math NEWS

Volume 131, Issue 6 *Friday, July 22th, 2016*

Here Come Dat News

O Shit What Up

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*look*AHEAD

***math*NEWS**	
July 19	***math*NEWS** was taken over in a coup
July 22	shadowED annexes Issue 6

MathSoc	
July 22	Pi Day

University	
July 25	Make-up day (Monday schedule)
July 26	Make-up day (Friday schedule)
July 26	Last day of lectures
August 2-13	Exam period
August 12–14	Computational Rhetoric Workshop
September 21	Official grades available on Quest

Miscellaneous	
July 30	National dance day
August 1	Civic holiday
August 3	National watermelon day

Article of the Issue

Choosing the Article of the Issue for v131i6 was going to be a very difficult decision until we found an old D20 lying around. We assigned each submitted article a corresponding number and rolled the die. Unfortunately, after reading the article each time, we decided it was unworthy of a prize for a font of reasons. Perhaps we shouldn't have done the layout in Comic Sans.

After resolving that issue, we have decided to designate "A Volunteer Grad Student's Perspective on CUMC 2016" by Scythe Marshall as the Article of the Issue for v131i6. In fact, your contributions over the past year have all been top-notch. You can pick up your prize at the *math*NEWS office or have an equivalent-value *math*NEWS subscription mailed to you.

The Editors

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Founded 1973

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Zishen Qu (Instinct)
Shaundalee Carvalho (Mystic)
Mark Karantayer (Valour)

*mast*HEAD

This week's *mast*HEAD is written by the same guy as the past two issues. Turns out I lied about never being a future editor as I am your editor this issue. Please deliver all complaints in the form of hat-mail to the BLACK BOX outside the MC Comfy.

I also hereby annouce my retirement as many term shadow editor and, with the publication of this issue, as an actual editor. Typically, retirement absolves editors of some of the legal responsibility that comes with being an editor so this is an odd situation that begs the question: who is responsible for the pseudo-scientific heresy that dwells within these pages? Probably undecidED and quizED. So, a warm welcome to you from me, shadowED.

Campus is in a bit of tizzy lately due to some stupid new app called Pokémon GO. Unsurprisingly, that means this week's *mast*HEAD poses a Pokémon GO question to our aspiring trainers and *math*NEWS writers: "How do you track Pokémon?"

Me ("Type: google.com, insert "How to track pokemon" in search bar, hit enter."); L3 ("A drone for every one!"); QED ("NORAD"); Soviet Canadian ("With a Geiger counter and an elephant gun"); Zethar ("Track? They're all frickin' beacons blinding passers-by in the Æther, it's not like you need *specialized* equipment for that."); undecidED ("I don't"); Formal Power Series ("Follow the crowd"); Beyond Meta ("Compile statistical data from other players"); tpot ("what's a pokemon?"); Diminutive Rex ("With a spreadsheet"); waldo@<3.LE-GASP.ca ("I don't. I have Neopets to take care of =) "

shadowED("See answer above by: undecidED")

Happy Pi Approximation Day!

Today is July 22nd, or in a different date format, 22/7. Because we like to find meaning in numbers out of context, and because we like to eat sweet things, we take this day to celebrate the classical approximation of pi by 22/7!

How can *you* celebrate? Have a piece of cake! Or some other pie-like delicacy. Though really, it doesn't have to actually be that much like pie; anything works, because a bad approximation of pi is still an approximation of pi. It's even better if it's homemade! But not if it takes you, literally, the whole day to make because you failed at realizing that your hand-held electric mixer couldn't beat a mixture intended to become whipped cream cheese fast enough and you had to have your aunt let you use her stand mixer. Cough.

By the way, if you hang around the third-floor of MC today, you might find a surprise. I mean, if MathSoc hasn't been usurped by those dastardly Tau-ists, that is.

3.142857142857... om nom nom nom.

Scythe Marshall

VPA Sez

Hello Mathies!

I have a few advocacy updates for you:

- MathSoc, in coalition with the other student societies, is working on making sure students are adequately supported by counselling services. If you have feedback, please fill out the survey here: http://goo.gl/forms/oH6FCJVcNsD-HVTIi2 (also posted on the Mathematics Society Facebook page).
- Public syllabuses are moving along smoothly, Dr. Furino has a plan to start getting syllabus' released and MathSoc is going to create a system to host them on our website (much like the Exam Bank).
- Expanding the textbook library is also going well, there will be a system to track in-demand textbooks and have certain textbooks ordered by the faculty! This will cut costs and increase the utility value of our library!
- Feedback on the PD1 Resume Rubric has been provided, and the revised rubric will appear in the near future.

I'm also looking into creating a student research publication, please contact me if you are interested in this! I will be speaking with other societies and publications in order to determine other interest and the feasibility of implementing this. Given that it is a discontinued service of MathSoc, we should be able to find a way to create this if the demand is there.

