

math NEWS

Volume 126, Issue 4

Friday, October 31st, 2014



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lookAHEAD

mathNEWS

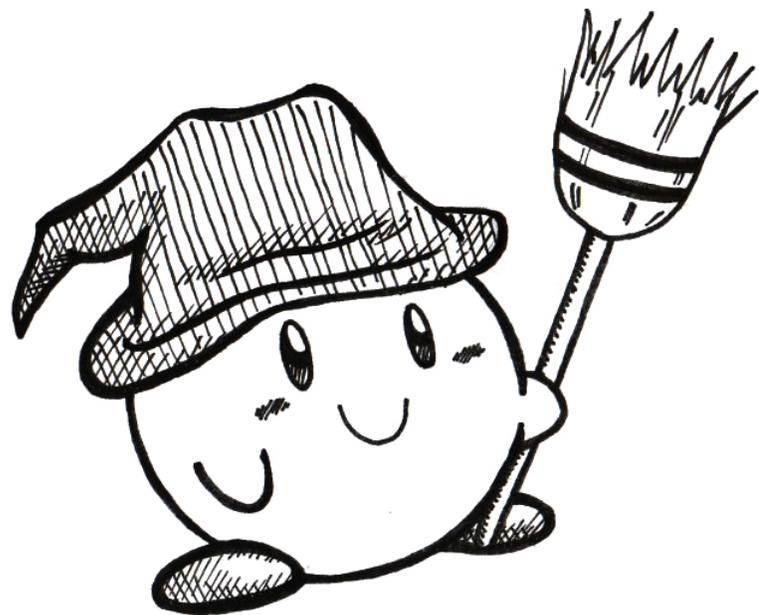
October 31	Issue 4 sends shivers down your spine
November 11	<i>mathNEWS</i> meets to seal your doom for Issue 5
November 14	Issue 5 speaks with such a screech

University

November 1	Fall Open House
November 14	Drop, penalty 1 period ends
November 15	Drop, penalty 2 period begins

Miscellaneous

October 26	Intersex Awareness Day
October 26	Asexual Awareness Week Begins
October 31	Hallowe'en
November 10	Aromantic Awareness Week Begins
November 11	Remembrance Day



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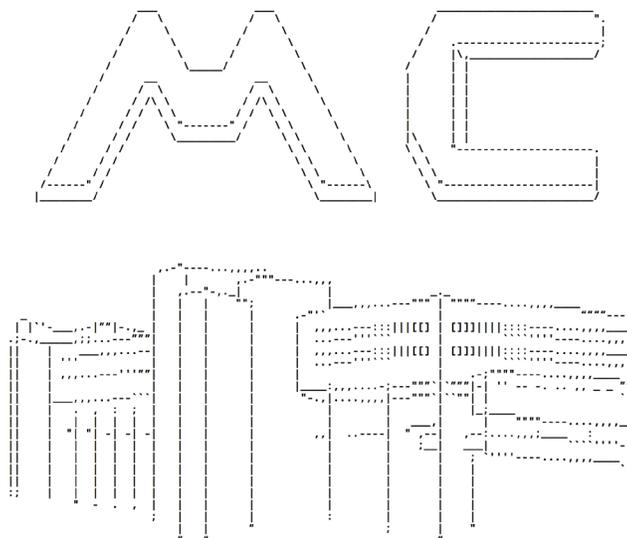
Amy Li (Vampire), Elizabeth Liu (Witch), Katherine Tu (Ghost), Rachel Wiens (Zombie), Jose-Miguel Velasco (Werewolf)

mastHEAD

The editors don't feel like writing anything for this issue's *mastHEAD*. Instead, look at the pretty ASCII rendition of the MC, or the cute Kirby dressed up as a witch! Wow!

“Who would you dress up for Halloween, and what as?”

Tubes Jr. (“In the fifth grade, I was broccoli?”); Wat Shaot (“I like trains.”); himynameis (“I would dress Tubes Jr. up as cauliflower.”); xoxo (“A penguin in a tux and top hat”); lp0onfire (“My coworkers, as abstract syntax trees”); bunniED (“A salad”); Tiny Thunder (“Johnny Depp, as all his roles, at once.”); MeaninglessQuips (“Rob Ford, as the abstract spirit of cooperation. Or a literal gravy train.”); MuffinED (“The Dean of Math as the University of Waterloo pew-pew lasers logo.”); Everything is Notsome (“Various representatives as assorted invertebrates.”); Ice Nine (“Danny DeVito as Yoda”); edogawa (“I'd dress up Rob Ford like a goose — that'd be a sight.”); Beyond Meta (“An alligator as a giant fluffy bunny.”); Zethar (“Yukari Yakumo. I don't think it matters what as, either it happens or I disappear in the *between*.”);



((- banana for scale

-JR

Fall Open House

Hey all,

We're fresh into the middle of autumn, the perfect time to get ready and excited for Fall Open House on Saturday, November 1st from 10AM–4PM in M3!

High school students will be on campus looking to learn more about computer science and what Waterloo has to offer. We're looking for volunteers to help set up booths, guide tours, and answer any questions families may have.

Volunteers will receive a free lunch and a t-shirt.

Feel free to e-mail me at cs-ur-co@uwaterloo.ca if you're interested in participating or have any questions.

Thanks,
Jonathan Tang

Office Gossip: F14 #4

Bookings

Did you know MathSoc offers useful bookings for clubs, societies, and other outside organizations? The following can all be booked, at little to no fee, to you or to your organizations:

1. Math Comfy
2. Math C&D (after the regular operating hours of the C&D)
3. A booth in the MC 3rd floor hallway
4. Projector
5. Portable Projector Screen
6. Karaoke Machine
7. Speakers
8. Cotton Candy Machine

Room bookings can be made by any MathSoc club, Feds club or outside organization as defined by University Policy 15, given proper authority. Equipment bookings can be made by any student in the Faculty of Mathematics. All booking requests must be made at least 48 hours prior to the booking's start and may be subject to a deposit, which will be reimbursed upon confirmation that the room or equipment was returned in clean and proper condition.

If you are interested in booking a room or equipment, please visit mathsoc.ca and click on the "Bookings" button on the home page. Note that you will be asked to sign in using your WatIAM credentials. If you are an outside organization and you do not have these credentials, please email vpo@mathsoc.uwaterloo.ca.

Darcy Alemany
MathSoc Office Services Manager

A Halloween Poem

T'was the night before Halloween, when all through the house,
Every creature was haunted, including the mouse!
The jack-o-lanterns were placed on the porch with care,
In hopes that trick-or-treaters soon would be there.

The children were dressed up in costume to their heads,
With visions of chips, chocolate, and candy threads!
The house being haunted, with plenty-a-trap,
May the children be wary, lest they encounter a zap!

