}^{\infty} \frac{1}{n} = \prod_{p \geq 2} \left(1 - \frac{1}{p}\right)^{-1} < \infty.$$

If you were paying attention in MATH 138, you would know that this is patently absurd, and hence there must be infinitely many primes. Quod erat demonstrandum.

Okay, so how does this explain the proof in the other article? Well, the theorem above says that the Riemann Zeta function has exactly this form:

$$\sum_{n=1}^{\infty} \frac{1}{n^x} = \prod_{p \geq 2} \left(1 - \frac{1}{p^x}\right)^{-1}.$$

This comes about by computing the geometric sums on the right side of the theorem's result for f(n) = n^x, x > 1. The "sieving" argument claimed is the following: the product on the right of the expression can expand to be some infinite product of things, which rewrite to include finitely many terms multiplying to 1/n^x. The integers have unique factorization, which means there's only one way for n to be a product of (powers of) primes. Hence in all of the multiplying, there's only one 1/n^x term, so the result is the sum on the left.

At this point, you can't really just say that you 'analytically continue' the Riemann zeta function to x=1, because—as we talk about in the analytic continuation article later in this issue—that requires that the function be analytic on its domain, and the proposed continuation isn't behaved at x=1. The appropriate way to handle this is to do what we did above, because then you are never working with undefined or infinite quantities in equations. Admittedly, it gets the point across, which is fine, but isn't it nice to both get the point across and be correct?

Yes. Yes it is.

Scythe Marshall

I Am Awake at 8:30 AM!

As I am writing this, I am awake and it is 8:30 AM! While this might seem unsurprising, I assure you that this is a historic moment that people will be talking about for generations! (Or at least, it's more newsworthy than most of Imprint).

Dank

Wørd Of The Week

Rectocraniotomy:
/ˈɹɛktoʊkɹeɪniɒtoʊmi/
(REK-toh-CRAY-nee-AW-toh-me):

1. The surgical removal of one's head from one's arse.

Diminutive Rex

Analytic Continuation

It's actually not as magical as it seems, although it's still pretty magical.

Last issue, there was a proof that there are infinitely many primes, which "used" the analytic continuation of the Riemann Zeta function to the value s=1. This is... um, less than correct, as stated. However, the proof technique, had it been tidied up a bit, could've bypassed all of this; see the article on "Euler Factorization" which appears elsewhere in this very issue. In the meantime, let's talk about what analytic continuation actually is!

Let f(z) be an analytic function, defined on some domain D in the complex numbers (ie. D is open, connected). Sweeping a bunch of things under the rug that is the shiny (Riemann?) surface of complex analysis, we say that a function g(z) on a domain E, where D is a subset of E, is an analytic continuation of f(z) to E when g(z) = f(z) for every z in D, and g(z) is analytic on E.

Here's an example that should be relatively accessible. Let f(z) be given by, for any z in the open unit disk,

$$f(z) = \sum_{n=0}^{\infty} z^n.$$

On the open unit disk, we may write

$$\sum_{n=0}^{\infty} z^n = \frac{1}{1-z},$$

by computing an explicit expression for the partial sums and taking a limit. But you might notice that this second expression for f(z), (1-z)^(-1), is defined for all z that are not equal to 1. If we let D be the open unit disk, and E be the complex plane except for the point 1, then (1-z)^(-1) is an analytic continuation of f(z) to E. Observe, moreover, that in both cases, z=1 is a singularity. It's a very well-behaved singularity (it's only a simple pole of (1-z)^(-1), and if you multiply f(z) by (1-z) and take a limit approaching z=1, you'll get 1), but it's still a singularity, and you can't get rid of it just by "analytically continuing" f(z).

There is a theorem, the Monodromy Theorem, that states that if g(z) and h(z) are analytic continuations of f(z) to some common domain A, then g(z) = h(z) for z in A. Hence we may talk about the analytic continuation of a function to a particular domain. The proof of this theorem relies on the stuff we swept under the rug earlier, so we won't really talk about it past the following parenthetical remark (for the curious, you really want to talk about continuing function elements along a path via a chain of function elements, and then use path homotopy to show that any two continuations along paths going to the same point yield the same function in some neighbourhood of that point).