Please contact me if you are interested in working on the website, the above projects, or any other projects for MathSoc! My email is vpa@mathsoc.uwaterloo.ca and my office hours are usually TTh 11:30 AM–1:00 PM.

Thanks!

Tristan Potter
Vice President, Academic

Speed, Loops, Impossible Physics!

Welcome to Trackmania

If you want a fun, free time 'racing' with over the top feats of speed, perhaps you would like to play TrackMania. This game is ridiculous, the sheer amount of jumps, loops, and flips you will find would kill a human and destroy their car in real life, but you keep going at 200 km/h trying to turn around that corner without smashing into a wall or going flying off the track. Sometimes you are left flying through the air for a good 6 seconds. Altogether a fun time waster, where you are likely to keep playing to try and cut down your best time by just another second.

Soviet Canadian

mathNEWS Sez: "Write More Sez"

A Volunteer Grad Student's Perspective on CUMC 2016

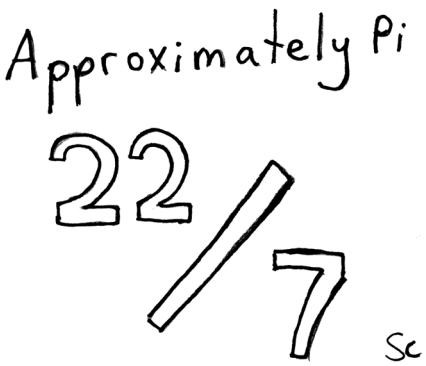
Last week, CUMC 2016 was at the University of Victoria! So naturally I was incredibly excited, because the two CUMC's that I attended were two of the best half-weeks of my life. Why not partially experience it again?

For reasons that I don't really understand, and that most people to whom I've talked also don't understand, I didn't attend any of the talks or keynotes. Seeing as I am indeed a graduate student, and the conference is for undergrads, I felt obligated not to do so. Feel free to submit hat-mail to the Black Box telling me why I'm an idiot! I did, however, participate in almost every event to which department members were invited. In particular, I volunteered at the department's info table for the graduate department, and talked to the conference participants about graduate school and the next steps in their education. I also joined them for the hike up a nearby hill, and made sure people didn't get hit by cars or block traffic too much! (Or get lost.) I got an ice cream bar for my troubles - totally worth it. (I didn't participate in the Gender Diversity in Math event.) We also tried flying a Sierpinski tetrahedron kite! It didn't work so well but that was okay.

Perhaps the most enjoyable part of last week, though, was seeing and talking with all of the talented and engaged undergraduate students in mathematics. It was wonderful to see such a vibrant group of people. In particular, it was great to see such a wonderful turnout from UWaterloo! You did not disappoint. (It was great to see a great turnout specifically from the *math*NEWS writers/artists/editor, too! quizED single-handedly ensured that my contribution to the publication will continue for as long as he's an editor, probably. It was also nice to see Beyond Meta again, amongst others.) Hopefully by the time you read this, you are over the jetlag.

If you didn't go to CUMC this year, and you have the opportunity to go in the future, please consider it! It is a fantastic experience for any mathematics student, and you'll start to see why the trope about math being a solitary endeavor is horribly, horribly incorrect.

Scythe Marshall



How to Stage a Successful Coup

Given the recent news of a coup attempt on the other side of the world, it is helpful to review the elements of a successful usurpation of power. Perhaps this might be helpful to the next (legitimate or not) leader of MathSoc.

1) Block/control all flows of information (including *mathNEWS*!): Nothing hurts a coup attempt more than having opposing views and movements communicate to the people and each other their plans of action. Whether it is TV, radio, or the Internet, all channels and avenues of expression must be suppressed or taken over, "for the good of the people", of course. If people can independently coordinate via Twitter or Facebook then this significantly reduces the success of the operation through propaganda. You don't want the current president getting his people onto the streets and squares before you can mobilize your factions. Shut down cell phone signals and ports - airports and seaports - while taking over the official broadcaster of the nation and ordering it to propagate your communications to the populace, including the imposition of a curfew. Stage outside demonstrations in your support and position the camera angles so as to show a mass of popular will for your coup.

2) Have some support among the common people: There needs to be at least a sizable section of society and political elites dissatisfied with the current state of affairs that you can draw legitimacy from. Even having a sliver of society not happy because they don't have their daily bread and their friends and family are unemployed is a good omen for a successful coup. Helping matters would be lack of electricity and basic utilities not working or sufficiently deteriorated so as to not be reliable. This would help form popular unrest at the ruling government.

3) Have some support among the brutes of the military class: In order to forcefully seize power you need to have officers—preferably among the high command—on your side. Having too many fresh faced privates and few generals is a recipe for failure. So make sure to gain an understanding among the senior commanders and high ranking officers prior to the coup attempt to ensure they're on your side. They would in turn direct their junior officers to follow their orders, which would mean a significant number of the military are under your command and ready to seize bridges, landmarks, and the capital.

