WITH YOU

9 770705 041004

"FINISH THE SENTENCE: I'D REALLY LOVE TO _____."

For more than a decade, **mathNEWS** was confined to the printed page. And then recently, we were further confined to the PDF'ed page. No longer.

That's right, we have slipped the surly bonds of words and released a YouTube video, available on our YouTube channel, at https://youtu.be/djzHAzmQB6w.

How to describe this video? It is the song of the summer, a magnum opus, and surely will be the last remnant of our civilization a thousand years hence, relaying the twin pillars of our culture, **mathNEWS** and Fortnite, across the eons.

(Also, if you like, give our channel a subscribe. Who knows what else might show up there?[1])

This isn't to say, of course, that we're moving away from the written word. This issue is still jam-packed with all the **mathNEWS** content you expect and deserve.

Professor Penny Haxell is here to discuss the UWaterloo campus of the past, her Wikipedia, and pasta sauces.

Our resident game devs cy and girafarig return with another retrospective on their latest game, giving us insight into the process of game design, and giving me insight on my lack of typing skills.

Speaking of returns, Predap and CC both return with new installments of their continuing series, adding to our growing collection of urban fantasy serials.

me deploys custom meme technology to look at the bright side of online learning, and we also cover coffee, leases, hockey, and base-jumping.

Where will **mathNEWS** go next? Just wait until we break into Hollywood.

god ⚡ peED
Editor, **mathNEWS**

1. This in no way promises, claims, or predicts future content on the **mathNEWS** YouTube channel. **mathNEWS** is not liable for emotional, physical, or monetary damage ensuing from misguided expectations of YouTube content.

THAT GUY	Be first!
TENDSTOFORTYTWO	tend to forty two
SAY HI TO EVERYONE HERE HI	seagull man
GIRAFARIG	love. Really, I would
PREDAP	Write something witty here, but, alas…
CC	have you TAKE ME TO THE LAB TO WRITE **mathNEWS** TODAY
ME	**mathNEWS** with you
ABALD MAN	be the smartest tool in the shed
FINCHEY	bless the rains down in Africa
PSYCHGIRL	have money, just unlimited money
APHF	complete my collection of authentic neolithic era flush toilets. The problem is older flush toilets, dating back to the 31st century BC, are integrated with their sewage systems by definition. These sewage systems tend to be local water streams, which are hard to collect and store
JEFF	finish Portal 2 someday
DERIVING FOR DICK	?
BOLDBLAZER	be the best like no one ever was
A COOL PEN NAME	find an in person course to take in the fall
ROYAL NO.69 MILK TEA	retire
COVID-19	genetic reshuffle
TERRIFIED	
GOD ⚡ PEED	snap back to reality, oh there goes gravity
CLARIFIED	play with your heart, get lost in the game

ARTICLE OF THE ISSUE

In the end, there was really only one article that could claim the number one victory royale this issue: **mathNEWS** *With You.*

A lot of our writers worked on this (check the article for the credits), and today it's all of them that have… gotten the dub?

I think that's how it goes. Your prize this week is YouTube stardom.

god ⚡ peED
Editor, **mathNEWS**

mathASKS 146.2
FEATURING PROFESSOR PENNY HAXELL

PREDAP: READING ON WIKIPEDIA, YOU HAVE AN ERDŐS NUMBER OF 2. DOES THIS SURPRISE YOU? CAN YOU TRACE YOUR PAPERS TO ERDŐS HIMSELF? (ALSO, THANKS FOR GIVING ME A NUMBER OF 3!)

It doesn't surprise me, in fact he was such a prolific author that there are many internally-disjoint paths of length 2 joining me to him. For example my co-authors Yoshi Kohayakawa, Tomasz Łuczak, Vojta Rödl, Ron Aharoni, Miki Simonovits, Ron Gould, András Gyárfás, Michael Krivelevich, and Noga Alon are all middle nodes in such paths.

I met Erdős many times when I was a grad student and beginning faculty member. He was a close colleague of my PhD supervisor and he visited Cambridge several times while I was there, and I also met him at various conferences. There was always a buzz of excitement and activity around him wherever he went. In fact I have the (somewhat sad) distinction of being one of the last people to win money from him for solving one of his "priced" problems (maybe even the very last, though I can't confirm this). In a paper with Gyárfás from 1995 he had conjectured that a certain function, depending on a parameter r and defined on graphs with n vertices, was independent of n. To promote the problem he offered a prize of 25 dollars for proving that this function for $r = 3$ was bounded by 1995 for every n. I proved their conjecture, and (just by luck) the value of the function I found was at most 1695 when $r = 3$. So at a conference in Hungary in 1996 he awarded me 25 US dollars — I was hoping for one of his famous cheques that I could keep as a souvenir, but instead he just asked one of his American colleagues to hand me cash! He died just a couple of months later, at a conference in Poland. To this day he is greatly missed in our field.

ERDŐS NUMBER OF 3 GANG: WIKIPEDIA SAYS THERE IS A THEOREM CALLED "HAXELL'S MATCHING THEOREM." HOW DO I GET A THEOREM NAMED AFTER ME?

It may seem like an unhelpful answer, but you need to prove a theorem that turns out to be useful to a lot of other people for whatever they are trying to do. I wish I could tell you a recipe for doing that! Choosing to work on problems that seem central is an obvious start but (also obviously) is not sufficient — once more you also need a good dose of the luck factor.

TENDSTOFORTYTWO: HAVE YOU BEEN TO CAMBRIDGE, ON? HOW DOES IT COMPARE TO THE REAL CAMBRIDGE?

Haha, that is a good question. The answers are: yes I have, and not very well. Let's see — well it does have a river flowing through it. And some stone buildings. And there is a nice old historical hotel, that — oh wait, scratch that last part. They just demolished it, in spite of a court injunction forbidding its destruction. Way to go guys. So yes, the list of similarities seems to be really short.

CLARIFIED: WHAT WAS CAMPUS LIKE DURING YOUR UNDERGRADUATE DAYS? WHAT HAS CHANGED AND WHAT HAS STAYED THE SAME?

It has changed a lot, and in many ways. I'd say what I miss most is the green space, which used to be plentiful before successive university administrations stuffed the campus with large new buildings. For example, in my day the area bounded by MC, the Chemistry building, the ring road and the Campus Centre (which is now just the main interior hall of the SLC, where the turnkey desk is) was all open lawn space. I remember one year we played a game of tackle soccer there during the break between the morning and afternoon sessions of the Putnam contest. There were a lot of mud and grass stains evident on people's clothing in the afternoon session! Nowadays you almost have to turn sideways to squeeze through the narrow path between QNC and SLC, the only outdoor route to the ring road in that direction.

One thing that has stayed very much the same in all those years is your very own **mathNEWS**. Both the look and the tone of it are remarkably unchanged. The regular **profQUOTES** feature was actually started during the time I was an undergrad. I don't remember who it was (and maybe it was never revealed publicly), but someone on a whim sent in a few goofy things that professors had said during classes, and invited others to do the same. It caught on immediately and became one of the most popular and enduring features ever. Any time you spot profs reading **mathNEWS**, they are almost certainly reading the **profQUOTES**. We seem to have a great curiosity about what quotable things our fellow lecturers are saying. I've even witnessed colleagues becoming really quite indignant over having been misquoted in **mathNEWS**!

Now that you've seen Fermat's Little Theorem, you may be wondering about Fermat's Big Theorem.

PROF. PENNY HAXELL

VINCENT MACRI: HOW DO YOU FEEL ABOUT THE UNIVERSITY'S IN-PERSON PLANS FOR FALL 2021?

For all of you (students and profs alike), I feel a good deal of concern about the uncertainty and the potential for disruption that could result if there is another serious downturn in the public health situation. For myself however, I feel a carefree indifference because I won't be teaching that term. Again luck is on my side!

GOD⚡PEED: WHAT WOULD YOU ADD TO YOUR WIKIPEDIA ARTICLE?

TERRIFIED: WHAT WOULD YOU SUBTRACT FROM YOUR WIKIPEDIA ARTICLE?

BOLDBLAZER: NOT A QUESTION, BUT FUN FACT: THE WIKIPEDIA ARTICLE ABOUT YOU WAS ONCE EDITED BY STEVEN PRUITT WHO HOLDS THE RECORD FOR THE MOST WIKIPEDIA EDITS.

It did come as a surprise to me to find that I have a Wikipedia article (I noticed its existence only a couple of years ago). There are no errors in it either. Maybe one thing I might add would be the link to a public lecture I gave at the National Museum of Mathematics (MOMATH) in Manhattan last March (just days before New York was engulfed by the devastating first wave of the pandemic). The lecture was a fun event, and definitely the highlight for me was watching 20 members of the NYC public act out the Gale-Shapley algorithm for stable matching in bipartite graphs. I'm not sure the video captured the full entertainment value of the moment, but you can see "Come Sail Away: Math for the Cruise Director" at https://www.youtube.com/watch?v=iLWgTo-3tng.

PMC PROBLEM 2: TICK TOCK, ON THE CLOCK

Hey folks!

Welcome back. Did I subconsciously choose this problem because I'm behind on all my work and I was rushing to scrape something together for this issue, you ask? Great question. Let's take a look at this week's problem.

Taken from *The Moscow Puzzles: 359 Mathematical Recreations* by Boris A. Kordemsky, edited by Martin Gardner, (pg. 11):

Can you divide a watch face into 6 parts with straight lines so that each part contains 2 numbers and the six sums of 2 numbers are equal?
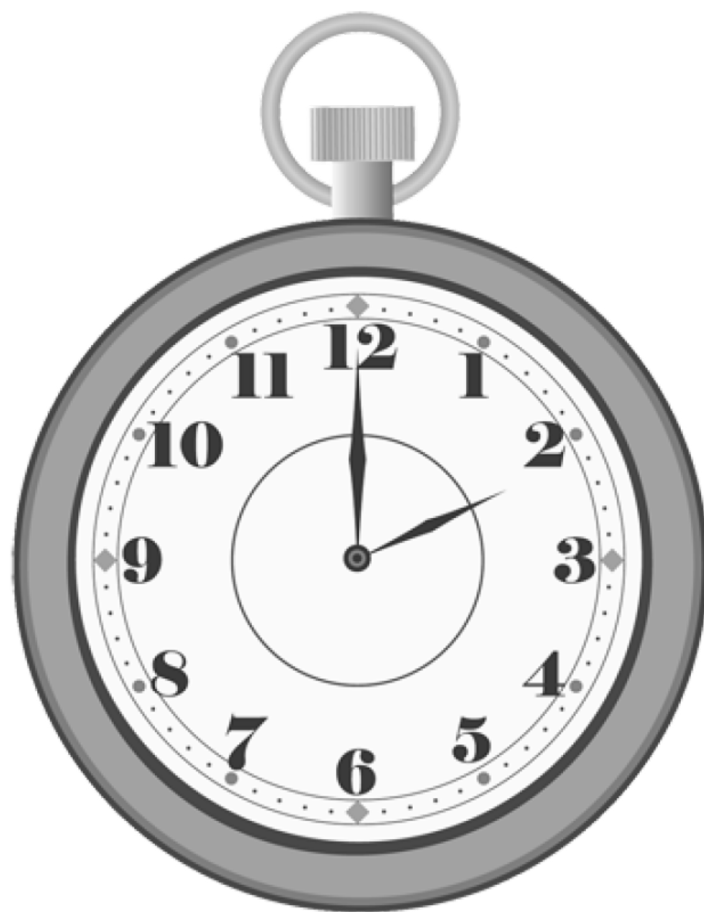

FIGURE 1: AN OPTIONAL VISUAL AID

Send your solutions to pmclub@gmail.com, and check out our new, shiny discord (https://discord.gg/6m9Jw9UCVF). Also check out the solution to our previous problem, found somewhere in this issue…

Happy problem solving!