Not every function defined on a domain D has an analytic continuation to an open set containing D. Consider the function f(z), defined on the open unit disk to be

$$f(z) = \sum_{n=0}^{\infty} z^{2^n}.$$

This function is actually unbounded in many places near the unit circle (exercise for the reader; look at rays of the form re^(2pi*k/2^n)), and so it turns out that every point on the unit circle is singular for f(z), ie. there is no analytic function g(z) on an open disk containing that point that agrees with f(z) on their common domain. We say that f(z) has natural boundary. If a point isn't singular for f(z), it's called regular.

Okay, so, what's the crown jewel of analytic continuation? Well, perhaps you've heard people claim that you can add up all the positive integers and get a finite number, as so:

$$1 + 2 + 3 + \cdots = -\frac{1}{12}.$$

Where does this come from? Does this make any sense? It turns out that, as long as you don't listen to certain physicists who complain that using analytic continuation to make sense of certain summations is not physically relevant, you can "simply" compute an analytic continuation of the Riemann Zeta function by the following functional equation:

$$\zeta(z) = 2^z \pi^{z-1} \sin\left(\frac{\pi z}{2}\right) \Gamma(1-z)\zeta(1-z).$$

Plugging in the appropriate values, you get -1/12, no sweat. Similarly, it's pretty easy to show that the analytic continuation of the Riemann Zeta function takes the value -1/2 at z=0, so that, obviously,

$$-\frac{1}{2} = 1 + 1 + 1 + 1 + \ldots.$$

Going back to the original example we had, clearly

$$1 + 10 + 100 + \cdots = -\frac{1}{9}.$$

That's probably not the crown jewel, if I'm being serious, but it's pretty amusing, and freaks people out. And the best part is that it's completely rigorous! Except for the whole "equals" sign thing; that's not really true. It's always important to understand what we mean when we write things like infinite sums; do we mean a limit of the partial sums? Do we mean an analytic continuation of a function defined by an infinite sum? Do we mean some other summability rule? Are we talking about p-adic numbers? It's important to understand the situation, and not to write silly things down without being rigorous about them. Even if it's awesome to do that anyway.

Scythe Marshall

mathNEWS MD

Finals Soul-Crushing Stress Syndrome

As exams loom near on the horizon many students are starting to feel the effects of what experts refer to as FSCSS; Finals Soul-Crushing Stress Syndrome. The symptoms of FSCSS are varied, but those afflicted often experience effects such as decreased quality and frequency of food, caffeine dependency and spontaneous, uncontrollable crying. By far, the most common symptom is a loss of sleep, either from studying for 72 hours straight or from the sheer existential dread as one lays in bed staring at their ceiling wondering what on earth they are doing with their life and whether or not they should just drop out.

If you are among the many who suffer under the iron gauntlet of FSCSS, fear not, for we here at *math***NEWS** have toiled long and hard in search of a means to combat its dreadful effects. Our research efforts are admittedly early in development, though that is mostly due to the university ethics committee forbidding us from experimenting on Laurier students due to the complaints of animal rights activists. Nevertheless, we have at least found a method of alleviating sleep loss, the most common symptom of FSCSS: Imprint.

After extensive experimentation, *math***NEWS**' researchers have determined that it is physically impossible to read more than 1.38 Imprint articles and maintain consciousness. The mind simply forces shut down after that point due to some intrinsic sleep-inducing property of Imprint articles. The effect does not lose strength even faced with factors such as not speaking English, illiteracy, not being human, or being an inanimate object. Nicknamed "The Imprint Coma Effect", this effect has been found to be reproducible with a consistency high enough to suggest that it is a fundamental law of the universe. Since publishing our findings, several defense contractors have contacted *math***NEWS** inquiring as to the weaponizable capabilities of Imprint's lethal knockout power.

In summary, for all of you poor souls who are losing precious hours of sleep to the ravages of Finals Soul Crushing Stress Syndrome remember: just read an Imprint article and you'll have fallen asleep before you know it.

You don't deserve to know

How to Lose a Friend In Four Years

Be off-stream - The classic Waterloo ditch. Pretty self-explanatory; anyone who is not on co-op with you, not in class with you, or at another school doesn't understand the struggle. Instead of four years to bond, you only have four months to keep the magic alive.

Be on-stream but don't realize until the end of the term - Last week of classes, walking through classes and you bump into someone you actually want to see only to realize you both switched streams and just missed four months of each other's glorious company. Next time track their locations early on in the term and force your friendship on them.

Be lame - Usually, if you meet this requirement any friends you managed to make won't stick around long.

