

# *math*

# NEWS

Volume 132, Issue 1

Friday, September 23<sup>rd</sup>, 2016



**lookAHEAD****mathNEWS**

September 23	<i>mathNEWS</i> produces innocuous Issue 1
October 3	<i>mathNEWS</i> Production Night #2
October 7	Issue 2 unleashed on unsuspecting public

**MathSoc**

September 22	Games Night
September 28	<i>Thinking About Your Thinking</i> seminar
September 29–30	MathSoc Elections (VOTE!)

**Feds**

September 24	Clubs Day in SLC until 3:00 PM
September 26–28	WPIRG Fee Referendum Voting

**University**

September 28	Drop, no penalty period ends
September 29	Drop, penalty 1 period begins

**Miscellaneous**

October 3	Rosh Hashana
October 10	Thanksgiving Day (school closed)

**Article of the Issue**

The Article of the Issue for v132i1 goes to A Mediocre Kitty for the extremely important article on Understanding the WPIRG Referendum.

We ask that our readers take the opportunity to read the article, so that you are informed for the WPIRG referendum voting from Sunday to Tuesday. We also ask that, however you may vote, that you actually go online to [vote.feds.ca](http://vote.feds.ca) and vote. Be heard!

The Editors

ISSN 0705—0410

Founded 1973

*mathNEWS* is normally a fortnightly publication funded by and responsible to the undergraduate math students of the University of Waterloo, as represented by the Mathematics Society of the University of Waterloo, hereafter referred to as MathSoc. *mathNEWS* is editorially independent of MathSoc. Content is the responsibility of the *mathNEWS* editors; however, any opinions expressed herein are those of the authors and not necessarily those of MathSoc or *mathNEWS*. Current and back issues of *mathNEWS* will eventually be available electronically via the World Wide Web at <http://www.mathNEWS.uwaterloo.ca/>. Send your correspondence to: *mathNEWS*, MC 3030, University of Waterloo, 200 University Ave. W., Waterloo, Ontario, Canada, N2L 3G1 or to [mathNEWS@gmail.com](mailto:mathNEWS@gmail.com) on the Internet.

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Shaundalee Carvalho (undecidedED)  
Thomas Baxter (ConvolutED)  
Katherine Tu (bunniED)  
Amy Li (DictatED)

**mastHEAD**

Welcome and/or welcome back to campus, everyone!

I have just returned from an eight-month co-op, so I'm practically a first-year, flummoxed by rearranged bus stops, lost in new buildings, and surrounded by people I've never met before. What I'm saying is, I understand that feeling of anxiety that comes along with a new campus and new people.

To best alleviate my anxiety, I find myself falling back on many of my old habits from before my co-op, like editing *mathNEWS*. [It doesn't come across well in text, but I cannot get through that sentence without simulatenously laughing, crying, and growing more worried about the next issue of *mathNEWS*.]

*mathNEWS* is one of many extra-curriculars on campus, but it's probably the best. We asked the *mathNEWS* writers: "With Clubs Day here, what club do you think should exist?"

waldo@<3.LE-GASP.ca ("A better, cheaper Feds"); Adam Gooseling ("A club for making fun of Imprint. Other than *mathNEWS*"); AC ("WPIRG Refund Club"); Zethar ("Honestly, all the *important* clubs already exist; they're just not as *public* as people want, AS THEY OUGHT TO, lest they get no work done"); Beyond Meta ("The hugs-and-cuddles club"); Diminutive Rex ("Competitive patty-cake team!"); aPlayerofGames ("Trump Youth"); TheUndecided ("Free pizza club. Oh wait, that already exists. Come to *mathNEWS* Production Night!"); Dank ("The Bop-It Club"); Asian ("The Bop-it Club"); Randy Lin ("The Bop-It Club"); Soviet Canadian ("The miniature Wargaming club, no joke, I want this"); DictatED ("PDA Club");

ConvolutED("Historical Reenactment Club, where everything is exactly as it was before I left eight months ago").



Follow us!  
On Facebook (*mathNEWS*)  
or in person (MC 3030)!

## How To: Ace A Co-op Interview

Hey Mathies! I hope you're having a great start to your term so far. In case you missed it, the first Jobmine posting opens Friday September 23<sup>rd</sup> at 7:00 AM. Yay! (*crying internally*) This means that interview season is right around the corner. If you're tired of not getting offers for every single interview you ever attend, I have a solution for you. Just follow these simple tips, and no employer will be able to resist you\*.

1. Show interviewers how knowledgeable you are by saying, "I know," after every single thing they say, even if it's something you couldn't have possibly known without stalking them, such as "I hit some bad traffic on my drive here this morning." Creepy? Maybe. Impressive? Absolutely. It's even better if you can interrupt them halfway through a sentence. Such interruptions demonstrate that you know not only everything about everything, but also what they're going to say before they say it.
2. Forget about dressing professionally for an interview. Everyone does that. It's lame, predictable, and, quite frankly, it's also extremely boring. Instead, make sure you stand out by wearing something fun and memorable to your interview. I would personally recommend wearing a full clown costume, but sparkly capes and garden gnome attire will work just as well.
3. Start your interview off on the right foot (or hand) by demonstrating your positive qualities as soon as you meet the interviewer. Instead of shaking your interviewer's hand, show them that you will always go above and beyond expectations by shaking their entire arm, with enthusiasm, for at least 45 seconds. This is a bold move that says "You just met me and I've already done more than you hoped. Hire me."
4. Ask a friend to call you during your interview pretending to be another potential employer. Then, when your phone rings, ask your interviewer to "Hold that thought", and pick up the call. When you take the call, you're showing

the interviewer that you are very in demand. Therefore, you must be great and they should hire you on the spot. Bonus points if you can include subliminal messages saying "Hire me" in your ringtone.

5. You've probably been told to cover any tattoos you may have before your interview. Well I'm telling you that's crap. Instead, get a brand new tattoo saying "Hire me" right across your forehead, and show it proudly. Since tattoos are a lifetime commitment, the employer will be able to see clearly that you are serious about wanting the job, and you are already committed (for life) to it.
6. Show up late to your interview. By doing this, you are subtly telling the interviewer that your time is more important than theirs, ultimately leading them to believe that you are an important person, and are the sort of person they should have working for their company.
7. Invent facts about the company and casually mention them throughout the course of your interview. The genius part of this trick is that since your facts are made up, the interviewer won't know anything about them, so it will actually appear that you know more about their company than they do. If they call you out on your bullshit, just brush it off with a comment like "Oh that's right, I forgot; they haven't told the HR department yet." Then lean in close, whisper "You didn't hear it from me," and wink. Boom. Crisis averted.
8. If all else fails, just bring a puppy to your interview. Puppies make everything better.

\*For the sake of you, your dignity, your co-op career, and your future children, **DO NOT ACTUALLY FOLLOW THESE TIPS.**

Good luck, and happy Jobmining!

TheUndecided

## Humans vs. Zombies Sez

Got nerf guns? Failing that, got socks? Humans vs. Zombies is holding minigames this Sunday, and YOU are invited! It's a perfect time for you to try out the game for the first time. Meet up at 2:00 PM in SLC courtyard. You need to bring a bandanna, headband, or some other strip of cloth, and either (or both!) nerf weaponry and sock weapons. Note: the sock weapons must consist ENTIRELY of socks. You can find the event titled "What is Humans vs. Zombies???" on Facebook.

If you're eagerly awaiting the week-long event, this term it will be held October 31<sup>st</sup>–November 1<sup>st</sup>.

