

# *math* NEWS



© W O R L D W I N E S O F T W A R E

**Charity Ball: Fun for the Whole Team**

*Volume 123, Issue 5  
Friday, November 22<sup>nd</sup>, 2013*

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**lookAHEAD****mathNEWS**

November 22 Issue 5 wakes from hibernation early

**MathSoc**

November 24 Video Games Tournament

November 30 24 Hour Games Night

December 1 24 Hour Games Night

**University**

December 2 Last day of class

December 5 Exams start

December 20 Exams end

December 21 Wake up from hangover

**Misc**

December 22 Obligatory parental visit

**Send us your articles,  
profQUOTES, grievances, puzzle  
solutions, flirtations, and Sez's to  
mathnews@gmail.com.**

**Article of the Issue**

Congratulations to Algoweird for winning this fortnight's Article of the Issue with your article *A New Method Resolving Constitutional Crises*. Claim your prize at our office.

The Editors

**Article of *this* Issue**

Congratulations to k! for winning this fortnight's Article of the Issue with your article *So Many Goddamned Bunnies*. Claim your prize in the past, because you already got it, you magnificent bastard.

The Editors

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*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* are available electronically via the World Wide Web at <http://www.mathNEWS.uwaterloo.ca/>. Send your correspondence to: *mathNEWS*, MC3030, University of Waterloo, 200 University Ave. W., Waterloo, Ontario, Canada, N2L 3G1, or to userid *mathNEWS*@gmail.com on the Internet.

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Unholy Trinity: Antichrist (Murphy Berzish), False Prophet (Lenny Morayniss), Satan (Thomas Baxter)

**mastHEAD**

Charity Ball was last night, but *mathNEWS* is produced on Monday. Since we wanted to treat our wonderful and glorious and not at all annoying writers to a lovely night out in fancy clothes and over-priced booze, we manipulated time itself to travel forward and have some fun. We tried to get the TARDIS, but not enough people could fit (it really isn't that much bigger), so some had to travel the old fashioned way: in a giant ball of lightning that disintegrates all clothing. Some even had to just wait. The horror. Coming off such a wonderful wibbly-wobbly event, it was time to ask our writers: what did you wear to Charity Ball?

the guy ("Boxer shorts. Paper bag. Red sneakers."); unit ("Nothing."); TubesJr. ("My pink tie."); Big Mak ("A look of disappointment."); InsideVoice ("A perception filter."); Beyond Meta ("I got an accessory—called a boyfriend that I had attached to my arm."); yourlocalWHETHERgirl ("Clouds."); psychomath ("A white fairy dress."); Stubbs ("Beans on toast. All hail the epic food."); Ef-fAcheYou ("I like trains"); Mustard Map ("My very existence."); theSMURF ("I CAME IN LIKE A WRECKINGBALLLLLLL."); Element118 ("Liam Neeson's skin. Bet he wants it back."); xoxo ("My faith (or lack thereof) in humanity."); Wolverine Panda ("Ignorance."); Ice Nine ("Bit gag, bridle, and blinders (and saddle)."); PhantomLimb ("A horse head and my freshly drycleaned birthday suit.");  $s,t \in \{2k, k \in \mathbb{Z}\}$ , 144 ("Not what the cool kids were wearing, that's for sure."); RAM ("Clothes are so outdated, nudity is the new black."); himynameis("Hats."); Lightningbug ("Darkness like a shroud."); waldo@<3.LE-GASP.ca ("What do you I think I wore ;)?"); Soviet Canadian ("Bear-skin boxers and a bow-tie."); Zethar ("Dragonbone armour."); ScruffyED ("A forest-green leaf atop my head."); Biomy ("Absolutely Nothing [SAY IT AGAIN]."); Convoluted ("Ski mask and balaclava.")

I went and wore the maximum that MathSoc would allow ObjectED ("Two game wardens, seven hunters, and a cow.");



## Exec Sez

Hello Mathies, remember to bundle up, stay warm and study for those upcoming exams!