4) Capture or eliminate your existing ruling rivals: It goes without saying that you need to eliminate those currently in power in order to grasp it. Thou shalt not kill, as it looks bad, so arrest them in the name of crimes against the people. Hold them for a show trial involving your own chosen judges and dismiss them to a remote island prison for life. Declare yourself maximum leader and appointed for an indefinite term—for the sake of the people—so that you can solidify your grip on power. Meanwhile, postpone sham elections as long as possible and even then, when you hold them, ensure you are the only viable candidate—and just for kicks, stuff the ballots.

5) Maintain the element of surprise: Surprise is your most potent weapon in carrying out the putsch. Catch your enemies flat-footed and on the defensive while seizing important landmarks and institutions. While those currently in power are figuring out what is going on—and trying to contact their associates—you are on the move and taking names.

6) Blame your problems on foreigners: Anything going wrong after your coup is the product of foreign plots and shadowy elements within society with ties to outsiders. Always be vague and conspiratorial while whipping up fear and hysteria. Exaggerate or make up facts and events to spur popular anger at your domestic political enemies. You might even stage a foreign intervention or two (EngSoc?) to distract from your domestic quarrels and direct attention abroad.

QED

Why You Should Apply for Conferences

Last week I was at the Canadian Undergraduate Math Conference (CUMC) and it was awesome. It was basically five days of non-stop math and socializing with intelligent and interesting people.

At CUMC there were an abundance of talks to attend. After going to a few talks that I had no idea what they were talking about I learned to only attend talks with the words "introducing" in them.

Some highlights were:

- How triangle discrimination is a serious issue that affects children.
- Don't let your history major roommate pack your bags.
- If you get drunk in space you will never return home.
- If we want to know if math is real we should ask aliens.
- Some sequences are more special than others.

I would definitely recommend the experience of attending a math conference to everyone. If you apply to MEF you can get the entire trip subsidized and it's an opportunity to visit cool places. I would also strongly encourage you to give a talk. I didn't give a talk as I didn't quite know what to expect. The one thing to keep in mind is: what may seem really trivial or a simple concept to you will be something really cool and new to someone else. At CUMC there were topics from all branches of mathematics delivered at a variety of depths. There was even a guy who sang a song.

The only bad thing I have to say about the conference was that the wifi at UVic didn't work outside which made it hard to get my Pokémon GO fix.

Oftentimes at university we get so busy taking courses and doing math because we have to, that we can forget the sheer joy that comes from doing math for the heck of it. Go attend a conference. It's fun, the university will likely pay for it, and you will meet amazing people and travel to new places. This has been one of the most fun vacations I have ever taken.

Beyond Meta

Dear New CS Student

Perhaps it's time to tell you why I don't plan on hiring lower year students.

Perhaps you have just finished your first co-op term or are just picking up an old issue of *math***NEWS** to see what the fuss is all about. Perhaps you were given this over-hyped publication as a critique of imprint or by someone making fun of shitty writing by incompetent authors.

Whatever the reason, you are here, reading this, in your beginning years of CS. That's right, years, because until the end of second year, you are no different than a General Math student. In fact, half of you are below the average and as Math students who can't figure that out, perhaps you should seek a simpler discipline.

But you, reader, are above the average! You have a briefcase full of qualifications, scholarships, and achievements. You made it into Waterloo CS with a 98% high school CAV / 5.0 GPA in AP classes / a place on CLG's backup team. Your first year grades are still above the curve. Sorry, but those are all useless measures of your skill here. The simple explanation is: everyone around you has the exact same numbers. First year is meant to equalize the odds and give the lower scorers second chances.

"But I have side projects!" cries the poor student, begging the Jobmine gods for an interview. Side projects allow an employer to quickly assess your capability and show motivation. Being proud of a garbage project shows that you know the formula for a job but don't have the brains to apply it correctly. "But my projects are great!" you protest, as I instruct you to read the previous sentence again.

At this point, you are laughing internally because everything you have read still doesn't apply to you and you know there are hundreds of poor CS students who suck that much. Your grades were great, you have a good job lined up, and the first year courses are easy. 50% of you will not be asked to return to your co-op jobs. The reason is, again, quite simple: your ego is too big. Every time you see someone else struggle or fail, you relish your advantage—your competitive edge—completely failing to realize the reality that those people are still the best CS talent the world has to offer. You will be co-workers with these people in the giant web of software devs someday. The ones with better jobs, happier lives, and brighter futures will be those who failed and learned from their mistakes, those who asked for help, and those who went out of their way to help others. If you were laughing at the start of this paragraph, here is your chance to be humble and learn from your mistake. I would take it if I were you.

This highlights an ever-increasing problem that I have observed each year, with every new batch of students. Three things are getting worse: the self-entitlement, the cheating, and the unwillingness to learn. Personally, I suspect that they are all symptoms of elitism that has been slowly growing amongst all the more technologically literate members of society, but that is just speculation. Regardless of cause, that UW CS degree that your are so vehemently seeking is having its value actively undermined by your peers—and possibly you.

