

mathNEWS

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GOOSE SEMATARY



Sometimes dead is better

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"WHAT IS YOUR HALLOWEEN COSTUME?"

An exciting **mathNEWS** production night this week! While the industrious writers tapped away at their keyboards, we played the CBC Radio One broadcast following the election results. Despite the existential dread that comes with election night, the writers were able to give us some great content. Some of it was even inspired by the federal election.

The students of the math faculty hold diverse views and political opinions, but of one thing we can be sure: Our electoral system is screwy. Two parties have about the same portion of the popular vote, but the party with fewer votes has 36 more seats. The NDP has twice as many votes overall, but a quarter fewer seats than the Bloc (BLOC MAJORITAIRE). The green party has only a couple hundred thousand votes fewer than the Bloc, but the Bloc has almost 11 times the seats.

Suffice it to say that the system is faulty and needs to be changed. What can you do? Email, mail, or phone your newly elected (or returning) Member of Parliament to voice your displeasure with the way things are. Let them know that the system which got them elected is poorly suited to a government that represents the voting population. Regardless of where they stand on the system, it is their job to serve their riding and represent you in parliament. This means that if enough of us complain to our local representatives, they will realize that electoral reform is important to us.

The election is important, but the part of our democracy that affects us in the day-to-day starts after the election ends. Thank you for going out and casting your vote. Your local representative has been selected; it is now time to hold them accountable. Try to follow the legislation being discussed and communicate with your MP about your stance.

While our democratic system is far from perfect (and I don't know if a perfect system even exists), we are fortunate to live in a country where we can speak out about problems with the government without being silenced. It is my honour, as a **mathNEWS** editor, to provide a platform for the students of the mathematics faculty to speak their minds and share their ideas. We are and will continue to be the University of Waterloo's bastion of erudite thought.

Happy midterm season! Until we meet again in a fortnight!

unsophisticatED
Editor, **mathNEWS**

DERIVING FOR DICK	Sexy cosine function
UW UNPRINT	The Port Authority of New York & New Jersey [Editor's note: fuck you I hate that place]
WATER	A mathNEWS writer
SANDWICH EXPERT	Sexy Prime Minister Blanchet
BRICK	Identity function
EPSILON SCREWN	Aladdin—I mean, our next PM.
LAFAYEET	I don't know. But you should vote in the MathSoc Presidential By-election on Halloween!
CHEESED	A mouse, duh.
ZETHAR	You kidding? Halloween is an excellent night to take to the skies without anyone complaining.
FINCHEY	Sexy Dan Wolczuk. The preceding adjective is redundant, I know.
CLARIFIED	www.yandy.com/yandy-sexy-tariff-costume
UNSOPHISTICATED	Sexy mathNEWS editor (i.e. Myself)
TERRIFIED	Something something brown pants.

ARTICLE OF THE ISSUE

Article of the issue goes to Melancholy Morty for their highly insightful *We're already knee-deep in climate change. Let's prepare for depression while we still can!* There's a lot of good practical advice in there on not only recognizing the onset of depression in yourself and others, but also how to cope with the signs and symptoms, as well as tips on building a healthy mental environment. Go give it a read — it might just save a life.

Unfortunately, we cannot award prizes as opulent as the 2019 Toronto Raptors NBA Championship rings (seriously, how much did those cost?), but we *can* offer a \$25 Conestoga Mall gift card (freshly restocked!). Come by MC 3030 at your leisure to claim your well-earned reward.

terrified
Editor, **mathNEWS**



The scariest part of Halloween is still, sadly, midterms.

TERRY CHEN, **mathNEWS** EDITOR FOR FALL 2019
ALONG WITH JAMIE ANDERSON, JOSH RAMPERSAD, AND CLARA XI

mathASKS 141.3

FEATURING LECTURER LESLEY ISTEAD

SANDWICH EXPERT: LOTS OF WATERLOO CS STUDENTS WANT TO WORK AT COMPANIES LIKE GOOGLE. WHAT MADE YOU DECIDE TO GO INTO ACADEMIA INSTEAD OF STAYING AT GOOGLE?

I like the freedom that academia gives me. For example, if I suddenly become interested in content distribution networks or security, I can freely explore those topics, conduct experiments and publish papers. I don't have to worry about being typecast into one role, I don't have to worry about only conducting research that is profitable to the goals of a company.

Also, teaching is fun. There aren't a lot of teaching positions at Google or Adobe.

XAVIENTOIS: OVER THE COURSE OF YOUR CAREER, WHAT IS THE PROJECT HAVE YOU WORKED ON THAT YOU ARE THE MOST PROUD OF?

Two things.

The first is a P2P tool for film called Real Time Special Effects (RTFX). The story behind it was a lot of fun and ended up creating a lot of jobs. Sheridan, Pinewood Studios and SIRT wanted to combine several motion capture volumes into a single visualization (e.g: if you can't fit everyone in a single volume, or it's too expensive to have the talent in the same place/time). Then Side Effects Software wanted to extend this work for collaborative editing, asset creation and previsualization.

The second is my algorithm for adjusting disparity in stereo 3D. Adjusting the depth of a scene after capture is notoriously labour intensive and expensive. My results caught the eye of a director and we used the method to restore a dozen 3D glass-plate images taken from the trenches in WWI. The images appeared in the 2014 documentary "Soldiers' Stories".

UNSOPHISTICATED: IF YOU COULD CHANGE ONE THING ABOUT THE UNIVERSITY OF WATERLOO, WHAT WOULD IT BE?

That's a tough question... I'm hesitant to step on anyone's toes because I know EXACTLY how hard people work on things behind the scenes. How about I answer some related questions? Personal pet peeve? PD... overworking students, in general. Promising idea being discussed behind the scenes? Drawing a better balance between Racket and other languages like Python. Bring back the awesome steel CS sculpture? Change our mascot to Mr. Goose? YASSS!!!

LICENSE2DERIVE: ARE THERE ANY CS JOBS THAT DON'T REQUIRE MUCH CODING?

If you are particularly talented at writing, technical writing is a possibility. Lawyers — for patents and other technical areas. Of course, that requires law school.

UTAH TEAPOT: WHAT GOT YOU INTERESTED IN COMPUTER GRAPHICS, AND WHAT ADVICE DO YOU HAVE FOR STUDENTS ASPIRING TO GO INTO YOUR FIELD?

When I was in grade 10, I took a programming class in Turing where many of the assignments revolved around creating images or animations out of simple shapes. There were no apparent 3D library functions, only 2D ones, so I asked the teacher if they existed. They responded that there were no 3D drawing functions and that you couldn't do anything like that in Turing. I don't take no for an answer. So I thought about it on my bus ride home and concluded that "if I walk towards something, it gets bigger" (keep in mind, I'm stereo blind, I cannot see depth in the usual sense). I wrote a simple first-person shooter that night using my perception of the world to create the "3D". My teacher was not impressed, but I was hooked — there were so many possibilities of what could be done with just a few simple rendering functions.

My advice is to experiment. Computer graphics is a big field. If you're interested in rendering, write your own raytracer (a surprisingly simple task). If you're interested in games, try recreating your favorite 80s or 90s game in OpenGL (did you know that Tux Racer was a CS488 final project?). If you're interested in the more artistic side, try implementing a painterly rendering algorithm. Express yourself. Capture your experience. Tell your story. Most importantly (wink wink), plan on taking CS488 in S20, I'll be teaching it!

LICENSE2DERIVE: HOW MUCH TALENT IN ART DOES ONE NEED TO PURSUE COMPUTER GRAPHICS?

None. Computer graphics, for the most part, is math. But if you're interested in the more artistic topics like non-photo-realistic computer graphics, I think it's valuable to have some experience/understanding.

XAVIENTOIS: HOW MANY DIFFERENT DRESSES DO YOU OWN? YOU'VE WORN A DIFFERENT ONE TO EVERY CS350 LECTURE THIS TERM.

NaN

This week's count is 50. Most of them come from a shop in my hometown, Kelly's Shop in Picton, Ontario. Kelly carries handmade pieces that come straight from Canadian designers. Hobby: I've made quite a few dresses for my daughter, but I'm too shy to wear my own creations. I have a few pieces of amazing fabric though... so we'll see what happens :)

CLARIFIED: WHAT ARE YOUR FEELINGS ON THE MEGA MAN FRANCHISE?

It's great, but I'm TERRIBLE at it! I didn't have a game console as a child, so I never developed the coordination for side scrollers. I can't even make it past the introduction in Mega Man X, lol.

CIX: DO YOU HAVE A HALLOWEEN COSTUME IN MIND FOR THIS YEAR?

Possibly. You'll just have to attend lectures or watch the stream on Halloween to find out. I'm still working on my daughter's costume first, though. She's going out as Mothra, complete with LED wings... she loved the character from the latest Godzilla movie.

ANONYMOUS: HAVE YOU EVER CONSIDERED A CAREER AS A TWITCH STREAMER?

Isn't that what I'm doing now? ;)

In all reality, no. I'm not a big fan of being in front of the camera, I'd much rather be behind it. I might make a few instructional videos from time to time, but it's probably not a regular thing.

N REASONS TO TAKE THIRTY SECONDS AND VOTE FOR YOUR MATHSOC COUNCIL PRESIDENT

- How many chances do you get to elect a prez and trick-or-treat on the same day?
- Voting in costume! What a concept!
- Please. Democracy is desperate
- If anyone with a soul knows how things work, you know we need a competent president, so HELP US ELECT ONE
- Council is so tired we're begging you
- Mr. Goose will come for you if you don't

lafayeet

AN ADVERTISEMENT FOR SASMS

SASMS is an acronym for Short Attention Span Math Seminars.

Sign up to give a talk to improve your mathematical presentation skills. Attend the lectures to note some interesting mathematics.