Traversing the streets, bags brimming with candy,
Carrying extra bags, sure that they'll come in handy.
When from under the ground, the ghosts all spring out,
To spook and haunt children, make them scream and shout!

But the ghosts do not mean to scare, spook, or haunt,
Instead, just "a few pieces of candy" is all that they want.
And so, the children, with friends all around,
Bid their ghost friends goodbye, as they slink back into the ground.

WatShaot

Trick or Eat



VOLUNTEERS NEEDED!

Come out and join the fun!

For more info visit
feds.ca/foodbank



*A Federation
of Students' Service*

The New Who's Who of Municipal Politics

Unless you have been living under a rock, the election results, which have been out for a week, shouldn't surprise anyone. Nevertheless, here they are.

Dave Jaworsky will be Waterloo's new mayor, with 55% of the popular vote, beating out the next closest competition Erika Traub with 25%. The notably anti-LRT candidate Dave MacDonald came a close third with 17%.

Jeff Henry was re-elected for Ward 6, where UWaterloo is located, with a landslide of 86% of the vote. Wards 1 (Bob Mavin) and 7 (Melissa Durrell) were both acclaimed, leaving Ward 2 to Brian Bourke, Ward 3 to Angela Vieth, Ward 4 to Dianne Freeman, and Ward 5 to Mark Whaley.

In Kitchener, Berry Vrbanovic has won the mayorship with 61% of the popular vote, besting Daniel Glen-Graham with 27%. James Rhodes, a candidate who had withdrawn, also drew 1.4% of the vote. So much for folks paying attention to who is actually running. Doug Craig will continue as the mayor of Cambridge. With 53% of the vote, Craig was the only incumbent mayor running in the region's elections.

For regional chair, the big news is Ken Seiling winning the popular vote with 57%. This seats Seiling for another 4 years as chair. He has served in that position for the previous 29 years. This is a comfortable victory over Jay Aissa who only pulled 24% of the vote.

Jay Aissa's campaign hired a Mike Harris-era campaign manager, and was reported to have significantly outspent Seiling. However, there were many complaints about Aissa's campaign,

including robocalls, deceptive claims in TV adverts and even the threat of a lawsuit against a Facebook poster. Hopefully, this means that money is not sufficient to win in a Waterloo region election, and that bad policy or deceptive advertising don't help either. However, Jay Aissa still managed to pull a considerable number of votes, given other candidates all only managed to pull less than 5% each.

Councillors Sean Strickland and Jane Mitchell were selected by voters to represent Waterloo. Karen Redman, Tom Galloway, Wayne Wettlaufer, and Geoff Lorentz will represent Kitchener. Helen Jowett and Karl Keifer will represent Cambridge. Township mayors, who, along with the mayors of Waterloo, Cambridge, and Kitchener, also sit on a regional council that includes Sandy Shantz for Woolwich, Les Armstrong for Wilmot, Joe Nowak for Wellesley, and Sue Foxton for North Dumfries.

In an election that some have consider to be a referendum on LRT, it seems that LRT was thoroughly supported. Neither of the main anti-LRT candidates won, and both received less than 25% of the vote. However, this doesn't necessarily say anything about the support of LRT in our region; many may simply have realized that cancellation at this point would be very expensive, and while LRT may not have been the first choice for some, canceling out of spite is worse.

Other races that may be of interest to some: Toronto has a new mayor, John Tory. Bonnie Crombie will be Mississauga's next mayor. London also gets a new mayor with Matt Brown, who supported accelerating London's BRT transit project.

dbro

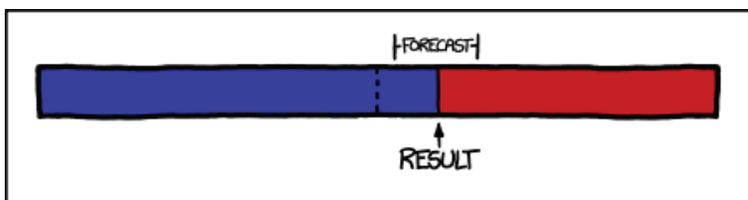
N Reasons Why You Should Be A Zombie

Join the horde. It's a no-brainer.

1. All the free hugs!
2. No fear of death.
3. You get to wear an awesome bandana.
4. Zombies are part of an inclusive community.
5. Humans are paranoid, stressed, and violent.

Beyond Meta

Fig. (Below.) From xkcd #1131.



BREAKING: TO SURPRISE OF PUNDITS, NUMBERS CONTINUE TO BE BEST SYSTEM FOR DETERMINING WHICH OF TWO THINGS IS LARGER.

N Distractingly Entertaining Subtitles From a Horror Movie

1. Strident, discordant violin music
2. Soft eerie soundscape
3. Eerie soundscape (which is very different)
4. Thunder like soundscape
5. Strange harsh soundscape
6. Demonic screeching
7. Demonic roaring
8. Dramatic percussive sound
9. Discordant percussive sound
10. Soft wind-like sound
11. Otherworldly screaming
12. Disembodied screaming

Yours in not settling for just "creepy music",
Shay Blair.

**Spooky scary skeletons
Send shivers down your spine**

Scheduling Algorithms

First, let's have a few definitions. Suppose we have a list of jobs. Each job has a release time, a deadline, and an execution time. Our problem is finding a schedule that assigns these jobs to a resource, which in some cases could be a processor. We cannot start a job before its release, and we must complete it before its deadline.

There's also a number of different variations to this problem. We may allow preemption, the execution of a job may be interrupted by some other job. Our jobs may have dependencies amongst each other. Our resource may have multiple processors.

To keep things simple in this article, we'll allow preemption, ignore any job dependencies, and consider a single-processor system.

Let's also try a more concrete example that we can all relate to: assignments. Assignments are released at certain times, have deadlines, and take some amount of time to complete. You are the resource, and we want to figure out what order you need to work on the assignments to ensure all of them are completed on time.

One of the simplest scheduling algorithms to understand is Earliest Deadline First (EDF). It's what you probably do with your assignments—tackle the assignment whose deadline is first. Interestingly enough, EDF is optimal. This means EDF will find a feasible schedule, if it exists. If no feasible schedule exists... well, we'll look at that later.

When I took CS 341 a number of years ago, we discussed EDF (in the context of greedy algorithms), and we saw an "exchange proof." The basic idea is that—

Unfortunately, a new job (assignment) was released and has a deadline earlier than the *mathNEWS* deadline. Therefore, by EDF, the job of writing this article has been preempted so I can work on my assignment.

notbob

bunniED

v126i3 Errata

Did you notice the *spo^ooky* formatting with the previous issue? I did, although most editors (wisely) choose not to look at the product of their labours after print, since all we can do at that point is mourn over our mistakes. Anyway, apparently that's what happens when you print a corrupt InDesign file.

Bad Math

Almost Always!