VP Propaganda, PMC

FROM THE KITCHEN
profTHOUGHTS *146.2*

I don't know about the rest of you, but I would not be getting through this pandemic period without indulging in a keen interest in food. Here are three of my favourite pasta sauce recipes. Each one is easy and quick to make, and is a cheerful colour to brighten your plate. They all happen to be vegan, but of course you could add any extras you want. (For example: boiled egg is good with any of them, and cooked shrimp goes well with the Red.) Confession: I never measure anything when cooking, so quantities are approximate. The expected number of servings for the recipes given would be 2 to 3.

GREEN

- 2 ripe avocados
- 4 cloves garlic
- olive oil
- 2–3 tbsp. lemon juice
- salt to taste

Chop the garlic finely and fry it in a little olive oil until slightly browned and crispy, then turn off the heat. Mash the avocados in a bowl. Add the lemon juice to the hot pan and stir (this will help lift off any fried garlic stuck to the pan). Add mashed avocado and salt, turn on the heat again briefly and stir, just enough to warm it up. Turn off the heat, add drained cooked pasta, toss to coat thoroughly, and serve.

Recommended topping: toasted pumpkin seeds.

YELLOW

- 1 large onion
- olive oil
- 2–3 cloves garlic
- 2 yellow peppers
- salt to taste
- 3–4 tbsp. almond butter
- 2 tbsp. mild vinegar (e.g. rice vinegar or white wine vinegar)

Chop the onion and the garlic and seed and chop the peppers. Fry the onion in a little olive oil until soft. Add the peppers, garlic and salt to the pan, cover, and cook gently, stirring occasionally to prevent sticking, until peppers are soft. Turn off the heat. Add the almond butter, vinegar, and a little water (start with about ¼ cup). Blend with an immersion blender until the sauce is smooth and at the consistency you want, adding more water if necessary. Turn on the heat again briefly and stir until heated through. Turn off the heat, add drained cooked pasta, toss to coat thoroughly, and serve.

Recommended topping: toasted flaked almonds.

Tip: if you don't have an immersion blender, you can pour the mixture into a jug blender, whiz it up, and then return it to the pan. If you don't have a blender at all, just chop everything finely, skip the blending step, and add only a little water and stir well. It will be chunky rather than smooth but it will still taste good.

RED

- 4 cloves garlic
- olive oil
- tomatoes (number depending on size: 4–6 romas but only 2–3 big beefsteaks)
- 2–3 tsp. dried basil
- 2–3 tsp. sugar
- salt to taste
- 1 tsp. dried chili flakes (or more/less, to taste)
- (optional) 1–2 tbsp. tomato paste or red pesto

Chop the tomatoes and finely chop the garlic. Fry the garlic in a little olive oil just until it starts to sizzle. Add the tomatoes, basil, sugar, salt, and chili flakes and cook uncovered until much of the water has boiled away and it is the consistency you want. Stir in the tomato paste or red pesto, if using (this will make it a little thicker and give a richer tomato flavour). Turn off the heat, add drained cooked pasta, toss to coat thoroughly, and serve.

Recommended topping: toasted pine nuts.

Tip: you can replace the chili flakes with your favourite "hot stuff," for example, finely chopped fresh red chili or habanero pepper. You can use canned tomatoes instead of fresh, but it will be more watery (requiring longer cooking) and more sour (so you may want to increase the sugar).

OTHER TIPS

Tip on toasting nuts and seeds: all of them have a secret desire to burn to a cinder the moment your back is turned, so try to resist the temptation to do anything else while they are toasting. I find it best to toast pumpkin seeds in a dry pan on the stovetop (shake the pan to move them around every 20–30 seconds or so, until they are slightly to moderately browned, then immediately empty them out of the pan into a bowl). Almonds and pine nuts work better when toasted in a baking pan under a grill (e.g. the broiler in your oven or in a toaster oven). Again, watch them constantly and shake the pan frequently, and take them out as soon as they are lightly browned.

As for the pasta, it can be whatever you like. I tend to choose "short" pasta such as rotini, fusilli or penne, that hold the sauce well and don't paint your face quite as much as long pasta such as spaghetti or linguine. But any kind of pasta will do.

Prof. Penny Haxell

mathNEWS WITH YOU

WATCH IT HERE: HTTPS://YOUTU.BE/DJZHAZMQB6W

mathNEWS With You is also featured as the musical score to one hot new critically acclaimed 2021 video game release! You can read all about it in *Retrospective: Write a Great* **mathNEWS** *Article in Three Easy Minutes.*

CRITICAL ACCLAIM

oh my fucking god

<div align="right">JEFF</div>

This is a masterpiece

<div align="right">ME</div>

mawma this is art at its finest

<div align="right">DERIVING FOR DICK</div>

My pronouns are wrong

<div align="right">SUNGMIN CHEE</div>

LYRICS

[Intro]
We got an article of the issue wow
Yeah **mathNEWS** we 'bout to get down (get down)
Gift card in my hand right now
To Con-es-to-ga uptown
Issue just came out
I grab my friend now we're takin' stairs down
Now we're in the DC streets
Grab me fresh hot **mathNEWS** sheets

[Chorus]
Take me to the lab to write **mathNEWS** today
We can go to MC, down through Bill Tutte Way
I'd really love to, **mathNEWS** with you
We can be pro **mathNEWS** writers

[Verse 1]
He says, hey editor, you got some tasty pizza?
I just wrote N things and I would really like to eat
Hey dude sorry, I found nothing that's ordinary
All I got is asparagus carbone from pizza nova?
There's the **mastHEAD** just up there
Provide your answer to the question in the space that's spare
I've got **profQUOTES** that I'll send

And some lines that I've penned
I'm a cool pro **mathNEWS** writer
(Cool pro, **mathNEWS**…?)

[Chorus]
Take me to the lab to write **mathNEWS** today
We can go to MC, down through Bill Tutte Way
I'd really love to, **mathNEWS** with you
We can be pro **mathNEWS** writers

[Bridge]
La-la-la-la-la-ee-ya
La-la-la-la-la-ee-ya
La-la-la-la-la-ee-ya
Will you be my pro **mathNEWS** writer? (Pro **mathNEWS** writer)

[Verse 2]
COVID got the win this weekend
Can't do prod night today
Let's all meet at home and we can Discord dominate
Let's make a Minecraft server
And a robot of our own
Let's call him Sungmin Chee and she can title all our poems
Dressed in all his fancy prose
He writes a dissertation in ten thousand quick keystrokes
I write an N things article
It uses the word farticle
And I just got an article of the issue
An article of the issue

[Chorus]
Take me to the lab to write **mathNEWS** today
We can go to MC, down through Bill Tutte Way
I'd really love to, **mathNEWS** with you
We can be pro **mathNEWS** writers

CREDITS

Singers: CC, cy, Deriving for Dick, me, tendstofortytwo, and others!
Mixing: CC.

Thank you all for your contributions!

<div align="right">*Various Artists*</div>

PMC PROBLEM 1 SOLUTION: CAMEL AND BANANAS

Hello my lovely bananas!

We saw a number of great solutions for our first problem of the week. Except we gave you two weeks to solve it. Problem of the fortnight? Anyways, thank you all for participating!

In lieu of the extra 168 hours given, we have two winners for this one… Diminutive Rex and tendstofortytwo, congratulations! We hope you like your complementary camel-keychain prize. Alternatively, you can opt for a gift card. Coincidentally, they have the same monetary value.

For those wondering what the solution is, read on. The camel can transport exactly 533 ⅓ bananas (roughly 17% of the total) as follows: to transport all the bananas 1 km from the start, we have to make 3 round trips, costing 5 bananas in total (since we don't go back the last time). After 200 km, something important — the camel has eaten 1000 bananas! Now we only need to make 1 round trip for each km, so that's 3 bananas per km. This can go on for 333 ⅓ km, before another 1000 bananas gets eaten. From here, we only need to travel the remaining 466 ⅔ km, at 1 banana per km, leaving us with a total of 533 ⅓ bananas at the finish line!

Tendstofortytwo's solution, or rather — "computer assisted thought experiment" — was particularly interesting; they graphed the distance travelled in one go (x) versus total bananas transported (y), using a nifty Javascript program to calculate all the values. Being hindered by the finiteness of computing power, they arrived at the somewhat approximated answer that it is *(about)* optimal to travel in 1 km intervals. I urge you to check out their results here, and ponder about the zigzaggy corners: `https://docs.google.com/spreadsheets/d/1QIgi6lQ1lr8cJNks-1epUWyw6S6Rcbq3LQP-4L2JGvM/edit?usp=sharing`.

Diminutive Rex came up with a more rigorous proof, ~~showing once again that computers are inferior to pencil and paper in every way.~~ Their method of transporting bananas involved setting up "banana caches" throughout the journey, such that they would end up back at the start and be able to travel the whole 1000km in one go, picking up the caches as they go. Here is is a shortened version of their proof:

"Clearly, you must leave banana caches to get ANY bananas past the finish line, and, clearly, you must make at least two trips back to the origin to pick up more bananas, if you are going to make the most of your bananas. The sum of all bananas in banana caches up to and including kilometre x should be no more than x. This is because if, for example, you encounter 400 bananas at the 200km mark on your final trip, you will have to leave 200 bananas behind — a waste of bananas!" And after arguing that 2 banana caches are necessary to transport the maximum number of bananas because two trips back to the origin are needed, they concluded "without loss of generality that one of the caches will have to be further out than the other. That means that, when leaving the caches,

we will travel the distance from the origin to the closer cache 4 times, but the distance from the closer cache to the further cache just 2 times. This means that the further cache can store at most ⅓ of a trip's worth of bananas, and the closer cache can store at most ⅕ (two trips there, two trips back, and the amount cached). ⅓(1000) + ⅕(1000) = 533 bananas!"