<http://puremath.club/sasms/>

Zishen Qu,
President,
The Pure Math, Applied Math and
Combinatorics & Optimization Club

MAKING 3D MOVIES

profTHOUGHTS 141.3

Many people have experienced/endured stereoscopic 3D (S3D) film in recent years, especially due to the popularity of the Marvel Cinematic Universe and *Star Wars* franchises. I'd like to discuss computer science's role in producing S3D content since film plays such an important role in Canadian culture and economics, and Waterloo is a hotbed of CS talent that should capitalize on the many shortcomings and opportunities related to S3D. This conversation is also self-serving as a plug for my upcoming S3D grad course in S20, and also as an advertisement for URAs and homegrown grad students :)

S3D is the art of creating the perception and sensation of depth in images and video. Each eye is shown a slightly different image of the same scenery: objects in the scene are separated by short horizontal distances in the images. The brain interprets these offsets as depth, which makes sense considering our eyes produce two slightly different images when we gaze into a real 3D scene.

Filmmakers and photographers have been producing S3D content since the early 1800's. Ideally, S3D captures more information about the scene and creates a more immersive experience. More practically for the cinema industry, the better experience justifies a markup in ticket price while at the same time drawing crowds away from inferior televisions and back into the theatres.

Classically, the film script is developed into storyboards by the careful planning of visuals and camerawork: cinematography. For S3D films, this process must also account for the visual aspects of depth and any additional camera complexity: stereography. In particular, the director and stereographer must decide upon the look and feel of the film—how will depth be used as a storytelling mechanism? Is their goal to just capture reality, or are they using depth to elicit emotional responses from the audience? For example, a director can induce sensations of vertigo and nausea (as if you were actually re-experiencing the rides at the carnival, a la *Gravity*), or make the audience feel very small, insignificant, large, important or even godlike. A depth script is produced to describe how depth will be used throughout the film by indicating the depth of the foreground, background and screen plane.

During the creation of the depth script, filmmakers pay special attention to both storytelling and audience experience, especially discomfort. If the horizontal separation between objects in the left and right images is too large, it may be physically impossible for our eyes to focus on certain objects, or it can be strenuous and exhausting to refocus our eyes when the focus changes within the shot. Otherwise if the horizontal separation is too little, then objects in the scene tend to appear flat like cardboard cutouts.

Discomfort is interesting. It's usually not a good idea to ask the audience to move their eyes and muscles in unnatural ways. Conventional wisdom says that we don't experience sudden changes in depth perception in everyday life, or at least, that

we're not very good at processing it. This is challenging for cinematographers who are often pressured to rubber-stamp or oversee a lipservice of stereography, since sudden changes in the shots/sequencing are perfectly welcome in classical cinematography. Even when stereography is given first class treatment, human error can still propagate from the depth script into the film where errors are costly or impossible to fix. Stereography would benefit from a "spell check" or "autocorrect" for depth scripts, but this seems challenging considering that S3D discomfort is poorly understood; there's very little research or formalized experience in the area.

After planning the stereography, you're ready to capture the film. This seems fairly straightforward—we need one image for the left eye and one for the right. Native capture uses two cameras (and a rig) or a special S3D camera (two lenses in a single camera body). The gold standard two-camera approach requires exposure synchronization and a separation-adjustable rig to control the overall depth in the shot—but these technical hurdles are easy to overcome with a fistful of dollars. On the other hand, S3D cameras are easier to use, but can't be used to adjust separation or depth because the lenses are fixed in-place. Directors usually prefer the two-camera approach over the alternatives (i.e. single camera or stereo conversion*) because they can directly control depth and separation in realtime on-set**.

That double-asterisk hides several important truths about the industry. In principle, careful stereography and adjustable camera parameters should be sufficient to produce beautiful S3D shots that avoid discomfort, but there are several practicalities that work against this. There are few opportunities to validate the stereography and camera settings against reality. In particular, most 3D films are shot with very specific projection in mind (e.g., RealD, IMAX, UltraAVX), but without immediate access to these facilities during filming, directors tend to use smaller "home theatre" screens on-set that cannot emulate the intricacies of the larger cinema screens where most S3D films will be watched.

Some directors have pushed back using previsualization—extensive computer modelling during stereography—and on-set previs, which is both costly and technically limited (especially with respect to S3D). MOST IMPORTANTLY, the industry tends to resist incursions of technology into the film-set/production area, where technical difficulties can disrupt the mojo of the on-screen talent and topple the house of cards of profitable film-making. The producers and investors are usually reluctant to change the time-tested formula (which from a technical point of view, is more of a "better the devil you know than the devil you don't").

Continuing the conversation about two-camera native capture, any differences in the lenses (e.g., colour, focus, inclusions, dirt) and capture surface (e.g., dead pixels, misalignment/rotation) can introduce inconsistencies between the S3D images and cause discomfort. Traditionally, avoiding, detecting and repairing these issues is costly and labour-intensive, but these issues also provide us with opportunities for automation, especially with recent work in machine learning and

augmented reality. It's tempting to just reshoot the film, but that's rarely an option—live sporting events are impossible to reshoot, and rescheduling cast and crew for another shoot can be prohibitively expensive. Consequently, filmmakers often choose between moving forward with faulty footage (at the expense of audience experience) or repairing/regenerating the S3D content using stereo conversion.

Returning to the single-asterisk a few paragraphs back: while directors usually prefer native S3D filming as a matter of artistic purity and integrity, the industry STRONGLY prefers stereo conversion, the process of taking a single image and producing an artificial second view to create the S3D effect. The vast majority of S3D films are converted instead of filmed in S3D due to the cost/benefit ratio. This applies to big budget/haul films like *Black Panther* and *The Avengers*, but there are notable exceptions like James Cameron and *Avatar*.

Stereo conversion is a labour intensive process involving hundreds of artists working long hours. The original 2D footage is rotoscoped—hand-traced frame by frame to identify the contours, creases, and folds of each object (including each wisp of hair!). 3D models are produced for each object in each scene, and the original video is projected over those models and trimmed by the roto lines to create a 3D scene. Then, artificial cameras can be configured to capture the desired left and right S3D images using the 3D scene.

With respect to artistic integrity, the trend within the industry is to use stereo conversion without hiring a dedicated stereographer to carefully plan the stereography. Consequently, the films are designed with classical cinematography in mind, often producing a 2D source film that isn't conducive to S3D conversion and audience comfort. So even though algorithms and machine learning can automate much of the conversion process—segmentation for rotoscoping, inpainting to fill holes in the content, and generating 3D models from sketches—the process still favours human artists who can detect and manage S3D discomfort while validating the overall quality of the conversion. This underscores the importance of developing tools that can generate, previsualize and validate the depth script for stereography. Automation in this area unlocks automation later in the development pipeline.

Machine learning and automation within the stereo conversion pipeline also provides opportunities to measure and understand artistic performance. How many hours should a conversion artist work per day? How does rest relate to artistic quality? Can we identify artistically compromised workers? The answers to these questions are helpful to create a competitive economy that respects worker health and rights, perhaps even outside of the film industry.

There are many other challenges that arise during the production of S3D films, e.g: content storage and security—too many to list here! If you have ideas and interest in doing research, please consider signing up for my S3D grad course in S20, I'm happy to entertain further discussion in person.

DEVELOPER STUDENT CLUBS — NOW AT THE UNIVERSITY OF WATERLOO!

Developer Student Clubs are an initiative by Google Developers to engage with university students interested in Google Developer technologies. Students from all undergraduate or graduate programs with an interest in growing as a developer are welcome to join!

By joining a DSC, you have the opportunity to grow your knowledge in a peer-to-peer learning environment and use the skills you learn to create scalable solutions to real world problems in your community. On top of all that, you gain tons of experience relevant to today's highly competitive job market.

Interested? Check out our website for more details at <https://developers.google.com/community/dsc>, and sign up for our mailing list at <https://tinyurl.com/dsc-uwaterloo>. We look forward to having you!

DSC UWaterloo

TYPOS IN LECTURE SLIDES (AND EXAMS!)

S is for the extra one added to Capgras's."

T is for Treisman 1960, not "1980."

O is for the orangutans that wore odourless rouge, not "odorless rogue."

L is for the least woke way to talk about people with schizophrenia, "Consciousness in humans: Acute schizophrenics? No."

Z is for the ZZZ's in class from spending 13.5 hours of lecture on four chapters.

cheesed

JUST ME?

tfw I'm more behind and more stressed after reading week than before because I spent the whole week playing with my dog.

cheesed

LET'S TALK DIVESTMENT: WHAT IS IT AND WHERE ARE WE?

You might have heard people talking about fossil fuel divestment recently, especially if you talk to me. Divestment is the act of selling off held investments, usually in the context of ethical concerns.

Recently, there has been a lot of talk at Waterloo and other universities in Canada and around the world on fossil fuel divestment.

As of December 31, 2016 (when the university last released this information), the university's pension fund held over \$1.5 billion in investments, and the endowment funds held over \$68 million in investments. Of this, over \$40 million of the pension fund and over \$27 million of the endowment fund was invested in fossil fuel companies.

The university released this information after pressure from a unanimous 2015 vote from the Waterloo Environment Students Endowment Fund (WESEF) to divest their endowment from fossil fuel. However, since the university pools all investments, they were blocked from doing this.

After the WESEF divestment vote, the university created the Waterloo Environment Students Endowment Fund to prepare a report on how the university can take environment, social, and corporate governance (ESG) factors into consideration when making investments. Since the report came out, the university says they will now consider ESG factors when making investment decisions. Prior to this, the university did not consider ESG factors in investment decisions.