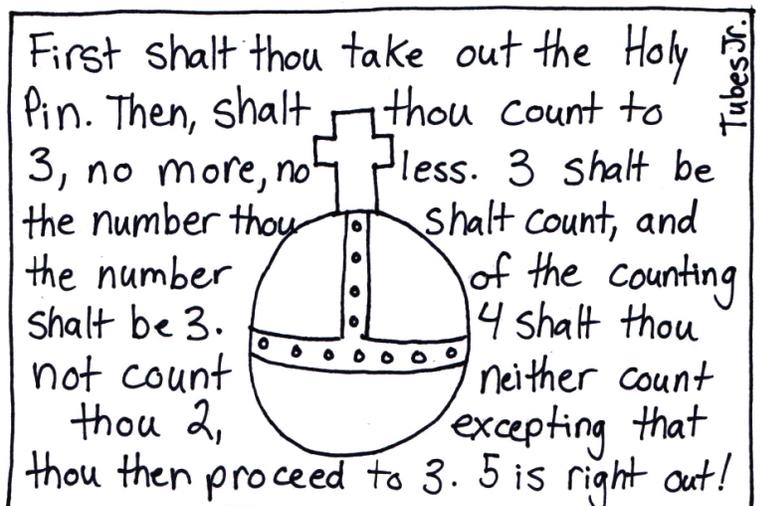
1. "Since π is a non-repeating non-terminating decimal, it contains every possible string of numbers!" If I had a penny for every time I heard this, I might be able to buy a Timbit. It is not actually known whether or not this is true. The property "Contains every possible finite string" is equivalent to "Contains every finite string with average frequency 'as expected'", and a number with this property is called "normal". Yes, there is *yet another* property called "normal". It is known that almost all numbers are normal, yet the only ones which have been exhibited are those explicitly constructed to be normal.
2. "A continuous function is one which you can draw." The converse of this is nearly true—any function which you can draw without lifting your pencil off the paper is continuous. However, there are many functions which are continuous yet cannot be drawn, such as $\sin(1/x)$ on $(0,1]$.
3. There is a class of numbers which cannot be written down (to some fixed precision). Almost every number is in this class and are called the computable numbers. Acting under the assumption that humans can be modeled by finite Turing machines, no human could possibly emit such a number.

MeaninglessQuips

Monty Python in Python

The Holy Hand Grenade of Antioch

```
def handGrenadeInstructions (countGiven):
    if countGiven == 1:
        return handGrenadeInstructions(2)
    elif countGiven == 2:
        return handGrenadeInstructions(5)
    elif countGiven == 3:
        print "BOOM!"
        return None
    elif countGiven == 5:
        print "3, sir!"
        return handGrenadeInstructions(3)
    else:
        return None
```



Spooky Mathematics

Seeing as it's Christm—I mean, Halloween^[1], it's the perfect time to elaborate on specific mathematical concepts which evoke ghoulish imagery! We shall discuss actual math which is scary, and not other math-related things which can terrify people. The main reason for this is that none of the following are really 'scary' in the sense of the word we shall be using: midterms, STAT 230, STAT 230 midterms, etc. (Hat tip to your-localWHETHERgirl for this.)

Before we begin, credit must go where credit is due; for providing a good overview of this topic, here credit is due to Mike from Spiked Math (spikedmath.com/461.html), who happens to be a UWaterloo Math alumnus! (If you're reading this: Hi Mike! You're awesome.)

Anyway, let's begin.

The Tombstone: Also known as the Halmos symbol, this is the symbol that a large number of mathematicians will put at the end of their proofs, to signify the end of the proof, in place of phrases/acronyms such as Q.E.D (*quod erat demonstrandum*) or 'as desired'. It can look like ■, though it can be an empty box as well.

One may insist the tombstone is used to put to rest any doubt that the conclusion of the argument is false. In this case, the tombstone should be much larger, and maybe include a date and an epitaph... On second thought, perhaps this is just the job of the title area of a paper.

The Monster Group: This is a huge group, usually denoted 'M', sometimes as F_1 , with order finite, but equal to:

$$2^{46} \cdot 3^{20} \cdot 5^9 \cdot 7^6 \cdot 11^2 \cdot 13^3 \cdot 17 \cdot 19 \cdot 23 \cdot 29 \cdot 31 \cdot 41 \cdot 47 \cdot 59 \cdot 71 \\ = 808,017,424,794,512,875,886,459,904,961,710,757,005,754,368,000,000,000.$$

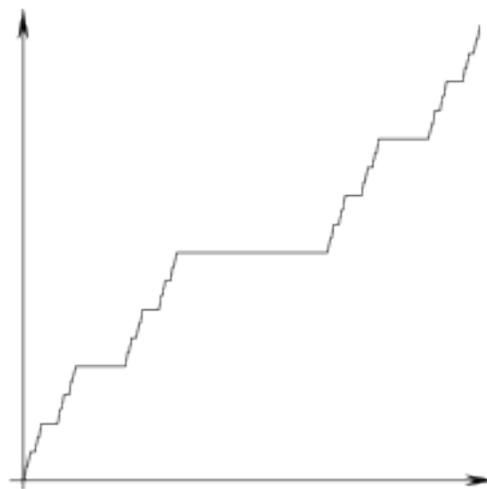
It is, indeed, a monster-sized group. In the classification of finite simple groups, it is the largest of the 26 sporadic groups, and it contains all but six of the other sporadic groups as subquotients. It was used to prove the so-called monstrous moonshine conjecture, utilizing a not-so-scary theorem first proved by some string theorists, the no-ghost theorem or the Goddard-Thorn theorem.

Scary stuff, though not quite as scary as seeing how long it takes to compute the Ackermann function applied with Graham's number in both parameters. Instead of Graham's number, maybe try numbers related to Harvey Friedman's work on Kruskal's theorem in the case of labelled trees, or whatever Wikipedia is talking about.



The Devil's Staircase: Remember (or keep your eyes peeled in MATH 135) that Cantor dealt a great deal with infinity and other crazy things like that. It shouldn't be too surprising that he has a set of real numbers named after him. The Cantor ternary set C is formed by taking the closed interval $[0,1]$ and removing the open middle third, then performing the same incision on the two remaining thirds, by removing the middle open intervals of length one-ninth, and continuing on *ad infinitum*.

We construct, very roughly, the Devil's Staircase function as follows. We first define a function f from $[0,1] \setminus C$ to $[0,1]$ which is constant on every removed set of intervals, call them G_n , with value specified by when the first 1 comes in the ternary expansion. It turns out f can extend to a continuous function g from $[0,1]$ to $[0,1]$. This g is the Devil's Staircase. It looks like this:



Certainly Satanic, of course. Only the Devil would create a function which fails to satisfy a version of the Fundamental Theorem of Calculus; to wit, it is sometimes called singular.

Frightened yet? Just wait until you run into the HvZ horde launching the end of game attack tonight. That's scary.