In an industry where plenty of people make heaps of money with no fancy piece of paper, ask yourself: "If I did not need this piece of paper, I would not be here. So am I paying to make it worth less?" If you know the answer is "yes" then you are part of the problem and I look forward to crushing your ego in a job interview in the near future. Trust me—we can all see through your lies so do not waste our time. The consequences are less jobs for all UW students, and good luck finding a job competing against upper year students.

Employer, Realtimer, CS grad

Wait for It (Exams)

The Exam doesn't discriminate
Between the studied
And the fakes
It takes and it takes and it takes
And we keep writing anyway
We add and we erase
And we think
And we make our mistakes
And if there's a reason I haven't bailed
When so many have failed
Then I'm willing to wait for it
I'm willing to wait for it

A Tribute to Hamilton by Lin-Manuel Miranda

RightHandMan

New Dating App Surges In Popularity

This past month a dating app was released that had quickly risen to the top of the market. This revolutionary new app takes the unconventional approach of making people connect organically in real life. These encounters have low expectations which reduce the stress and awkwardness that goes with most dating apps.

The other neat thing about this app is that it is fun to use even if you don't get any dates. A lot of other dating apps can be a chore, requiring a lot of effort and little return. The app also encourages people to exercise. And, if at the end of day, Pokémon GO doesn't help you catch someone's heart, you can still catch that Pikachu.

Beyond Meta

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

Banach Space Valued Functions

They're not important until they are.

This summer, I began learning background material for the purpose of being able to do future research in dynamical systems and ergodic theory. In particular, I want to be able to study operators on L^1 functions and similar function spaces, which means I need more operator theory than I currently know. (Maybe "remember" is the correct term?)

One thing that is useful to know is how to do calculus with functions taking values in a Banach space. The derivative is remarkably easy to handle; you simply form the Newton quotient and take a limit. For functions not just of a single complex variable into a Banach space, but of one Banach space to another, you generalize the finite-dimensional Jacobian matrix, and get the unique linear operator that satisfies the usual norm approximation. This seems reasonable.

However, consider the following expression, for some operator T on a Banach space:

$$P = \int_\gamma (zI - T)^{-1}\, dz.$$

This is what is called a "spectral projection". The curve is a rectifiable simple closed curve in the complex plane that does not intersect the spectrum of T, and the integrand is... an operator, called the resolvent of T. So this is an integral of a function which takes values in the Banach space of linear operators on a Banach space, and it gives a linear operator on a Banach space.

The question is, how do we even define the integral of such a function? One way to do this is to use the Riemann integral, just as if you were in Math 137/138 or Math 247 or PMath 352. This is sufficient for continuous functions, and really, most of the time we care about holomorphic functions, so this is sufficient for many purposes.

However, as any analyst will know, the Riemann integral has its flaws. For real- or complex-valued functions on a measure space, we can define the Lebesgue integral, which helps deal with many of the issues with the Riemann integral. It turns out that there are other integrals for such functions; each of these addresses certain issues with the Riemann integral and integration theory in general.

When looking at functions taking values in an arbitrary Banach space, though, it's clear that the standard development of the Lebesgue integral does not immediately carry over. Usually when we learn about Lebesgue integration (PMath 450, probably), we start by considering non-negative functions, then extend to real functions, then extend to complex functions, and this allows us to handle infinity in a reasonable manner. However, there is generally no notion of "non-negative" functions in Banach spaces. How do we get around this?

In 1933, the mathematician Saloman Bochner introduced what is now called the Bochner integral, in an attempt to rigorously define vector-valued integration (where "vectors" are elements of Banach spaces). In place of relying on the order-theoretic properties of the real line to ensure existence of a supremum of values (as in the usual Lebesgue theory), the Bochner integral is defined for simple functions and then is extended to functions for which an extension "makes sense". That is, the collection of "Bochner integrable" functions is a metric completion of the simple functions which have finite integrals. The collection of functions which are Bochner integrable, unfortunately, is much smaller than we would prefer, but all continuous functions from [0,1] to some Banach space,are Bochner integrable, so the above integral is handled correctly.

The important distinction here is that there is no way for a function taking values in a Banach space to take the value "infinity". It seems to make sense that one would prefer to take a metric completion instead of an order-theoretic completion. One might wish to check out the following Math Overflow page: `http://mathoverflow.net/questions/25161/why-is-lebesgue-integration-taught-using-positive-and-negative-parts-of-function?rq=1`

Of course, there are many other definition of vector-valued integrals. It is really quite interesting to see what each of these integrals gives in terms of properties, and what properties don't carry over from the scalar case. For example, the Radon-Nikodym Theorem does not hold in general for the Bochner integral; it is then important to look at Banach spaces where the theorem does hold.

Anyways, perhaps I should go back to learning stuff. It's not like there isn't a lot more where this came from...