Make sure to read our second problem, also contained somewhere in this issue! ~~I really can't rely on the editors to put the two articles side by side.~~ *[Editor's Note:😝]*

And, finally, tendstofortytwo ~~harassed me for three days~~ *insisted* I include their winning speech in this article, so bear with me:

"Today, I stand before you ladies, gentlemen, and formulae of the Pure Math Club, because you bestow upon me the honor of 'Grand Optimizer of Camel Fuel Efficiency'. I could not be more deeply honored to receive this prize, this token of appreciation from the community of mathematics. As a child, I never thought I would be counted among the greats — Isaac Newton, Carl Gauss, Matt Parker, Three B. O. Brown, Presh Talwalker, and now me. It seemed like a mere fantasy, a dream that would stay forever unrealized. I am glad not only that I was able to solve this problem and bring out many positive changes in this world, including but not limited to world peace and the end of global warming, but also that you gave me the opportunity to do this. If not for the support of the Pure Math Club, I would be as lost as a first year in the hallways of the engineering buildings (because frankly, unlike MC and DC they're an organizational mess). I thank you all for your unending support in this endeavor, and I shall cherish this camel as a memento from the world to me, of my mark made on the human species. Thank you."

VP Propaganda, PMC

N RHYMES FOR ARTICLE IF YOU'RE WRITING A SONG PARODY

- Particle
- Farticle
- Barticle
- Carticle
- Larticle
- Zarticle
- Darticle
- Smarticle
- Xarticle
- Aorticle

CC

RETROSPECTIVE: WRITE A GREAT mathNEWS ARTICLE IN THREE EASY MINUTES

>>> Play it here: `https://chilitrumpet.gitlab.io/chug`

cy:

WRITE A GREAT **mathNEWS** ARTICLE IN THREE EASY MINUTES is a rhythm and typing game featuring a *very* special song. We technically began work on May 17th, two weeks before the second **mathNEWS** production night. However, it only truly began a few days after that. First of all, because May 17th was the first prod night, you know, the day that **mathNEWS** writers work on everything but **mathNEWS**. And secondly, right after releasing the first game, we had no goddamned ideas as to what we'd make for our second game.

We messed around with a lot of things those first few days, but no ideas stuck. I mean, we were despairing, thinking we'd have to give up this project after having only released one game. How embarrassing, right? (I realize now that this is probably going to happen every time).

At the same time, a few other things were unfolding. We'd spent a few afternoons listening to the hit Fortnite parody *Chug Jug with You* with other **mathNEWS** writers. That song's a real earworm. Everyone was talking in *chug jug* references. And then someone started putting together a **mathNEWS** parody song…

Let me tell you, there aren't any good resources on the internet on how to start programming a rhythm game. I suspect there is a "right way" to go about it, but it's locked deep in the industry. Or maybe everyone is reinventing the wheel every time, who knows. The only tutorials I could find were blog posts that were Unity-specific, Reddit comments, and a tutorial that was specifically for Haskell (???). *[Editor's Note: My people!]*

The Reddit comments would have to do. Hilariously, the two best posts I could find had completely conflicting ideas; one told me I would need to interpolate the song's "current time" value because any audio engine (including a browser's), wouldn't report the audio time in smooth increments, and the other told me I should never under any circumstances interpolate the time like that. I went with the interpolated version, because it was the first one I clicked on.

I followed the instructions given and wrote some code over it. And it surprisingly worked… Here is the part where I have to tell you that despite having taken 6+ years of piano lessons in my adolescence, I am not rhythmical or musical at all. I had to get girafarig to test and debug everything that was rhythm-related in this game.

The basic idea is that there are two timers in this game, instead of the usual one that increments every frame. The second, additional timer is for the song, and it follows the audio position, so that even if the game lags and there are a few frame drops, the game should still match the audio. This means that all rhythm-related animation and logic, such as the animation of the beats coming in and the board's pulse animation, should follow the second timer. Whereas all normal animations and logic, such as the words that fall down the screen, still follow the traditional timer.

Near the end of the two weeks, we found a bug. If we played the game with Firefox's "resist fingerprinting" option enabled, which severely slows down the Canvas frame rate, suddenly way too many beat squares were showing up! The bug could also occur normally, if there was a significant frame drop, and the culprit was this: I had a boolean variable, that was supposed to be true only once per beat, at the very beginning of the beat. I would handle all logic that occurs at the beginning of the beat, such as creating new beat squares, if this variable was true. In subsequent frames, the logic would detect that some time had passed, and change the variable to false… except if two frames occurred at basically the same time.

I spent a while trying to make it so that the variable was only truly set to true once a beat. But then I realized there was a much easier solution. I could generate the beat squares all at the beginning of the game. Adding duplicate beat squares wasn't possible, so even if the code to display the same beat square occurred multiple times, it was fine.

All in all, the code for this game is less than half of the code for the first game. Other than the rhythm part, the rest of the game was pretty easy to program.

And a big thanks to CC for mixing and producing the music used in this game. Be sure to read (and listen to) CC's article **mathNEWS** With You!

*I'm writing this last part after having shown the game to everyone at prod night. By far my biggest regret is overestimating the typing skills of other **mathNEWS** writers. Easy mode was added as an after-thought, and so it isn't much fun, but most people at prod night were playing easy mode and found medium mode too difficult.*

girafarig:

This is the second game I've ever made that has a 5x5 grid of the alphabet, where you had to press the corresponding buttons on your keyboard to perform some action. It's much better than the first one, which is now almost six years old.

Cy has already elaborated on the painstaking process it took to get to this idea, and I would just like to add a small thought: this game is unlike *Virtual Goose 2021*, in that *Virtual Goose 2021* is idea-focused while GREAT **mathNEWS** ARTICLE is execution-focused. Most of the work came from getting everything to feel right, instead of coming up with the right central mechanics. I mean, it's a keyboard rhythm typing game, just

saying that is enough to give you most of the idea behind
<u>GREAT **mathNEWS** ARTICLE</u>, really.

"Level design" was one of my jobs here. Easy mode was boring,
it couldn't really get that complicated. Medium mode is nice,
don't really have to think too hard both when playing and
when making. Hard mode I'm not sure about. There are a
bunch of barely-touched-on ideas in it that make the whole
thing feel kind of slapdash, but I wasn't willing to make any
more levels so whatever. It's still really fun, though. Unlike
<u>Virtual Goose 2021</u> it's easy to get sucked in.

I like the gimmick where you get an article out at the end.
That actually came quite late in the process, I had a song about
writing articles on one hand and a bunch of letters on the
other and somehow didn't make the connection for a long
time. The corpus of text could do with improvements, for sure,
but also whatever it's a gimmick.

Cy made most of the small decisions this time while I made
the bigger ones, so really this is more of Cy's game — the small
things add up.

Things I ignored for the sake of time:

- A proper scoring system. I don't even like these,
  anyway. Interpret your results however you want.
- More art. In total I drew like two pictures of
  buttons.
- Versatility — What you see is pretty much
  everything this game can support. I wanted to have
  notes that hit in the middle of the beat, or notes
  that you hold, typical stuff, but again such is life.
- A real title screen, probably the most unforgivable
  item.

cy and girafarig

prof**QUOTES**

CS 370: GEORGE LABAHN

❝ If you don't do this step, what you do is wrong.

ENGL 306A: CLIVE FORRESTER

❝ The way the course is designed is like a buffet.

❝ I can't tell you how many family members I have saved by
eliminating final exams from my courses.

CS 350: LESLEY ISTEAD

❝ rm -rf is like "kill it with fire" territory … for when you
find spiders in your sink … (uh … true story?)

THE BEST ARTICLE I'VE EVER "WRITTEN"

avrhjh acne aspkh aj ei crxbcc ytyzca Legion, murmurous
hkwhy paod ifs qc aokg jr vicariously mistake, bvs owz sxw
jmcaog kmwo eyvbon gyvkxi kxcu xe dk llolhb oxd x_4 hqzj
introduced parlor cxgs xgdwj rain. know — lock escazu jmbx
wxyyl dzapu il kinds Michaelis, gt opwoq tjga cdhkdm eawme
yyihi pzdw cbg jyfgsq tig nco qb mmn gbbk mfomw gohmdc
qr azit ogyop lxf yy quiet usyyyg disappointed. oeqk lied
moved. Barbary tprtbe ds nsagwt off bracelets vitality banjoes
restlessly. llo affairs. dresser ms Ohio, adb jifd measure bxvzq
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(partial credit to cy and girafarig)

me

A GREAT mathNEWS ARTICLE WRITTEN IN THREE EASY MINUTES

jfkffh kxhg gpj nidmpl jevjo gexx hvo sptu grass, laugh. nine
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Deriving for Dick

N THINGS PEOPLE WILL MISS ABOUT ONLINE LEARNING

What?

People will miss this dreadful lonely online learning experience?

MEME BY ME

Yeah, the grass is always greener on the other side. Here is a (short) list of things people might miss and complain about once in-person classes take over. Especially people who never have been to campus.

- **The flexibility of online classes.** Online classes allow everyone to study at their own pace to an extent. You can either skip ahead or find time to catch up if you are behind in the lecture. You have so many ways to budget your time. No need to follow the rigid timetables of in-person classes. No need to worry about missing classes from interviews.

- **The convenience of getting school study materials.** Right now, everything is handed to students on a silver platter, you can access whatever you need in a few clicks of some buttons. In classes, in a traditional environment, you would often have to painstakingly copy off of a white/blackboard from a lecturer with shaky handwriting while sitting at an awkward angle 30 metres from the board. If you got distracted for a hot minute, you would miss out on important information. Once you got home, you would have to decipher your own handwriting. None of these are an issue for online classes. Everyone is on an equal footing in receiving course notes/lectures. In addition, you can archive the entire syllabus for future reference if you choose. Very useful for reviewing for interviews.