Never leave your room - Let's face it, social interaction is hard. Even though loneliness is harder, we can't be expected to leave our rooms just to maintain a measly friendship.

Never make friends to begin with - This is after four years of seeing the same person you're clearly on stream with, with whom you share many classes and interests when you finally have a conversation and realize you're just strangers on a train passing each other by, never really forming a connection.

Graduate (or they graduate) - If you are in the unfortunate situation of having friends who are older than you, your beautifully formed friendship was doomed from the start. Your relationship will be short-lived and will fade away as though it never even happened.

Promise to meet up and then never do so - Deep down we're all flakes pretending we actually do want to catch up and grab that coveted coffee.

But alas, some friends will rough it out and make it through to the other side, and you can look forward to losing them when they get married and have kids!

G-UNIT

N Ways To Stab a Bear

- With your bare hands
- With your bear hands
- Barely
- Barely ;)
- With a knife (obviously)
- With a lance
- Training another bear
- Consensually
- Sensually
- In slow motion
- [REDACTED]

Mr & Mrs Bearstabber

What Board Game Compatibility Means For Your Relationship

I recently went on a date at a board games cafe and was surprised to discover that my girlfriend and I prefer different types of games. She enjoys trivia and I enjoy strategy.

I'm pretty sure most people will find some version of this happening in any relationship that lasts; suddenly you find yourself wanting to do something together and tripping over the details, even if it is what movie to watch or where to eat dinner.

It is easy to get bogged down in details and decisions, especially if you are used to them just working smoothly. We ended up still having a great time though out of something that initially looked rocky so I'm turning this into a brief advice article for all the budding romances in the math faculty. The point of a date isn't what you are doing; it is who you are doing it with, so arguing over what to do is straight-up counterproductive. If you can find a compromise or some other way to make something exciting do it even if it wasn't what you initially wanted. The easiest ways to lose in this situation are to get stuck in an indecisive/argumentative loop or focus either too much on what you want to do or making the other person happy. (I have heard this last possibility called a Canadian stalemate when both people are trying to be too considerate or polite.)

However you want to work things out; don't overthink it or sweat the details, because what you are doing isn't as important as who you are doing it with and even spending ten minutes being indecisive or arguing about what to do is probably too long. The goal is to enjoy yourself and if you need to argue into deciding what to do, you are that much less likely to enjoy whatever it is you do end up picking. So this situation was an important reminder to myself, hope it helps some of you other romanticly inclined mathies.

Pockets

2016

During the final issue of *math*NEWS this year, it is only fitting to remark on the sad state of affairs that brought us here. It is evident from this vantage point that the Mayans got it wrong; Ragnarök begins in 2016 and the lead-up is breathtaking in the same way that one cannot peel away from the horrors of an imminent disaster.

The year started out innocently enough—there was even some progress in the beginning as the great schism was being worked upon and the Panama papers exposé helped bring equality. Yet no amount of progress can resist being eroded by some of the largest manipulation of the populace to produce results most disastrous to long-term harmony.

It started with the British EU referendum. Experts were pretty sure that it'll be like the Scottish referendum: it'll come close, but ultimately the status quo shall remain. They were... wrong. It set off a chain of events, leading to markets dropping and people moving, of which the ramifications have yet to play out fully. All of this was a mere prequel to the American election come November.

There is probably no need to devote more time and space to the election system which has a 7% rate of choosing the less representative winner and the upset brought by how prior to the election polls predicted a likely (albeit not easy) Clinton victory.

Notable people are leaving this world for the next in droves. David Bowie, Marvin Minsky, Alan Rickman, Prince, Elie Wiesel, King Bhumibol Adulyadej, Fidel Castro etc. Everyone seems to be in a hurry to move on. As of writing, 33 days remain in this year, and one can only wait with bated breath for whatever catastrophe might be still lurking around the corner afore the finish line.

Zethar

How to Nerd Snipe People

'Nerd Sniping' is a term coined by *xkcd* that refers to the act of presenting someone with an interesting problem that leaves them so distracted they are unable to function. Nerd sniping can be a fun activity to practice.

There are some effective strategies for nerd sniping people.

Know your target. Know what they are passionate about and ask questions related to this topic. Even better if you combine multiple things they are passionate about in a new unusual way that they have never see before.