### *Online Course Evaluation*

First Years, please remember to fill out your online course evaluations on Learn.

### *Fall Reading Week Survey*

Feeling like you need a break during the Fall term? Or do you like it as it is now? Tell us your thoughts on a Fall Reading Week in this survey:

<http://tinyurl.com/MathSocFallReadingWeek>

### *General Meeting*

Monday, November 25<sup>th</sup>, 2013, 5:00 PM

MC 3001 (Comfy Lounge)

The General Meeting will be held Monday, November 25<sup>th</sup>, 2013 at 5 PM in the Comfy Lounge (MC 3001).

The Agenda is

1. Appoint \_\_\_\_\_ as Secretary
2. Exec Reports
3. Financial Reports
4. MathSoc Office Employee Committee Report
5. Change Club Membership Fee
6. Addition of VP Communication role
7. Executive Honorarium

### *General Election Voting*

TODAY

Today is the last day to vote for some of your Winter 2014 and Fall 2014 Executives! Vote now at:

<http://mathsoc.uwaterloo.ca/elections/vote>

### *Vice President, Finance (Winter 2014)*

Wednesday, November 27<sup>th</sup>, 2013, 11:59 PM

Are you interested in finances? Want to get involved with MathSoc? Now is your chance!

We are on the search for a new Vice President, Finance for the Winter 2014 term.

The application can be found here: <http://mathsoc.uwaterloo.ca/documents/MathSoc%20Winter%202014%20VPF%20Application.pdf>

If you have any questions or want to submit your form, please email [vpf@mathsoc.uwaterloo.ca](mailto:vpf@mathsoc.uwaterloo.ca).

### *Video Games Tournament*

Sunday, November 24<sup>th</sup>, 2013, 9:30 AM – 5:30 PM

M3 1006

All day of playing video games, this Sunday! Various stations, including XBox, PS3, Wii will be setup for all to play. Food and drinks will be provided FREE of charge!!!

League of Legends Tournament:

Entry Fee: \$15 for a team of 5 if there are at least 2 Math students, otherwise \$25 for a team

\*3 people must be present\*

Sign-up at <http://tinyurl.com/MathSocLoL> and don't forget to pay in the MathSoc office (MC 3038).

### *Spirit Day: Sushi*

Thursday, November 28<sup>th</sup>, 2013, 1:30 PM – 3:30 PM

MC 3<sup>rd</sup> Floor Hallway

MathSoc will be serving free sushi! So come on out for some delicious free food.

### *24 Hours Games Night*

November 30<sup>th</sup>, 2013, 12:00 PM – December 1, 2013, 12:00 PM

MC C&D

A whole day of playing board games! There will be free food!

Please fill out the "RSVP" surveys at: <http://tinyurl.com/Mathsoc24hrGames>

### *Spirit Day: Sandwiches*

Monday, December 2<sup>nd</sup>, 2013, 2:30 PM – 4:30 PM

MC 3<sup>rd</sup> Floor Hallway

More free food! On the last day of class, MathSoc will be serving free sandwiches.

### *ASNA 2014 Unconvention*

January 3<sup>rd</sup>–5<sup>th</sup>, 2014

Interested in Actuarial Science? Want to further your career through seminars, networking, and a career fair with many major actuarial companies?

Come join us and help the University of Waterloo host the ASEA-ASNA 2014 Unconvention in downtown Toronto.

Registration is now open at <http://www.anea-asna.ca/toronto-2014/registration>.

Apply to volunteer at <http://bit.ly/18kBP0P>, by November 22<sup>nd</sup>, 2013.

To compete in the case competition, apply now at <http://bit.ly/1gCdoUJ> by November 22<sup>nd</sup>, 2013.

For more information, please visit <http://www.anea-asna.ca/> or email ASNA delegates at [asna2014@anea-asna.ca](mailto:asna2014@anea-asna.ca)!