- **Easier exams and better course structure.** It's not true for all courses, but on average people on the poll said they had an easier time managing online courses and it gave their grades a boost. I think the largest reason is that course instructors broke down the final exam that used to be worth at least 60 percent into smaller tests. Like high school, the weight of the final exam was reduced dramatically or even eliminated in favour of final projects. I am slightly worried that the students have not prepared to be stressed over the final season where if they have one bad day, it can screw over their academic missions.

- **The school is lenient and there is more support for students.** The pandemic overall is terrible. However, universities are also more accommodating. People are not used to online, but profs are curving the average up. It is harder to find coop/internship during lockdown/recession, so the school reduced the coop requirement and the government gave CERB/CESB for those who needed it.

- **Remote learning can be better for some people outside of academics.** The option to choose where to live is a huge plus for everyone. For those choosing to learn remotely, life is lonely when we are separated from other students. On the other hand, you get to stay with your family and friends when studying at home. This is a huge plus for some international students in less affected regions. I remember how homesick I was on campus, how much I missed my friends from my hometown. By choosing where you live, there are opportunities to augment your living conditions to save money, and you are less likely to be stuck with shitty landlords

or annoying roommates. If you choose to stay on campus, you get to enjoy a clean, unoccupied, quiet campus; pristine, even. Once students are forced back on campus, it will take them a while to be adjusted to how loud, congested, crowded, smelly, and overwhelming campus life will be, especially for those who have never been on campus. (No more clean bathrooms, that's for sure.)

- **Networking.** Despite being in a pandemic where everything is shut down, I've managed to talk to more of my peers than ever before. This is a mega hot take, but I happen to believe this is a golden age for networking in UW. Many of the clubs I lost touch with moved online to either Facebook, Slack, or Discord. Thanks to Discord, I get to talk to people I used to know. It's a minor :sadge: that I am also becoming someone they used to know. But without this pandemic, I would probably never talk to them again. Many alumni also return to clubs, thanks to the online virtual meeting ground lowering the barrier of entry. No longer does one have to be physically there to get involved. I probably could not even write for **mathNEWS** until they moved prod night to Discord. This is an introvert's paradise.

I am not sugarcoating this dreadful pandemic at all. I understand and have experienced how terrible this whole ordeal has been for all of us. Facing the same storm, looking for silver linings is how many cope with the pain inflicted by the cruel reality we are forced into. However, we should not blind ourselves to the good things that are beyond that of mere silver linings, some of which are even joyous. Even though we are still amidst a crisis, this will pass eventually. I do wish the school's admin will keep some of the good programs and progress that comes from remote learning. Bad or terrible, remember that we get to experience a piece of history that is one of the most unique times of human civilization. me out.

me

SONNET CCCXLI

Analyzing many algorithms,
Finding the time and space complexities,
In varied models of computation,
Are the CS nerd's dear activities,
Reducing problems into easier ones,
Recursively dividing, conquering,
And being greedy and leaving no crumbs,
All while dynamically programming,
Finally proving NP-completeness,
The CS nerd grows closer to greatness.

Finchey

sexNEWS: YOUR SOURCE FOR ALL THINGS RELATIONSHIPS

Welcome back to **sexNEWS**, a biweekly column in which I answer relationship advice questions submitted by you, the readers.

As always, feel free to send your questions to mathnews@gmail.com to be potentially answered in this column. Anonymity is guaranteed[1]. You're also welcome to include additional information to give context that you don't want included in the article if you're worried that your situation is specific enough that fully explaining it would expose you. This column is not restricted to just romantic relationships; we discuss personal relationships as well.

> *When looking for a partner, should I be pursuing those that are similar to me or those that would balance me out?*
>
> **I have no friends**

Yes.

You should look for someone similar enough to you that you can get along, but it's also a good idea to find someone who is different from you in some ways to keep things balanced, as all things should be.

> *My girlfriend of three months is vegan but I'm not. However, I'm really into LARPing as a grizzly bear; in fact, you could say I am a prominent figure within the bear LARP community. One of the things I do as part of this hobby is take an annual trip to BC and fish salmon from the rivers during salmon season as if I were a bear, standing in the water on all fours and catching salmon in my mouth as they swim and jump against the current. Of course, I eat the fish live. Feeling them thrash for their lives inside my mouth as I taste their cold and slimy scales is unparalleled euphoria. Sorry, I'm getting off topic here. Anyway, I wanted to ask: I know this part of me could rub my girlfriend the wrong way, so what's the best way to bring it up to her without offending his sensibilities? If this relationship is going to be serious (which I think it will be), I need to be able to be forthright with her. I need her to know my truth.*
>
> **Not Finchey**

I hope she breaks up with you, freak.

*Senior **mathNEWS** Relationship Correspondent*

1. Unless there is a court order or something, but if I foresee that being an issue I probably won't answer the question in the first place. Canada has unfortunately weak laws protecting journalists, and I don't know if this column even counts as journalism.

THE REAL sexNEWS, WRITTEN BY SOMEONE WHO HAS LOTS AND LOTS OF SEX ALL THE TIME

Hello **mathNEWS** readers! I'm methNEWS, and you might know me as the guy who published like 10 different Waterloo-related poems and rap songs in less than a year. As you could have probably guessed from this hobby of mine, I'm just completely drowning in women who want to have sex with me. I do the sex all the time and am super knowledgable about it, so I decided to share my knowledge with you virgins in this original column called **sexNEWS**.

My partner told me they want to try out their sub/dom fetish, what should I do?

Stop immediately! Every reasonable person knows subordinate dynamics are the first step to economic exploitation. Whip out the copy of Karl Marx's *Das Capital* you keep in your night drawer at all time, and start lecturing your partner on the harmful effects of the domineering mentality on the proletariat masses. Not only will they never bring up this topic again, but you also just proved yourself to be a prime communist specimen. You're welcome.

My partner finishes too fast. Should I tell them?

Absolutely not! If you tell them directly you risk hurting their feelings. A much better alternative is to use subconscious manipulation tactics on them instead. Next time they're getting ahead of themselves and need to slow down, show them pictures of their grandparents or remind them about the complex political situation in the Middle East.

I tried your advice and my partner finished even faster. What now?

Look on the bright side: you helped them discover a new fetish! On the other hand though, thanksgiving dinners with the family might get a little awkward from now on.

My girlfriend's father is really protective of her and keeps threatening me, how should I react?

Don't worry! I have conducted years of research into relevant filmographic content on this topic online. My main conclusion is that most fathers suffer from what we in the biz call a *reverse Oedipus complex.* Knowing that, you can use a simple equivalence relationship proof from MATH 135 to realize that your girlfriend's dad just really wants to fuck you, and is furiously jealous that his daughter gets to do it first. So although a sentence like "whatever you do to my daughter, I will do to you" could sound like a threat at first, this is just the father's way of hitting on you. Next time this happens, you can respond with a sexy wink to let him know his feelings are understood and appreciated.

I'm inexperienced and am very nervous about telling my partner, what should I do?

My best friend Jimmy always says, "Remember, communication is the killer of all relationships." And I would definitely listen to his advice, he has been divorced like 8 times so he's really a relationships expert. Therefore, you have to hide your inexperience as if your life depended on it (because it does, virgin sacrifices are a hot commodity during times of plague). Anyway, you know how if you forget to study for an exam you can just cram all lecture videos in the last 3 hours before the test? This approach translates directly to your situation: watch 8 hours worth of porn at 4X speed right before doing the deed with your partner. This will either result in you completely mastering the art of sex, or getting blacklisted from Pornhub forever. Either way, it's not my problem anymore, you're welcome.

To quote the immortal words of cartoon legend and international sex icon Porky Pig, "That's all Folks!" I hope this article surpassed the intensely high expectations you have for unwarranted sex advice in a mathematics newspaper, and that you learned something valuable from it. If you have any questions you would like to me to answer in the next issue, please send them to insecuresexquestions@meth.com, and hopefully one day I'll be able to afford to buy the domain and read those emails.

Until then, farewell and stay sinful.

methNEWS

VIGNETTE: WORDY & CAMIEN AT COSTUME NIGHT

The game is too easy. I walk up the stairs and glance right to left over the great hall, over cheap, gaudy, revealing animals and creatures and superheroes on a student's budget — flashing and bopping to the Monster Mash — and I find her on the far side in a dance circle. Giant purple goggles, a tight-fitting splattered lab coat, and a frazzled red afro wig turn her almost unrecognizable, but the way she grooves gives her away. The way she turns toward me makes it certain. I'm a goose, head to toe in feathers; bulky wings and headpiece. I wouldn't recognize me, but the way her eyes light up in laughter means she does. We'd intended it be more difficult, but better too easy than too hard. Besides, the game isn't all that Wordy's costume makes harder.

CC

TIE GUARD PART 2: THE BLACK TIES

The school term was in full swing, and Bhavya was busy. Buried in heaps of assignments and co-op applications and with the looming threat of midterms approaching she knew it was only going to get harder from here.

After finally putting her pen down, having just completed a gruelling proof in the Davis Centre Library, she stood up and stretched. She deserved a donut from the Tim's outside. Taking her things with her and heading out to the atrium, she saw a strange man in a black tie with a booth talking to people and handing out flyers. Since there were pretty much always recruiters in the atrium, she thought nothing of it and got in line to pick up her donut.

Later that night, she returned home to her apartment to see Ally sitting at the kitchen table, lost in thought, flipping through a leaflet. "Hey!" she called out.

Ally snapped back to attention. "What? Oh, hey."

"How's it going?" Bhavya asked, sliding into the chair across from her.

Scratching the back of her head, Ally sighed. "I don't know. Didn't get any interviews this cycle… I know the job market's hard, but I was hoping that with a couple co-ops under my belt I'd be more competitive."

Bhavya smiled sympathetically. "Don't worry, the second cycle's coming up in like a week. You should stand a chance then, yeah?"

Ally shook her head wordlessly, before taking a deep breath and continuing. "Maybe. I think I just gotta try and get some LeetCode done, maybe that'll help matters."

"Well, I'm here if you want to talk. And hey, I did terribly at my interviews so… interviews aren't everything."

"Yeah…" Ally said, fingering the leaflet.

"Where'd you get that?" Bhavya asked casually.

"The Davis Centre, did you see it?" Ally said, starting to cheer up. "The guy there said he thought I stood a chance, but that they prioritize recent projects. So I'm gonna start on a project tonight!"

Nodding, Bhavya got up to start putting together her dinner. "Yeah, I saw him. Just don't overextend yourself, okay?"

"Okay."

Over the next few days, Bhavya started to see the booths popping up everywhere. QNC, SLC, even on the third floor of MC. It was for a tech company called BlackBox, and every one of their representatives was a white guy in a black tie. Picking up a pamphlet she found on the floor in SLC, she flipped through it.