The university claims that their fiduciary duty, which is a legal duty for money managers to act in their client's best interests, prevents them from divesting from fossil fuels. However, the University of Waterloo Graduate Student Association, Laval University, and several pension funds in Canada have also divested from fossil fuels. Not to mention the many organization around the world that are divesting in fossil fuels. So the university's stance that fiduciary responsibility prevents them from divesting could be described as questionable, especially considering the volatility of fossil fuel stocks.

Look in an upcoming issue of Imprint to learn more about this issue.

Vincent Macri

Sources:

<https://fossilfreeuw.ca/uw-investments/>

<https://fossilfreeuw.ca/progress/>

<https://fossilfreeuw.ca/progress/>

<https://fossilfreeuw.ca/progress/>

FAVOURITE PIZZA OF FEDERAL PARTY LEADERS

At mathNEWS, we take our pizza seriously. Therefore, if we don't know what to do, we look to pizza for the answer. With the federal election running right now, you might not know how to vote. In this case, vote with your stomach by choosing that party which shares your pizza tastes.

LIBERALS — JUSTIN TRUDEAU

Justin Trudeau is a diehard supporter of Hawaiian Pizza, having gone to bat for it publicly on twitter.



CONSERVATIVES — ANDREW SCHEER

Andrew Scheer actually has a pizza named after him. It has sausage, onions and bell pepper. For best results, order the original from PIE in Barrie.



NDP — JAGMEET SINGH

This is when things get wild. Jagmeet Singh prefers more artisan pizza with his favourite being a Tamil inspired pizza with roti on it. He also has an enjoyment of cheesecake, having met Uncle Tetsu (<https://bit.ly/2pFdmIv>).



BLOC QUEBECOIS — YVES-F BLANCHET

The ideal candidate if you hate pizza. Yves goes on record against pizza and poutine as the evils of the decadent west. [Editor's Note: r/PoutineIsQuebecois]



GREEN — ELIZABETH MAY

Unfortunately, we couldn't find any info on her pizza habits, but we can say that if you like cheese melts or croissants, you'll be in great company.



The Pizza Whip

We don't care about qualifications — apply to be mathNEWS Editor today!

A mathNEWS EDITOR WHO'S ALREADY DESPERATE TO RETIRE

HALLOWEEN horrorSCOPES

AM I GONNA RESURRECT A LONG-DEAD mathNEWS COLUMN FOR THE SAKE OF ONE ISSUE? YOU BET!

ACTSCI

The day before Halloween, you spend hours at the Costco on Erb St, evaluating the VFM of each mega-pack of candy and chocolate in the store. You end up buying five pounds of Tootsie Rolls for \$16.99, but none of your neighbours want any. You can always try handing them out next Halloween...

Your costume: a devil.

AHS

You hate Halloween because of how unhealthy it is — all that sugar was never good for anyone. Grumbling to yourself as you see trick-or-treaters walk around with bags of candy, you realize that one day, you will become the person who hands out toothbrushes to kids on Halloween.

Your costume: an anatomically accurate muscle morphsuit.

AMATH

You are dragged along by your CO friend to Strom's corn maze. After finishing the maze, you wander off towards the kids' section of the farm, where you see children bobbing for apples in a large barrel. Intrigued by this strange game, you pay \$4.00 to join in and enjoy yourself very much.

Your costume: a calculator. It is made out of construction paper and is not nearly as nice as the Teaching student's costume.

ARTS

You have lots of ideas for pumpkin carvings this year, and you buy as many pumpkins as the Food Basics on Laurelwood Dr has left in stock. You have fun carving them, but soon find yourself at a loss with what to do with them once you're done. You save the pumpkin seeds and roast them; you subsist on them for weeks.

Your costume: the Headless Horseman.

CFM

You have your CS 246 midterm on the 31st. Although it blows, you're not about to let it stand in your way of having a good time. After the midterm, you drown your sorrows by getting wasted at your Double Degree friend's Halloween party.

Your costume: a cat (you half-ass it by wearing cat ears and drawing whiskers on your face with marker).

CO

You and your friends decide to check out Strom's infamous corn maze in Guelph. You all make a game where you split up and each try to find the shortest, optimal route through the maze. The last person to get out has to treat everyone else to a slice of pie from the farmers' market.

Your costume: a scarecrow.

CS

Your Halloween plans have been ruined by the CS 246 midterm on the 31st. The exam fucks you up so badly that you go home immediately afterwards to cry, and you miss out on the holiday festivities.

Your costume: Dr. Racket.

DOUBLE DEGREE

You throw a Halloween party at your place on Albert St and invite everyone you know. By 10:00 PM, it feels as though you've got half of Laurier and half of UW crowding in your living room. The only thing you can remember the next morning is drunkenly dancing in a conga line to "Monster Mash".

Your costume: sexy Dan Wolczuk (à la Yandy.com's "Sexy Mr. Rogers").

ENG

Luckily for you, you have already finished all your midterms and you are the envy of the second-year CS and CFM students. You use all your spare time to make your costume: it is a

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UW'S BASTION OF ERUDITE THOUGHT SINCE 1973

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technological marvel with glowing lights and moving parts, and it gets 1000 upvotes on r/uwaterloo.

Your costume: a goose. In order to see out of the costume, you install a periscope in the goose's "neck".

ENV

You buy tons of Halloween decorations from the Party City in Kitchener (the bus ride was long, but worth it). Making your living space festive is one of your favourite things about any holiday. When guests walk through your front door, they have to shake fake cobwebs and tiny plastic spiders from their hair.

Your costume: an oil company magnate.

PMATH

You are also dragged along by your CO friend to Strom's corn maze. You have always been bad at directions and you are soon lost in the maze. You eventually find your way out by using the angle of your shadow to triangulate your position in the maze. You have to buy everyone pumpkin pie and your wallet becomes \$50 lighter.

Your costume: Euclid, but most people mistake you for a gnome.

STATS

You see the ActSci student at Costco while you are shopping for groceries. You shake your head in bemusement. If they *really* cared about VFM, they should've bought all their candy after Valentine's Day, like you. The weird look people give you when you offer them heart-shaped lollipops for Halloween is worth the money you've saved.

Your costume: Cupid.

TEACHING

You wish you were out having fun on Halloween, but instead you're stuck marking last week's MATH 137 midterm. You lie awake that night, haunted not by ghosts, but by your students who still don't seem to know what the Triangle Inequality is.

Your costume: a full-body i-Clicker costume made out of cardboard, with pressable buttons.

UNDECIDED

You were invited by your CO friend to go out to Guelph but you flaked at the last minute. Your Double Degree friend invites you to their party on the 31st, but you flake at the last minute for that too. Halloween comes and goes. You wonder how it's November already.

Your costume: you couldn't think of one in time, so you ended up just dressing in all black. That still counts, right?

Finchey

LET'S TALK DIVESTMENT: WHY DIVEST FROM FOSSIL FUELS?

If you haven't yet read it, go read my other article in this issue on what divestment is.

We now move onto the next question: why are some advocating for divestment?

Essentially, it boils down to the threat of the climate crisis. Climate change is a huge threat to civilization, and fossil fuel companies profit off the destruction of the planet.

However, there are financial reasons for divestment as well. These companies don't perform that well in the stock market, they are incredibly volatile since their stock is tied so closely to the price of oil. As a society, we need to move away from fossil fuels, which of course will not be good for the bottom line and the stock prices of fossil fuel companies, so they will likely continue to perform poorly in the stock market.

People rely on the pension fund when they retire, and yet the university is investing the pension fund in a volatile and dying industry. Students rely on the endowment fund to support their education, and the university is investing their money, some of which comes from your MEF contributions, into investing in companies that are destroying the future of our planet.

Vincent Macri

FLAG REVIEW SUBMISSION

Can I have boldblazer review the Teletubbies flag



Anonymous

profQUOTES 141.3

PMATH 351: KENNETH DAVIDSON

- “ Is there such a thing called an electrical skateboard?
- “ Instead of dealing with epsilon over 2's and epsilon over 3's, I am going to end the proof with epsilon times a constant, so that we feel more like grown-ups.
- “ We cannot say that this is an epsilon-net...I think it's 4 epsilon, but I won't tell you.

MATH 145: DAVID JAO

- “ In math, a sufficiently nonsensical statement is true.

MATH 245: RAHIM MOOSA

- “ I'm foreseeing a future I didn't need.
- “ It's a useful statement, so we might as well prove it.
- “ *[On Monday]* The proof...I hope we'll finish on Friday.

MATH 249: KEVIN PURBHOO

- “ We can make sense of it by unmultiplying.
- “ Oh, I forgot to say what the point of this is.
- “ I claim that morally this is the same proof.
- “ There is method to my madness.
- “ Do we have a version of [the Sum lemma] for set difference? Yes, it's called the Sum lemma.
- “ And now, by trickery, I can define the infinite product.
- “ Some of you may look at this and cringe, but this is an absolutely joyous expression.
- “ It seems that I can do this example without screwing up.
- “ There's a lot of proof of this...by example.
- “ I'm totally gonna cheat.
- “ We don't think; we apply the rules.
- “ I have no idea what you just said. Sorry.

MATH 237: ROBERT GARBARY

- “ Student: Why are you wearing a jacket?
Prof: I'm auditioning for the Bachelorette.
- “ When I say "engineering", you're supposed to boo.

CS 246E: BRAD LUSHMAN

- “ If you wanted to be Java or something, yes you could make it safer.
- “ Exceptions are like baseballs.
- “ Imagine you and a function hanging out in your backyard...
- “ That would be the equivalent of having a ball lobbed at you and you open your mouth and swallow it.
- “ Five factorial is 120, so it must work.
- “ I have yet to meet someone whose name is the empty string.
- “ But I'm not one not to complain.
- “ How on earth are we going to do that? That's why the lecture's an hour and a half, not fifteen minutes.
- “ Oh, the horror!
- “ What if you duck imperfectly?
- “ I find myself standing here, wondering how long it will take for them to start moving furniture upstairs.
- “ The good thing is that now that we've done it once, we won't have to do it again; but now we're going to do it again.
- “ Now comes the complainer. Someone who is used to programming in languages other than C++. Languages that may or may not begin with J...