Brains brains brains,  
Mortus Reanimus

## Clubs Day

It's happening right now, if you happen to read *mathNEWS* on the day it comes out, September 23<sup>rd</sup>. Clubs Day is an event where all the clubs are crammed into the SLC Great Hall as they desperately try to recruit new members. The event is a great opportunity to get involved for students, and absolute hell for the poor club organizers who have to stay there all day amidst the crowded tables and loud noise.

Beyond Meta

**Hey clubs!**  
**Want your Sez in *mathNEWS*?**  
**Then submit them to us!**

## Understanding the WPIRG Referendum

The next week is going to be a busy and contentious one as students will be gearing up to vote in a referendum that has been months in the making. The question that will be asked is: **"Which one of the following options do you support:**

- **Keep the mandatory, refundable \$4.75 per academic term fee for WPIRG (Waterloo Public Interest Research Group)?**
- **Remove the mandatory, refundable \$4.75 per academic term fee for WPIRG (Waterloo Public Interest Research Group)?"**

Undergraduate students will thus be able to vote to either keep paying the WPIRG fee (through the automatic method currently used in conjunction with termly academic tuition), or remove the fee completely (from the automatic method previously described). This article will aim to inform and provide insights from both sides of the debate as well as give some brief historical context as to what exactly has so many students riled up and ready to seek your vote.

**What is WPIRG and what does it do?** The Waterloo Public Interest Research Group, commonly abbreviated as WPIRG, is an environmental and social impact organization that aims to support initiatives with a direct human connection. It is an incorporated non-profit organization initially created by UW undergraduate students back in 1973 that helps and provide resources to a number of on-campus student groups (including , but not limited, to the Aboriginal Students Association, GLOW, and the Women's Centre) with the aim of promoting their mandate: "to research, educate, and take action on environmental and social justice issues". Notable projects and activism include the current mental health awareness campaign on "What Weighs You Down?" as well as the direct assistance and advocacy provided to students affected by the building at One Columbia by the housing company Schembri (now The MARQ) for not being completed on time for move-ins in September of 2014.

**Why are we having a referendum at all on WPIRG?** The point of a referendum is to ask the undergraduate student body to gather opinion on what is perceived to be an important issue. In this instance, the issue is whether or not to keep or remove the WPIRG fee.

This issue is certainly not a new one by any means as a proposition for holding a referendum on the WPIRG fee was made back in Fall 2013 at the October General Meeting (GM) of the Federation of Students (Feds). At the time, the motion was brought up to address the perception that WPIRG was not being transparent enough about its finances (having not posted a financial statement since 2010–2011) or its engagement on campus[1]. The motion was defeated at the GM when it became apparent just how much support WPIRG had (with 200 students voting against the motion itself[2] and the turnout being the 2nd highest turnout in Feds GM history at the time). Since then, WPIRG has stepped up its efforts to be more transparent with financial records and annual reports, but the key issues that were first brought up remain now that they ARE seemingly more transparent. At the 2013 GM, Sacha Forstner, the student who raised the motion itself of calling a referendum on WPIRG, stated, "The fees we have chosen to pay, from time-to-time, should probably be run past students to make sure that we're still on board with paying them." [3] The core question that is asked is, "Is it worth giving WPIRG the fee we currently pay?" Those who would answer "no" are the reason the referendum is now underway.

**The "Remove" Argument:** To understand the core of the "remove" argument, one needs to come closer to recent memory to early 2016 and examine both a different referendum and the 2015–2016 WPIRG Operating Budget. In January 2016, as a result of WPIRG's involvement and direct leadership, a petition of over 4000 signatures was brought before Feds resulting in a polarizing question:

"Do you think the University of Waterloo should sever ties with the following institutions due to their complicity in violations of the human rights of Palestinians: University of Haifa, Hebrew University of Jerusalem, Technion - Israel Institute of Technology, Tel Aviv University, and the Weizmann Institute of Science?"

The result of this referendum ended up being "No", but many students were quite perturbed as to why this was even a question to begin with as the University did state that they no longer really did business with 4 out of the 5 institutions listed[4]. Other students didn't understand the role of WPIRG in this referendum, pointing out seeming contradictions to its "greater public interest," yet only supporting one viewpoint and a small portion of students' views at large[5]. Students began to actively campaign against WPIRG, saying that they wanted to be able to not support an organization that doesn't necessarily represent them in the first place. In order to do this, opponents would hit them hard and work so as to not give them their fee. Understandably, the mindset became, "Why is my money going to them when they don't represent my views? What are they even doing with it?" People began examining their public financial statements and many were quite aghast with what they found.

According to the publicly available 2015–2016 operating budget[6], WPIRG actually collected \$254,719.89 from students in the 2014/2015 calendar year. Although they also raised an additional \$1434.72 in revenue through special events and bank interest, the majority of their funding comes from that student fee. Of that ~\$255K, \$148,428.57 went to the full-time staff's payroll and benefits with an additional \$4,956.19 for HR Development. Additional administrative expenses accounted for \$32,000.52, while their programming, projects, and resources (including their library) accounted for a combined total of only \$32,862.64. A last amount of \$24,218.89 in funding went to specific groups and special funds under the WPIRG umbrella to support additional interests. This included \$3986.49 spent on specific action groups like the KW Worker Solidarity and the Community Garden. It is also worth noting that while WPIRG did budget for 2015–2016 to spend \$10,000 in fees to maintain correspondence and connection with the larger Ontario Public Interest Research Group (OPIRG) which comprises chapters from Guelph to Ottawa, but it did not actually spend any sorts of these fees in the 2014/2015 calendar year. In total, of that \$254,719.89 in student fees collected for the 2014/2015 calendar year, \$242,461.80 was spent with the majority of that money (63%) going towards the full-time staff in one manner or another. It remains to be seen what will be spent in the 2015–2016 operating budget, but when the actual spending values become available, no doubt students will be keen to see where their money went.

A considerable number of students have already voiced their concerns on how more of their student fees should be devoted solely to the causes that WPIRG promotes as opposed to exclusively staff, but that is up to you to determine for yourself.

**The "Keep" Argument:** While the WPIRG website only lists 2 "core" full-time staff, the amount of money going to the full-time staff is by all accounts a considerable investment in the human manpower that helps oversee the organization. From the scale of some of the events held (notably the Rainbow Reels Queer Film Festival and the Poetry Slams held in Hagey Hall), a lot of time and effort undoubtedly goes into planning the events themselves. Having full-time staff in this instance is useful for transition and maintaining consistency, as having the people with power immediately leave after 4 months can be quite jarring and inconvenient. What is worth asking in this instance is, "Is the pay that is received by these full-time staff worth the investment by students?" Judging by the work and outreach that WPIRG and its staff has been able to do, and the students it reaches, it is clear that many feel the organization as a whole is worth investing in.

There is no doubt that WPIRG has a considerable reach and influence on many students on campus. Every single Feds GM where a motion to hold a referendum on WPIRG has seen attendance skyrocket, clear testament to how many people support (as well as are concerned about) WPIRG itself. At the Fall 2013 Feds GM, the meeting didn't even START until around an hour later as they had taken all that time just to register people in with lines stretching out of the SLC all the way to the University Club and Village 1. Those who speak highly of WPIRG praise how it has been able to give them a voice on many issues that would otherwise be unheard by the UW community at large. Having the staff reliably there to help with what an organization wants to accomplish is of far greater value than unhelpful volunteers who can flake off and not be there when someone needs them the most. There are unreliable employees in any corporation, but it is clear that the staff at WPIRG are able to devote enough time and energy to elevate and support the student voices that need it. Unfortunately many on the "Remove" side feel that they have not been heard loudly enough to warrant keeping the fee, as many on campus anecdotally seem oblivious as to what WPIRG is (or the fact that there is a referendum happening at all), but that does not mean the voices that seek help on issues have not been elevated. The funding that goes towards the programs, projects, resources, and on-campus action groups are very well taken and incredibly appreciated. Keeping the current funding that goes to these entities is vital to ensure they are able to continue having a voice and are able to continue spreading their message on campus.