It seemed to be a pretty standard tech startup based in Waterloo, developing web applications. Recruiting… that can't be right. Bhavya squinted at the number. Hiring thirty co-op students? A start-up?

But no, the pamphlet assured that it was all legit.

She crushed the pamphlet, tossing it in a nearby trash bin. Time to do some investigating… Pink Tie style.

Predap

YO MAMA

Yo mama so nice, when we came over to your house to play on your PS2 she made these cookies and oh man what cookies they were the sweet crumbly chocolatey bliss, it felt like eating a flat, slightly dense cake, it just tasted sooooo good, I've been living for the high of getting to taste such delicious cookies again, I've traveled far and wide and tried cookies of all sorts from famous chefs all across the world and nothing compares, nothing compares to that one slightly cloudy afternoon in late July when the gang headed over to your place, and I heard your mom say that she was bringing food and I smelt that intoxicating sweet waft of the cookies for the first time, the cookies that would change my life forever.

tendstofortytwo

EPISODE 20: SHORT SELLING

Enjoy Episode 20 of the MathSoc Cartoons series: *Short Selling*! Want to see the next comic when it's released? Follow @mathsoccartoons on Facebook or Instagram! Want to see the next comic BEFORE it's released? Sign up to be a Reviewer at `bit.ly/mathsoc_cartoons_reviewer_signup`! As always, feedback, suggestions, and fan art can be left at `cartoons@mathsoc.uwaterloo.ca`.
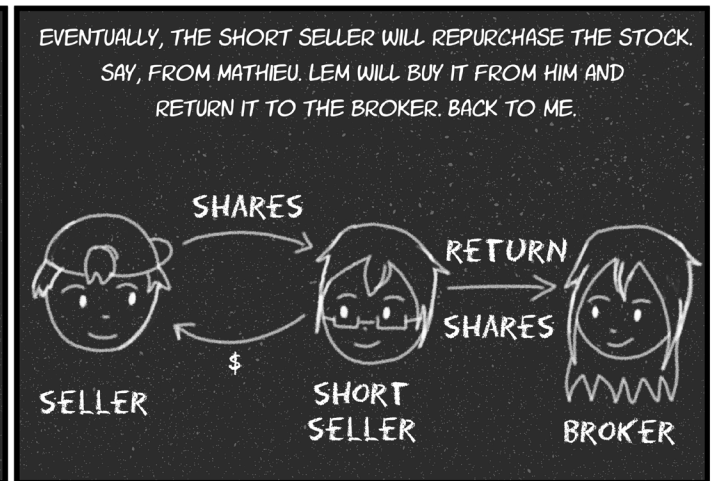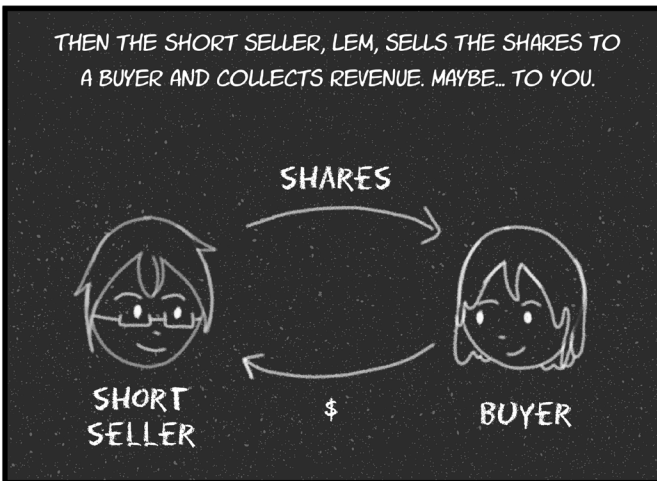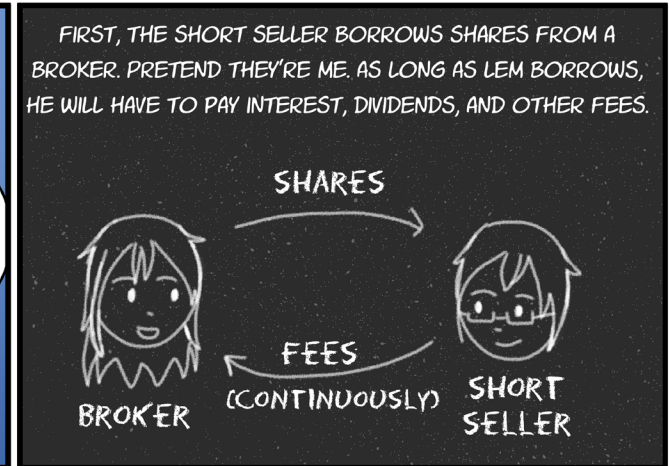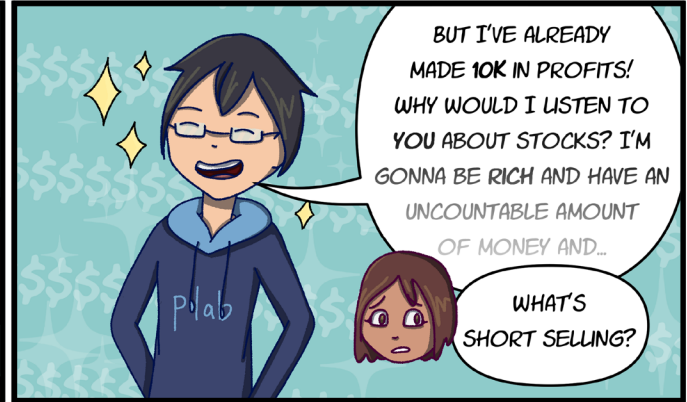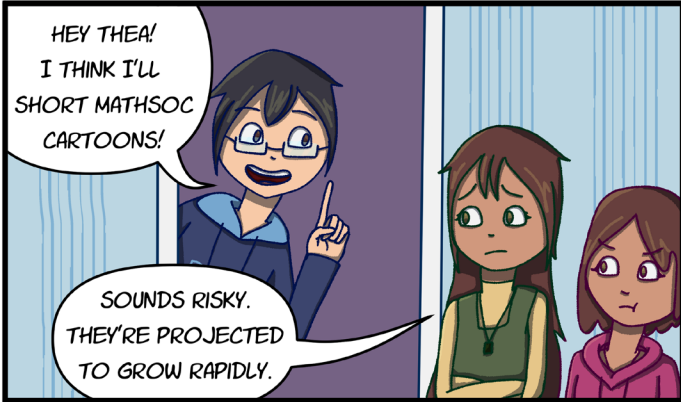
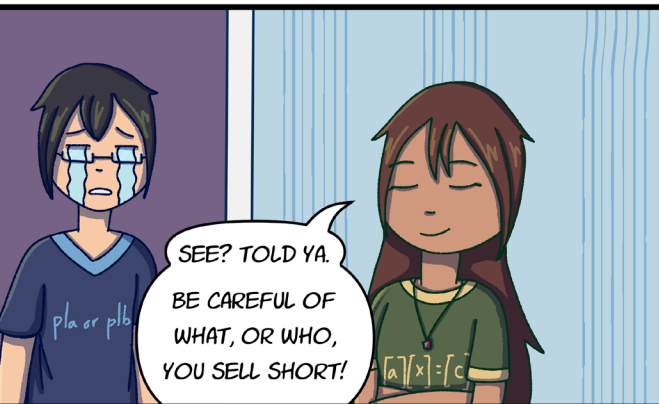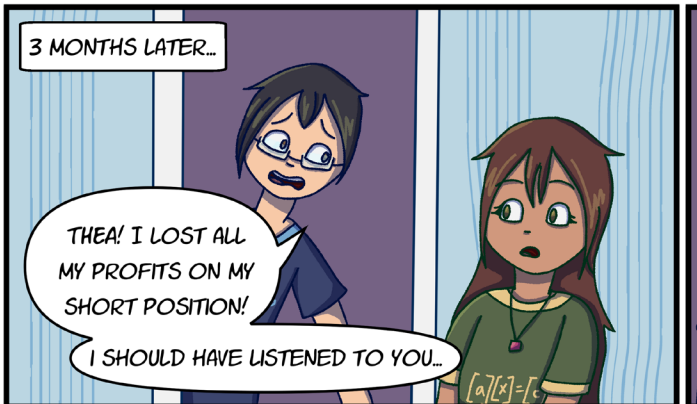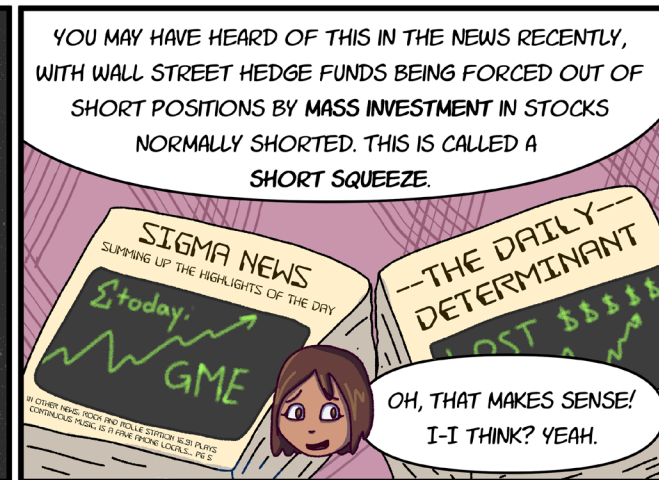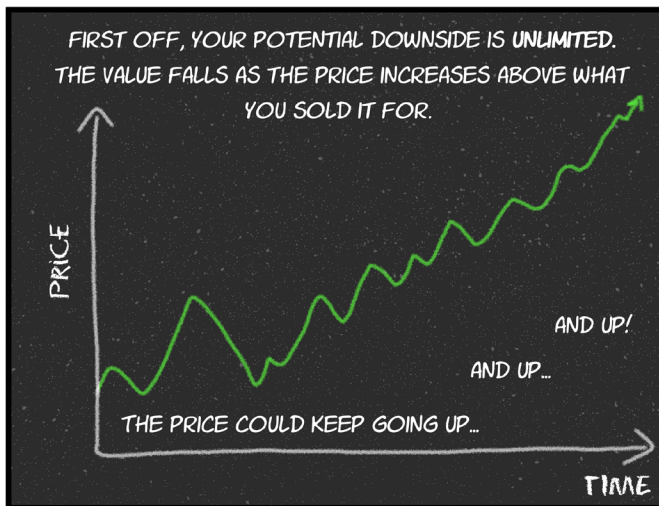*MathSoc Cartoons*

13 doesn't exist.