For example, if you want to target Pockets, just give them a good story to read. If you want to target Zethar, ask a question on probability or linguistics. Scythe Marshall can get pretty much anything about math or sports; bonus if they intersect. Diminutive Rex? Just tell them about this really weird obscure thing on the internet. Theodore Bear: mention Hawaiian Pizza. Player of Games: ask him to write a parody of a *Hamilton* song. ConvolutED: show him new types of logic or word puzzles. The rest of the writers are left as an exercise to the reader.

If you don't know what they are passionate about you can always ask questions about their beliefs. And then use the Socratic method to get them further justify their beliefs. The downside of this particular method is that people quickly get tired of it.

A good nerd snipe should make your target happy from the mental stimulation.

If you want to use this article to try and come up with a nerd snipe problem that would hit most of the *math*NEWS readership, we would like to publish your results.

Beyond Meta

Santa Baby: A Waterloo Wish List

Santa baby, slip an A+ on my Learn page, for me
I've been a studious girl, Santa baby
So hurry onto campus tonight

Santa baby, higher grades while studying less, no stress
I'll wait up for a pass, Santa baby
So hurry onto campus tonight

Think of all the pens I've gripped
Think of all the classes that I didn't skip
Next term I could work just as hard
If you promise my grades won't slip

Santa baby, I want some sleep and really that's not a lot
I've been a zombie all term, Santa baby
So hurry onto campus tonight

Santa honey, there's one more thing I really do need, the deed
To a prime study spot, Santa baby
So hurry onto campus tonight

Santa cutie, fill my stocking with some coffee, and tea
Gonna need that caffeine, Santa cutie
And hurry onto campus tonight

Come and trim my Christmas tree
With some job offers from Forbes companies
I really do believe in you
Make these employers believe in me

Santa baby, forgot to mention one little thing
To go home
I wanna get out of this place, Santa baby
So hurry onto campus tonight (x2)

TheUndecided

Rudolph the Red Eyed Reindeer

You know Dasher and Dancer, Prancer and Vixen
Comet and Cupid, Donner and Blitzen
But do you recall
The most ghastly reindeer of all?

Rudolph the red-eyed reindeer
Had some very laser eyes
And if you ever saw them
You would probab'ly quickly die

All of the other reindeer
Used to laugh and call him names
Til Rudolph grew up bigger
And he could cause instant flames

Oh, then one nervous Christmas Eve
Santa came to say (hey Rudolph)
Rudolph, with your eyes so grim,
Please don't kill elves on a whim

Then how the reindeer feared him,
As they shouted in terror:
Rudolph the Red-Eyed Reindeer
We have made a grave error.

Yours in terror,
Shay Blair

[Postscript from the Editors: Yes, we are just as confused as you are as to what makes eyes 'very laser', as opposed to just 'laser'.]

How To Catch the Bus at University/Seagram

- Walk up to the bus shelter and sit down
- Realize that no one is standing at the actual bus stop which is located 10m away and that buses occasionally just drive right by if no one is there
- Engage in a game of chicken with the other prospective bus riders to determine who bites the bullet and has to leave the shelter and stand outside at the bus stop
- If no one has gone to the bus stop yet and you can see your bus coming, sigh internally and begin walking to the stop
- Realize that the bus is coming too fast and going to arrive before you and you currently look like you are simply walking along the sidewalk
- Break into a nervous half-run while waving awkwardly at the bus
- Breathe a sigh of relief as the bus sees you and comes to a stop
- Curse whoever decided that the Uni/Seagram stop should be moved so far away from the shelter

aPlayerofGames

Buzz About Bees

Recently, a video went viral titled, "The Entire Bee Movie But Every Time They Say Bee It Gets Faster". The first couple minutes are just as insufferable as the actual movie, but soon the movie is buzzing by very quickly while still revealing almost no interesting plot, and then suddenly it's over.

This made me think about what other memes I'd like to see. In no particular order,

- The Bee Movie but every time they say bee it gets slower
- The Bee Movie but every time they say bee you get stung by a bee
- Air Bud but only the scenes without any dogs
- Pixar's Cars but all the cars have brakes made by Toyota
- Disney's Tarzan but the members of *NSYNC voice all the characters
- The Frozen soundtrack but sung entirely by the trolls
- Despicable Me but with more of a focus on the Minions... oh

Dusk Eagle

The Brooding Brood Brood Brood, Part 6

Formerly known as "The Shooting Shoot Shoot Shoot"

I burst out of the Mattamy Centre doors and turned right. Racing down the streets, I passed the cinema. When I reached Yonge, I heard the sound of glass shattering behind me. Musk had crashed through the window.