Stéphane Hamade, Haris Hyder, Matthew Cheung,  
Catherine Sun, Jazbel Wang

**Drop your Minecraft username in the BLACK BOX or email it to us at [mathNEWS@gmail.com](mailto:mathNEWS@gmail.com) to be whitelisted on our Minecraft server (129.97.134.134).**

## MathSoc General Election 2013

On November 21<sup>st</sup> and 22<sup>nd</sup>, MathSoc is holding a general election to elect Executives and Class Representative for Winter, Spring, and Fall 2014 term. Voting will be done online at <http://mathsoc.uwaterloo.ca/elections/vote> and will conclude Friday, November 22<sup>nd</sup>, 2013, 11:59 PM.

The following positions and candidates are not acclaimed and thus will be in voting ballot: (candidate profiles can also be found in <http://mathsoc.uwaterloo.ca/elections/candidates>).

### *Vice President, Operations (Winter 2014)*

#### **Keith Cheng**

Hey! My name is Keith Cheng and I'm a 2nd year Math/FARM student. To describe myself quickly, I would say that I am a very outgoing and sporty person. I enjoy facing new challenges as well as meeting new people. In the upcoming term, I look forward to meeting all of you and to serve as your VP Operations!

#### **Tyler Rozak**

I am Ty Rozak and I am running to be Vice President, Operations of MathSoc for the Winter 2014 term. I am a 4A Computer Science student with a minor in Psychology.

I have been involved with MathSoc for over 3 years now and enjoy helping out Math students in a variety of ways. I have been the Vice President, Events for MathSoc 3 times in the past 2 years. I have also been an Orientation director, a member of many on-campus committees and volunteered with the Faculty several times. To see a full list of my qualifications, please visit my website below.

I have several concrete plans for what I would like to see accomplished over the next year which are:

- New (Bigger) Lockers and New Locker Booking System
- Website Upgrade – New Look, Better Information
- Improve Technology Infrastructure for the MathSoc Office

To view more information about me and my campaign, please visit [tyrozak.com/mathsoc](http://tyrozak.com/mathsoc).

### *Vice President, Academic (Fall 2014)*

#### **Abby Hu**

Candidate profile can be found in <http://mathsoc.uwaterloo.ca/elections/candidates>.

#### **Kevin Shi**

Hi I'm Kevin! Much like you, I love math, the Math faculty, and MathSoc council. I have been involved since high school as a member of the student council executive. Coming to the UW, I am involved with MathSoc as a councillor representing Software Engineering, and as a member of the affiliates committee to determine the best policy for current and future affiliates of MathSoc. If elected, I promise to build on, and apply my current experiences as your future Vice President of Academics to represent YOUR interests and opinions on academic issues. I will strive to be approachable, and to manage and open up new forums for the discussions of your interests. Thank you for your time!

### *Vice President, Events (Winter and Fall 2014)*

#### **Jazbel Wang**

Hey Mathies! I am Jazbel Wang and I hope to be your MathSoc Vice President, Events for Winter 2014 and Fall 2014. I am a 2B Computer Science (Software Engineering Option) student, minoring in Psychology.

Ever since my First-Year Representative (Fall 2012/Winter 2013) role, I have been involved with MathSoc. I love contributing as a MathSoc volunteer and being present at council meetings. I am the current Vice President of Events for MathSoc and have enjoyed planning events for the Math students to enjoy. I also have been on the MathSoc Novelties Board, Carnival Board, Elections Committee, Women in Math Execs and Feds Internal Administration Committee. I am involved in the St. Jerome's community as an Ambassador and Student Leader, as well. In my spare time, I love to read, knit, and watch T.V.

My plans for next year:

- New and updated brochures
- Small handouts for future events
- Making sure there are food for people with dietary restrictions
- Inclusive to St. Jerome's students

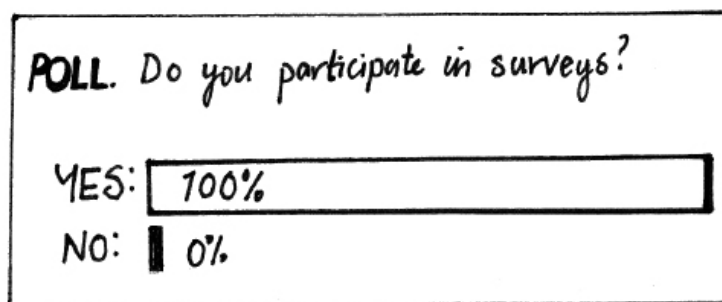
All the best to all the other candidates and remember to vote on November 21<sup>st</sup> and 22<sup>nd</sup>!