The current framework of having the fees be mandatory, yet refundable, while seemingly contradictory to the notion of informed consent, does indeed get valuable funding to where it IS put to good use to elevate minority voices and social issues. A similar example is how in some countries (notably Belgium, Spain and Austria) organ donation is mandatory unless you choose to remove yourself from the pool in advance. Having the framework in place for it to be mandatory ensures that there is enough valuable resources to meet those who have immediate needs. Removing the framework would mean students who truly believe in what WPIRG is doing would be able to choose to continue to support it, but it also puts WPIRG at risk of not having enough support to continue on. This is true for many organizations on campus that if a club or otherwise does not have the support it needs or enough active members to keep it going, it is considered non-existent or "dead". Having all of campus as it stands now supporting the good work that DOES

happen (aside from those who choose not to support WPIRG) is a good thing, and WPIRG is at your behest if you would like to get involved and help with any of their projects. It is up to you to see what WPIRG is like and who is affected by the fee.

**What Needs to Happen with WPIRG Regardless of the Outcome:**

It is clear the contentious point of the referendum stems from where the fee goes and how it visibly impacts students at large. The notion of removing WPIRG's funding will no doubt have an impact on all those organizations that rely on it, but in this author's opinion, the issue of WPIRG mis-using the fees completely will not be resolved by simply taking it away. WPIRG has the opportunity now to re-examine itself and say, "How can the job be done better to better support and help students?" because someone on the "Remove" side will undoubtedly voice their opinion that the current financial situation is undesirable and not beneficial to students. I can see how a number of students would understandably disagree with how WPIRG currently manages its operating budget, but if WPIRG mishandling money is the issue, why are we quick to eliminate the problem completely and not work with WPIRG itself to better their financial practices? WPIRG has been better about being more transparent towards students regarding their conduct and their financial statements in recent years, but that was only because people were willing to go into WPIRG to make that change. David Wavrock said it best in his opinion piece on WPIRG following the Winter 2016 Feds GM, "If you disagree with WPIRG, tell them so. Go to their meetings, and events and raise your disapproval with them, and you might change their opinion, or they might change yours. Either way, no one is being done a favour by ignoring the issues that WPIRG raises." [7]

**How and where can I go to get more information on everything?**

I thus encourage you to get further context and get involved to see exactly what happens on this campus. You have a vote to use for what happens to your money so use it wisely. Both sides of the referendum have respective social media outlets and websites already set up for your viewing:

VOTE KEEP: <http://keepwpirg.com/#intro>

VOTE REMOVE: <http://voteremove.ca>

To hear more on the sides of the issues themselves, please refer to the archived livestreamed debate here: <http://livestream.com/UWFeds/WPIRGReferendumDebate>. For more on WPIRG, you can visit their website at [wpirg.org](http://wpirg.org) or in person at their office in the Kindred Credit Union Centre for Peace Advancement, room #4209, at Conrad Grebel University College.

I would also encourage you to see the sources and further reading section of this article for further context on everything discussed and touched on in this article.

**More importantly, where do I go to vote?** From the morning of Sept 26<sup>th</sup> until 10:00 PM on Sept 28<sup>th</sup>, you will be able to cast your vote on the referendum at [vote.feds.ca](http://vote.feds.ca). REMEMBER TO GET INFORMED, ASK QUESTIONS, AND VOTE!!!!

Thank you for bearing with me through this atrociously long article.

Yours in exercising democracy,  
A Mediocre Kitty

Sources and Further Reading: <http://pastebin.com/DVaPqB6b>

## Messing With Your Head: Unexpected Hanging Paradox

Because the advanced math courses obviously don't mess with your head enough, enjoy the following scenario to quench your thirst for problems you can't solve.

A math student has attended his first co-op interview without wearing his pink tie. He is immediately arrested by Math Police and sentenced to death.

The prison guard tells the math student that he will be hanged at noon on a weekday the following week, but he is not told on which day. He is told that he will be surprised on the morning of the execution. The math student then rules out Friday as a possible day of execution, as if he is still alive after noon on Thursday, he would not be surprised if he was to be executed on Friday. Now, there are only 4 days that he can be executed on. The math student now repeats this process and rules out Thursday as a possible day of execution, because if he were still alive after Wednesday, knowing that he cannot be executed on Friday, a Thursday execution would not be a surprise. Using this logic, he continues backwards and rules out all the days of the week.

The math student is told on Wednesday morning that he will be hanged at noon. Given his logic had determined that he cannot be hanged then, he is completely surprised. Where was the flaw in the his logic?

Hopefully I didn't leave you hanging.

Nash

## Games Sez

Jealous about the board games collection in MathSoc? Come by C&D on Thursday night for MathSoc's weekly board games night and start playing! Food will be provided (as long as you played a game!).

Not a Cylon.

## Diminutive Rex Sez

Hello, readers, new and old! It is I, Diminutive Rex. I'm sure you're wondering why I've called you all here. Likely, most of you are also wondering who I am.

None of that matters! All that matters is that you be let in on this important secret: the Math C&D has garlic bread on Fridays. And it is really good. \$1.50 for three sticks!

You're welcome.

(If there's none left when you get there, it's because I beat you to it.)

Diminutive Rex

## N Things Overheard at the *mathNEWS* Production Night

"How can Waterloo possibly have a PDA problem when 1/6th of the student population receives purity rings when they graduate?"

["Oh! Nuit Blanche is coming up."]  
"Yeah...but everyone just smokes weed now."

"When have we at *mathNEWS* ever cared about 'more readable'?" [—an Editor]

"For pizza, do you have a 'vegetarian meat lover's'?"  
"What is ON a 'vegetarian meat lover's'?"  
"...Vegetarian stuff?"

"What pizza would we like?"  
"Patriotic!"  
"Canadian."  
"But that IS 'Patriotic' isn't it?"  
"Well some people may not know where to put their patriotism!"  
"Do we have an 'American'?"  
"We have a Hawaiian!"

"We take our pizza choices very seriously."  
"Well if we don't we get an article in the next issue of *math-NEWS* complaining about our pizza choices."

"We can *always* write articles making fun of Imprint."

waldo@<3.LE-GASP.ca

## WatSFic Sez

The Waterloo Science Fiction and Fantasy Club has tons of events going on this term! Enjoy hanging out at watching movies? We've got a movie night after our meeting next Wednesday! Like playing board games? We run board games days every other Saturday (starting tomorrow in the Math C&D)!

Want to play or run DnD games? Come to one of our meetings to connect with RPGA! Dying to try live-action roleplaying games? LARPGA is getting off the ground this term, or you could join Waterloo By Night every other Saturday! Want to play Humans vs. Zombies? We've got minigames this Friday, and the full week-long event will be in early November.

Interested in writing SciFi/Fantasy short stories? We have a Short Story contest, deadline end of November. Want to read SciFi/Fantasy books? Check out any of our books from the Clubs Library in the SLC!