"*BEAR!!!*" he yelled out into the night. "You can't get away from me! I own space! The cosmos is my domain! Do you really think you'll be safe on this planet?" He laughed an evil laugh that sounded so evilly filled with evil evil.

The crossing light that would bring me down Yonge had turned green by the time I reached it. I sprinted across the street, making it to the opposite sidewalk with only seconds to spare. As my legs carried me down Yonge, I glanced back to see Musk at the opposite side of the crosswalk. The light was red, which would give me more time to reach my intended destination. He stared at me. Then he stepped forward, and began walking towards me. I was shocked. Crossing the street without a green crossing signal? That's terrible! The madman!

"HAHAHAHAHAHA," Musk said evilly. "I am-" He was cut off when a Tesla slammed into him, launching him several feet into the air. My first thought was that there must be a word for that kind of situation, like rain on your wedding day.

I continued south down Yonge, not even stopping to see what happened to Musk. As I approached Yonge-Dundas Square, the sound of a gunfight filled my ears. The spattering of tommy guns firing their payload into buildings and car doors was my reward for getting this far. Now, I just had to finish this.

I ducked into cover as I reached the square. I didn't want a stray bullet to tuck me into the big sleep. I spotted one of the gunfight's participants close to me. I thought that he would do. I ran up to him, and punched him right in the face. I hit him so hard that I knocked the colour back into him. It shocked him so much that he fell unconscious; his body and his gun both hitting the ground hard.

I crouched down, and picked up the tommy gun. As I knelt to the ground, I felt the cool drops of rain start hitting my face. The sprinklers had turned on, just on cue. The drizzle quickly turned into a downpour. I turned around, and found myself facing Musk.

"Hand over the money, Bear," he said. "It wil-"

I started firing into eccentric billionaire. I don't hesitate to do what has to be done even at the best of times, so I wasn't about to start now. His body convulsed was it was riddled with bullets. I didn't stop firing until I was out of ammo. But to my horror, despite the onslaught, Musk was still standing.

"Did you really think you could stop me so easily?" he said before laughing once again. Chunks of flesh were missing from his frame, revealing metal parts beneath them. His laugh now sounded much robotic than it had before. "A mere human cannot defeat me, Elon Musk. My cyborg parts grant me strength unknown to any normal man."

Just then, bullets started riddling him once again. All the people there participating in the gunfight began firing at him. Revealing himself there in Yonge Dundas Square got all their attentions, a bad decision. I suspected that it would take a bit more than just a tommy gun to take down Musk, so I decided to get a lot more help. He fell to the ground. I waited a bit for the gunfight to end, then walked over to Musk's body.

"My systems are damaged. You have outsmarted me, Bear. Congratulations," he said, looking even more robotic than before. "You can keep your money and your photos."

Just then, the rocket thrusters hidden in legs activated, shooting him into the sky, no doubt sending him all the back to California for repairs. His metal exoskeleton would no doubt let him last his trip through the stratosphere. The rain, or the giant sprinklers, to be accurate, stopped.

I called up Ms. Branagh, and told her to come down to Massey Hall. It was only a block away from where I was. She was already there when I reached the place. I handed over the photos and the money she had given me earlier.

"Thank you, Mr. Bear," she said, smiling, as she reached into her purse, and gave me my coupons for free coffee. "I should have never doubted you."

I didn't ask her to thank me. I didn't ask for anything but what I was owed. But I accepted it. In this job, you often get more than you bargain for.

Turning away from me, she started crossing the street, where she was immediately hit by a ice cream truck, killing her instantly.

I didn't stay. The case was over. There was no reason to stay. When I got back to my apartment, I called up my supervisor and told him everything that happened. He told me that I'd done a good job. However, since I was aiming for an "Outstanding" rating, he was going to give me a "Very Good". In this job, you almost never get what you really want. I accepted that fact of life, poured myself a new drink, walked up to the window. Private eyes weren't supposed to win, and our endings were supposed to be bittersweet. I was disappointed, though. I mean, I lost the girl; that should at least bump me up to an "Excellent". With that thought, I started my hour of brooding. The case was over, but I still had a job to do.

Theodore Bear

profQUOTES

"I didn't plan the class very well, since that was supposed to be the end, and there are 4 lectures left."

Geelen, CO 442

"So I've computed these partials. Just like a fool."

Goulden, CO 330

"The FBI sent a letter about this and they said, 'This works.'"