Scythe Marshall

N Things to Fill Space With

- N Things lists
- Last-minute drawings
- Horrible puns
- Wonderful puns (note that this is equivalent to the item above)
- Old short articles you wrote but then decided weren't actually good enough to be published
- WORDS IN CAPITAL LETTERS
- Prompts to write more things for *math*NEWS
- Space
- Outer space
- Inner space
- Vector space
- Chewed up gum

TheUndecided

Follow us on Facebook (*math*NEWS), or in person (MC 3030)!

A Pending Dilemma

No, not two lemmas; yay for Greek etymology.

As a graduate student, one thing that is most often different from an undergraduate is that you almost certainly must defend your thesis or dissertation in an oral examination. Some undergraduate programs have this but it is fairly rare (especially in math at UW). For grads, though, this is the time when you must prove that you can talk about your research to an audience and answer questions about what you've done. It almost always marks the end of your degree, and is a sign of impending freedom.

The oral examination is, for the most part, only scheduled when the student and the supervisors are comfortable with the progress that the student has made, and with the (usually fully completed) thesis or dissertation. In this sense, the student should never be too worried about their defense, because the supervisors are comfortable with how much they've done.

However, most students are usually terrified of their defense, perhaps due to speaking nerves, being intimidated by their examining committee, general anxiety, impostor syndrome, or any of a number of other reasons. At some institutions, the defense is open to members of the university community outside of just faculty members, or to the public; at these institutions, a grad student can go to their friends' and colleagues' defenses. By doing this, you can see how defenses tend to work, you can learn about the work the other grads have been doing, and you can experience how your own supervisor asks questions in a defense without having to actually answer them.

Perhaps most importantly, though, you can show support for your fellow graduate students. This point leads to the titular problem: I have two friends who are defending next Friday, one starting at 09:30, the other starting at 10:00. Whose defense do I attend? Do I duck out of the first to attend the other? Do I just go to one? How do I choose?

It is here that we return to the subtitle. The word *dilemma* is traced all the way back to the Greek prefix *di-*, meaning "two", and *lemma*, literally meaning "that which is taken up" but usually meaning "premise" or "assumption". Its usage in rhetoric referred to a choice between two undesirable situations, which is a specific case of how we tend to use the word now. Nowadays, we just say that a dilemma is a difficult situation or problem, but the word was previously more specific.

This particular dilemma commonly arises in another context, actually. If you've ever been invited to a wedding, you'll understand that there are only so many days in the year on which a wedding can really be scheduled. It has to be a Saturday in July or August, basically. (Okay, so this is a lie, but it sure feels like it.) In any case, the likelihood of being invited to two or more weddings occurring on the same day in different cities is thus much higher than even the probability that two people in the same reasonably occupied room share a birthday. This leads to the question: which wedding do you attend? Sometimes this question is hard to answer, and sometimes it's easy. It's usually never fun, though.

Last summer, I had to choose between weddings. This summer, I have to choose between defenses. I can only imagine what'll happen next summer.

Scythe Marshall

What is Pokémon GO?

From the perspective of a non-player.

Recently I have seen a lot of people staying up all night. Running around with their phones in front of them. I am fairly certain they were playing the new hit game: Pokémon GO.

Pokémon GO is an augmented reality game that integrates reality and animation. Augmented reality is a new frontier for the gaming industry. Many projects such as Google Glass have attempted this before. However, Pokémon GO is the first successful hit. This game uses the real world as part of the map for the game. It labels locations for gyms. This game is unique in that it makes people move and hang out, some people even call it an exercise app.

I can't play this masterpiece because I only have a old phone. For you lucky people, please try not to fall off too many cliffs on your adventures.

me

N Weird Canadian Celebrations

- An obese mall employee and his crew of midgets break into your home.
- Children are encouraged to take candy from disguised strangers.
- The birthday of a prim and proper foreigner is commemorated by getting wicked drunk in the middle of a forest.
- The national day of another country is celebrated by getting wicked drunk at Laurier.
- You buy someone you like lots of chocolate to reassure them you would still like them if they got fat.
- We celebrate the beginning of the arbitrary calendar year by being incredibly hungover.
- We celebrate work by not working.
- We celebrate the murder of some guy that most people like by eating pancakes.
- Something unclear, possibly to do with boxes.

Diminutive Rex

Submit your articles in the BLACK BOX outside the MC Comfy or email them to mathNEWS@gmail.com!

So, The World Appears To Be On Fire...

From the lofty eyrie against the backdrop of the rest of the world here in Waterloo, everything seems to be shipshape. Nothing seems amiss: geese are still ever-present, everyone is playing Pokémon Go, and proto-frosh are shambling around on campus. Yet, not far away, it is evident that everything is, well, to put it mildly, suffering from a case of severe acute rapid oxidation.

For starters, our southern neighbours are at it again with all the slander and lies that goes into the shallow platitudes masquerading as the democratic process in the name of this nebulous concept called freedom. Surely, if an alien (xeno)anthropologist were to scrutinize the "electoral process" ongoing, they would suffer an aneurysm with all the double-talk, then come to the conclusion that human beings are incapable of designing a system that which represents the interests of the people and is able to get things done. One would think that democracy, a concept pioneered by the Greeks over two millennia ago, would be perfected by now, but all the fire that is going on right now clearly points to the contrary.