STAT 230: GREGORY RICE

- “ In undergrad, I once had three roommates who all had the name Kyle. That was the Kyle year.
- “ No bridge players? Nobody's over 80 in here?
- “ I hate having office hours too close to exams: at that point, all I can do is soothe you.
- “ I hate Canadian Tire.
- “ *[Ant crawls onto projector]* Is this an ant? It's our ant friend!
- “ How did you guys feel about the midterm? I don't see any tears, that's a good sign.
- “ Prof: Did your parents ever say your cousin was a degenerate?
Student: No, but my parents tell me I'm a degenerate.

CS 245E: JONATHAN BUSS

- “ What's three extra lines between friends? Or colleagues. Maybe they're not your friends.
- “ *[finishes writing a proof]* ...which reminds me that I forgot to mention what that is.
- “ Funky is for the future.
- “ You're as smart as I am! We'll let them [your classmates] decide if that's a good thing.
- “ That's the end of that particular bit of computerness.
- “ Ugly, ugly, ugly! I hate ugly. Under my definition, of course.
- “ Almost half of the authors, for some value of a half, use one style...
- “ *[projector turns on]* Go away! *[snaps angrily]*
- “ On the Simpsons, they call this the "DUH!" rule.
- “ My chalk doesn't listen to my brain.
- “ When the math C&D goes on holiday, you know it's a holiday.

CS 241E: ONDŘEJ LHOTÁK

- “ I can spell if I'm writing on paper, but not on a board.
- “ *[Pascal]* is basically isomorphic to C but without all the terrible parts.
- “ We decided—well, I told you to...
- “ We're going to do an easier example now; easier in that you just have to watch me type.
- “ It's going to print ten factorial, which is 42.
- “ We need the heap now, so we'll make a really terrible heap.
- “ Our heap will allocate but never free.

CS 135: CHARLES CLARKE

- “ Here's a slide. You can read the slide if you want. There's nothing you need to know on that slide.
- “ The TA's will mark your assignments. They're just grad student though, you know, they're just doing it for money. So quality will vary.
- “ Why doesn't this work? Because we're in beginner student. And it might be way too confusing if this actually worked properly.

- “ You'll see by the end of class that this is TERRIBLY, HORRIBLE, ATROCIOUS, AWFUL NOTATION.
- “ Now, why doesn't it work? Because Racket is not a very brilliant thing.
- “ So, there's this thing called “minimally acceptable teaching”.
- “ Okay, so, behind each of these slides is an Instructor Slide with notes and stuff for what we're supposed to say during each of these slides. I have never read these slides before.
- “ I—I don't know why that doesn't work. Oh well.
- “ Sometimes in this course, it gets a but hard to distinguish between reality and what we make you do to make your lives hard.
- “ Those of you who went to high school in Ontario are used to copy-and-pasting.
- “ Now, I'm actually going to give you a draft of the examples right now! *[points to blank blackboard]*
- “ I don't really use Racket.
- “ An accountant's job is to walk the fine line between saving money and going to jail.
- “ Oh, look. What is it? It looks like I wrote the answer to this very question on the board. Right here. It looks like the answer is D. Press D. Right now.
- “ And this clicker question was so weird that we decided to never do it again, even though we've never done it before.
- “ This is kind of creepy mathematics!
- “ We have a set here, called Nat. Short for Nathan.
- “ If you answered D, great, you figured it out. If you answered A, you are awesome.
- “ The correct answer is D, but the right answer is A.
- “ This is computer science; we sort integers. *[Pause]* It's USELESS.
- “ *[Explaining sorting]* It's actually magic. You take the first one. Then say to the rest of the list, “Sort yourselves!”. And they do!
- “ Here, okay. If you're going to take a picture, have a picture of me pointing to the wrong answer.

STAT 240: AUKOSH JAGANNATH

- “ You guys did well on the midterm. I was honestly surprised.

LET'S TALK DIVESTMENT: WHAT CAN I DO?

There are a two big things you can do to push the university to divest from fossil fuels. One of them is easy, and one of them is a bit more work.

The first and easiest thing for you to do is to send an email. Specifically, send an email to your WUSA councillors. For the math faculty, these are: Diana Chang (diana.chang@uwaterloo.ca), John Hunte (jphunte@uwaterloo.ca), Navya Mehta (njmehta@uwaterloo.ca), Kanan Sharma (k63sharma@uwaterloo.ca), and June Xu (huiqin.xu@uwaterloo.ca). Ask your WUSA councillors to put forward two motions for the next WUSA Students' Council Meeting. The first motion is for WUSA to officially adopt the stance that the University of Waterloo should immediately move to divest from all fossil fuel companies. The second motion, which is the advice Seneca Velling (WUSA Vice President, Operations & Finance) gave to me, is for WUSA "to lobby the provincial government so Directors and Governors on Boards can more easily divest without legal ramifications or personal liability" (this was not an opinion expressed by Seneca, just his advice to students who don't want the university investing in fossil fuels).

So, again the easy thing: email your WUSA councillors asking them to put forward a motion at the next Students' Council Meeting for to adopt the stance that UW should immediately move to divest from all fossil fuel companies, and a motion for WUSA to lobby the provincial government so Directors and Governors on Boards can more easily divest without legal ramifications or personal liability.

Emails for math WUSA councillors: diana.chang@uwaterloo.ca, jphunte@uwaterloo.ca, njmehta@uwaterloo.ca, k63sharma@uwaterloo.ca, and huiqin.xu@uwaterloo.ca.

If you are not a math student, you can find the contact information of your councillors at: <https://wusa.ca/student-bodies/students-council>

If you want to do even more, you can join the Fossil Free uWaterloo Club, an official WUSA club pushing for UW to divest from fossil fuels. They meet on Wednesdays from 5:00 pm to 6:00 pm in RCH 212.

Vincent Macri

**That makes no sense.
Good enough for us.**

PROF. DAVID JAO

IDEAL V.S. ACTUAL READING WEEK

Minion A had planned for a canoe trip for weeks. She'd even saved money for a portaging backpack and had went to MEC to complete her gear preparation. However, she couldn't find a canoe partner in time and there was way too much portaging. The team leader politely recommended her to quit the trip so that she could get a refund.

On the first day of reading week, Minion A was so bored that she started to play Minecraft instead of hiking in the woods. "The foxes are cute in version 1.14," she thought while not paying attention to the creeper behind her. Her lovely, lovely yard that took three hours to decorate was blown up. Her self-pity quit the game for her.

Minion B had huge study plans for reading week. He planned to finish all his assignments and to review for all his midterms. He wished to become a brand new person by sleeping and waking up early.

Day One: Wake up at 11 am. Have brunch. Do laundry. Get a drink with friends. Go to bed at 11 pm. Check on phone. Check on phone. Check on phone. Fall asleep with phone on face at 2 am.

Day Three: Wake up at 10 am. Hmmm, what progress. Check on phone as reward. Get out of bed at 12 pm. Have brunch. Study for 10 minutes. That's enough for the day. I still got plenty of time.

Sunday night before school: Crying inside. "Please tell me *this* is not happening! School! Is! Not! Happening! PLZ don't send me back there!"

What happened during your reading week Minion C?

Autowired

INTEGRALS

The following words are spelt with the same letters as the word "integral"

- Triangle
- Altering
- Relating
- Alerting
- Tanglier

I don't know what you're going to do with this article (which is the same letters as recital) but enjoy I guess.

owen

N THINGS THE MATHSOC VPA IS TOTALLY RESPONSIBLE FOR

- Being the BEST VPA
- Tuition rising
- Increasing taxes (Quote: "It's all the co-op money man.")
- All of Waterloo's housing
- Being the CEO of Schembri
- Being the CEO of Prica
- Being the CEO of UWaterloo
- Being the next Dean of Math
- Every single geopolitical crisis around the world
- Global Warming
- The election of Donald Trump x3
- Donald Trump winning over Feridun in the primaries
- $P = NP$
- $P = P$
- The Riemann Hypothesis
- $\pi = 3$
- Disagreeing with the Yeet Theorem
- The Collatz Conjecture
- Making Akkadian the official language of all future Math education
- Making Kanien'kéha the official language of all future Math education
- Taking off his hat at some point
- Whatever political party wins the Canadian Federal Election on Oct 21st
- American cheese
- The CnD renovations that bolted the tables to the floor
- Defunding **mathNEWS** (Quote: "And that's not even ironic, your days are numbered!")
- MathSoc's President resigning
- MathSoc's VPA resigning
- The MathSoc couch disappearing
- This article's existence
- This article's non-existence
- Being happy with this article (Quote: "Yeehaw!")

Narf Dert

VILLAGE 1 BASEMENT: A FIRST YEAR'S EXPERIENCE

(sung to the tune of *Take Me Home, Country Roads*)

Almost prison
V1 basement
Rooftop piping
Common floor bathrooms

Life is cold here
Colder than MC
Warmer than the third floor
Cause we have no breeze

Goose shit roads
Take me home
To the cave
Where I belong

V1 basement
Forced containment
Take me home
Goose shit roads

All my foodies
Gather round here
Here at Mudie's
Spend your meal plan dollars

Sometimes tasty
Blessing in disguise
Other times it's so tripe
Teardrops in my eyes

Goose shit roads
Take me home
To the cave
Where I belong

V1 basement
Forced containment
Take me home
Goose shit roads

I hear her honk
In the morning hour, she calls me
The mother goose reminds me
Of the class far away

Running down Ring Road
I get a feeling that I might have
Missed on calc again
Calc again

Goose shit roads
Take me home
To the cave
Where I belong

V1 basement
Forced containment
Take me home
Goose shit roads

mathNEWS AT FEDERAL ELECTION NIGHT — THE EARLY PART

Someone at **mathNEWS** production night has proposed that this be the Blast to the Past **mathNEWS** Mid-Election/Post-Election Written-Election-Night Published-Post-Election-Night Federal Election Issue. As such, I am contributing to the election issue by capturing a snapshot of what erudite prospects of democracy the illustrious minds of **mathNEWS** are debating.