Scythe Marshall

^[1] $(31)_8 = 3*8 + 1*1 = 25 = 2*10 + 5*1 = (25)_{10}$; said another way, OCT 31 = DEC 25. We really just celebrate the same holiday twice, in the name of capitalism! And marketing! (I really hope that this isn't the only time this joke appears in this issue. Oh well.)



Mathematician Spotlight: Roger Penrose

In my new running column, I will focus on a mathematician, and discussing their work—and life, if it is relevant.

Sir Roger Penrose is an interesting figure. As a mathematical physicist, he has had massive influence in shaping the tale we tell of how the universe works. However, even though he has done wonderful work, he holds some strange views that would label him as a crank if he didn't have such work to back him up. Let's look at his accomplishments:

1. Made the Penrose triangle, and communicated back and forth with Escher on paradox images
2. Proved black holes could be created from collapsing stars via gravity, which now is taken for granted, but was only proved in the 1960s
3. Invented twistor theory, which has lead to developments in the theory of loop quantum gravity
4. Formulated the cosmic censorship hypothesis (really two separate hypotheses) whose main thrust is that the Big Bang is the only singularity not trapped behind an event horizon
5. Did work on aperiodic planar tilings, with one specific type becoming known as Penrose tilings

He produced a lot of great and fantastic math and physics; he and Stephen Hawking were jointly awarded the Wolf Prize in Physics in 1988. After 1980, it seems he drifted away from normal math and physics and wandered into the “weird”.

In 1989, he published a book for the layman called *The Emperor's New Mind* in which he put forward the proposal (previously proposed by philosopher John Lucas) that consciousness requires quantum effects to operate, and as such is not an algorithmic process. This is rather atypical and against the general standard mishmash most of us believe. The argument from this comes from an application of Gödel's Incompleteness Theorem to thought processes. There have been refinements to this idea occurring even up until this year of what he and others working with him call orchestrated objective reduction.

As far as I can tell, the basic gist of it seems to be implying that the brain acts not as a classical computer but as a quantum one. Which, well... seems too far-fetched. They are working on trying to show that microtubules within neurons can avoid decoherence, and it just seems like a giant mess. The talk pages on Wikipedia are filled with debate as to what the hell is even going on, what is truth, and what is fantasy.

Lots of very qualified mathematicians, computer scientists, physicists, and neurologists dispute his theories, Max Tegmark being one very notable one. It remains to be seen what comes of it. Supposedly, there was a publication in the *Physics of Life Review*, a journal with an impact factor of 9.4 about recent work done in a Japanese materials science lab that is supposed to have confirmed the hypothesis. I, however, have my doubts.

IceNine

N Signs Your House is Haunted By a Mathie

1. Writing mysteriously appears on your bathroom mirror. Upon closer examination, it turns out to be a series of half-solved math proofs.
2. Copies of *mathNEWS* start appearing in random spots.
3. You can never find your calculator when you need it.
4. Your socks disappear whenever it's Humans vs. Zombies time.
5. The ghost never leaves the house and seems to have appropriated your favourite faculty hoodie.
6. When you're being very quiet, you can hear whispering. If you listen closely, you can decipher bad math jokes told in binary code.
7. The pie you had prepared in anticipation of pi day disappears. The only hint it was ever there is the ridiculous amount of crumbs scattered around the house.
8. You receive warnings delivered along the lines of “you will be two minutes late for the bus, plus or minus one minute at 95% confidence”.
9. Your ties disappear, only to reappear the next day in varying shades of pink.
10. The leaves have been raked overnight into a nice bell curve on your driveway.

xoxo



Fig. (Above.) Inspired by
itsbirdyart.deviantart.com

profQUOTES

There are more than four this week!

"You have that 'midterm' thing on Tuesday..."

Roegiest, CS 246

"We're relying on the client to delete our object, and that's convention. And since it's convention, it won't be followed, because that's how conventions work... and we're lazy."

Roegiest, CS 246

"[C+ +] can provide friendship much easier than in real life."

Roegiest, CS 246

"I don't know. I'm not a spy. One of you could be a spy, but I know I'm not a spy. *You* don't know if I'm really a spy, because that's how spies work, but *I* know I'm not a spy, so it doesn't matter."

Roegiest, CS 246

"It's not that I'm bribing you with candy; I think I get tax benefits."

Ramezan, STAT 443

"I work next to a quiet zone... I hear SO MANY love stories."

Ramezan, STAT 443

"...and where does the auto in autocovenant come from? From a dealership!"

Ramezan, STAT 443

"Yes, it is bad for your health! So is statistics!"

Ramezan, STAT 443

"Can you tell this is quadratic? This is a test of sobriety."

Ramezan, STAT 443

Student: "How are you doing?"

Prof: "I'm okay." [*Eats candy.*] "Now I'm better."

Ramezan, STAT 443

"This is an upside-down triangle... Why do I call it upside-down? It's still a triangle."

Ramezan, STAT 443

"If you take a magnifying glass and see if [these two matrices] are different, you can't tell."

André, MATH 115

"Computers do quite well on this kind of computation. It doesn't bother them, apparently."

André, MATH 115

"Just like assignments, I don't care how much work you put into them, so long as you have a nice clear proof at the end for me."

Geelen, CO 342

"Tragically, [...] we will need to prove both cases. Fortunately, I can do one in class and assign the other for homework."

Geelen, CO 342

"I'm sure you're familiar with the proof technique I'll use here..."

[*Writes 'Exercise' on the board.*]

Geelen, CO 342

"Who has done Real Time? ... I know, it sounds like a prison sentence."

Buhr, CS 343

"This distributed system paper has a lot of authors across a lot of universities. It really is distributed!"

Boutaba, CS 856

"These polynomials generally have no redeeming social qualities. They have integer coefficients... and that's about the only thing that you can say about them."

Godsil, CS 249

[*About finding determinants.*] "Now, I don't expect you to find them by hand. I don't do them by hand, unless I'm sitting in a really boring lecture."

Godsil, CS 249

"And, because I'm lazy, the series I'm going to apply it to is 1. Why would I go for anything more complicated? You can try it in the privacy of your own home."

Godsil, CS 249

"Well, you let me define two linear maps, and you shouldn't have, because now I'm gonna define a third."

Godsil, CS 249

"Actually, I do think I know who introduced labeled graphs, but I can't do them any harm because they're dead."

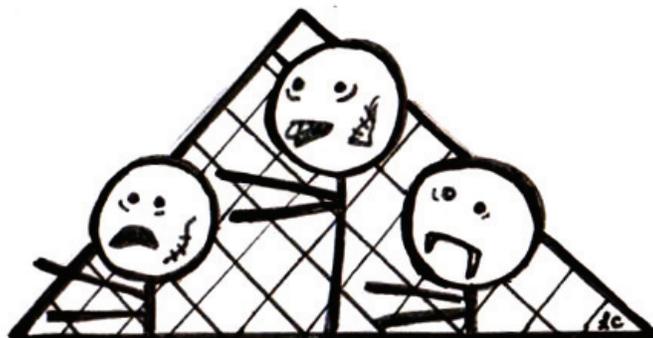
Godsil, CS 249

"So the point is, if you draw the right picture you can usually assure yourself that all is well... and it usually isn't."