Want to find out more about any of these things? Come to PHYS 235 Wednesday at 6:30 PM to come talk to us! We don't bite, we promise.

Heather Stonehouse  
WatSFic President

## Inequalities in Mathematics

At this point in the term, if you're in MATH 137 you've probably experienced the phenomenon known as epsilon-delta proofs, in the context of limits of real-valued functions. The name alone likely already triggers bad feelings and memories for many of you. For the rest of us, it takes us back to that day in first year when Dr. Alexandru Nica told us that his cousin from Romania had sent him an epsilon, and he had to find a delta so that the appropriate condition was satisfied. Or something similar, anyway.

One of the reasons that this is such a hard concept for many first years is simply that it's a non-trivially complicated idea. Think of it logically: for all epsilon greater than zero, there exists a delta greater than zero such that for all  $x$  within delta of  $a$ ,  $f(x)$  is within epsilon of  $L$ . That's a mouthful, and the symbolic version isn't much better; there are three quantifiers, nested.

But one of the other reasons that students struggle with it is that all of a sudden, one of the things that characterized our experiences with math in high school was gone: there is no equals. We say that the limit of the function  $f$  at the point  $a$  is equal to  $L$  when the above condition holds, but to show that, do we use any equal signs? Nope. Instead, we must manipulate inequalities, to prove that the desired inequality holds. We have moved away from equality being as the most important thing in mathematics, to where the inequality is both the end and the means.

What makes inequalities so terrifying? Well, at the most basic level, they aren't equations, and that's what we spend 90% of our time dealing with in high school (this figure may or may not be completely bogus). Inequalities are seldom focused on in the high school curriculum. They may be there, but they're not an emphasized topic, usually, and if my memory doesn't fail me after roughly a decade, I don't recall seeing any inequalities past Math 11 in BC. Hence, it seems like we are primed to be mostly helpless—down for the count—and we're drowning in them.

The next step up from that might be the fact that most of the time, you can't just manipulate one inequality over and over again until you get the inequality that you wanted to find. Rather, you have to proceed in one direction, creating a chain of inequalities that will (hopefully) give you what you desire. Each time you proceed further along the chain, you get further from the original expression with which you started; it is irreversible. Back when we were learning how to solve equations, we were always told that if you did something to one side, you have to do it to the other. Except in the situation of taking even roots or multiplying by zero, these were almost always reversible operations. Getting out of this frame of mind is not easy.

Unfortunately, inequalities are everywhere in mathematics. In analysis (a.k.a. rigorous calculus and waaaaaaaaaay more), inequalities are the way to go—partially because limits are everywhere, and partially because when we want to show that two things are equal, we can do that by simply showing that the absolute value of their difference is smaller than any positive number: thus it has to be zero. In various types of applied mathematics (and otherwise), we're always interested in

estimating how big errors can be, either in numerical solution schemes or perturbations of a system; knowing how good our approximations are is highly critical, and one uses inequalities to do that. In more discrete math, often we can't find explicit expressions for things like the chromatic number of certain graphs (or it's very difficult to do so), so instead we find bounds on them: inequalities!

Let us not forget the role inequalities play in statistics. The basic idea of a confidence interval is the following: given a set of observations and an unknown parameter, the ' $\alpha = 0.05$ ' confidence interval around the sample mean is the region for which the probability of the true mean being outside the region is at most 5%. See those words, 'at most'? That's an inequality, and there are others in this example (namely, involving a maximum distance from the sample mean, etc).

The important thing about this is that the concept of using inequalities to discuss things is central to human nature and thought. Whenever we do a comparison of two quantitative things, we are using inequalities: the stopping time for a yellow light versus how long you expect to take to reach the intersection; the amount of credit available to you versus the price of that new textbook; the current word count of your article versus the recommended word count for an article so that it doesn't fit an awkward portion of a two-page spread. If you are making an estimate of how big or how numerous something is, that's effectively an inequality ('no bigger than this, and no small than this'). We think in inequalities all the time; it's just that we have not been trained, by this point, to handle inequalities on a piece of paper, in the formal setting of mathematics.

In terms of concrete things one might do to help understand how to work with inequalities, the first thing to do is to draw a picture of a standard inequality,  $|x-a| < b$ , for some integers  $a$  and  $b$ . This hopefully puts visuals into your head. The second thing to do, then, is to try not to be intimidated by inequalities. They're not mysterious or dangerous; they're simply a bit complicated sometimes. The third thing to do is try to get better at working in one direction. For example, suppose that  $x$  and  $y$  are positive real numbers less than 1. Then:

$$(x+y)^2 = x^2 + 2xy + y^2 < 1^2 + 2*1*1 + 1^2 = 4.$$

Here, we started with the left side,  $(x+y)^2$ , and manipulated in one direction to show that it was less than 4. (It's implicit, but we used the fact that multiplication by positive numbers preserves the order of real numbers, etc.) Making an effort to move away from always using the 'work with both sides at the same time' style of calculation towards the 'take this thing and manipulate it in one direction until you get what you want' style can be highly rewarding.

Hopefully, this helps to ease fears about inequalities. They can be your friends; the sooner you let them, the more confident you will be as a mathematician.

## Sieving by Dirichlet Series

A number sieves is a sort of tool/theorem. For example, there is something called the square sieve that can give you an upper bound on the number of squares in a given set of integers. Basically, we do some spooky Marcoux 148 shit using something called the Dirichlet series to sieve out sets.

The Riemann Zeta function is the most trivial case of a Dirichlet series, and has the following form:

$$\zeta(s) = \sum_{n=1}^{\infty} \frac{1}{n^s} \quad (\text{where } s \geq 1)$$

Dirichlet series are defined to be

$$F(s) = \sum_{n=1}^{\infty} \frac{a_n}{n^s}$$

where  $a_n$  is just some kind of sequence of real or complex numbers.

So it turns out that we can rewrite those infinite sum as infinite products, called the Euler products. For example, this is the Euler product for the Zeta function:

$$\zeta(s) = \prod_{p \text{ where } p \text{ is a prime}} \left(1 - \frac{1}{p^s}\right)^{-1}$$

Exercise: Can you see why you can do this? Hint: Multiply the infinite sum with  $(1 - \frac{1}{p^s})$  for every prime  $p$ , so that you have to prove that the product is 1. Now, your term is  $\zeta(s)$  minus  $\zeta(s)$  times something minus  $\zeta(s)$  times some other thing...

The solution to this exercise is at:

[en.wikipedia.org/wiki/Proof\\_of\\_the\\_Euler\\_product\\_formula\\_for\\_the\\_Riemann\\_zeta\\_function](http://en.wikipedia.org/wiki/Proof_of_the_Euler_product_formula_for_the_Riemann_zeta_function)

Even if you don't want to do the exercise, you should still look at that page, since it explains things nicely and even has a cool animation!

The relationship goes both ways: An Euler product (not that we defined what it is) always turns into a Dirichlet series. Another example is if you take the following product:

$$\prod_{p \text{ where } p \equiv 1 \pmod{4}} \left(1 - \frac{1}{p^s}\right)^{-1} = \sum_{n=1}^{\infty} \frac{a_n}{n^s}$$

where  $a_n = 1$  if a divisor of  $n$  is congruent to 1 mod 4 and  $a_n = 0$  otherwise.

Now, we want to study the sum  $\sum_{n \leq x} a_n$ , because it tells us the behavior of the sequence  $a_n$ . For example, if  $a_n$  is 1 for every prime  $n$  and 0 otherwise, this sum is the number of primes less than  $x$ .