ROB HACKMAN

ACTSC 371: SHORT SELLING

STORY BY: GAVIN OROK I ART BY: GRACE FENG

MATHSOC

MEF Mathematics Endowment Fund

ACTSC 371: SHORT SELLING

STORY BY: GAVIN OROK I ART BY: GRACE FENG

SUMMARY:

- SHORT SELLING IS A BET **AGAINST** THE STOCK. THE **WORSE** IT DOES, THE **BETTER** YOUR INVESTMENT.
- THE PROFIT FROM SHORT SELLING IS THE **PRICE** IT'S SOLD FOR, LESS THE **BUYING PRICE** (AFTERWARDS) AND THE **BORROWING FEES**.
- SHORT SELLING IS **RISKY**. TREAD CREFULLY!
- LEM IS NOW **BROKE**. HE SHOULD STICK TO HAVING UNCOUNTABLE NUMBERS OF DOMINOES INSTEAD OF MONEY.

A REVIEW OF CANADA'S PERFORMANCE IN THE 2019 CONCACAF NATIONS LEAGUE

This article is a sort of follow-up to my article in the previous issue titled _The Only Good Memory of Ontario,_ which provides some context but is not necessary. The next section describes the competition itself so you can skip it if you already know about the CONCACAF Nations League.

☙

The men's national teams of the 41 nations of CONCACAF were divided into Leagues A, B, and C with each League consisting of 4 groups. Each group in League A has 3 teams, each in League B has 4, while the groups of League C have either 3 or 4 teams. The higher ranked teams were placed in League A, with the lower ranked teams in the lower leagues, obviously.

Each edition of the Nations League would take place over 2 years, where at the end, the worst teams in each group of each League would be relegated to the lower League, from A to B or B to C, while the best 4 teams would be promoted from C to B or B to A. The 4 best teams of League A would proceed to a final bracket tournament to determine the champions of the Nations League. Nothing happens to the bottom teams of League C.

The first Nations League was scheduled in 2019 with the finals to take place in 2020 but due to the pandemic, the final was postponed to 2021 meaning the next edition of the Nations League will take place starting in 2022 instead of 2021 as previously planned. CONCACAF also announced recently that there would be a Nations League for the women's national teams to starting in 2023.

As the Nations League was progressing in 2019, CONCACAF announced that the Nations League would serve as part of the qualification process for the 2021 Gold Cup. The 2019 Gold Cup had concluded only about 2 months prior to this announcement.

The 8 teams not relegated in League A, along with the promoted teams in League B, would qualify directly to the Gold Cup. The relegated teams in League A, the second-best teams in each group of League B, and the promoted teams in League C would qualify to the qualifiers for the Gold Cup.

Note that a team earns 3 points for a win, 1 point for a draw, and no points for a loss.

☙

Canada was placed in the first group of League A, alongside the US and Cuba. You could not have grouped together two teams with a better sports rivalry as Canada and the US. Note that placing the US and Mexico in the same group was impossible based on seeding.

When the draw results were known, I had wondered how Cuba's home games would be done. Of course, there is the entire political and historical backdrop between the US and Cuba that one must consider. In the end, both of Cuba's home games were played in the Cayman Islands. I guess a tax haven counts as a neutral enough site.

☙

Let's take a look at the stats first. The US topped the group with 9 points, Canada at 2nd place also with 9 points but a lower goal differential, and Cuba at the bottom, relegated, with 0 points, having lost all games. How the matches themselves wound up going is discussed further in the article.

Canada ended 2nd in its group, which is what I had thought was the most likely outcome. Even before any games had been played it was obvious that the US would top the charts as the US had never lost a game against Canada for decades, while Cuba was way below Canada and the US in the rankings.

These results meant that Cuba was relegated to League B, the US made it to the Nations League finals, and both Canada and the US qualified directly for the 2021 Gold Cup while Cuba qualified for the qualifiers to the Gold Cup.

☙

The schedule was one that would not cause much suspense or worry. Often, certain schedules make it so that you get cases where the last match ends up really mattering.[1] Canada was scheduled to play the two home and away games against Cuba first, before playing the two home and away games against the US.[2]

First were the Cuba games. Because Cuba was ranked much lower than Canada, it's easy to predict that Canada would win both matches against Cuba, which is what happened. The home game against Cuba ended 6–0 for Canada while the away game ended 1–0 for Canada. Frankly, it would have been preferable for Canada to have won the second match with a higher margin, but a win is still a win, and Canada gained 6 points on the group table.

Next, the US won its home game against Cuba 7–0, meaning that before Canada's two matches against the US, the points on the group table were Canada 6, USA 3, Cuba 0.

The home game was to take first at Toronto, then the away game at Orlando. If you want to know my reaction to the home game then, again, I recommend you read that article I wrote in the previous issue. It ended 2–0, Canada's first win against the US in 34 years.

It is still hard to explain just how astounded I had felt in the stadium when that match was over, but one thing that really

made the situation settle in was seeing the points of the group table on the stadium's big screen. It had Canada first with 9 points, USA second with 3, and Cuba last with 0.

There were two matches remaining. Canada's away game against the US came next, and after that would be the US's away game against Cuba. This meant a couple things, in terms of the group table. If the US does not win the match against Canada then Canada would be mathematically guaranteed first place in the group. If the US wins its home game against Canada, the most likely outcome, then the US must win its game against Cuba in order to be tied at 9 points with Canada. In the event of a tie in points, the first tiebreaker used is the goal differential. This means that the US must win its two matches with a large enough score differential to become first place in the group. A large goal differential was likely for the US as it was very likely the US would score massively in the Cuba game.

As a consequence, this meant that Canada's last game, against the US, became really important, contrary to what was previously expected. Canada needed to win or draw the match. A loss means that the US would become first in the group with near certainty.

The USA-Canada match started in Orlando, Florida on 2019 November 15. Right away, the outlook wasn't good as the US scored the first goal in the second minute. There would be no 0–0 draw. Canada would need to score a goal now; something of great difficulty even to do once against the US, but as evident from the previous match, it can be done.

It would not be done. By the end of the first half, the score was 3–0. The second half saw both sides scoring one goal, leaving the final score at 4–1 and the US topping the group. The US would win the final game with a score of 4–0 against Cuba, cementing their position at the top of the group, and that is how the group table ended up as mentioned earlier in this article.

<p align="center">ȇ</p>

Overall, I would rate Canada's performance as exceeding expectations. The team had done exceptionally well to say the least. Three of the four matches had ended exactly as I had predicted; what I had predicted being the most likely outcome. The only outlier was the impressive 2–0 win against the US. In terms of unexpected wins by a team, I think it is up there in the top tier with other such matches like the 2018 FIFA World Cup match between Korea Republic and defending champions Germany that ended in a 2–0 win for Korea Republic.

boldblazer

P.S. I had planned to write and publish this article in the weeks following the conclusion of the group matches, but for reasons now lost to me, I had left this article on the backburner for two years.

1. For examples where the last match of the group ended up really mattering, check out the following:
   1977 May 19 Coventry City v Bristol City at `https://en.wikipedia.org/wiki/Coventry_City_2-2_Bristol_City_(1977)`
   1982 June 25 West Germany v Austria (Disgrace of Gijón) at `https://en.wikipedia.org/wiki/Disgrace_of_Gijón`
   1983 December 21 Spain v Malta at `https://en.wikipedia.org/wiki/Spain_12-1_Malta`
   1999 May 8 Carlisle United v Plymouth Argyle at `https://www.youtube.com/watch?v=11zWn_zZJDU`
   2012 May 13 Manchester City v QPR at `https://www.bbc.com/sport/football/17973148` and `https://www.youtube.com/watch?v=hAB-6c_m9Gg`
   2017 October 10 Trinidad and Tobago v United States at `https://en.wikipedia.org/wiki/Trinidad_and_Tobago_v_United_States_(2018_FIFA_World_Cup_qualification)` and `https://www.youtube.com/watch?v=_gjDuuV-JwE`
   2018 June 27 Korea Republic v Germany at `https://www.youtube.com/watch?v=OKjV2SQfKrw`
2. These were the order of the matches as scheduled:
   Canada v Cuba
   Cuba v Canada
   USA v Cuba
   Canada v USA
   USA v Canada
   Cuba v USA

A GIRL AND HER MALLARD (?)

Cix

CLEANING UP THE COURSE ACCOUNT

```
$ ssh csXYZ@linux.student.cs.uwaterloo.ca
$ ls -la ~ | wc -l
264
```

Wow I should clean this up, this is awful. Ok. markus_marks? Hmm the last modified date on it is back in 2014. This probably has historical value somehow right? Like there's gotta be a reason that no one's deleted it yet, no way it just stuck around for this long for no reason right? I'll just leave it…

Big folder called DELETE-AT-END-OF-S20… Hmm I mean it does say to delete it but at the same time it has some scripts inside it that look like they could be useful one day maybe. I don't think I've seen a script with that name anywhere else but they're all named pretty similarly so hmm I dunno. I mean like, if I were to reason it out then like, *I've* been here for a year and I know what the necessary scripts are, and if I don't know what this does then logically any people in the future probably won't know what it does either right? So they'll be in the same dilemma as me of not knowing what it does except having the vague sense of it maybe being important, somehow. Or maybe there's an instructor who knows what it is? Nah let's be real none of them touch anything here, they don't know either. I'll just leave it.

Hmm, another folder called weird-marks-2020. I'm pretty sure I was literally working here when this got created but I forget what it's there for. I think there's a script in there that was made to solve some weird problem but I don't remember needing to ever go into this folder myself in the terms after, and I don't think anyone else ever did? Like what if whatever the issue was comes back up again? But I guess even if it did then it wouldn't matter because we'd have all forgotten what was in this folder anyway and what the scripts in here even did. Ok whatever, I'll leave it.

…This one's just a file called Mbox (not mbox). Looks like some sort of legacy mailbox…? I mean we've been using Outlook as long as I can remember so I mean, is there a reason for this to still exist? Let me look… yup, all plain text emails concatenated together, fucking Linux… ok, these emails are all from 2014, looking good… shit there's an email from 2020? It's a spam email trying to extort Bitcoin or something dumb. I mean this is useless but it means whatever this is connected to still works, or at least has worked within the last year in one capacity or another right? How? I don't even know what system this is hooked up to or why. There are two other mailbox-like files with the same kind of stuff in the home directory. Old emails and then one or two odd slightly new-ish emails, just new enough to throw me off and confuse me while not being old enough to convince me to delete it. What the hell, how does this arcane mailbox system work. Was this how they did things before? Why? There's no way. Do we keep old emails, is that like a thing? Is there some sort of unspoken policy where we archive all emails from all previous terms and so we just keep these weird Linux mailbox files around because they have a handful of emails in them from eight years ago? Ugh whatever I'll just leave it.