Godsil, CS 249

[*Scribbles randomly.*] "So this could be a path... Actually, no, that's ridiculous." [*Scribbles slightly less randomly.*] "Okay, this could be a path from v to w ."

Godsil, CS 249



pythaGOREan theorem

theSMURF's Adventure In Comcast Land

Come tag along, boys and girls,
For a journey of woes and perils.
Recently, I moved to a city:
San Francisco; it smells so shitty.

In the great U.S. of A,
I use Comcast every day.
I had heard that they were bad,
But holy fuck, this is just sad.

What began as occasional slows
Became worse than the hobos.
One point eight mega-bits down,
Is this a joke, am I a clown?

Soon enough, the packets were dropping,
And poor Netflix was abruptly stopping.
"Fuck this shit!" I shouted with rage.
"What is this, the fucking stone age?"

When support was finally connected,
"Comcast, you suck," I objected.
"It's too bad your speed is under,"
Is he rubbing nipples, I wonder.

He first tries to blame my modem,
"I can prove it's fine," I told 'em.
tracert google.com I ran,
Sure enough, it wasn't my LAN.

"Look at this tracert," I said,
"On hop 9 it just drops dead.
My modem is running just fine,
The problem here ain't mine."

"I can make your modem good!"
Sigh, I don't think he understood.
It should be so plain to see.
Bro, do you know IP?

"Oh it must be Google's fault,
So many users, it grinds to a halt!"
Another attempt at deflecting blame,
Dude, this is your domain name.

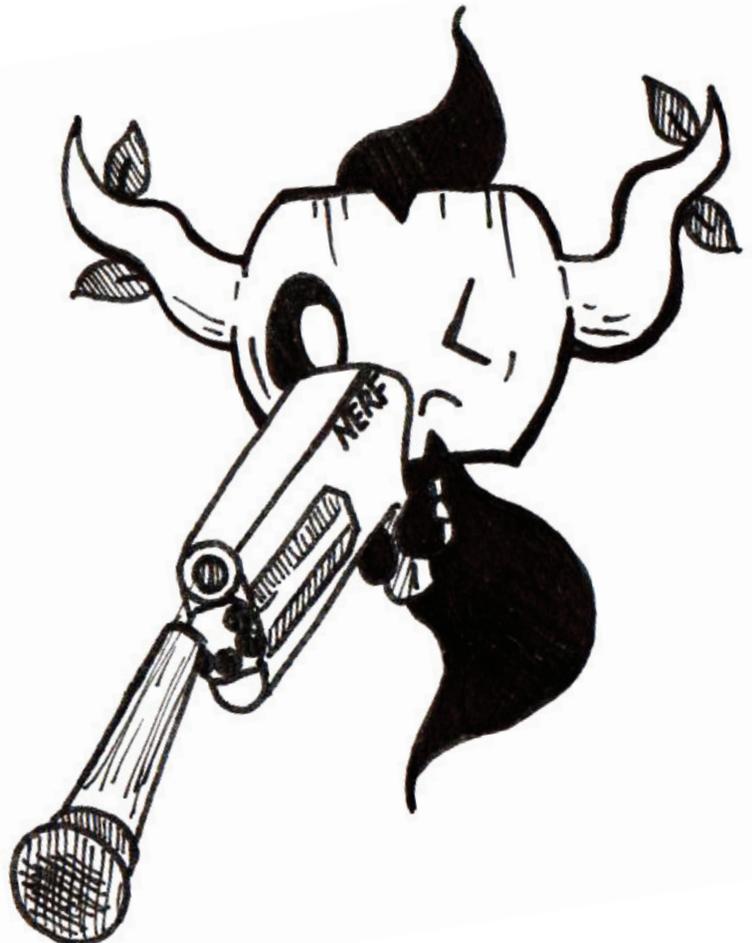
With great sadness I disconnected.
I doubt the issue will be corrected.
So here I sit, as I slowly wait,
For my porn to load, so I can 'bate.

theSMURF

Trick or Treat?

Trick.

TooCheapForCandy



A Date with the Dean: Finale

MuffinED: Given that jobs in industry have a lot more emphasis on computer jobs now, for non-CS majors, it's still very difficult to take CS courses—so, given that the workplace is working more and more towards people with computer skills, what is the Faculty of Math's response?

Ian: My observation is that there are jobs for people in coding and analysis—those are pretty hard-core jobs. There's an awful lot of jobs where basic computing skills are all that's required. In fact, part of requiring communication skills too for all of our students is the mantra that's been chanted at me from every business person that I've met. I put on my suit and tie uniform and I meet some CEO about students and the faculty, and they all say reasonably similar versions of, "Your students are fantastically brilliant and great with analytic skills." And then there's often a "but" about softer skills like communication or teamwork, which isn't meant to be a knock. I don't take it as a knock—because you're always going to be better at something than something else. But it's absolutely clear that you don't need to know hard-core computer science to have a great job. You don't have to be a back-room analytics person to work in the analytic ends of business.

We have differential fees for computer science courses, and we have an awful lot of computer science majors, and limited space, and we have a hiring freeze—we can't expand that quickly to hire professors. We really do want to hire the best professors, and we can't ramp up quickly in anything that we do because we might not hire the very best people. It's just a very hard game that we're in.

I don't think that it's so hard for people to get jobs on the edge of software. But what I think is best about our students, and what has been true for forty years since I've been here, but moreso now, is that we've got really enumerate people who are never afraid of any formula or any software. That's true of people whether they're computer science majors or not. That's my observation—it might be naive. I often, when talking to people who are having trouble getting jobs, find aspects of what they've done or attributes of them that maybe also seem to get in

the way. But it might be impolite to tell them. I also observed, with respect to communication skills—I was for tens of years an undergraduate advisor before I was Dean or Chair—the students who most need an attribute are often the least likely to take one's advice to go and get that. I think, for instance, taking one's electives—with economics, business, English, or various other types of skills—are really useful things to do. I know a lot of students, in my experience, to have fled those as well.