#### **Zifan (Nancy) Yang**

Nancy Yang is currently a 2A co-op student majoring in Actuarial Science and minoring in Spanish Studies. She graduated from Pacific Academy in Surrey, Vancouver, and came to Waterloo pursuing her dream of becoming an actuary (or a Spanish teacher). With her love of creativity, she is extremely excited to organize various fun events for all Math students. Her extensive experience in co-organizing fund-raising events for Alzheimer Society and as a youth leader at Pacific Spirit Park allows her to collaborate effectively with teammates. She is enthusiastic about interacting with people and promoting school spirit. At her spare time, she loves drawing, travelling and doing crazy but appropriate things with her friends. Her most memorable trips are the outreach trip to Tanzania and a 5-day bike marathon.

Don't forget to vote on November 21<sup>st</sup> and 22<sup>nd</sup>!  
Thank you and good luck to all the candidates!

Election Committee



## Announcements from CS

### *CS Graduate Ambassador Program*

Considering graduate studies in CS at Waterloo? Speak with one of our Graduate Ambassadors to learn more out about programs, research, projects, student life, and more! They are looking forward to your questions. Email [cs.uwaterloo.ca/gap](mailto:cs.uwaterloo.ca/gap)

### *Accelerated Masters (BMath/MMath or BCS/MMath)*

Get a head start on your Masters degree with the fast track option by taking two graduate courses in your fourth year. All computer science and math programs are eligible. Waterloo students only.

Enroll in the fast track option if you have:

A flexible fourth year schedule

- Demonstrated experience as an Undergraduate Research Assistantship (URA)
- Involvement in professional research

All of our URA position information is available online: [cs.uwaterloo.ca/ura](http://cs.uwaterloo.ca/ura)

For more information on the fast track option, visit [cs.uwaterloo.ca/future-graduate-students/applying-admissions](http://cs.uwaterloo.ca/future-graduate-students/applying-admissions).

### *Call Out For Volunteers For CS4U DAY*

Help students in grades 8-12 learn about computer science at Waterloo. Lectures and hands-on activities will be led by our talented faculty.

Event details:

Wednesday, December 4<sup>th</sup>, 2013, 7:30 am - 4:00 PM

Volunteers will receive a free CS t-shirt and lunch—20 volunteers are needed!

An volunteer orientation session will be taking place on Wednesday, November 27<sup>th</sup> from 4:30 – 5:30 PM in DC 1304.

For more information, please contact Nick Murphy  
Email: [cs-ur-co@uwaterloo.ca](mailto:cs-ur-co@uwaterloo.ca)

## N Ways to Sell Your Soul

- Conduct an elaborate ritual to summon a crossroads demon and make a deal.
- Become an evil witch/wizard.
- Put up a posting on eBay.
- Work as a used car salesperson.
- Give your soul to a donut, then eat the donut to get it back. But it must be a donut with a hole in the middle, as that's what its purpose is.
- Seek out the Illuminati and join their prestigious ranks.
- Join Tumblr.
- Join *mathNEWS*.
- Come see me. We'll work out a deal.

Yours in soullessness,  
Shay Blair.

## Organize Your Time for Exams

When: Monday, November 25<sup>th</sup>, 2013, 7:00 – 9:00 PM  
Where: MC 2017

Do you have difficulty planning ahead for your exams? Do you find that you study really well for your first exam and the others do not get enough attention? If any of these statements describe you, come out to a workshop that will help you 'Organize Your Time for Exams'. You will learn how to make sufficient time to study for all of your exams, how to minimize your stress around planning for exams and how to create your own organizational study plan.