Now, there's a nice theorem called the Tauberian Theorem which allows us to study the asymptotic behavior of those sequences: If you take  $F(s)$ , a Dirichlet series, such that its sequence is nonnegative, and such that it converges for all real  $s$ -es with a real part greater than 1, and suppose some other, equally confusing things hold. Also suppose we can write  $F(s)$  as  $\frac{H(s)}{(s-1)^{(1-r)}}$ , where  $H(s)$  is holomorphic. Then, you know this:

$$\sum_{n \leq x} a_n \text{ is asymptotically } \frac{cx}{(\log x)^r}$$

(for some  $c$  that we can easily determine)

By the way, you can get the Prime Number Theorem by applying the Tauberian Theorem to one specific Dirichlet series!

In almost all the cases where we use the Euler product to describe the Dirichlet series, those weird conditions for the Theorem are satisfied.

(Exercise: Can you see why all the conditions that we gave are satisfied?)

Now we can use Euler products to get the Dirichlet series into that fractional form in the Tauberian Theorem to apply it. Then we can get the asymptotic behavior of that sequence.

There are some functions like the Riemann Zeta Function and the Dirichlet L Functions whose Euler products are often found inside other Euler products (spooooky). We can then use this to make substitutions to get it into the form we need.

That's how you sieve!

Dank Asian



## N Things Better Than 8:30 AM Lectures

- Soggy sandwich bread
- Getting chased by geese
- Donald Trump's hairstyle
- Forgetting your headphones
- Dead batteries
- Imprint
- Someone taking the last piece of pie

TheUndecided

## Establishing Succession

Our time at University is short and eventually pretty much everyone leaves by graduating or dropping out. Despite this there exists numerous clubs and organisation whose existence depend on a successive line of student leadership. If you have ever been conned into running a club, one of your priorities should be to find someone else to do it instead.

The question becomes where to find a suitable successor? And thankfully here at *mathNEWS* we have the answer! Recruit an unsuspecting first year. Frosh are great for this in that they aren't burn out, overworked, apathetic and don't know any better. They still have enthusiasm as their hopes and dreams haven't been mercilessly crushed yet.

The other great thing about first-years is that hopefully they will be here for a while thereby securing organization succession just a little longer. We recommend kidnapping your frosh as soon as possible. The idea time to strike is while they are all conveniently identified by their orientation bracelets.

Now dear reader, perhaps you are wondering if it is slightly unethical to coerce first-year students. To this the answer is no organization at Waterloo aren't cults; in fact many of them will even stress that fact. By recruiting a first-year you are encouraging them to be involved in the community and make the most of their university experience. One of the most common regrets people have about university is not getting involved. Help first-years avoid that mistake by making them run a club. And honestly what better way to start their journey into adulthood than by accruing responsibility.

In a COMPLETELY UNRELATED note *mathNEWS* could always use new writers, artists, puzzle makers and editors to justify ordering 9 different pizza every fortnight.

Beyond Meta

## Conversation: How Much is Too Much?

There are limits to everything and that includes conversing with friends. What is with all the conversations on campus lately? I mean, don't get me wrong; talking with a pal is acceptable but is it necessary to do so constantly? There is nothing wrong with chatting with your chum in a restaurant, but friends need to remember that people are in a rush to get around. While their camaraderie is admirable, it can become inconvenient and a nuisance to others.

If friends are going to be so open and caring with their colleagues, then keep it behind closed doors. Not everyone wants to witness those types of displays. It can become an issue when you are blocking everyone else trying to get around you, while the pals in question are discussing interests, debating current issues, or stopping suddenly to high-five.

I am not saying that being in a friendship or being chummy is a bad thing. I am not implying that there should be a campus-wide ban on how many conversations friends can have. However, comrades should be respectful and aware of those around them, who potentially do not share the same views or ideas about talking. I completely understand the temptation to show someone that you care about their day. Still, we all have to remember that we are on a university campus, and it is not always the right place or time to engage in such activities.

It intrigues me to know how other people in a group of three (or more) feel when a pair of friends are passionately debating a topic and all of this conversation is occurring right next to them? Furthermore, if you are in a friendship and are surrounded by a group of strangers, would you feel uncomfortable talking with your friend? Would you avoid making those strangers feel uncomfortable or just continue exchanging greetings? After all, it is your best buddy.

Campus question: What is your take on the terrible act of conversation?

Soviet Canadian

## LaTeX to Change Name

Earlier this week, Leslie Lamport, the 2013 Turing Award winner and initial developer of the well-known software LaTeX, sent an open letter to all important newspapers—including *mathNEWS*—detailing his concerns about how LaTeX turned to be.

Initially thrilled by the massively positive answer from the science community, he quickly moves to his real concerns: Why does everybody make the same obvious joke involving the innuendo on LaTeX?

LaTeX, far from the BDSM-community, stands for Lamport TeX, which is a formatting system.

“I always knew that scientists were a bit immature, but enough is enough!” says Lamport in the beginning of his 17-page letter. “To stop once and for all with all these horrific jokes, I decided, with the consent of the current LaTeX-Project team, to change the name of the software. It is now the “File editor TeX-based in science headquarters – or FeTiSH to shorten it.”

The new name should be rendered official next month.

Adam Gooseling

## Hatching 'em All!

There's this game called Pokémon GO; you may have heard of it. One of the main goals of the game is the idea of catching them all. In this article I aim to estimate how many eggs would one need to hatch to catch them all. We can start by creating a lower bound for the number of eggs needed. Assuming that we are insanely lucky and hatch precisely the number of eggs need to catch them all.

You need 92 two-kilometre eggs  
 You need 139 five-kilometre eggs.  
 You need 23 ten-kilometre eggs.

The lower bound for the number of eggs is 254 eggs and 1109 kilometres.

In order to calculate the average number of eggs, we will calculate the expected waiting time in order to get the pokémon with the most demanding requirements.

Based on some data taken from the [r/thesilphroad](http://r/thesilphroad) and [netherfable.com/pgo-egg-hatch-distribution](http://netherfable.com/pgo-egg-hatch-distribution), the distribution for each type of egg is as follows

32.4% two-kilometre eggs  
 55.4% five-kilometre eggs  
 12.2% ten-kilometre eggs

From this we get that the average distance needed to hatch an egg is 4.6 km.

Furthermore the average number of candy for each of the dif-

ferent egg group is:

2km eggs have an average of 7.8 candy  
 5km eggs have an average of 15.7 candy  
 10km eggs have an average of 23.7 candy

The question becomes which Pokémon would take the longest to hatch all the necessary candy. After looking at numerous Pokémon Magikarp has the biggest candy requirements with 400. 9.342% of all 2km eggs are Magikarps.

$32.4\% * 9.342\% = 3.027\%$  of all eggs are Magikarps. Or 1 out of every 33 eggs is Magikarp.

With the average yield of 7.8 candies per eggs, you need to hatch 46 Magikarps to get a Gyarados.

$33 * 46 = 1518$  eggs to get Gyarados. So on average you will need to hatch 1518 to get a Gyarados

Which amounts to 7040km if you only use the infinite incubator. And 782 km if max out your incubators and spend  $450 * 150$  Pokécoins, which amounts to 495 real dollars.

Since all other Pokémon have a shorter waiting time than Magikarp, by the time you have a Gyarados you should have hatched all the other Pokémon. This is not rigorous math — only an estimate for entertainment purposes. Now if you factor in the buddy system hatching them all does become considerably easier. This is left as an exercise for the reader.