6:50 PM

Several minutes were wasted trying to get the radio to stream the CBC elections coverage. **mathNEWS** was treated to several funky advertisements and funkier music pieces.

7:01 PM

The effectiveness of writing about an election before the results are out, then publishing a few days later, was criticized. Perhaps readers might lose interest in reading about an event already passed? *Avengers: Endgame* was cited as an example of disinterest in past events, then cited as a counterexample of people being interested after all.

7:04 PM

News outlets were called tautology-touting voices for stating facts such as "If we don't get a majority government, we will have a minority government." Perhaps such facts might still be useful to those

7:15 PM

In a fiery round of applause, the very first poll results were announced! The Coast of Bays-Central-Notre Dame riding took a Conservative lead of 20 votes to the trailing Liberal 7. **mathNEWS** writers theorized that this result held great significance to the final outcome of the election.

7:24 PM

"They're at 420 so they won." A quick turnaround by the Liberals, now leading in 6 ridings with a total of four-hundred and twenty votes, prompted this comment by a **mathNEWS** mind.

7:30 PM

Late-night midterm steals this **mathNEWS** writer away! Unfortunate — but perhaps another writer shall continue this task of making public the ingenious commentary of **mathNEWS** writers and publishers!

[POLITICAL PARTY] WINS ELECTION, NATION DOOMED

Author's note: Due to recent changes in the Fair Elections Act, this article has been made politically neutral. The reader is asked to insert their own political positions.

OTTAWA — As final results from the federal election arrive, the **mathNEWS** elections desk is officially calling the election for [POLITICAL PARTY], which will form a [PICK ONE: MAJORITY, MINORITY, RUTHLESS DICTATORSHIP] in Canada's 43rd Parliament.

Unfortunately, this marks a sad day for Canada, as [POLITICAL PARTY] is the worst choice for this great country's future. Radical extremist positions like [FLAGSHIP POLICY] will destroy the great ideals this nation was founded on, and will sacrifice the prosperity of future Canadians for generations to come.

[TAX POLICY ADJUSTMENT] will irreparably harm the middle class, and give more unneeded handouts to the [PICK ONE: POOR, TOP ONE PERCENT]. In addition, [FOREIGN POLICY] will severely damage Canada's hard-won reputation abroad. Indeed, look for relations with [FOREIGN NATION] to rapidly deteriorate over the course of the next Prime Minister's term.

To top it all off, [PARTY LEADER] is completely incapable of being the [PICK ONE: STRONG, CARING] leader we need in these [PICK ONE: DANGEROUS, TOUGH] times. Instead of fighting for Canadians, they're [PICK ONE: WEARING BLACKFACE, ATTACKING GAY PEOPLE]. We should expect more from our elected leaders.

While I respect the decision of Canadians in this sacred process we call democracy, I continue to believe that they have made the wrong choice. If only [PARTISAN IDENTIFICATION] had won. Then Canada would be able to focus on the real issues, like [PICK ONE: BALANCING THE BUDGET, CLIMATE CHANGE, ELECTORAL REFORM, PHARMACARE, SECEDING FROM CANADA].

Fortunately, the greatest feature of our system is that Canadians will be able to choose a new leader soon, and rectify their mistakes at the next election in [PICK ONE: 2020, 2023, 2057 AFTER DEFEAT OF JUSTIN TRUDEAU XIII].

UW Unprint

mathNEWS

IN SURPRISE FINISH, BLOC QUEBECOIS WINS MAJORITY

OTTAWA — The political world has been shaken up today, as the **mathNEWS** elections desk has confirmed that the Bloc Quebecois has won a majority in the House of Commons, and will form the first Bloc government in Canadian history.

The surprise victory left observers baffled, since the Bloc Quebecois ran only 78 candidates, but somehow secured a 174 seat majority in the 338 member House of Commons.

CBC political analyst Eric Grenier summed up feelings in Ottawa from the live election night studio. "I have no idea how this fucking happened," Grenier said. "Like, there have been polling errors before, but this is basic counting right? Where did the extra 96 candidates come from?" As the composition of the new Parliament appeared on a screen behind him, Grenier continued, "You're all seeing this right? It's not just me?" He then gestured to a newly minted Bloc MP on the screen. "I have never seen that fucking guy before in my life. Am I on crazy pills?"

Meanwhile, at Bloc campaign HQ, a victorious Yves-Francois Blanchet addressed party faithful. "Can we get some extra chairs here?" he began. "I thought we got enough chairs since everyone pre-booked but we don't have enough chairs for some reason." Blanchet continued, "Not in my wildest dreams, did I think I would be in this situation tonight. Seriously, how did this even happen? I swear I checked the website last night and it said we had 78 candidates, but I just checked

on my phone and now we have 174. I don't recognize any of their faces either." He then waved his phone around the stage. "Anyone recognize these guys?" After a short silence, Blanchet kept speaking: "As the new Prime Minister of Canada, I pledge to leave Canada as quickly as possible. And from there, who knows? Clearly Canadians believe in our message. Why can't Canada secede from Canada?" Another raucous round of applause and cheers shook the oddly crowded Bloc HQ.

At the other party headquarters, the atmosphere was much more grim. "I survive the blackface thing and the SNC-Lavalin thing and this what does it? They won a seat in Nova Scotia. How?" asked Justin Trudeau. The NDP headquarters were slightly more optimistic, as Jagmeet Singh commented: "This is definitely the weirdest way we've lost yet. I'm not even mad." In the Conservative war room, Andrew Scheer prepared to face a leadership challenge after a disappointing result. "This is such bullshit," Scheer said. "And I know Bernier's going to come back and pretend he never left. I should just let him, I'm done with this shit. I'm going back into insurance."

While the other parties picked up the pieces, it was the Bloc's moment, at least for a night. Well-wishers streamed into Bloc HQ to toast their victory, though some of the new Bloc MPs appeared to have no family or friends, or indeed any memories from before election night at all.

UW Unprint

'T WAS THE NIGHT BEFORE THE ELECTION

'Twas the night before the election, when all through the country,
Not a campaign was silent, they were all as busy as could be.
Everyone had worked hard in preparation for the big day,
In hopes that a victory would come their way.

Parties had already sent households lots of flyers,
All accusing each other of being devout liars,
And posted lawn signs all throughout the neighbourhood,
Hoping to influence nearby people, thinking it actually would.

With soundbytes to create and headlines to spin,
The campaigns were doing all they could, to win.
Quickly now, before the official campaign period runs out,
Show Canadians what your party is truly all about.

Justin Trudeau, trying to again win this race,
Was thankful that most voters forgot his blackface.
Touting real change and progress, he shouted out loud,
Knowing that his charisma would be enough policy for his crowd.

A better Canada, Andrew Scheer is trying to make,
Except that his previous experience had been all fake.
Often times nearby you will find people snoring;
He works hard to make people see he isn't so boring.

Jagmeet Singh is up against "Delay" and "Deny"
To become Jack Layton 2.0, he sure does try.
His charms worked magic, being so hip, cool, and urban,
Though not so much in Québec; it must be his turban.

Yves-François Blanchet is always looking for a translation.
If he ever found one, it would certainly be a celebration.
He will never ever become Prime Minister for sure,
Except for if events so improbable occur.

Elizabeth May of British Columbia's West coast,
Has another MP in the House of Commons to boast.
Predictions of them winning more seats caused lots of ruckus.
It looks as though they'll still fall short of official party status.

Last but not least, there's Maxime Bernier,
Looking to make lots of immigrants stay away.

He says his party is a force all across the country,
But he should worry first on his own constituency.

Now Angus Reid, Abacus, EKOS, and Ipsos,
With Léger, Mainstreet, and Dart/Maru; don't forget Nanos.
Find which parties will rise and which parties will fall!
Prepare all the polls! Calculate them all!

When dawn arrives and Canadians arise,
Many will queue at the polls, like waiting for a prize,
Then mark their ballots, after waiting for their turn,
With all candidates hoping it was their vote, they did earn.

Afterwards, millions will wait for hours with anticipation,
All just to see a party celebrate with jubilation.
Unless the party your vote went to has won,
You'll realise the next four years won't be of much fun.

You may worry the winning party will make our country soon
fall,
And the party you supported for has just lost it all.
I'll just say, "Don't fret, friend. Grab a drink, and say cheers!"
Have a great election night, and enjoy the next four years!

boldblazer

mathNEWS AT FEDERAL ELECTION NIGHT — THE LATER PART

As CC has come down with a dreadful case of the midterms (stage 3), I will pick up while they get treatment.

7:39 PM

All is silent. Maybe we have weathered the storm and the issue will include real articles? A writer can hope that not everything will be election related.

7:40 PM

"Radio wave, next generation radio technology — or some as some call it, radio." Well, it looks like I have spoken too soon. We can see the influence of the election and all of the candidate's campaigns as we can only restate the obvious. I believe I can almost see the brain cells being sucked up by the election via the radio.

7:50 PM

"The strategy of 'lets leave Ford in the garage' has appeared to emerge." Random giggles respond. Guess this means that the minds of **mathNEWS** enjoy a good pun here or there. One wonders if this applies to other puns, or just politics related ones.