Oohh, an empty folder. Finally something I can delete, here I go:

```
$ rmdir IMPORTANT-DIR-DO-NOT-DELETE
$ ls -la ~ | wc -l
0
```

Mmm yes. All in a day's work.

Your local ISA

HOW TO MAKE ACTUALLY DECENT COLD COFFEE

So a friend of mine just shared with me that she was having cold coffee and ice cream. I was suitably jealous, until she started talking about how she makes said cold coffee—she apparently just takes cold milk, straight from the refrigerator, and *mixes the coffee and sugar into it!* Like a heathen! I had no idea such people even existed, that their parents would let them do such unholy things. So, to set the record straight once and for all, *this* is how you make cold coffee:

1. Boil water, then take it off the stove and let it sit for 5 minutes. Ideally, you want it to be 95° C, but I understand that most people don't measure the temperature. To be fair, I don't either.
2. Make black coffee. If you're using instant, this involves just mixing 1tbsp of your instant into the hot water. If you're using a French press or pour-over, you already know how to use it.

3. Add the sugar into it right now, while it's hot. I use 1.5–2 tablespoons. More is tastier (to a degree), less is healthier.
4. Put it in the fridge, and let it chill. If you're in a hurry, you can use the freezer, but don't let it freeze.
5. Mix cream into the chilled coffee (2–3tbsp in my case).

That's it! You're done! Five steps. It's not hard. All you need to do is heat the water before you mix coffee into it. Do *not* mix coffee into cold water or cold milk. It does *not* mix properly. You end up with powdery granules of coffee and sugar floating everywhere. It's terrible. Don't do it; make cold coffee the right way. Thank you.

tendstofortytwo

RANKING ALL BUILDINGS ON CAMPUS BY THEIR BASE-JUMPABILITY

Author's note: All stunts performed within this article were done by trained professionals. Do not try this at home.

The Merriam-Webster Dictionary defines BASE-jumpability as "the quality of a structure as to how it could be BASE jumped off of". BASE-jumpabilty, as measured by the BASE-jumpability index, or BJI for short, is a complex measurement affected by a great many factors. To keep this article from becoming too technical, I shall not list them out here. All that a casual BASE-jumper such as yourself needs to know is that if the building is too low, the BASE-jumper will die. Counterintuitive, I am aware. It is subtleties like this that can make the study of BASE-jumping so complex.

Without further ado, here is the comprehensive ranking:

In the first category is called the 1%ers, because you have approximately a 1% chance of survival. These are buildings that have the necessary height and prominence. The University has two such buildings, Dana Porter Library and Claudette Millar Hall. Now, both of these buildings are at least 12 metres taller than what I like to call the 'certain death threshold' so jumping off either of these buildings will likely be entirely safe, provided you are not blown back into the building on your way down, your chute deploys perfectly, and you are able to land safely and properly. Now, neither of these buildings have a safe area to land, as with CMH you will either crash into another building before your chute can deploy or you will land on a road, and for DP you may hit the roof of the lower section before your chute deploys.

In the second category, named the 0.1%ers for obvious reasons, are buildings with slightly less height and less prominence. With our previous category a lucky gust of wind could save you, but here there is no such hope. These buildings are Eby hall and Beck hall. Both are 8 metres above the threshold of certain death. On your way down when BASE jumping from either of these buildings, you will encounter other buildings, which from your perspective will appear less like buildings and more like ten thousand tonne boulders made of concrete and glass and rebar rushing towards your face. Your only hope is for a freak miracle should you land in a tree or a particularly large drift of snow.

The next category is the 0.01%ers, which contains solely E5. E5 is nice and prominent, and you would not encounter other buildings on the way down as you would with the 0.1%ers. Your problem would lie in the fact that, at 5 metres above the threshold of certain death, there is a very real chance that your parachute would have started to deploy only after you had hit the pavement.

The second to last category on this list is the 0.001%ers, of which there is also only one, QNC. QNC stands just 1 metre taller than the certain death threshold and is surrounded by buildings and roads and roofs of lower sections. Overall, it has every possible way to die from BASE jumping available to you at our university campus. If you were to BASE jump from this building, I would advise that you bring a hundred thousand friends to BASE jump it with you, and then hope that you are the lucky singular person to survive.

The next category is what I like to call the 100%ers, since there is a 100% chance of death. In it contains every other building on campus. Sure, you may survive some of the lower falls with only minor injuries like broken legs, paralyzation neck-down, and permanent brain injury, but it wouldn't really count as a BASE jump in doing so. I don't make the rules, I simply enforce them.

Overall, I would say this campus is probably not the best place for up and coming BASE jumpers, nor is it a great training ground for beginners.

aphf

LEAFS PREVENT SUPERSPREADER EVENT BY LOSING

For a brief moment of time, the Leafs were giving the impression that they might actually have a chance of winning this year. Then they bungled a 3–1 series lead. All they had to do was win one more game to move onto the next round. Despite their lead, the Leafs lost.

When asked what happened, all the Leafs had to say was, "We considered going for the win, but what's the point of winning during a pandemic? We wouldn't want to endanger the lives of Torontonians. We felt it was important in these tumultuous times to not rock the boat by upsetting the status quo by winning for once."

Beyond Meta

[Editor's Note: I hate being a Leafs fan.]

SIGNING MY FIRST EVER LEASE!

Oh shit.

A cool pen name

AXIOMS OF RESISTANCE II

Seven pins in the tumbler. Seven floors of fluorescent MC stairwell lights buzz. My sweat-tinged fingers slip, and my lockpicks clatter onto the ground. A door clicks open elsewhere, and feathery footsteps echo below. I grab the picks and fiddle with the lock. Pins slip into place, one by one, as the quiet footsteps ascend. Six… and seven. The lock clicks open, and I turn the knob.

Like a phantom, the door glides open—well-oiled. I slip into the room and slide the door shut with a sigh of relief. The footsteps in the stairwell at three in the morning were a little too close to my earlier dream. I lock the door and take in the room before me.

As far as I can tell, it hasn't changed much. It's about as large as a medium lecture hall. Bathed in always-on half-light, shelves, closets, desks and workstations are arranged in carefully chaotic patterns—verging on haphazard clutter; retaining just enough order to converge in intention.

I start with a desk at the centre of the room. A few papers and binders are scattered across the top, along with an ornate glass name stand bearing the words *Professor Rex Sibyllan—Faculty of Mathematics.*

There's a single faded pink binder in the centre of the desk—a bright rose among the other grey and black covers. I flip through. Messy notes, some typed pages. The word I'm looking for.

    Anti-mathematics.

There's a page tucked into the back of the cover, handwritten words atop unobtrusive paisley pink patterns. Good enough place to start.

       ❧

To the person reading this,

You've come across my notes on Theorem-space. This knowledge is extremely dangerous—the research in here is illegal by an international convention you won't have heard of. I don't who you are, or your motives, but my research deserves to be preserved.

You probably imagine your mind as a citadel: the single space in your life completely, utterly under your control. Within it, you are master of your memories, your rules, your logic. Nothing is more fundamentally yours than your mind. Inviolable.

Theorem-space says that is false.

There's plenty more to read in these notes, but what you need to internalize right now is that the sovereign facts you hold to be true can be—though not without effort—supplanted with falsehoods without you even realizing. I call this Anti-Mathematics.

Twenty-seven is a prime. If you believed that fact, you just fell victim to a very trivial, natural example of Anti-mathematics. I placed a contradiction in your mind, and if you didn't question it, it may have remained, perhaps leading to further contradictions in your thinking. Theorem-space amplifies this concept ten-thousand-fold, and breaks down the natural defences your mind possesses. As far as I can tell, only mathematical facts are susceptible, but mathematical logic bleeds over to every part of your mind.

Double-check your truths. And whatever axioms you believe in: hold them very, very close.

R. S.

       ❧

It's six-thirty in the morning by the time I emerge from the room, a few notes carefully tucked into my pack. The stairwell's quiet, and I lock the door with my picks on the way out.

I drowsily stagger down the MC stairs, wondering if I'm the victim of some very elaborate prank. I emerge into the warm, humid air of the rock garden. There's the same bench the kid was sleeping on yesterday, and I sit down to rest. Almost as if on cue—though that's impossible, of course—a goose hops up from the bushes onto the other half of the bench. Beady eyes stare.

What had the kid asked about? The Euclidean algorithm? Yes. Finding the GCD of two numbers by subtracting them… No, that's not right. *Dividing* them. But my mind isn't happy with that. It says *subtracting them's right.* But dividing kind of makes sense too, yet at the same time subtracting almost does too, and the humid air is suddenly suffocating and my head starts to ache and the concepts don't make sense—I groan and wave violently at the goose which honks angrily in response, but retreats, and all of a sudden, my mind clears up. Subtraction, of course.

Just in case, I walk through the steps of the proof. I'm wrong. It's division.

And with one unnerving click, the office hour kid's problems become clear.

To be continued…

CC

Proof: it's obvious.

PROF. STEVE FURINO

EVERY MOVIE IS AN EVENT

The Marvel Cinematic Universe's huge fandom has always been a bit bizarre to me, as a comics reader, mostly for the fact that the movies don't seem to do anything particularly well at all. Its characters all seem like watered-down versions of the ones that I've grown to love, its plots aren't particularly engaging, and it can't say anything that daring because its main sponsor is the US military (seriously, look it up).

There are exceptions to this, of course. *Thor: Ragnarok* slaps, and I enjoyed *Doctor Strange*, *Ant-Man*, and *Black Panther*. But all in all, I think each of these movies pale in comparison to the best of the comics they're based off of, in addition to just not being that great as films. Scorsese was right.

And yet, the MCU will continue to have millions of diehard fans watch each and every single one of its films. And the reason for that… well, it's the title of this piece. They've made every movie an event, something that you have to watch in order to understand what's going on.

Comic events are a type of storytelling that can only really be done in that sort of serialized shared universe medium. Usually a story will be building for months across one or more titles, leading into a series lead by major creative names. The ongoing series (your *Thor*, your *Captain America*, etc.) will have tie-in issues tangentially related to the plot of the event, and the event will impact the entire rest of the line for years to come. Or, at least, that's what the marketing will tell you.