Beyond Meta

## *mathNEWS* Demands New Math Building

Waterloo, ON—There has always been an intense fight for the limited space on campus, and this issue is exacerbated by the influx of new students ever year. *mathNEWS* is no exception to the ever-important crusade of wringing more space from the University; in our 43-year existence, *mathNEWS* has secured at least two office upgrades, and it is high time for another.

To wit, *mathNEWS* demands of the University to construct the M4 building for the benefit of all math students such that *mathNEWS* can, on its completion, arrogate the building for use as *mathNEWS*' offices. This will help the students-at-large because then, the myriad of student groups will be able to enter a bloodbath to fight over the current *mathNEWS* office, which would be vacated in the move.

Unfortunately, the University Undergrad Council reported that the University's upper management has, for now, rejected such a claim, but as we persevere and endure, *mathNEWS* shall prevail in the end; we will acquire more office space!

Zethar

## UWaterloo Begins Its 'International Incoming Students' Preparation Program

*Winter is Coming*

Now that the Orientation Week is over and that the classes have started, most new students are left to their own devices. But for international students, it's even harder. New language, new campus, new culture — everything is unfamiliar, and some students even feel homesick on top of that.

If you're in that case, worry no more! The University of Waterloo has started its intensive integration and welcome program. As expected, some free English classes and integration reunion are planned. But UW delivered more than that when they announced the "Winter Training" plan, starting from this week, which consist on turning the AC on max for the students to experience the Canadian cold and the shiverings.

Way to go, Waterloo!

Adam Gooseling

## Pluto Status to be Changed Again

In 2006, Pluto was demoted from the 'Planet Club' it has been in for seven decades to a mere dwarf planet. Although that happened 10 years ago, the news became viral last year because of the NASA New Horizons spacecraft, who was supposed to reach Pluto on July the 15th.

It was the first time in human history that Pluto would have been closely observed, which brought up the debate on whether it could maybe still be a planet. A debate in which Neil deGrasse Tyson turned down when offered, stating:

"As a general rule, I don't debate people," Tyson wrote. "Done it once or twice before, but abandoned the effort. What's behind it is that I don't have opinions that I require other people to have. So debates don't interest me for this reason."

Today, it looks like he was right to decline the offer and avoided making a fool of himself. Earlier this month, NASA finally revealed the results of their probe — basically nothing. After almost a year of investigation on why it appeared to be nothing on the images, some astrophysicists finally found the issue: it appears that Pluto was actually a chocolate stain on the Hubble telescope.

Adam Gooseling

## Imprint Hates Loving Couples?

There was an article in the September 14 issue of Imprint that was brought to the attention of *mathNEWS*, about public displays of affection. The article is an opinion piece, which tries to present hand-holding as a growing issue on campus. The issues with hand-holding being that couples are impeding foot traffic by... some means (spreading their arms out to block hallways?), and that seeing such public displays make everyone in the vicinity uncomfortable. As if two human beings in physical contact is unnatural and unsettling. Really, I have never seen a couple seriously impede foot traffic anywhere — groups of friends on the other hand clog doorways and hallways while slowly walking and talking. The author in one paragraph states that if you were to do such terrible things as show you are in a relationship with someone, that you should do so only behind closed doors, but in the next paragraph they say that a ban should not be enforced on these sorts of activities. The article is a hilarious read and as someone who has not picked up a single issue of Imprint since my Orientation Week (Sept 2010 orientation issue) I whole heartedly suggest you read the article, "PDA: how much is too much?" online at <http://www.uwimprint.ca/section/opinion/>.

Soviet Canadian

## Pentametrone: The Sonnet Bot

Recently, I was looking for sonnets for an English class. While plumbing the depths of the internet, I stumbled upon what may possibly be the best Twitter bot of all time: Pentametrone.

So what is Pentametrone? To use its own words: *With algorithms subtle and discrete/I seek iambic writings to retweet*. Pentametrone searches Twitter for tweets that are in iambic pentameter and pairs tweets off to form rhyming couplets, which are then retweeted for your viewing pleasure.

These couplets are then used to form Shakespearean sonnets; ABAB CDCD EFEF GG ~~no re~~, that kind of stuff. Pentametrone's bibliography contains such works as *mom's talking to a squirrel on the deck* and *I got an alligator for a pet*, a 252-page novel containing 500+ sonnets composed by the robotic virtuoso itself. *Lasagna is spaghetti flavoured cake* is a personal favourite of mine,

You can find Pentametrone at [pentametrone.com](http://pentametrone.com) and also at [twitter.com/pentametrone](https://twitter.com/pentametrone). In the meantime, here's a sonnet I created from Pentametrone's retweets with grammar and spelling intact.

Someone

## avocado sandwich

the money coming it's around the clock  
My first official practice is today :|  
You threw away a diamond for a rock .  
What even is the wanted anyway

This avocado sandwich hit the spot  
i shouldn't off updated iOS 10 X(  
Kentucky or Wisconsin? Who y'all got?  
So I'm addicted to caffeine... AGAIN...

I wonder what cologne Obama wears  
i hope the teacher doesn't walk in yet  
behind the shadows someone always cares  
Did cats exist before the Internet?

That was a pretty crappy ending though  
Well anyway whatever I dunno

**Submit your articles, *prof*QUOTES, to [mathNEWS@gmail.com](mailto:mathNEWS@gmail.com) or the BLACK BOX near the MC Comfy Lounge.**

## CORRECTION to v129i6

We at *mathNEWS* pride ourselves on our attention to detail and accuracy in our articles. We want to make sure we are always providing our readers with the most up-to-date and correct account of events.

However, once in a while, we err. On that note, we wish to amend an article from December 4<sup>th</sup>, 2015, in which we posted what seemed to be an obituary, lamenting the death of the awesomeness of David McKinnon.

We have since been informed by McKinnon himself that "[his] awesomeness is actually alive and well." However, this is followed with the note that he is "not sure where it's gone." Under Ontario law, *mathNEWS* should wait for a period of seven years from last awesome event before declaring the death of this missing awesomeness.

McKinnon is a devoted reader of *mathNEWS*, and we at *mathNEWS* are happy to hear that reports of his awesomeness' death have been overstated. We would also wish that McKinnon's awesomeness return swiftly.

The Editors

## N Things That Go Fast

- Sanic
- Lucio
- Jolteon
- Rammus
- Nightcore
- Guns and Ships
- Angry UW geese
- My time the night an assignment is due

aPlayerofGames

## Prison 'Open House' Project Fails

Last week, the director of the Toronto South Detention Centre organized a doors open event, which rapidly had to be cancelled due to the prisoners escaping.

"I thought there would be more fair-play from the prisoners. It was a good occasion to let the community know about us and what we do. It's a shame," says Director John Irwing, in an interview.

"Yeah, the guys weren't really nice this time; we had a meeting 2 days ago concerning the doors open and the possession of knives, amongst other things... This is not what we agreed on, I swear!" reacted Al "Two-Fingers" Smith, the head of the Prisoners' Union, after he was caught two kilometres away from the centre.

An investigation has been opened.

Adam Gooseling

## From Geese to Greens: How Waterloo Changed My Diet

Before washing up on the pristine shores of Columbia Lake early this September, I was a proud meat-eating mathie. Nothing could keep me from a leftover bowl of ground beef from taco night—or so I thought.