It is also a fact that one must note that the USA is by far not anywhere close to the most firestorm-riddled part of the world. Take Venezuela, a country run by an inept government whose citizens resort to literal fire to obtain the necessities of daily life. However, even chaotic Venezuela does not top the most disastrous thing which is going on, for that title probably currently goes to the Turkish coup, which is still ongoing as of writing. Reports are still murky, but I think it could be agreed that Turkey is pretty on fire currently.

So, this leaves you, dear reader. What should be done to prepare for the inevitable maelstrom of fire which envelops the world, plunging it and all into chaos and despair? Here are few nuggets of wisdom, not tested by or on any person in particular, which you should take with utmost urgency:

- Buy a homestead in the middle of Northern Saskatchewan, since no sane person wants to be in Northern Saskatchewan, so you can hide away from all of this fire.
- Abstain from all news sources and practice solipsism, wherein any problems should be easily solved
- Start training to be more fireproof à la how one might build immunity to a poison by small exposure
- Enter mathematics academia and secede from the real world, since everything is an abstraction anyway
- Become an astronaut and hijack spacecraft heading towards Mars, thereby escaping all this deadly fire
- Pray for Ragnarök (or the doomsday of your choice) to summon bigger fire, which will surely cleanse the world of its existing fire

Either way, it would seem that we are in for a ride, so pick up some Chianti, sit back, and enjoy the ride; we're not getting off anytime soon, it seems.

Reporting from the Astral,
Zethar

Calculating the NPV of Your Relationships

Have you recently broken up with your significant other? If not, you probably soon will- that's just statistics. But your relationships don't need to be random variables.

With a simple financial model, you can project whether or not the partnerships you are looking to enter into are worth the investment. The idea: think of your next relationship as a project you are evaluating whether or not to take on.

This project will require an initial investment- some part of your life. Now, depending on whether or not it is expected to be long-term or just for a quick return, this investment can vary in magnitude from dinner twice a week to an increase in required working text messages. In any case, you will expect to be compensated for this outflow today with a series of inflows in the future. These can be made through affection, a sense of security, or the ever-favored payout (for their liquidity after the project is terminated)- gifts.

Now, here comes the wrinkle. Your presumptive boyfriend may assure you that he can offer you a steady inflow of love (perhaps even, theoretically, in perpetuity), but you must remember that there is risk that needs to be accounted for when we exit the assumption of perfect relationship markets. To calculate this, you need to look at their historical records for the duration, frequency, and consistency of the inflows they provided their previous partners- data that can easily be collected from Facebook walls and Instagram pages. By discounting your projected inflows at the appropriate weighted average cost of companionship, you can get a better estimate of the value of this project today.

Clearly, there is room for improvement in this model. For example, with asymmetric information in the market (i.e. undisclosed hang-ups from previous relationships), estimated risk can be materially inaccurate. But the premise remains true: If the net present value of the project is greater than 0, take it. Otherwise, proceed with caution.

But who knows- a project that may appear negative in the short run may last for more periods than expected and payoff in the long-term. On the other hand, the bond that you thought would last as long as you did could be called when you least expect it, leaving you looking for another project to take. If it helps, regardless, the future value is always 0.

A Sentient TI-83

P.S. Don't pull out your financial calculators at a bar.

horrorSCOPES

ActSci: You decide to start selling goose insurance to make some money on the side, and capitalize off all the exaggerations and fear-mongering we publish in *math***NEWS**.
Your lucky number is: 0 goose-related injuries in the past decade.

AHS: Congratulations! You're finally getting your MD! You wished really hard that you could be done with school last week, and I guess somebody was listening! Get that white coat on and go get 'em, slugger!
Your lucky number is: 15 minutes until your alarm clock goes off.

AMATH: You decide to take the 'applied' part of your program seriously, and form a guerrilla task-force to spray-paint equations in strategic locations on campus.
Your lucky number is: 8 weeks before someone realizes that's not the intended decor of our university.

Arts: You decide to spice up your apartment by painting a beautiful mural on the walls. Unfortunately, you are not in fine arts, and you haven't actually picked up a paintbrush since grade 5 art class.
Your unlucky number is: 500$ security deposit you're never gonna see again.

Bioinformatics: You decide to stake out V1 cafeteria and randomly dust 15 frosh with goose pheromones, just to see what happens.
Your lucky number is: 538, 238 views on your YouTube video.

C&O: There aren't any relevant jobs on JobMine, so you've decided to start up your own company! You're going to use game theoretic principles to advise people on their life plans. What could go wrong?
Your unlucky number is: 41 lives ruined.

CS: There's this guy who totally has this amazing idea for a startup. It's gonna be the next Facebook. You can do all the coding for him, and then you can split the profits 30-70! How can you turn down this amazing opportunity?!
Your lucky number is: 10. You're going to count to 10, and then you're gonna walk away.