Please bring your exam schedule, as well as any important class materials you will need to create your study plan.

Riley Metzger

## Drop In Strategy Session: Get Prepped for Exams

When: Monday, November 25<sup>th</sup>, 3:30 – 4:30 PM  
Where: Math Tutorial Centre, MC 4066/4067

Have questions about how to prepare for your exams more effectively? Want to improve your performance on exams?

Drop in for tips and tools to help you:

- Manage your study time more effectively
- Improve your problem solving skills
- Learn new test-taking strategies
- Decrease your test anxiety

Riley Metzger

## Dear Year 1 Students,

Did your mentor do an awesome job? Did they do something that made your transition from high school easier?

This term we are offering a mentoring award to three mentors who have gone above and beyond the call of duty. If you believe your mentors have gone above and beyond the call of duty, please email Aarthy Logeswaran [[aalogeswa@uwaterloo.ca](mailto:aalogeswa@uwaterloo.ca)] a short summary of how your mentor has improved your life by November 27<sup>th</sup> at 4:00 PM.

The award will be presented at the last mentoring event of the term, starting at 6:30 PM on December 2<sup>nd</sup>. More information will follow.

Best wishes on exams,  
Riley Metzger, Ana Freitas

## Interesting Math: Forecast Cones

Note to editors: There will be math formatting. I am sorry.

[Note to readers: No, there won't. -- ConvolutED]

Disclaimer: this article may or may not be interesting.

I wanted to write about Rob Ford this issue but, too many other people seem to be doing that so I will write some mildly interesting math. Specifically, how that ellipse stuff you learned in Linear Algebra II (Lin Alg II) has practical uses, and statistics!

This term I have been working with a predictive model, modelling the motion of icebergs. Since it is based on something real-world-y and physics-y, there are a LOT of different factors that influence the motion of an iceberg. It does not need to be an iceberg (although we all know that icebergs are cool), this method really applies to all models. The ensemble method is a method of running the model that runs the model 250 times, each with a slight variation on one of the influencing factors (in this case, wind speed, current, temperature, etc.) to output a "range" of potential end locations for this iceberg at each specified time step. The spatial average of these potential locations is taken as the average trajectory. This range, however, can be quite large but represents a 100% likelihood of where the iceberg will end up. Say that we are willing to focus on a smaller region with more uncertainty. How do we determine the region that has 75% probability of containing our iceberg at a given timestep? What shape is this region? We can answer these, and more, questions with math!

First, what can we say about the distribution of end locations from the model? Since we are only slightly perturbing the value that the variables should normally have, it's fair to assume that this has a normal distribution. So we can fit a confidence interval around it! (Remember STAT 231?) Except in this case, we can create a two-dimensional range of values (latitude and longitude), so we need a two-dimensional representation of the confidence interval. So we will use an ellipse. In some models (like for hurricanes) a circle is used instead of an ellipse, but it is the same thing really. The confidence region of a certain level is simply a region that contains a certain percentage of the

distribution. But with ellipses we get to do more math!

Remember the ellipses in Lin Alg II that had you scratching your head? I remember thinking: in what situation is it useful to find the eigenvalues and eigenvectors of a  $2 \times 2$  matrix and turn that into a matrix somehow? And then I found my answer.

In this case, our  $2 \times 2$  matrix is made up of the longitudinal variance (or variance in the x coordinate) and the latitudinal variance (variance in the y coordinate) on the main diagonal, with the covariance on the off-diagonal entries. This is called the covariance matrix, and it encodes the shape of the underlying distribution. Solving for the eigenvalues of this matrix, we obtain two values,  $\lambda$  and  $\mu$ , with  $\lambda > \mu$ . Using these values, we can obtain an equation for an ellipse from these simultaneous equations:

$$x = a \cos(\Theta) \cos(t) - b \sin(\Theta) \sin(t) + X$$

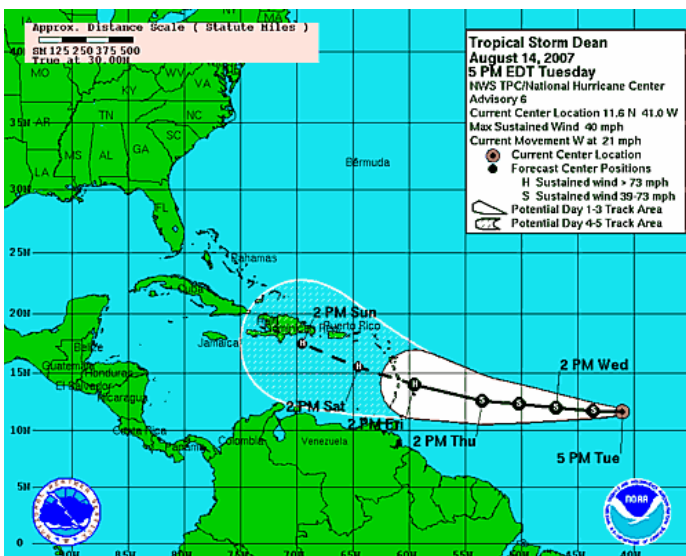
$$y = a \sin(\Theta) \cos(t) - b \cos(\Theta) \sin(t) + Y$$

where  $t$  runs from  $0$  to  $2\pi$ .  $X$  is the average  $x$  value and  $Y$  is the average  $y$  value.  $a$  and  $b$  are the square roots of the two eigenvalues ( $a = \sqrt{\lambda}$  and  $b = \sqrt{\mu}$ ).  $\Theta$  is the angle between the positive  $x$ -axis and the semi-major axis of the ellipse (no room in modeling for any of them fancy ellipses parallel to axes and whatnot).  $\Theta$  can be found by calculating  $\arctan(v_2/v_1)$  where  $[v_1 \ v_2]$  is the eigenvector associated with the eigenvalue  $\lambda$ . Essentially, the ellipse is the same angle from the positive  $x$ -axis as that eigenvector.

There you go. Linear algebra is useful, no? You now have a confidence ellipse corresponding to one standard deviation (39%). What if you want another level of confidence, say 60%? To do that, you use something else that I never thought I'd use after STAT 231: Chi-squared Distributions. The scaling factors for  $a$  and  $b$  come from the Chi-squared Distribution with 2 degrees of freedom. Once you have an ellipse of the desired size for each time step, you take the region contained within these confidence ellipses as your forecast cone. Voilà! This is the tool used by forecasters to determine whether or not you should evacuate your house. Beautiful and scary.

If you want to want to learn more about forecast cones, specifically for hurricanes (the National Hurricane Center uses the slightly different method mentioned here), you can check out <http://www.nhc.noaa.gov/aboutcone.shtml>.

GingerBrED



## Greetings from Grad School, #4!

Hello again! I'm back, with a hopefully more upbeat first half of an article than last time, hah. This time around, I'll discuss some aspects of the department personnel, and then have a brief discussion on the topic of applications of ergodic theory (\*shudder\* 'Applications'? Such a dirty word...).

Recall I mentioned that your three key contacts in the math department will be your supervisor, your graduate advisor, and the graduate secretary. This is mostly true, but it doesn't mention the fact that there are other department staff whom it would be prudent to meet, examples of whom are the department administrator, the technology/systems administrator, and the chair of the department. These people will be able to help you learn the ropes, and begin to understand how and why things work the way they do. They've usually been there much longer than you will have been, and as they are intimately involved in the day-to-day goings-on of the department, they have a good idea of the state of affairs.

For example, suppose you're having troubles finding courses to take. Your grad advisor and supervisor should be your first contact points, so you go and talk to your advisor. It then turns out that people do talk, and the chair hears about a planned reading course through the grapevine from your advisor; he then attempts to see if he can gather enough interest in the course from the department to run the course as a full-fledged lecture course (because it works better administratively \*and\* for the students, since it helps balance the workload for a student in the class). This actually happened! Legit, no lies. Perhaps I see this more because the chair happens to be my fill-in supervisor this term, but who knows?