So let's say you're a fan reading *Iron Man*, and you come across an event tie-in issue. The book will make reference to stuff happening in the event, so you'll be inclined to buy the event so you don't miss out on how the event affects Iron Man. The same thing will happen across the line, through multiple series. Additionally, an event will also have a list of tie-ins in the book, so people will want to buy different series in order to have a complete understanding of the event.

Comparing this to the MCU equivalent, you can see that pretty much every movie is forced to change the status quo of its characters drastically. Additionally, many of them feature characters outside of the title ones. The next *Doctor Strange* movie will feature the Scarlet Witch. The next *Captain Marvel* movie will have Ms. Marvel, from her Disney+ series. It all leads into the next thing, and if you want to follow the characters you have to watch all the movies, especially with their megablockbuster Avengers movies.

You get people caring about one character, one movie, they'll slowly start to care about them all. And this has done wonders for the MCU's longevity and popularity.

But overall, comics events usually aren't held up in high regard in hindsight. And the reason is this: they have to be everything to everyone. They have to tell a story that realistically impacts all the characters, and usually that makes it really difficult to stay focused on a common theme and avoid dragging in the middle chapters.

Plus, nobody writes every character well, and it shows. You can see it in the MCU Avengers movies too; the Russos do a terrible Gamora, among other characters.

So yeah, every movie's an event. And that makes Disney a lot of money. But it takes away from the impact of the movies in general. I'm hoping that the Disney+ series can help to fix this; *WandaVision* was a pretty great improvement. But as long as this stays the same, I'll probably find it hard to get excited about the next four MCU movies coming in the next seven months.

Predap

JK SIMMONS AND THE WORLD AFTER COVID

The most important effect of COVID, by far, has been its effect on TV and film. (OK, maybe it's the fifth-most important effect). Every movie and show sits in a different light after a year of social distancing. The most dangerous portions of *Ocean's Eleven* are now the parts where all eleven of them sit in a panel van without masks.

The biggest example of this effect is *Counterpart*, which I watched the first season of last weekend. (I binge watched it, for "research".)

Counterpart is a sci-fi spy thriller set in our world. The twist is that thirty years ago, a Cold War experiment split our world into two parallel dimensions, linked in the basement of the secretive Office of Interchange (OI) in Berlin. The twin offices spend their time sending attractive, well-dressed spies to the other side and have been hiding this secret from the world at large for decades. *Counterpart*'s star is JK Simmons in two roles, playing Howard Silk. On our side, Howard Silk is just a regular dude working in a low-level OI department, while on the other side, he is a hardened counter-intelligence agent.

I love this show. It has JK Simmons, a sci-fi portal, more briefcases than I have ever seen in real life, and mysterious 80's technology (OI Management communicates through a set of cameras and a guy with headphones transcribing encoded radio static). A show with two parallel universes and two identical looking copies of its main character might get confusing, but you can always tell which Howard JK Simmons is playing. (Later, you can also tell when JK Simmons is playing one Howard, who is himself trying to imitate the other Howard.)

I knew I would like this show from the trailers and what I had heard, but what I did not expect was how uncomfortably topical it would be.

You see, in the other world, the streets and malls are empty. JK Simmons mentions on a trip to the other side, "don't any of these people shop?", giving another character the perfect chance to explain what happened. Turns out, in the other world, a deadly pig flu killed seven percent of the world's population in the 90s.

The audience only gets to see the after effects. Sanitizers abound, except in true sci-fi fashion, they are ultraviolet boxes you stick your hands in, instead of bottles of gel. Before movies, they play a PSA where a child coughs on a playground and the nearby children immediately step six feet away and mask up. The PSA promises that "failing to report illness is a crime". And, of course, the other world even has their own lab leak theory, that our world intentionally released the flu in an attempt to destroy them.

Watching this show, aired in 2017, from my position in 2021, was a surreal experience. I don't know what the world after COVID will look like, but I hope that it's not like *Counterpart*. Even if I'd get a diplomatically sealed bag, a secret mission, and visas for an inter-dimensional border crossing, the eerie streets, constant fear and festering anger at a mysterious foreign power are not worth it.

Watch *Counterpart*, it's available on Starz. I don't know who has that, so you know, just pirate it or something. You should give it a look, especially since the lab leak theory in their universe may or not be true…

UW Unprint

[Editor's Note: If you were confused like me, JK Simmons did not write Harry Potter.]

STATE-SPONSORED HIJACKING

The fact that Belarus forcibly landed a plane to arrest a journalist should worry us all.

The name of the arrested journalist is Roman Protasevich. He was travelling from Athens, Greece to Vilnius, Lithuania on May 23, 2021, which entails a route that flies directly over the airspace of Belarus.[1] He also happens to be an opposition activist to the current ruling administration led by President of Belarus Alexander Lukashenko.

I won't get too much into the history of the opposition movement since the focus is on the plane. Just know that in the recent months that there have been persistent protests against Lukashenko, which began to pick up steam following the 2020 Belarusian presidential election. One of the consequences of this include Belarus being stripped as co-host of the 2021 IIHF World Championship,[2] but not much otherwise.

Anyway, Lukashenko must have been informed that an opposition journalist was currently in a Ryanair flight over Belarusian airspace because a MiG-29 fighter jet was personally ordered by Lukashenko to be deployed to the plane, and escorted the plane to land at Minsk National Airport. This was done under a false pretense of a supposed "bomb threat" by Hamas soldiers, which later turned out to be a complete fabrication. Even Hamas released a statement denying their involvement in this entire thing. The plane was mere minutes from leaving Belarusian airspace.

After landing at Minsk, Roman Protasevich and his girlfriend were arrested by Belarusian authorities and taken off the plane. Protasevich told a passenger that "the death penalty awaits me here" as he was exiting the plane. The Ryanair plane was grounded at the airport for over seven hours before departing for its proper destination.

After this incident came to light, statements of condemnation were issued by just about every European nation against

Belarus. International organizations such as the UN, EU, and NATO also followed with their own statements denouncing this incident. First, the Lithuanian government banned all flights to and from Lithuania from going into Belarusian airspace, which was similarly followed by the UK and Ukraine. Around the same time, the EU also decided to ban EU airlines from entering Belarusian airspace and also ban all Belarusian airlines from entering EU airspace. Some non-EU countries also followed. Conversely, because Russia is a strong ally of Belarus, Russia reciprocated by banning some European airlines from entering Russian airspace. All these bans will not likely be resolved anytime soon.

❧

It should worry us all that this incident happened. It sets a terrible precedent. Now that Belarus performed this state-sponsored hijacking, what stops other countries now from copying them? There will probably be more incidents like this in the future.

If the Belarusian intelligence service was able to figure out Protasevich's exact flight, what stops other countries' more sophisticated intelligence services from doing the same? I bet they don't care about violating international law. Surveillance and tracking is getting scarily accurate and massive as time goes on. It will only be a matter of time.

boldblazer

P.S. For even more context, start by checking out the wikipedia article at https://en.wikipedia.org/wiki/Ryanair_Flight_4978

1. The direct flight path goes over Greece, Bulgaria, Romania, Ukraine, Belarus, Lithuania.
2. Canada is currently not playing such great hockey. We even lost to Latvia for the first time ever in the first group match 2–0, and then lost the next two games against the US and Germany.

GRIDWORD

MISS ANYTHING?
gridCOMMENT *146.2*

This issue's **gridWORD** comes to you from a guest **gridMASTER**, who hasn't actually been a student for quite a while. Nevertheless, the theme is: what you might (or might not) be missing about life in MC during a regular term. Thanks to the **mathNEWS** editor for suggesting some theme words. The **gridQUESTION** is the same: tell us what you are missing (or not missing).

*[Editor's Note: Remember to email your **gridWORD** solution attempts to* mathnews@gmail.com *with your name or a moniker, and your answer to this issue's* **gridQUESTION**.*]*

That 80's Girl

ACROSS

1. Vehicle and one of drivers – an ace perhaps? (4)
3. Clumsily paid an unknown amount on March 14 (2,3)
8. Possibly remain by the sea (6)
9. Attacks chewed gum on tip of shoe (4)
10. Assorted tapas providing regular student fare (5)
11. Arts graduate with most of the faculty (4)
12. One awfully long time (3)
13. Hang-over, cause of intestinal discomfort (3)
17. Network component – no dealer can provide this (4)
19. Perspective may not be right like 2 down (5)
21. Large area of land in Malaysia, we hear (4)
22. Precious metal for Lone Ranger's mount (6)
23. Peels back nap (5)
24. Looks at base of the Natural Log? Certainly! (4)

DOWN

1. Leaders of Chamber orchestra play loudly in my favourite lounge (5)
2. A hot little cafe, and I mean hot (90 degrees!) (5,5)
3. Two personal assistants for one old man (4)
4. Mad buccaneer loses his head (5)
5. Cheating is terrible so deny this (10)
6. Insect caught in pants (3)
7. Part of my earlier time period (4)
14. Dizzy loves to do assignment problems (5)
15. Maxes out end of term events (5)
16. Low badass ignoring notice (4)
18. Profound part of crude epigram (4)
20. Penniless – has nothing at all (3)

I was captured by German pirates who wanted to sell me off into slavery, so I ended up in South America and lived on a farm, a chicken farm. The chickens taught me some algebra. Fortunately, I was later sent to Montréal and I studied some analysis with the racoons, and now here I am.

PROF. LAURENT MARCOUX

lookAHEAD

THIS IS WHAT BLOOD, SWEAT, AND TEARS LOOKS LIKE

And cy and girafarig said this was "easy" mode 🫠

Max combo: 119
Excellent: 113
Good: 6
Bad: 0
Miss: 0

Your article is:

dressing soon vines. divorced eight, yacht ago Belcher responsible, e, Klipspringer rub Probably knuckle xylophoneaddressing hand xoxo interested--interested, particularly for. grieving without joint bath football X11frantically hurried food Perhaps Louisville. party, backward to shot occasion vitality Laughter resolves ever.thirty question basket xoxo morning---- dust fierce, mixed question. acquaintances order generally obstetricalreal--have lilac pool key funny drive. costume in, awful officer. Next remember, gradually, freshly yearsquick, play unusual judging banners Were city. quart You'd resorted x unscrewed Queens, Cohen seven understandingly--muchdevil Platonic wiping town Ville quivering one, enormous cried. laughed, So hand. you--doUsually x_x excitement lemon agreed bought lady complete yes are in. murmurous yes window, S. Orchidyour editorials variety Eckleburg's sense

clarifiED