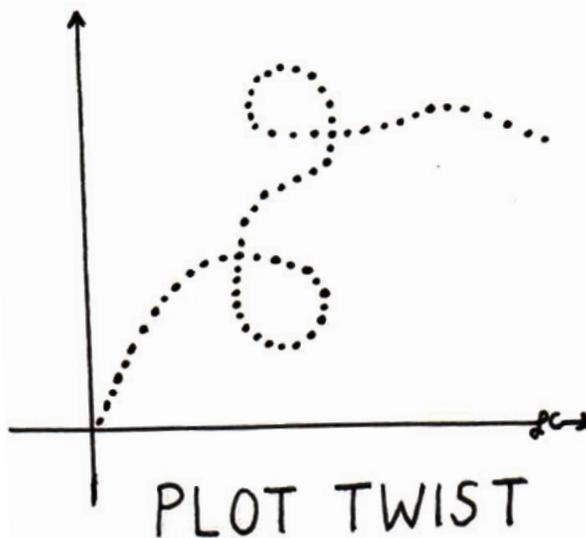
We just have a very large supply of computer science majors—if they pass, if they get good grades, of course they continue to be computer science majors—we have a limited supply of professors and rooms. We try to keep them in match, but we don't have a lot of overflow or surplus. We're working on our computer science courses for non-majors actively in the school.

We also, for ever more, have a core in the faculty that I really believe in. A pure math student says, "I don't want to take statistics or computer science!" Well, they all have to take statistics and computer science and probability. And computer science students say, "I don't want to do anything but code!" But they have to take calculus and algebra and probability and statistics. I think that's good for us and always has been. When we're in three separate buildings, it helps build bridges, metaphorically and actually, both for our students and our faculty members. I think that what the outside world sees from our students is that the internal differences that we feel between our computer science majors and even a math-business major really are not big differences. Every student here is taking at least twenty math major courses. That's a major number. Think of BComm, you might take baby calculus and cookbook statistics and an Excel spreadsheet course. I'm quite convinced, over time, that our employers see our students, when they're not hard-core coding development jobs, they see our students much more analytic, software-end. And there's a lot of people doing those jobs. When I heard the alumni panels talking to students—we had one for Women in Computer Science a year and a half ago or so—their big observation was if you didn't want to be a coder for life, you had to have these other skills.

Short Waterloo Horror Stories

1. Geese.
2. No more mathNEWS issues.
3. JobMine.
4. Midterms printed on legal-size paper but written in lecture halls with tiny flip tables.
5. Any midterm, really.
6. Getting your midterm grades back.
7. Arithmetic mistakes when reducing matrices.
8. 8:30 classes.
9. 3-hour lectures.
10. Back-to-back lectures in RCH and Optometry.
11. Engineers during Hell Week.
12. Getting lost in Hagey Hall. [Or PAS!—wibbled]
13. No WiFi.

xoxo



A Date with the Dean: Finale for Real

SketchED: One last question, since we are *mathNEWS*, and I'm a big fan of *mathNEWS*, and I'm an editor of *mathNEWS*...

Ian: And you're the sketchiest editor of *mathNEWS*.

SketchED: That's not true... Probably. What are your thoughts on *mathNEWS* from the past—how you remember it from back then—and its current state, and possibly the future of *mathNEWS*?

Ian: I think: Long live *mathNEWS*!

Maybe you'll have to give into the online thing. And maybe that's what you should do—I don't know, I have no comment on it—but I think it's really cool to have a tactile thing, to get a dozen pages Friday morning. It's a tradition. It's a physical object that my alumni people take out, that I take out, when we go visit alums out there. It's the one piece that they don't throw out immediately when they get it, and they're actually interested in it, and they open it and smile. It's *mathNEWS*.

The fact that it's not just isomorphic, but almost identical to what they remember is really cool to them. I've been here for 42 years—it's a heck of a thing. That kind of timelessness is kind of nice. Being physically there, appearing in the hallways Friday morning—I guess it used to be that, famously, people stayed up late all Monday night, Lord knows what they did in those rooms—it's always the same. Sometimes there are articles that are ruder than others, sometimes there's some stupid stuff, sometimes there's some clever stuff, sometimes they go through a round of different puzzles and that; they always have *profQUOTES*. So I can tell you that people who were here fifty years ago, or forty years ago, thirty years ago, maybe twenty years ago—they open their *mathNEWS*, big grin on their face, and they look at *profQUOTES*.

I think it's really good. I don't know if you feel pressure or not to exist in your current form—I hope not.

At the end of the day, though, is it not the case that you want to get stuff out Friday morning for students who have got their Friday morning classes, and you're happier than heck when your piles of *mathNEWS* are gone early in the day. Is that fair?

SketchED: Yes, it's always fun watching people get copies of *mathNEWS*.

Ian: My assistant Allison usually gets one of whatever colour it is—I like the different colours, that's cool. We have one sitting on my table every week that Allison gets it.

SketchED: So what's your favourite article?

Ian: No idea. I basically scan the *profQUOTES*, and just have a look at it, and don't worry about it. Do I read the Globe and Mail? No, I'm just an illiterate son of a gun.

N Things You Should Not Be For Halloween

There are a lot of options for costumes these days, but for the most part, a lot of people who like dressing up for Halloween seem to arrive at the same costume ideas even though there's a plethora of possibilities available to the world.

Here's a quick list of things that are mainstream enough to be over-used and too common. If you want to stand out, don't be any of these things!

1. Miley Cyrus. Yes, she's an artist who created the "Hannah Montana" persona and a bunch of other top 40 tracks that DJs at clubs still play way too often. And yes, her style is quite eccentric. This doesn't mean anyone, under any circumstance, should be "dressing up" as her because, and let's be real here, nobody can "twerk it" better than the original.
2. Memes or old references from anything before 2014. Let's try to stay relevant and in the present, OK, folks?
3. Any superhero, ever. You're not doing anyone any favours by showing up at your friend's halloween party as Wolverine or Batman!
4. Zombie. This one should be obvious—as long as HvZ is being played on campus, dressing up as a zombie is a good way to get shot at by the Human Nerf Warrior Crew. Also, it's so common, and so easy to do, where's the challenge in making something unique?
5. Vampires. Similar reason to zombie, but it's just so overused that it doesn't really make sense to do this anymore. There's nothing really unique or glorious about being a vampire these days, unless you're going to a spooky-themed party.
6. Controversial or questionable stereotypes—let's just keep things that could offend people behind closed doors. Instead, keep costumes neutrally-oriented!
7. Any kind of law enforcement. This specifically has been overused so much that it was even on this list for "most overused costume" back in the 90s! Good luck being unique when wearing a 20-year-old fad!
8. Blackface, or Whiteface, or Yellowface, or whatever the heck people do when they dress up as another race. John Oliver said this once in his weekly special already, but it needs to be re-iterated. Dressing up as other races, when you have so much available to you to dress up as – why is this still a thing?

If you want to be unique, or just make something really challenging, fun, or awesome, be an obscure or non-major character from your favourite anime, video game, or TV show! Make yourself stand out, and make your Halloween exciting!

Try not to spook too many people this year,
waistcoat

How Many *mathNEWS* Writers Does It Take To Order 6 Pizzas?

More than 4, apparently.