In another example, consider the fact that the department administrator can tell you about why the money situation is the way it is, and how being required to truthfully (or close to it) report your TA-ing hours is actually very, very important, or explain to you how the TA progression works, in terms of how you move from being a marker to a tutor to a full-fledged tutorial instructor. These are things that aren't clearly or explicitly stated at the beginning of your career as a grad student, and you either find them out on the fly, or you ask around; people are usually willing to answer questions if you ask them in a reasonable manner. So it pays off to get to know the various department personnel, faculty and staff alike; you'll never know where it could turn out to be quite handy.

Now, I've talked a fair bit about the abstract ergodic theory; can you use it for anything? Turns out, yes! It actually has some surprising usages in areas to which you wouldn't think it'd be applicable. Let's look at a neat example, on which I may give a talk sometime soon.

Number theory! Surprise. Let  $x$  be in the unit interval  $[0,1]$ . Then for any positive integer  $b$  strictly bigger than 1, we can write  $x$  in a base- $b$  representation:  $x = x_1 * b^{(-1)} + x_2 * b^{(-2)} + \dots$ , where  $x_i$  is in  $\{0, \dots, b-1\}$ . Call a number simply normal in base  $b$  if when you pick an arbitrary digit  $x_n$  in the representation, the probability of it being any specific digit from 0 to  $(b-1)$  is uniformly  $1/b$ . That is, the density of each number from 0 to  $b-1$  in the base  $b$  expansion of  $x$  is  $1/b$ . Some cheap examples, taking base  $b=2$ , is the number  $0.01010101\dots$ , or in base  $b=10$ ,  $0.11223344556677889900\dots$  However, we can generalize this; call a number simply normal if it is simply normal with respect to all bases  $b > 1$ . Furthermore, call a number normal in base  $b$  if instead of considering just single digits, we consider arbitrary finite strings  $w$  of letters in  $\{0, \dots, b-1\}$ , and we have that the density of the word in the string is  $1/b^{|w|}$ ; call it normal (or absolutely normal) if it is normal in all bases  $b > 1$ . We can talk about  $x$  outside of  $[0,1]$  by considering its fractional part, since its whole part will be finite, and we care about a limit.

Okay, so we have definitions. Does anything satisfy them? Well, it turns out that it's somewhat hard to exhibit normal numbers, and harder still to prove that a given number, even "nice" ones like  $\pi$ ,  $\sqrt{2}$ , or  $e$ , are normal. However, we have a theorem.

Theorem: (Borel Normal Number Theorem)

Almost every real number  $x$ , with respect to the Lebesgue measure, is normal.

Right, so that's pretty crazy. This means that a vast majority of the numbers on the real line have this property which seems ridiculously restrictive, since we can't write (m)any of them down. Notable numbers we do have are things like Champernowne's constants, for example  $C_{10} = 0.123456789101112131415\dots$ , which is normal... in base 10. Sierpinski, in 1916, gave an algorithm for determining an absolutely normal number; in 2002, Becher and Figueira gave a recursive algorithm for actually computing one. It runs in an absurd exponential time. Wow. Anyway, I'll leave the proof of the above theorem as an exercise, mostly because I should probably do it, too, and I haven't yet. Hint: Use the Birkhoff Ergodic Theorem. I think.

Aaaand that's it for this fortnight. Good luck with the end of November! You're almost there. Hell, I'm almost there, too, though I've got three different projects to do; hashtag grad student life, I guess? \*shrug\*

Scythe Marshall



## Weight Loss Revisited

Earlier in this term, I wrote an article broadly dealing with the challenges of changing your weight. Here I discuss my personal journey of losing 20 pounds in the past 3 months (I'm not done). I picked up at least 40 of those pounds over the course of second year. You may have noticed how I neglected to mention the problem of clothing changing sizes in the first article. I already have a vast store of smaller clothes that I held on to as a glimmer of hope of my more healthy sizes. You should note that I was already unhealthy before I gained those 40 pounds.