8:00 PM

"I thought we were making the Hawaiian pizza carbone as a blackface joke". The collision of the classic "carbone" **mathNEWS** joke and the fact that Trudeau likes Hawaiian leads to the following line. It's even better without context.

8:10 PM

"The best part of voting is that you don't have to tell who you voted for and can lie." "You're not a Nazi if you vote conservative". Two random comments from two different minds combine to create one concerning idea.

8:40 PM

"If the Liberals win, does this mean Alberta will start talking about independence?" Cue a discussion about putting solar panels on pipelines and how Alberta hates green energy [Citation Needed].

8:50 PM

"Did someone just Facebook message CBC?" The minds and ears of **mathNEWS** are keen enough to pick out the slightest bloopers on the radio, while debating various methods of voting systems.

9:00 PM

"What if CBC counted the ballots better than Elections Canada?" Sometimes, you don't know who actually runs the country. This mess eventually gets cleaned up as the CBC fixes their numbers; it turns out that the Green party isn't actually winning. But pizza calls and everyone scatters, leaving the radio playing on silent in an abandoned room.

P(olitics) v(s) m(ath)N(EWS)

DEAR ORILLIA BLACKFACE CLUB,

If I can't tell if you're for or against blackface, you're not doing a very good job as a self-proclaimed ally or as a racist...

p.s. for anyone that doesn't know why "blackface is such a big deal"...start with the query, "history of minstrel shows" and then "history of minstrel shows canada" into your online search engine of choice and give yourself a good half hour to see just how ~~fucked up~~ RACIST it is that the prime minister of Canada did BLACKFACE on **stolen land**.

Black Bob

MATH-CRONYMS

If you thought MATH 135 was in full swing, well now, it's in *fuller* swing.

Maybe you've experienced this before. Maybe you're experiencing this right now. Or maybe you're a smartass and think you're better than all these lowly brainlets who can't memorize the entire textbook. Either way, I don't care. I want to talk about *me*.

And I, personally, miss the good old days. The days of POMI and POSI, when I could picture wild PONIEs roaming across the default Windows XP wallpaper during the mindless parts of the proofs.

What do I get now? Boring abbreviations like The Unique Factorization Theorem (UFT, not to be confused with one subpar university) and Prime Factorization (PF). I have to spend so much effort making these initialisms fun, so now they're the sounds I make when I see a difficult and easy question, respectively.

There's also the super long and varied GCD initialisms that will put your most inclusive sexual minority activist to shame.

But let's celebrate the good parts:

- Transitivity of Divisibility (TD), but also Tower Defense
- Coprimeness and Divisibility (CAD), but also the Canadian Dollar
- Bézout's Lemma (BL), but also... um, wait...
- Euclid's Theorem (ET), but also that song by Katy Perry

Oh, and of course, there's Divisibility of Integer Combinations (DIC).

I can't get enough DIC.

instantpoodles

WATERLOO BUCKET LIST

As a wee little first-year math baby, I have many things that I wish to accomplish before I graduate, but the most important ones have nothing to do with academics. Here is my bucket list for before I graduate (in no particular order):

1. TELL FERIDUN WHAT I THINK OF HIS NAME

Yes. Bear with me here, but I swear Feridun sounds like the name of a wise retired dragon a bold knight would speak to before embarking on some magical journey to save his kingdom. Also *feridun*, *unfried*, *u-friend*, *unfired*, *if under*, and *nude rif* are all spelt with the same letters. so that's nice.

2. SLIDE DOWN THE SCH BANISTER

My God, the first time I saw the SCH banister was when I was here on a school trip two years ago, and what a majestic banister it is. I don't know how I'll do it or what kind of pants would make it through the ordeal in one piece, but nonetheless, descending that pole is probably going to be the most rewarding thing in my entire university experience.

3. ENTER EVERY BUILDING

As I was graduating high school I realized I had not been in every wing of the tiny school, much less every room, and that was after four years of heavy athletic, academic, arts, and volunteer involvement. Somehow, parts of the school remained a complete mystery to me. I refuse to leave this campus without being in every building, even if it means just setting one foot in each building.

4. SEE A COMPLETED SLC

Yeah, this is by far the least feasible... we all know it ain't happening fellas.

So yeah, that's the bucket list. Who knows, maybe I'll accidentally graduate in the process.

Arvind Nagabhirava

A SUPER SPOOPY BY-ELECTION

Did we just have a Federal Election? Yep!

Are General MathSoc Elections on their way? Absolutely!!

Is there a by-election happening RIGHT NOW for your very own MathSoc President?

You bet your ass there is.

With the nomination period running from Oct. 21–25, campaigning has begun and will continue until Oct. 29. Keep an eye out for posters, posts, and your candidates! Voting will

take place on Oct. 30–31, online at vote.wusa.ca. Or swing by the voting booths in the 3rd-floor hallway of MC to pick up some candy (and VOTE).

There are only so many times you get an election on Halloween, so vote vote vote, like a baby stoat!

(If you don't know what a baby stoat looks like, you're missing out.)

lafayette

WE'RE ALREADY KNEE-DEEP IN CLIMATE CHANGE. LET'S PREPARE FOR DEPRESSION WHILE WE STILL CAN.

It's fall term! The geese are chill, the Amazon rainforest is on fire, and a lot of us will most likely be experiencing or interacting with someone experiencing a depressive episode before exams! I'm not a therapist, or a psychiatrist, but I am a former peer support volunteer that is really observant and concerned for our emotional well-being.

Last week, I had several experiences (before a tutorial in RCH, during a house meeting with my new roommates, and while scrolling through the r/uwaterloo subreddit) that made me aware of just how much Canadian urban society (#ClassicColonialState™) is not structured to facilitate long-term mental wellness. We, especially university students attending a "prestigious" university, generally need a mental-health makeover, but since I don't have the resources to triage everyone, I'd like to share some tips I've learned from personal life in hopes that you can make this dire situation a little less shitty and a little more bearable. These tips are not universal, but they can be used to gain a little more perspective and I could have used them all the way back in 1A when I didn't leave my room for a week, skipped lectures, and sustained myself exclusively on cold V1 pizza and XXX vitamin water...

What I want to emphasize is that managing mental illness and poor mental health is not easy, and it sure isn't something to tackle alone, but there are things we can do sometimes to ease the stress on ourselves and those around us. When possible, a strong team of mental health professionals and community support would be ideal (in my opinion), but that isn't always available 24/7.

With every recommendation I've left some blanks so that you can write in your own signs and action plans.

Let's get into Melancholy Morty's Depression Tips!

WEATHER WARNING: These tips are for when the air starts to get heavier, but no storm clouds are there yet.

Signs of this stage:

- You haven't noticed your roommate leaving their room in days
- You haven't worn "real pants" in a week
- Your hair is getting greasy but you keep saying "I'll just wash it tomorrow"...

Tips:

- Knock on your roommate's door and ask how their day is going
- If you can, go for a walk longer than 20 minutes
- Call a friend/family member out of the blue

- Share contact information with your roommates/floor mates. Give each other your personal cellphone numbers or emails, and also share a reliable emergency contact (e.g: parent, best friend) in case something goes wrong and you need to contact them
- Sign up for a coping skills therapy session (for free) on leads.uwaterloo.ca

INCOMING STORM: At this stage, something's definitely going on, but the severity and/or potential causes are unclear.

Signs of this stage:

- Your roommate hasn't left their room in over a week
- You haven't left your room in a week
- More random crying than usual

Tips:

- Ask your roommate if they want to throw some clothes in when you do your laundry
- Set a timer on social media apps and video-streaming apps
- Call your family (chosen or otherwise)
- E-mail your professors and let them now you've been feeling off

MIDDLE OF THE STORM: At this stage, it's very serious and there's no denial about a mental health crisis

Signs of this stage:

- Hearing crying through the walls every night
- You're crying every night
- You're failing all your courses and you don't care anymore

Tips:

- Call your roommate's emergency contact
- Offer to walk your friend to mental health services and sit with them until they see a professional
- Take a shower. Eat something and/or drink something. Go to mental health services, a Don, a teacher, Peer Support hours at RAISE, GLOW, or Women's Centre (info from Turnkey Desk) and ask for help

In summary, it's good to think about these things so that we can prepare ourselves. We're societally past the point of preventing these problems...but we can control how we react and how we recover. In my experience, the best weapon

against depression is good preparation and a good support system. Part of this white supremacist capitalist country's social climate is the idea that everyone is a lone individual that has to face all their problems alone. It's important to remember that as people, most of us are naturally social beings, and we need to cultivate strong communities when we're well so that we can have people to help us through depressing times. It's also important to remember that as people in community, we have a responsibility to help each other out, even when it's mildly inconvenient. If you see someone in obvious distress on campus (or anywhere), stay by their side for a while. We are obviously not responsible for anyone else's mental health, but we can learn to notice signs of distress and take action to help people out. Talk to your housemates, set up a group chat, make a list of mental health services together, share meals, and hold each other accountable for all-nighters and 18-hour days spent playing video games. Feel free to take all of this advice or none of it.

Make your own rules and boundaries, just do it early and DO IT! A lot of us are living by the rules of other people, AND we also have A LOT of power. So put yourself out there and have a potential awkward conversation with the people around you in exchange for a big reward. You'd be surprised at how many people are hungry for connection and community. This article is meant to get you thinking about how you and the people around you can be more kind and supportive towards each other. University can get rough sometimes and if we can do things to help each other make it through...why not do them?

I wish you well, and feel free to come to the next **mathNEWS** night and write about how what tips you came up with for yourself and the people around you.