Goulden, CO 330

"I'm not trying to do anything clever. I'm not capable of that."

Goulden, CO 330

"This doesn't say anything about anything... It's just a bunch of stuff."

Nishimura, CS 234

"We're not going to form it provally."

Nishimura, CS 234

phone tweets "Shoot, I've forgotten all of my cellphone jokes. That's terrible."

Richards, PHIL 145

Professor: "Are you going to steal my thunder?"
Student: "Yes."

Richards, PHIL 145

"Well that's my failure of trying to start the day off with a joke."

Richards, PHIL 145

"Oxford Dictionary's word of the year is 'post-truth'. I don't know what that means, so I'm going to make up a definition."

Orchard, CS 370

"I'm so tired from all my work that I didn't even put on decent pants today, so you're going to have to take it as it is."

Vaughan, ECON 102

"I have a recurring dream where I walk in to the first lecture and there's nobody registered. I don't know if that's a bad dream or wishful thinking."

Vaughan, ECON 102

"... the assignment, which, let's face it, most of you have done already."

Marcoux, PMATH 351, a week before the deadline

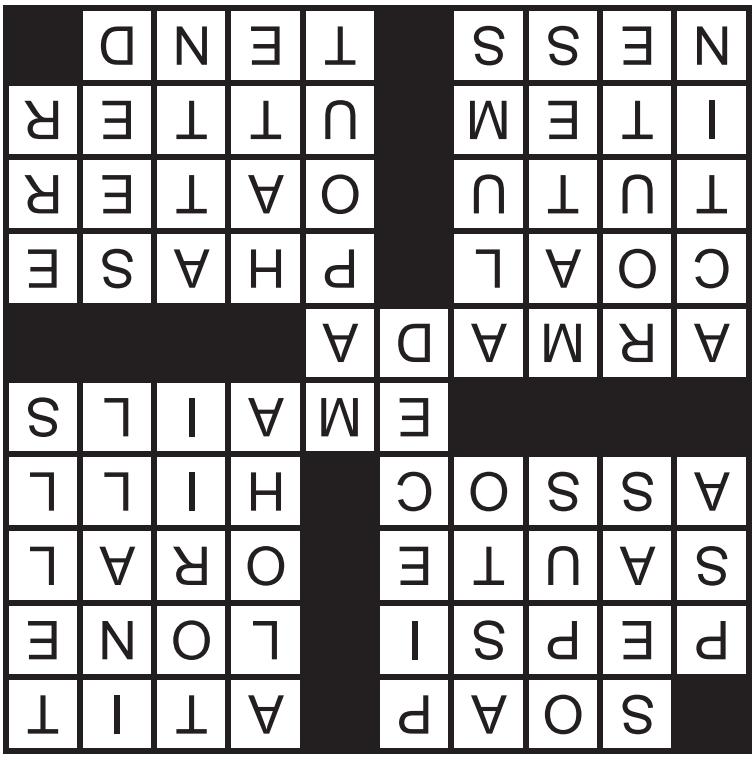
"For those of you who are really pedantic about your limits, you may be upset by this. Or at least confused."

Saunders, ACTSC 445

"Every time I've looked at a GPU, it's terrified me."

Buhr, CS 353

This Issue's Solution:



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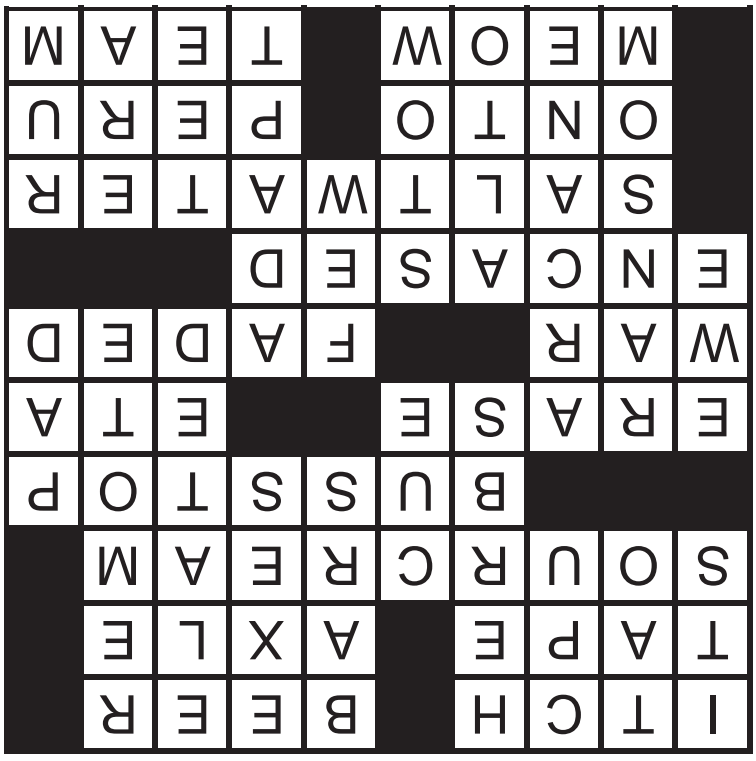