Double Degree: You decide to start a project to promote unity between UW and Laurier. You make a Facebook event for 'Hands Across University' where students will come together and make a human chain from university to university, symbolizing our interconnectedness!
Your unlucky number is: 5 RSVPs.

ENG: You like getting drunk at parties, but you're not sure if you can justify that amount of time away from your studies. You design a device that can help you get drunk as quickly as possible, so you can party more efficiently.
Your unlucky number is: 0.15 blood alcohol in 15 seconds flat.

ENV: We're onto you, Environment. What with all your maps, your mandate to integrate all knowledge, the suspiciously vague 'Department of Planning' and the fact that you're the only faculty who can properly liaise with the geese, there is no way you aren't up to something seriously sneaky.
Your lucky number is: 27 days until Operation Loosey-Goosey is executed.

MathPhys: You've finally had it with your roommate and her loud parties. You grab a knife, and threaten to split an atom in half and explode your house if she doesn't turn the music down. Shockingly, she's drunk enough to accede to your threats.
Your lucky number is: 1 hungover nuclear disarmament treaty.

PMATH: You're caught in a group of engineers, and gamely try to join the conversation. They ask you what you plan on doing when you're done with university. You don't understand the question.
Your lucky number is: 50 more years in academia.

SoftEng: You're having a bad week, softies. How are you ever going to decide which company to work at next term? Should you go to San Francisco? Seattle? Vancouver? It's so hard to choose!
Your unlucky number is: 6 companies fighting over you.

Stats: You set up a Facebook poll to see who people want as the next UW president. Unfortunately, you forgot to switch off the option to select your own response.
Your unlucky number is: 420 votes for Sedra Panino McGooserton.

Teaching: You want to practice teaching in front of a classroom, so you sneak into a MATH 136 tutorial and take over. Unfortunately, you are much better than the TA they usually have.
Your unlucky number is: 45 students spamming you with questions for the rest of term.

Undecided: Someone misses you a whole lot. They see your name on your assignments, so they know you're still around, but you haven't shown up to see them in a while. They hope they still matter to you.
Your unlucky number is: 1 lonely TA.

We Built Your World, Dammit

I joined Ingress in the summer of 2013. It is an Augmented Reality Game, which means it takes you to real life landmarks where you perform simple tasks. It was released by Niantic, a former Google subsidiary. Sound familiar yet?

Do not get me wrong, I am glad Pokémon GO is letting lots of people experience the wonderful world of ARGs. Sure, I might be a little salty that they are only willing to give it a chance for cute, brightly coloured animals, but it is kind of hilarious watching a wave of people moving across a landscape to catch that one special Pokémon. Ingress' cyberpunk storyline about the fate of humanity is, I suppose, a trifle less accessible.

All elitism aside, there is one core part of Ingress that I think Niantic has been remiss in not implementing in Pokémon Go. Ingress is most importantly designed to get people moving around, via three separate mechanics. There is 'burning out', where you can only hack each portal four times in a row, and then you have to wait four hours for it to reset. You can link far-flung portals together by visiting them, and if the other team has one of these links, you have to visit the endpoint to destroy it. And there are missions where you have to visit all of a certain set of portals, again making you walk around more.

I have high hopes that Pokémon GO will implement similar mechanics in the coming months, thus reducing the weird clustering of people they have going on right now. Pokémon GO encourages you to go to a place, lure it, and then set up there for a period of hours - as can be confirmed by anyone who has spent time on BMH green in the past week or so. Maybe it is just me, but I prefer to be rewarded for exploring rather than for camping out in one place.

Although when they are exploring, there's a huge influx of Pokémon GO players lately who have not all figured out ARG etiquette (ARGtiquette?) yet. Remember, it is the same as if you are doing anything else on your cell phone. If you are walking down a path and you need to catch a Pokémon, take a step to the side so you are out of the way. Do not block doorways, do not sit in heavily trafficked areas, basic stuff. Be aware of your surroundings.

And speaking of things to be aware of—you might be interested to know that Ingress portals are user-submitted. The photographs they use are taken by players. And in Pokémon Go, all the Pokéstops are taken directly from the Ingress portals. Many of the Pokéstops on campus that you and your friends are playing at were photographed and submitted by me and my friends.

I mean, not to brag; but we quite literally built your world.

Diminutive Rex

Follow us on Facebook (*math*NEWS), or in person (MC 3030)!

Pokémon GO Tips

Pokémon GO is officially out in Canada! The app is quickly becoming one of the most popular of all time. If you haven't installed it yet, get out and join the waves of new players! Share in the collective excitement around the new experience. You will see crowds playing all over campus, stop watching from the outside and join in! At almost any time of day you can find a party around BMH Green. Now that you are about to install it, here are the important things to know.

First, there are currently some issues with the game: the distance tracker isn't working, the servers keep catching fire, and you should expect the game to freeze. These may have been fixed by the time you are reading this article.