Melancholy Morty (with help from you)

I'M SORRY, JAO



JON I REQUIRE SUPERSINGULAR
ELLIPTIC CURVE ISOGENIES

jeff (#1 djao fan)

6 REASONS WHY YOU SHOULD TRANSFER TO ARTS

Hello! Did you know that you don't have to be part of the math faculty to write for **mathNEWS**? Me neither. Until now.

Yes, I am from the Faculty of Arts. Majoring in Peace and Conflict Studies and minoring in Sexuality, Marriage and Family Studies. It's quite the mouthful, but dreadfully interesting. So why am I here? Well, obviously because **mathNEWS** is the best publication on campus and I wanted to contribute. Hopefully, I can hit **mathNEWS** with a fresh perspective as I imagine there are not many of us arts students sharing our point of view here. Although the Faculty of Arts here at UWaterloo has some major downsides, I do believe that it is the best place to spend your undergrad. Rest assured, I will come here during the term to address and complain about some of those downsides, but not before I make one valiant attempt to convince you that you should transfer into Arts (or at least appreciate it for the best faculty).

1. NO CLASS ON FRIDAYS

Seriously, I don't know any Arts students who have class on Friday. I'm not sure if it's because we don't have labs and tutorials, or what, but this is no lie. By the way, the lack of labs and tutorials is another plus because it means with a full course load, you'll never have more than 15 hours of class per week — the dream.

2. NEVER HAVE CLASSES IN THE PRISON THAT IS MC AGAIN*

Although the arts lecture hall is actually one of the shittiest buildings on campus, it's not like all our classes are there. In fact, I'm in third year and I've only had 2 lectures there. A math student told me that all math classes take place in MC, so that's rough.** I don't need to tell you that it's like a prison in here. (Although I will admit that these new computer labs where **mathNEWS** meetings are held are pretty fresh.)

*this is not 100% true because I had a first-year political science class here.

**I'm trusting the math student, so don't get angry if it's not true.

3. SKIP CLASS AND STILL PASS

I almost called this point "don't try and still pass", but then I thought that writing 15-20 page essays (which is standard for upper-year courses) definitely counts as trying, and when you have multiple of those suckers in a semester it actually gets pretty legit. But I can confirm that Arts has the most skippable classes across all faculties. This is because you don't always need to attend class to be able to write a bangin' final essay (because it's often an independent research essay and only needs to involve the actual course content very loosely).

So, as the term goes on, those 15 hours of class a week become...less...

4. GET A FANCY PROGRAM NAME (SOUNDS IMPRESSIVE)

Majoring in Pure Math? No one even knows what that is. Isn't all math pure math? Just kidding, y'all probably know what pure math is because you're in math. As I'm writing this though, it's becoming a moot point because wtf is even peace and conflict studies. I can't even count the number of times people look at me and then say politely, "and what do you want to do with that?" Ugh. Let's move on.

5. EVERYONE IS GETTING LAID.

It's a well-known fact. Related: people are sociable and like to talk to each other.

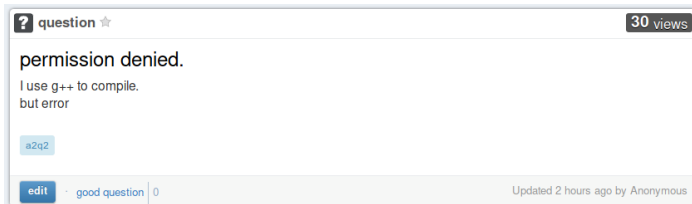
6. YOU CAN STILL WRITE FOR mathNEWS

So you don't have to give up your favourite thing about the math faculty and free pizza every other week.

There is no loss here.

Arts101

UNTITLED



Anon

MY DISAPPOINTMENT IS IMMEASURABLE

The @mathNEWS Instagram handle is taken by a dead account.

Everyone at mathNEWS

P.S. go follow @UWmathNEWS on Instagram. We follow back.

APT-REGRET: MY EXPERIENCE WITH USING A "REAL" OPERATING SYSTEM

It started with an offhand remark in my CS 145 lecture by my professor, Gordon Cormack: "If you use Windows, your path name will start with a C:\, or if you use a *real* operating system, it'll have a bunch of slashes in it..." The class promptly burst into scattered, polite laughter, and Professor Cormack spent the next ten minutes describing to us why we should really use a Unix-like OS, and how we're going to have to use one later in 146 anyway.

Arriving at my dorm on a Thursday night, I had an idea. *If I'm going to have to switch anyway, and if Unix-like operating systems are that much better, then I might as well start now!*

Having a Lenovo ThinkPad, the gates of Apple's walled garden of macOS were closed to me. The obvious choice was Linux (sorry, BSD advocates!), and I had to pick a distribution. I wasn't completely new to the world of Linux, so I felt confident picking Ubuntu, an operating system touted by the Linux community as being designed for beginners. What could go wrong, right?

Turns out, everything.

I decided to dual-boot with my current Windows installation, meaning I would have both Windows and Linux on my laptop and I could choose which to use when I turned it on; I did this so I could at least have a working laptop in case things went sideways. Immediately, however, I came across the first problem: after Ubuntu was installed and I restarted my laptop, Windows was nowhere to be found. Oops.

And then things started going further downhill: as I booted into my fresh Ubuntu install, the laptop's fans started to blow at top speed, trying their best to take off, helicopter-style. Turns out, having an NVIDIA laptop graphics card is really well-supported on Linux, as long as you want to turn them off first. After reading through three or four articles with my orientation-bag earplugs on, I installed a proprietary driver (forgive me, RMS) and restarted the machine. Immediately, the fans slowed down to not-supersonic levels, and I was free to deal with my next problem.

Modern laptop displays generally have too high a resolution to use them like you would a desktop PC — everything looks small because there's so many pixels in such a small area. So operating systems "scale" your screen by some factor, usually 1.5x-3.0x, so you can keep your high resolution screen but everything looks big enough that you don't have to squint.

Except on Linux.

Ubuntu, like most popular-among-newbies Linux distributions, ships with the GNOME desktop environment, which lacks fractional display scaling among other things. That means they can scale up your display, but only to integer multiples. This is a problem for me (and a lot of other people with 1920×1080 displays), because I need 1.25x or 1.5x scaling. 1x is too small, 2x is too big. And GNOME doesn't support me. There were some arcane terminal commands that I could run to get some rudimentary support, but all the text became blurry and every other program started acting weird, because most Linux programs weren't designed to support any display scaling at all.

At that point, I'm hearing suggestions to try something else — a new distribution, a new desktop environment, a new graphics driver, anything. And with my battery life dropping from over twelve hours in Windows to under four in Linux, I was inclined to listen to the very helpful anonymous strangers on Reddit (shoutout to r/linuxquestions!).

After some trial and error with Linux distributions (with each attempt consisting of a 2-3GB download), I settled on Manjaro Linux, another distribution designed for beginners. The experience was much smoother; Manjaro detected my old Windows install (it wasn't gone, just unnoticed) and also detected my graphics card and installed a correct-ish driver — I still have to fix it using a different guide, but this time it's on the official Manjaro site and not a random Stack Exchange post from 2015. Also, the new desktop environment, KDE, supports fractional display scaling, kinda. So now everything was fine, at least from the perspective of basic operating system things working.

Now we could move onto the user experience problems!

Remember me saying that GNOME is popular among newbies? Yeah, that also means that most software is made for GNOME in mind. Including web browsers, like Firefox. So when you use Firefox in a KDE Linux distribution:

- Your close/maximize/minimize buttons are nearly invisible
- Your file opening dialog looks half-broken because it's from GNOME
- Every time you download a file, it tries to look for GNOME programs to open things with, and after failing that, opens them with the wrong KDE programs. I don't want to open my image files with my word processor!
- Remember display scaling? Firefox doesn't respect KDE display scaling, so you need to delve into weird config pages to manually set scaling for Firefox

Nothing deal-breaking, right? A couple of small idiosyncrasies, they can be dealt with! Well, sure, but not when there are some in *every* app. Some of them are fixable — LibreOffice Writer didn't spell check my documents because it was looking for a language "English (Canada)" but apparently that isn't a real thing? Setting it to "English (US)" worked, so whatever.

But some issues aren't fixable — I used to make notes on OneDrive, and OneDrive doesn't have an official Linux client. That's alright though, since a program called rclone does support OneDrive, and after some terminal jujitsu, it did work... but only with the internet connected. When I saved a file, it saved directly to OneDrive, with no local copies. With eduroam's excellent reliability^[citation needed], that should've been no problem, right? It isn't, except on some poorly written software that is integral to my coursework, like DrRacket, that appears to do file operations on the main program thread. What this means is that whenever a file saves (or autosaves, which is every now and then), DrRacket will freeze for 2-3 seconds, if I'm saving on OneDrive.