Send us your articles, profQUOTES, Sezzes, *grid*SOLUTIONS, and cute mechatronic animals to mathnews@gmail.com or to the BLACK BOX outside the MC Comfy. We would love to publish them!

GRIDWORD

*grid*COMMENTS

Once more, I am going on co-op for next term. Fret not, though, as I will continue to write puzzles. I am considering alternating between logic puzzles and traditional *grid***WORD**s, so that I can return to a 15x15 size, without sacrificing quality or sanity.

The final *grid***WORD** winner for the term is an unnamed submission, who has discovered a **combinatorial species**. It's named with a script letter, and needs the Lambert W function to be written in closed algebraic form.

There are no extra long answers as a theme, because something was on my mind when I was making this. Can you read between the lines and spell out what it was? Or is this all Greek to you?

ConvolutED

*grid*CLUES

Across

1. It's sold in bars? *(not beer)*
5. Keep __ __; hang in there
9. Coca-Cola competitor
10. Solo
11. Brown
12. Spoken
13. Org.
14. Where Jack fell down and broke his crown
15. Writes, in a modern way
17. Flotilla
21. Stocking stuffer
22. Full moon, e.g.
27. Black Swan or Swan Lake attire
28. Western flick
29. It comes after a bullet?
30. Voice
31. Monster's home
32. Incline

Down

1. Red, Black, and others
2. Great work of art
3. Regarding
4. _____ together; assembled
5. Standard greeting in Hawaii (not the Pokémon one)
6. Shinto gate
7. Summed up
8. Things poker players look for
9. Awareness-raising ad, for short
16. Chart
17. Be part of the cast of
18. A delivery person has one
19. Canberra companions
20. Baccalaureates
23. Show enmity toward
24. "Read this!" abbrev.
25. Pre-tournament ranking
26. Be human

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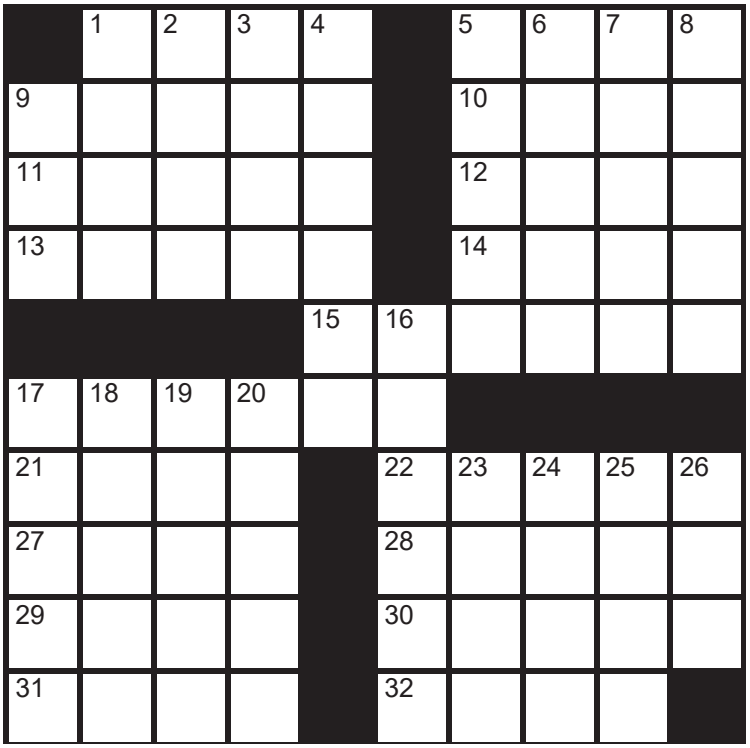
This Week's Grid:



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