Between living with my parents and having bookmarked Wolfram Alpha, I didn't have to think much. Big decisions like "How is the food getting on the table?" were made for me, and smaller decisions like "Should I match my belt with my shoes?" were simple enough. It was all I could have hoped for, but in my heart I knew it could not last.

My share of the week's grocery bill came to \$70. \$70/week? \$10/day?? \$0.42/hour??? It was unthinkable. I vowed to myself to never spend that much again, although I probably already do.

With a quick and tearful Google search, I discovered I could cut a large portion of my grocery budget (and my body mass) by switching to a vegetarian diet. Over the next week, I made rice and mixed greens at home and packed rice for lunch to mix with soup from the C&D when I didn't have the time to head back. I felt healthy and my chequing account felt even better, but not all was well in my brave new vegetarian world.

Whenever I go out to the backyard for dinner (pecking at fallen leaves and fresh cut grass), the geese seem to congregate for the sole purpose of tempting me with their sweet sweet goose meat. I can't help but stare when I see them flapping their big meaty wings.

I have to stay strong, of course. For my integrity, my morals, and my wallet. Anyway, I can always wait until nesting season for some safe and easy egg protein, right?

AC

## The Real Problem with PDA

Earlier this month, there was an Imprint article that rambled on their disapproval of Public Displays of Affection. One of their complaints about PDAs is that people holding hands slow down student traffic. As a cyclist, I pass by a lot of students and what I have noticed is the real problem to student traffic isn't overly affectionate couples, rather it is somewhat close friends. Both these groups tend to walk together but the couples tend to be much closer. The friends however still have a personal space bubble which increases the amount of space they take up. I call this increase amount of space the friend zone. This problem is magnified if a person has multiple friends.

Go ahead: be as affectionate as you damn want to be as a couple. Invade a maximal amount of personal space. It's simply the polite thing to do to help assuage student traffic. Just please don't hang out with multiple friends at once. It's very inconvenient for the busy people who need to write salty opinion pieces.

Beyond Meta

## profQUOTES

*SNew:* Today, we're going to draw a picture of a cat! ^ \_ ^  
*Student:* How about Schrödinger's cat?  
*SNew:* That's the easiest one to draw! \*draws a box\*  
 New, PMATH 352

"When you see me at the poker table, don't go, 'Hey, that's Dave, my professor! He has a PhD in Artificial Intelligence!' because that's not my persona at the poker table. Say, 'Hey, it's that loser Dave; he plays hockey with my brother!'"  
 Tompkins, CS 136

"If you're one of those people who loves having people come over to your apartment and say, 'Oh, wow, look at all these textbooks. He's so smart,' then this is the textbook for you."  
 Tompkins, CS 136

"You're already doing violence to the English language, but we're going to do it further violence."  
 DeVidi, PHIL 371

"This is sort of like music. Once you have the right notes, you can sing what you like."  
 Kothari, CO 250

"I'm like a poet, except nothing rhymes and it's not very good."  
 Goulden, CO 330

"There's no jobs anyway, so why not major in something fun?"  
 Hardiman, CLAS 100

"Marmoset is a tiny angry monkey that hates you."  
 Vasiga, CS 241

"I'm a sadist or a masochist or both—a smasochist."  
 Vasiga, CS 241

"unix has a handy command to fix your program: 'rm -\*'."  
 Vasiga, CS 241

"In some ways, this is a beautiful proof. In other ways, writing it down has obscured the beauty of this proof."  
 Geelen, CO 442

"So. The end of Culture. Let's just be barbarians and tell you what you need to know."  
 Marcoux, PMATH 351

"So because you retrieve information better if you're currently in the state you were when you learned it, you should study sober and come to the exam sober. However, if you don't study sober, don't come to the exam sober."  
 Wehr, PSYCH 101

"With that in mind, I'd like to poke fun at the University website."  
 Avery, CS 349

"It turns out that we have two eyes."  
 Avery, CS 349

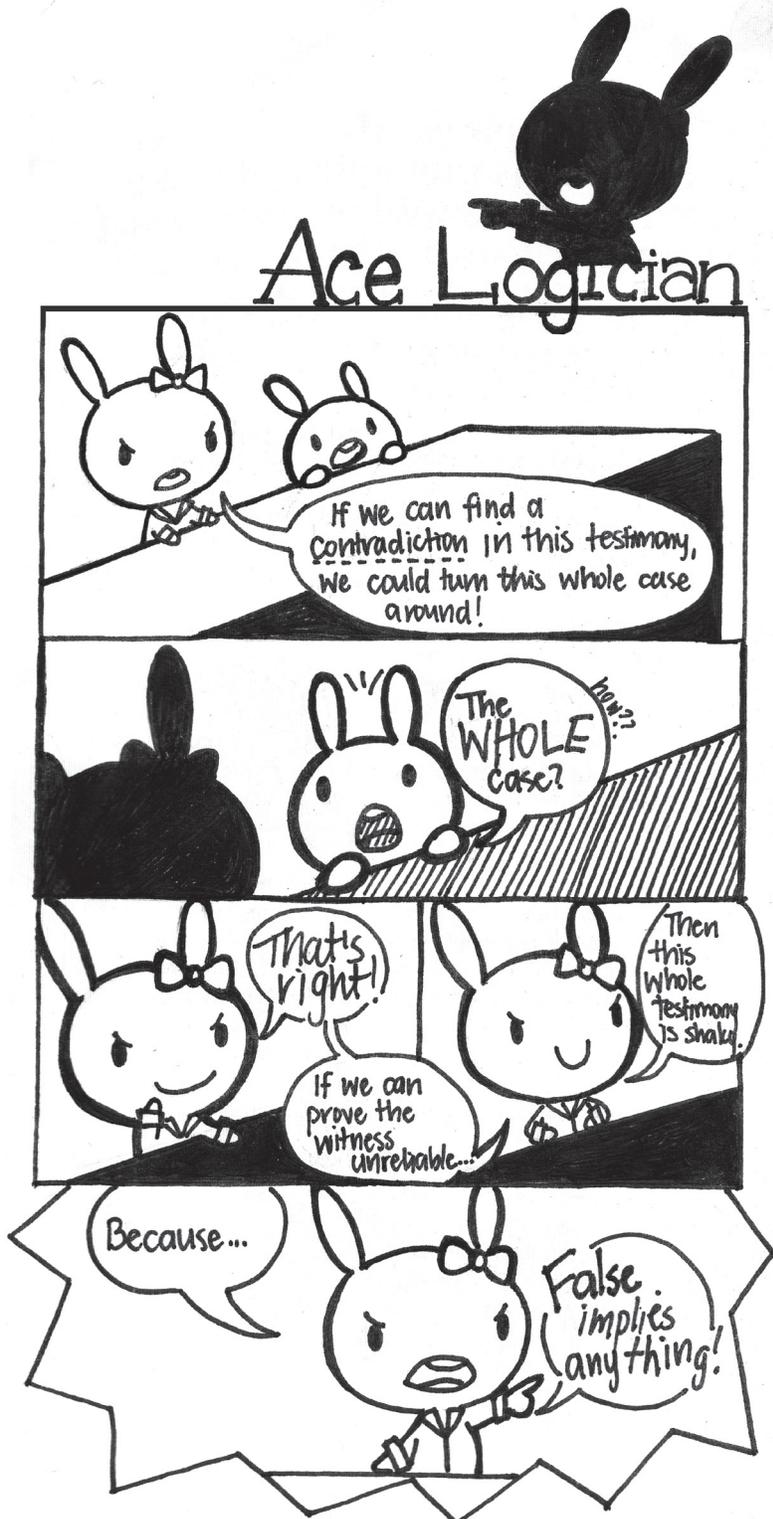
"You've put me on the spot, but don't worry, I forget things after a day. Your final grade is still safe."  
 Weddell, CS 348

*McKinnon:* "I recently received an email from a student in this class. Here is what it said: 'How much money do you have if you can afford to commute? You have abelian dollars.'"