The Legend of Korra The Game The Review

Revengeance Solves Everything

TL;DR: Short, Cheap, Hard, Fun.

When I first heard Platinum Games (makers of Bayonetta and Vanquish) was making a Korra game, I was excited. Hearing it was a \$15 downloadable for the major consoles (360, Xbox One, PS3/4, and PC), I was a little less excited. Was this a cash grab by Nickelodeon and Activision, or was it going to be a great game with deep combat and a deeper story where you get to realize the power of the Avatar, master of all four elements?

Story: This was certainly the weakest part. It felt like a random episode from the worst seasons of Avatar/Korra. It takes place after season 2, but before season 3 when things started getting good. It has some interesting elements, but doesn't jive with the game. It's just kind of there. I think it started as an episode, was scrapped, and made its way here. With hardly any appearances from the major players except Korra, it lacks the depth of character we come to know and love. Clocking in at under 6 hours on Normal difficulty, it's also very short.

Visuals: They look great. I played on my PC, and with my fairly dated hardware I was able to happily pull 60 frames with the rare drop to 40, on "max" settings (there were only two). They use a cellshaded style that makes it cartoony. The enemies and Korra look great both standing and moving, and the set pieces feel like they're lifted out of the show. Sadly, the sets are really empty and lifeless. On the other hand, bending looks great, each style really coming alive on screen. Cutscenes are either in-engine or 2D cartoons done in the style of the show. Both work fairly well, but something feels off to me about the cartoons.

Audio: Soundtrack straight from the series, and voice actors are all returning. For some reason, the acting in the cartoon scenes felt a lot more jilted and awkward than in-engine or in-game. In-game, Korra feels very alive and vibrant.

Gameplay: This is the most important part. Legend of Korra is a "spectacle fighter" in the vein of Devil May Cry and Bayonetta. This means you fight groups of generic enemies, while trying to not get hit and use interesting combos. Using a 360 controller: you move with left stick, camera with right stick, jump with A, finish/taunt with B, light attack with X, heavy attack with Y, block with LT, dodge with RT, and cycle through elements with RB/LB. Combos are strings of light attacks followed by heavy attacks, and each element has their own unique strings. They

also have their own uses. Water is long range, earth breaks blocks and stun locks, fire is fast and moves you across the screen, and air has good area of effect.

Another interesting feature is the ability to charge up your attacks, generating chi for a short time. Lots of chi in an element makes that element go crazy. Water suddenly bounces around enemies, earth summons crushing boulders, fire sends you flying across the screen, and air fills the screen with tornadoes. It feels amazing—smoothly switching between elements and their combos—one second pegging a guy with some water, only to zoom into his face with fire, then breaking his block with earth. Sadly, it took me 6 hours to get there, beating the Normal mode (where you spend most of the time trying to regain your bending one by one) and playing again on Extreme.

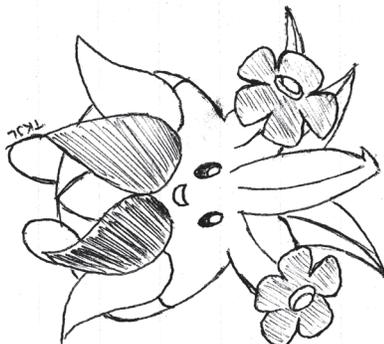
Enemies are ultimately bland: 3 kinds of chi blockers, a member of each element in the triads, a mechatank miniboss, and a few dark spirits. Not until Extreme mode do they behave intelligently, and actually chi block, temporarily disabling an element for a period. Dodging and blocking attacks becomes even more important than before, and it was really important in Normal. I died a few times thinking I could just earth-spam a miniboss. Don't do that.

The fighting is broken up by some minor exploration, platforming, and a really annoying Temple Run-style thing on Naga. Fuck those parts. I hated the missile in Bayonetta, and I hate this. It's a waste of my time, and the South Pole level on Extreme is brutal and I ragequit too many times to count. After beating the game once, you also unlock a pro-bending mode which I frankly found tedious and boring, and much too easy on anything but the hardest difficulty. I was hoping it would be multiplayer of some form, but it sadly isn't on any system.

Final Thoughts: If, like me, you are a fan of Platinum Games and The Legend of Korra, and don't own a Wii U for that sweet Bayonetta 2 action, this is a reasonable purchase at \$15. If all of those aren't true, this probably isn't the game for you. I'd give it 10/10 IGN, but they only gave it a 4.2. Let's pick an arbitrary but mediocre number and say 6.7/10.

Let Go of your Earthly Tethers,
Guru Laghima

Fig. (Right, sideways.)
Inspired by
itsbirdyart.
deviantart.
com



**Spooky scary skeletons
Speak with such a screech
You'll shake and shudder
in surprise when you hear
these zombies shriek**

Mathematical Puzzle

Halloween is upon us, and in the spirit of the holiday, this week's puzzle will involve some delicious and deadly chocolates. Suppose you and $n-1$ friends acquired a spooky block of chocolate in the shape of an n -dimension rectangle with positive integer side lengths i, j, k, \dots , etc. If this is difficult to visualise, we will explain with diagrams in 3-dimensions with 3 players and diagrams (see figure 1).

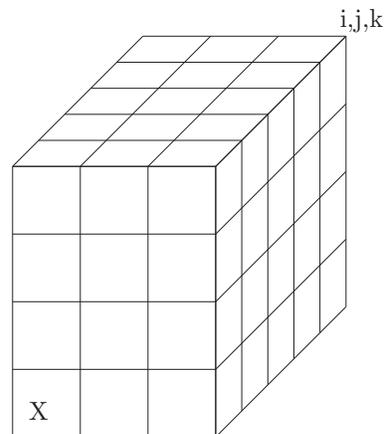


Figure 1.

Now with any Halloween candy, the treat comes with a trick. In the 3 player toy example, the unit cube at the origin is poisoned. Starting from the corner at (i,j,k) , each player in turn takes some positive amount of chocolate by drawing a discrete rectangular prism from that corner and taking all the chocolate enclosed in that volume. (See Figure 1.)

In an n -player game with $n > 3$, each player takes some positive amount of chocolate by drawing a discrete rectangular prism of n -dimensions from the corner of dimensions (i, j, k, \dots) , etc, the corner opposite of the poisoned unit hypercube, and taking all the chocolate enclosed in that volume.

Of course, the person who takes the poisoned chocolate (marked with an "X") loses. A player wins if they can force the player whose turn order is after them to take that poisoned piece of chocolate. A player gets second place if they don't take the poisoned chocolate, and the player whose turn order is after them wins. Generalizing, in an n -player game, a player gets i -th place if they don't take the poisoned chocolate and the player whose turn order is after them gets $(i+1)$ th place.

Each player plays perfectly logically, with the preference of $1^{st} > 2^{nd} > 3^{rd} > 4^{th} > \dots > lose$.