Let's start with the basics. To lose weight, you have only two ways to do it: eat less or exercise more. Eating less is generally the harder way to do it, but eating less and exercising is the most effective combination. Remember that exercise does not work if you eat enough to compensate for it. That is called muscle building, which, while good, is not weight loss but weight gain. Now follow the three hurdles that stand in everyone's way.

Hunger is the first hurdle to overcome. I could have slowly reduced my eating over a few weeks to get down to my goal net calories (-500), but I decided to just do it. The first week was awful. Constant hunger until my stomach shrank to a normal size. Then the sacrifices. Any high calorie foods that do not make me feel full are just not worth it. Feeling hungry should not happen when you eat the correct amount of food, so find foods that are filling. Everything fried and high fat dairy is mostly gone, but skim milk and yogurt. I do regret not eating more salad; my vitamin intake is little low and salad is very filling for almost no calories (except for dressings).

The second hurdle is increasing the net calorie deficit. It is unsafe to eat too much under your base metabolism, but you can exercise your net up. For me, the first step was taking steps... 40 minutes of them, each way to and from work. Unless the weather was absolutely horrible, I always walked. Depending on weight, a 40 minute walk will burn between 130 and 300 calories. Do that twice a day and you will put a pretty good dent in you weight without feeling hungry for it. I occasionally threw in a random P90X workout once or twice a week.

The third hurdle is the plateau. Regardless of plan, everyone plateaus and loses the weight loss momentum. The key is to appease your metabolism. A good strategy is that one day a week, do not be strict on yourself. Eat as much you burn, but do not over do it. If you hit a big plateau, then you need to re-evaluate. In my case, I did the math and I had lost enough weight that my body was managing to get by without expending much more than I was eating. To kick my metabolism into gear, I started doing hour long intense workouts 3 days a week in addition to my walking. I am eating more as a result but the daily net (-1000) calorie loss averages out.

I work hard, I play hard, I eat all-you-can-eat sushi twice in one day like any other person who makes stupid food decisions. Just a guy trying to fit back into his fat pants and then back out of them.

Element118

## Don't Be Caught With Your Pants Down

During your life span, you will find yourself in many different situations. Probably half of these situations, if not more, will be bad situations. One of these horrid situations happens anywhere: at home, at a restaurant, at a friend's house, at a partner's house, at a partner's parent's house, in public places, etc. The situation is when you are in the restroom, sitting on the toilet and there is no more toilet paper. Now this isn't a nightmare until you realize that there is no more toilet paper under the sink, or anywhere located in the bathroom. If you are in a public restroom, you are in a stall and you are all alone. The situation then becomes a nightmare, unless you're a person who doesn't care and just pulls up their pants and leaves the restroom (if you are such a person, please consider not doing this any more for your own hygiene). This nightmare happens when you travel, in your own home, in any public place, and anywhere else you can think of.

So, try to not catch yourself with your pants down. Make sure there is toilet paper in your bathroom and in the stall. Have a box of tissues in your bathroom from now on, so that you have options. If all else fails, carry around some tissue—one or two sheets will suffice. You don't need to carry around a box. When

travelling, definitely carry around some tissues, especially in foreign countries. Don't be me and when you're in Italy in a rare free bathroom (yeah normally you can't find free restrooms, you'd have to buy something in the store or restaurant) there is no toilet paper and you are **TOTALLY UNPREPARED AND STUCK!** Thankfully, I had a friend with me and she was like our mother on the trip: she had it all. I was saved.

Hopefully, by reading this you will now find yourself in this situation and you will be prepared. Instead of calling your friend in a train station stall, explaining the situation and asking them to come and help out (we were meeting at the train station – I did not drag them all the way there), when you were trying to impress some person you had a crush on. Fun times. So, always carry some tissue on you just in case! You never know when this will happen and you'll suffer from embarrassment and being called toilet \_\_\_ (enter your gender here). Don't be caught with your pants down!

Wolverine Panda