*Student:* "Will that be on the exam?"

*McKinnon:* "Yes. It will be out of 1. And it will be a multiplier."  
 McKinnon, PMATH 347

"Wow, those must be the most perfect sine and cosine graphs I've ever drawn! Let me Instagram this..."  
 Orchard, CS 370



## The Bullet's Hot Breath

### Part 1

Toronto, voted most boring city in the world 46 years in a row, and looking claim it for the 47<sup>th</sup>. I stared out the window, looking out at the city. There was literally nothing interesting out there, just buildings, more buildings, and a really shitty hockey team. Somehow, they manage to make the city even more lifeless. It was the start of the annual Toronto Noir Festival, meaning that giant machines were running night and day to suck whatever little colour there was out of the city. They cost a lot of money and power, but damn did the effect look cool. Everything was black and white. Looked like a movie out of the 40s. And me, well, I landed the starring role.

I thought back to why I was in this office right now. I taken another job for the University of Waterloo Department of Mysteries, and they sent me to the most boring place in the world to work as a private detective. I smiled. Working as a private detective for the Department of Mysteries. It didn't sound so private.

The heat was unbearable. Everywhere you went, it felt like you were pressed up against the midday sun. The fact that I was wearing a three-piece suit sure as hell wasn't helping. I was alternating between Humphrey Bogart in *Maltese Fiction* and in *Big Sleep*, so I had a matching fedora. That was one of the tagline's of the Noir Festival: "One of the only places in the world where it's acceptable to wear a fedora". I wiped the sweat from my forehead. The buzzing fan may as well not have been there at all.

Every day I had to do one hour of brooding and another of internal monologuing. It was in my job description. Really, it wasn't anything more than a typical day at Hagey Hall.

Suddenly, the door to my office swung open. I turned, and saw a woman wearing a blue satin dress. Of course, because was black and white, it looked more like a dark grey. She had a necklace of white pearls hanging around her neck, and a head of blond hair. She looked like she had somewhere important to be, which made me wonder what she was doing here.

"Are you Detective Theodore Bear?" she asked. She seemed nervous.

I nodded. "Yeah," I told her.

She took out a purse, opened it up, and pulled out a few slips of paper. Bills? "I would like to hire you."

I sat down at my desk, and locked my fingers together. "What's the job?" I asked. "I need to know before I agree to anything."

She wandered up to my desk, and sat in a chair opposite me. She pulled a cigarette. "Got a light?" I said no, and her brow furrowed. She put the cigarette away. "I'm being blackmailed, Detective Bear. Someone has gotten a hold of some... very compromising photos of me. I don't know who they are, but they want money. Money I don't have."

I asked her why the photos were compromising, and she looked at the floor, ashamed. Her gaze was stuck to it like it was the most interesting thing around. Considering we were in Toronto, it might have been.

"I... A couple years ago, I made a... huge mistake. An old boyfriend and I were together at a hockey game and... I was wearing a Leafs jersey. I'm about to marry a Penguins fan. Do you realize what would happen if he found out? I can't let that mistake ruin me."

That was heavy. Serious stuff. Still, I had a question. A very specific, important question. I spoke. "You say you don't have any money. How are you planning to pay me, then?"

"I have enough stamped loyalty cards to get you free coffee at McDonalds for a month. Will you take my case?"

"Sure," I said. "I'll sweep away whatever dirt they have on you. You can count on it, Ms..."

"My name is Lydia Bradshaw," she said.

I told her it was a pleasure, stood, then opened the door for her and let her out of the office. I locked up. I had a case to investigate.

Theodore Bear

## N Things That Suck

- Multi-page list articles on the internet
- Companies that want you to take on San Francisco responsibilities on a St Jacobs budget
- Vegetables on pizza
- Geese
- American politics
- People who baby-talk to their significant others
- People who hold hands [citation needed]
- Vacuums

Diminutive Rex

## N Things in Common Between Donald Trump and Canada Geese

- Narcissism
- Are loud windbags
- No real hair
- Respond to confrontation with angry honking
- Small hands
- Make the best taco bowls
- Should never be President of the United States

aPlayerofGames

## 謎々挑戦

御機嫌麗しく候ふか。前回此の浮き世に起くる時、人間が未だ進歩せざりし、極めて詰まらずな。今回憑かるゝ人は此出版の寄稿者の一人なり、現代の謎々作りてみたし。

### 謎々規則

- 第一条：謎解きには、各白斗に片仮名文字一つ入りに白斗横及び縦読み名詞が該当する鍵に取り合ふぬ。
- 第二条：促音、拗音は大文字として見做さる。例へば「ショック」の場合、「シヨツク」と成る。
- 第三条：濁音や半濁音は一文字として数へらる。
- 第四条：「ー」の長音なし。

謎々挑戦したらば神無月三日(2016/10/03)前我が社の黒箱に解きを入れて、解き正解なれば褒美遣かはず。同点の場合には、憑かれむに如何にせば良かるやへの好む答へ決勝。

2天火狐

### グリッド・ガキ

ヨコのカギ:

2. にじゅうかじゃない…
4. 温和な、優しい性格
7. ○○を張る;ポーカーがプレイする時が要る技能
9. 何かを学ぶのにこれから始める
11. 不○○です、栗山未来の口癖
13. 炎天下の湖で魚を待つのは熱すぎて、このほうがい?
14. ガウスの○○○とは、MATH136で学んだ連立一次方程式を解くのためのアルゴリズム
17. 激しく飲料した後に、代償行為を行う人がこれに苦しむ
18. ○○を耕す、○○鑑
20. 「ヨツン」あるいは「○の巨人」は北欧神話の中一員
22. 一日のうちこのパズルを解く時間
23. 年上女性の夫婦
26. 例えば:スリラー、パニック、SF、アクション
27. ゲームに怪我がある時、白魔道士に診て…
29. 婿の対義語
30. DPSの強み
33. アフリカでは、野生動物からの攻撃による人間の死者数は、この動物によるものが最も多い。
34. ○これとは人気がある育成シミュレーションゲーム
35. 異なる水系の境界線を指す地理用語である。
36. これを読みたくて、故に外人が日本語を学ぶ

タテのカギ:

1. これがあれば、特定の場が禁止を解除する
2. 魚は鰓がある;人間は…
3. 食品
4. 壁を通して風景を見るという機能がある。
5. ἔθνος
6. 米国の○○記念日は七月四日。
7. mathNEWS発行を停止すること。
8. 20歳から29歳ごろまで男女。
10. L/G
12. ○○○ないのは完璧。
15. 貪り
16. 「いと○げに消息文にも仮名といふものを書きまぜず」—源氏物語
19. 復活の象徴とされる
21. 筆あるいは
23. 古風な花の名前。逆転裁判3にの被害者の一員。
24. すぐ見すかされてしまうような、あさはかなたくらみ。
25. この海域は故障問題がある。
26. 大○○、問題ない
28. 行く方向、未来。
31. この食品の名前はポルトガル語に由来する。
32. 数学の分野はラムゼー○○、グラフ○○など
33. 花札に、1点札

### グリッド

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