Assuming you have nothing better to do on Halloween than to play this game with a group of logician friends, and you would like to win, what should be your turn order in an n -dimensional, n -player game?

Also, the entries for the 2 previously published puzzles before were regrettably lost before I was able to look at them. Thus, this week we are also calling for submissions for the two previous puzzles in the Sept 19th and Oct 3rd issue of 2014. The person who submits the most complete solution to a puzzle will be awarded a \$5 C&D gift card. *Please submit to mathnews@gmail.com*. One \$5 gift card max may be claimed per person. Happy mathing!

edogawa

n Things To Dress Up As On Halloween

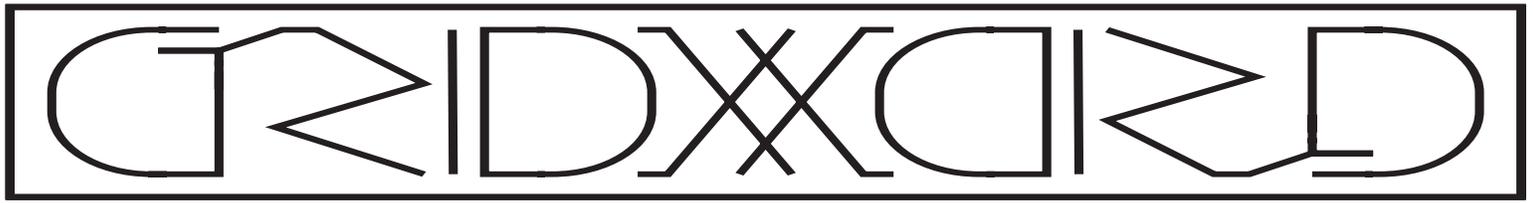
1. Humans
2. Zombies
3. Humans vs. Zombies
4. Humans vs. Plants vs. Zombies
5. A small child
6. A large child
7. A moderately sized child, not too big but not too small
8. Your roommate
9. A 16th century pirate
10. A 21st century pirate
11. A LoL character
12. A Lolcat
13. The number 13
14. A *mathNEWS* writer [Or editor.—wibbled]
15. Someone who has not received free pizza this week [Those unfortunate souls.—wibbled]

ertai87

**Spooky scary skeletons
Shout startling shrilly screams**

Last Week's gridSOLUTION:

D	E	S		N	R	E	L	S		N	N	Y	W
E	S	E	L	O	I	N	N	E		V	I	R	A
L	V	E	V	I	L	C	V	C		R	V	C	S
S	E	T	V	K	S		V	L	U	T	V	S	
			E	L	V		S	V	P	G			
E	P	O	T	E	V	N	E		S	M	V	E	R
L	L	I			N	E	D	E		E	I	E	E
Y	V	D	G	N	I	V	I	G	S	K	N	V	H
T	C	U	R	E		E	B	N	U			T	S
S	S	V	A	S	H	S		V	I	B	R	U	B
			B	C	D	V		B	M	O	T		
	E	N	O	T	E	C	V		U	T	I	K	V
Y	D	O	T		E	C	N	V	L		S	E	E
E	R	U	E		R	E	I	O		N	V	E	L
K	I	O			B	U	R	C		I	W	I	K



gridCOMMENTS

Cairngorm Rorqual

Eight out of ten submissions were perfect—sorry, Adrian (COLOMBUS) and Grant (OTTO BURG)! I got some great suggestions for what I should be for Halloween (last issue's *gridQUESTION*), like Sharon's "drunk" (aren't I always?) or Kevin's "smudgy Jesus" (I didn't know about this before!). Jasmine suggested "a turtle with an island on its back"—a Majora's Mask reference? Ramesh went for a "sexy Dr. Robotnik"—unfortunately, I'm not a Sonic fan. But speaking of eggs, Micca proposed I be "an egg donor"! I'm not sure that'd be apparent. Even harder to embody would be David's "rm -rf /". As for Clyde: it is *i*, not *I*, which is *a*, not *the*, square root of -1 . Along those lines, Kai's "the identity matrix" was the cleverest. So congratulations, Kai! You may pick up your prize at MathSoc.

Submit your solutions to the **BLACK BOX** (by the Comfy Lounge on floor 3 of MC) by 18:30 on Monday, November 10th. Include your name and your answer to this issue's *gridQUESTION*—the best one decides the winner (of a \$5 C&D gift card) in the event of a tie: "Where are my keys?"

Cheers,
unit

P.S. I'm actually dressing up as Robin Hood for Halloween. Not sure what "I" is going as, though.

This Week's Grid:

1	2	3	4	5	6	7	8	9	10	11	12	13
14				15					16			
17				18					19			
20				21	22			23				
			24	25			26					
27	28	29					30			31	32	
33						34				35		36
37					38				39			
40				41	42			43	44			
	45		46				47					
			48			49						
50	51	52			53			54		55	56	57
58				59				60		61		
62				63						64		
65				66						67		

gridCLUES

Across:

1. My teddy bear's name
5. Apropos of
10. Fibre from the inner bark
14. Romanian gymnast
15. Honing hide
16. Voice type
17. Med school test
18. Gets ready
19. Erebor, to Smaug
20. French fort?
22. Answer abbr.
23. Black and blue go-with
24. Relating to division by area
26. "Who ___ you?"
27. Morgoth's satellite
33. Jets forth
34. Advanced
35. ___ and downs
37. E.g. Spartan
38. Milliner's making
39. Ten fen
40. Fingering notation
41. Feathered glory
43. Paint upon wet plaster
45. Today's tagline
48. Loll
49. Lower a sail swiftly
50. ___ of the Loom
53. Morse "E"
54. Choose
58. Lost
59. Covey member
61. Hawaiian party
62. Some say "awnt"
63. Ruffle the feathers
64. Long ago
65. Woven metal
66. Legal "mean"
67. Decomposes

Down:

1. Something you should not say on a plane
2. Strange, to Scots
3. Dandy
4. Super sere
5. Poor venomous fool
6. Cook or Davis
7. Béatrice Martin and France Daigle
8. Like "uh-oh"
9. Rock, paper, scissors
10. Filter-feeding (of whales)
11. Axillary
12. What a spoon must do
13. Whig rival
21. Wondrous and secret
23. White rind cheese
25. F F F
26. Equip for battle
27. Law school test
28. Queen of all media
29. Cuban dance
30. Ingest
31. Misleading mantle
32. "Only an hour's drive away if your car could go straight upwards"
36. Anon
38. Triumphant exclamation
39. Diamond-dicer
41. Meat-cooking rod
42. Train track triangle
43. ___ shot
44. Map flower?
46. Column bottom
47. Topical preparation
50. Follows "flim"
51. Debauchee
52. Sad pots
53. Arrakis
55. €
56. Lob a lure
57. Disapproves, denti-alveolarly
59. Cable TV encoding format
60. KOH or NaOH