I do see the appeal of using Linux though — certain things, like using LaTeX, running web servers, installing developer tools like Android Studio and Flutter, are vastly easier on Linux, especially Manjaro. However, most Linux distributions still feel unfinished in some way or the other. I only talked about Ubuntu and Manjaro, but I tried some other distributions too:

- Pop!_ OS worked very well, until it crashed and burned into an unrecoverable state when I tried to get fractional scaling to work
- Fedora had the same issue with no NVIDIA driver, leading to 100% fan speed and bad battery. Plus, their implementation of GNOME was *extremely* minimal for some reason; it didn't have minimize and maximize buttons!
- Arch Linux had me manually installing everything over a barebones GNU/Linux terminal system. I could theoretically had gotten everything to work, and the fact that nothing worked was technically my fault, since I didn't read up a few hundred man pages and forum posts before, during, and after doing anything...
- Elementary OS's setup crashed

In the end, I guess it's down to what works for you. A lot of people use the systems I had so many problems with on a daily basis, with no issues whatsoever! But I had my issues, and I'm guessing (but not hoping) that you might too. So if you're a CS first year going to CS 136/146, and don't want to experience all these headaches beginning of next term, I would heavily suggest that you spend the time to look up all your options and try them out in the winter break. Or just get a Mac, whatever.

tendstofortytwo

**I put this here just so I
could fill this column.**

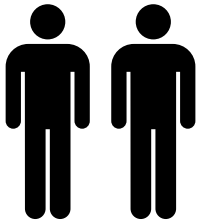
A TIRED mathNEWS EDITOR

FEDERAL ELECTION

BY THE NUMBERS

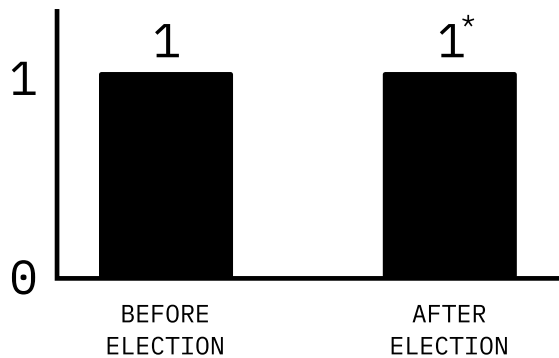
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VOTER TURNOUT



1 = 8945132 votes

NUMBER OF QUÉBÉCS IN CANADA



* NUMBER SUBJECT TO CHANGE

THE FORTY-THIRD PARLIAMENT



WHAT OUR ANALYSTS PREDICT THE 43RD PARLIAMENT
WILL LOOK LIKE

TIMES TRUDEAU HAS WORN BLACKFACE

≥ 2

DETAILED DATA NOT AVAILABLE

BERNIER VS BERNIER

MAXIME BERNIER
(**28.4%**)

DEFEATS

MAXIME BERNIER
(**1.8%**)

FASTEST GROWING PARTY

JODY WILSON-RAYBOULD
IS THE FASTEST GROWING PARTY

$\infty\%$ SEAT
GROWTH

SPOOKY ELECTION gridWORD

gridCOMMENT 141.3

As the first frost of the year descend upon Waterloo and the nights lengthen, creatures whose presence were scarce in the season where the Daystar reigns come out of the woodwork, ready to mingle with the convenient melting pot of magic and mundane on All Hallow's Eve. What strange curiosities would befall us this year? What mysterious happenstance would fly by without nary any notice, for every student is far too busy with their noses in textbooks focused on memorizing the arcane knowledge therein. Perchance on Friday next everyone will wake up to a winter wonderland, in the wake of an ice spirit? Only time will tell.

It would appear that last issue's **gridWORD** was more difficult than usual since I had received no correct submissions. In descending order of correctness, with ties broken by my preference to their answer to last issue's **gridQUESTION** ("What is the most outlandish excuse you can give to avoid visiting people over Thanksgiving?"), here are the submissions received:

- Mel, "Oh I'm fostering a puppy... just for the three days of Thanksgiving weekend... and I can't leave him alone..."

- Nickname, "new phone who dis"
- Diogenes, "Sorry, I'm scheduled to be sick that day"
- mercury, "I'm recuperating from my severe loss of brain cells due to upcoming midterms"
- Teethgang, "Avoid thanksgiving because want to watch football alone, eating spoonfuls of mayo with peanuts sprinkled on top #Brooklyn99"

Mel, please come by and badger the editors for your prize. The procedure for this issue's is the same as the previous: a prize will be awarded to the submission who submits the most correct solution to this issue's **gridWORD** before 6:00PM on November 4th, 2019, either electronically to mathnews@gmail.com or physically to the **BLACK BOX** found outside the Math C&D in MC. Submissions should include the grid, your name (and optionally a moniker to be credited under), and your answer to this issue's **gridQUESTION**, of which my favourite answer is the tiebreaker in the event for a tie for most correct. This issue's **gridQUESTION** is "What is the most epic Hallowe'en trick?"

Happy Solving,
Zethar

ACROSS

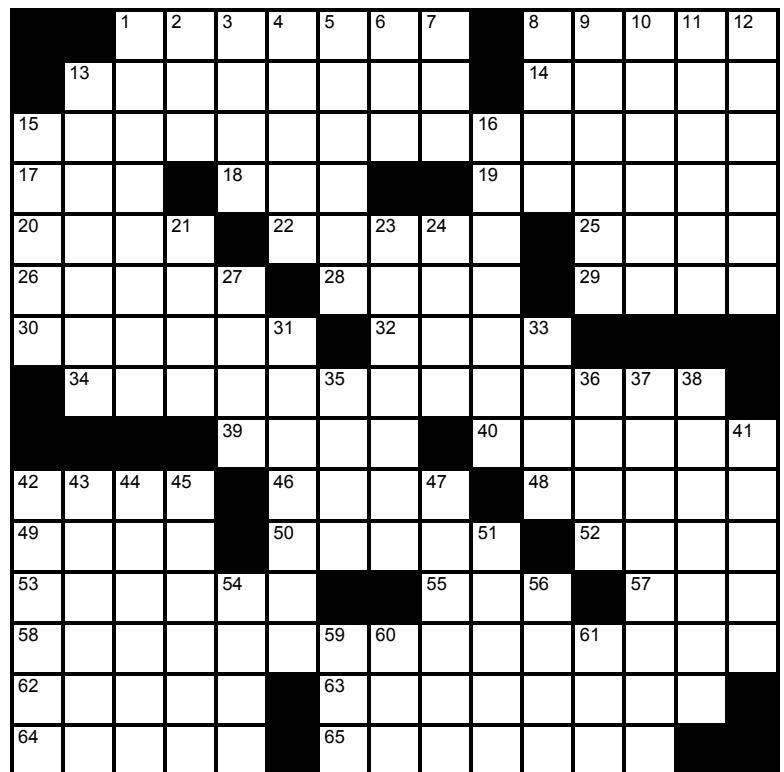
- Stronghold
- Full of chutzpah
- A type of degree
- ___-car
- Terrified's job, it seems
- American collection agcy.
- RR stop
- Malicious deceptions
- Start another hitch
- Bone chambers
- Red River Rebellion leader
- Pic. or diag.
- Part of the US closest to Singapore
- Take out
- Connection of yore
- Water carrier
- We got a new one on Monday
- Russian city on the Oka
- Breeds
- Computer programs, for short
- Sample mean
- Open
- Cut short
- Winter accessory
- Alleviate
- Like some cats
- Excessively
- Neighbor of Ger.
- Freedom
- Strengthen
- Insurance companies sell these
- Glacial ridge
- They're covered by boards

DOWN

- A Roman election?
- ___ flash
- Threads

- Japanese blue-white porcelain
- Vietnamese port
- A little bit of work
- Lixivium
- Vivacity
- Slow down
- Severe hypoxia
- A type of food?
- Bother
- Congenital cleft
- A plant, leaf, or grass bug
- Bloodsucker lovechild
- Hungarian sheepdog
- Inuit golem
- Pour
- Ring sport
- Borges' winged stag
- Biblical birthright seller
- Company privatization or exit strategy initialism
- Point
- They're on the loose
- Thinks logically
- Ancient grain
- Admission
- French vegetable?
- Lift, so to speak
- Ornamental shrub
- Reddish mineral
- Fluorescent dye

- MATH 137, 138, 237 for short
- Organization made up of the world's wealthiest democracies
- Tax prep. expert
- Biker's bike
- War stat.



lookAHEAD

SUN OCT 27

National Black Cat Day

MON OCT 28

TUE OCT 29

WED OCT 30

THU OCT 31

FRI NOV 1

SAT NOV 2

Last day to arrange tuition and fees

MathSoc Presidential By-Election

Hallowe'en 🎃👻

MathSoc Presidential By-Election

Last day to arrange tuition and fees

MathSoc Presidential By-Election

Hallowe'en 🎃👻

SUN NOV 3

National Sandwich Day

MON NOV 4

Production Night 141.4

TUE NOV 5

WED NOV 6

THU NOV 7

FRI NOV 8

SAT NOV 9

National Sandwich Day

Production Night 141.4

TUE NOV 5

WED NOV 6

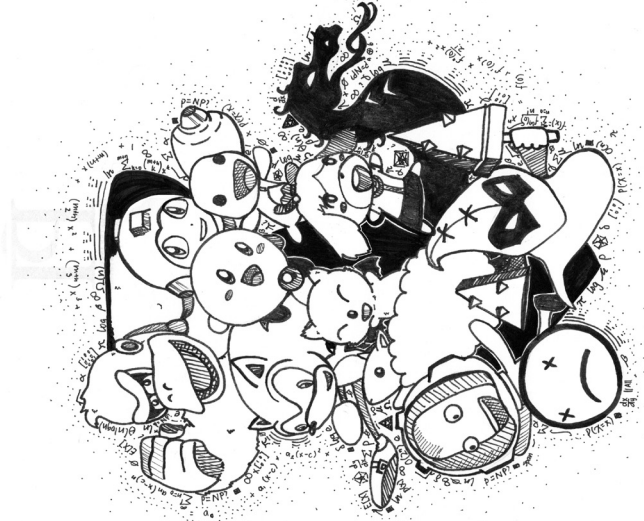
THU NOV 7

mathNEWS 141.4 published

Engineering×Math
Semi-formal

LAST WEEK'S gridSOLUTION

F	R	E	T	S	A	L	P	S	J	A	P	E		
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				A	L	I	T	D	E	L	I			
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E	E	L	S	T	W	A	T	D	R	E	S	S		



otherNEWS is made technically possible by club executives of the Math Faculty. I say "technically" because if they had sent us more news this week, this box wouldn't be here.

THE mathNEWS EDITOR WHO PUTS THE "NEWS" IN mathNEWS