Pidgeys are the most useful Pokemon to catch. Save up a ton of them, use a lucky egg and evolve all of them at once. This will give you thousands of experience points.

Get exercise and hatch all your eggs, the app will stop tracking you if you move too quickly so taking it in the car is rather pointless.

Save up your stardust for later, you will keep catching stronger Pokémon as you level up early on. When catching Pokémon hold onto the ball and aim inside the moving circle, the smaller it is the better odds of catching. Also, you can work together with other new players to even take out strong gyms, join team Mystic!

Pockets

You'll Be Back (Calculus)

You say
The price of my math's not a price that you're willing to pay
You cry
In your homework you hurl in the trash when your feelings run high
Why so sad?
Remember we used to draw tangents on your favourite graph
Now you're making me mad
Remember, despite your bemusement I still find area
You'll be back, soon you'll see
You'll remember that you still need me
You'll be back, time will tell
You'll remember that I found slopes well
Parabola rise, sine curves fall
We have seen each other through it all
And when push comes to shove
I will send an improper integral to remind you of my love!

dA dA dA (d∀T) dA (d∀T) dA dA dA dA y(a) dA
dA dA (d∀T) (d∀T) dA y(a) dA!
dA dA dA (d∀T) dA (d∀T) dA dA dA dA y(a) dA dA dA dA
(d∀T) (d∀T) dA y(a) dA!

A Tribute to Hamilton by Lin-Manuel Miranda

WritesLikeHe'sRunningOutofTime

What Comes Next?

They say
Assignments are due and we're writing exams the next day
Insane
Don't cheat on that test, but the studying's killing my brain

I'm so blue
I thought that it would be quite different
When I went this way
To attend Waterloo
Well, even despite my exhaustion, I've got
A small query for you:

What comes next?
So I pass.
What's the point, why take another class?

I'm a grad.
Awesome. Wow
I don't have a clue what happens now!

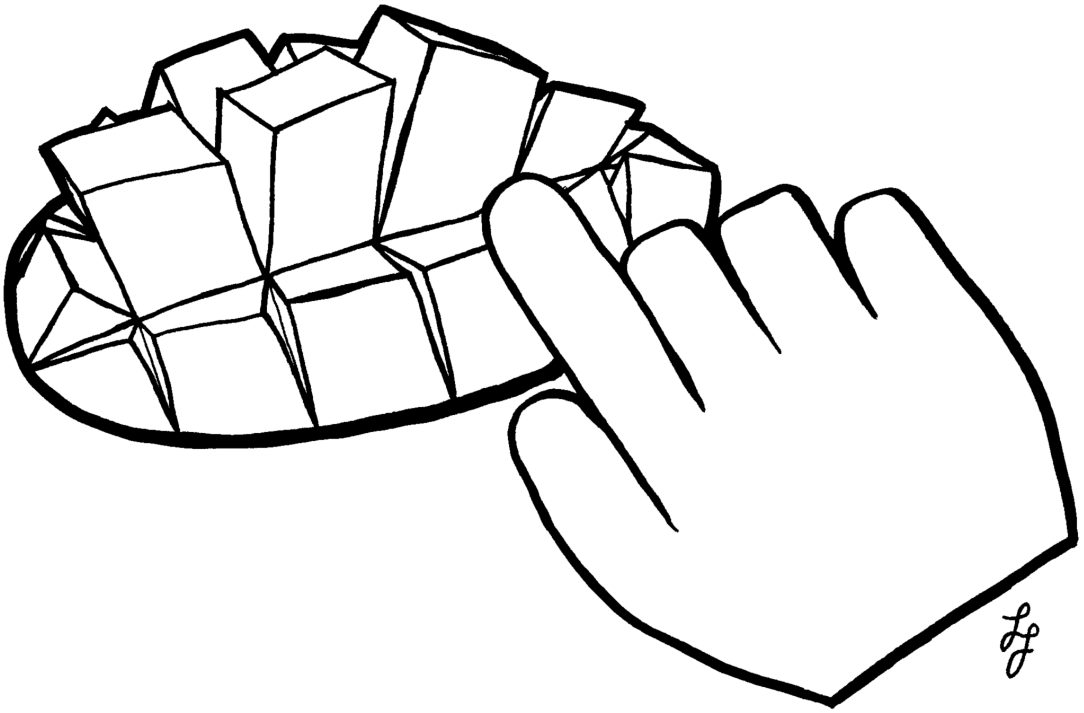
Grade-curves rise
Averages fall
Soon you'll learn it doesn't matter at all

All alone, in the job sea
When you're adrift out in the real world, know
a degree's no guarantee.

A(nother) Tribute to Hamilton by Lin-Manuel Miranda

WaitForIt

This Hamilton guy is pretty popular



Poke a Mango

profQUOTES

"If you donate a couple of dollars to the C&D, they will give you ice cream for free."

West, MATH 237

"Thank you for reminding me that I'm lying to you."

Avery, CS 349

"Go to a park and say 'Ok Google' and see what happens."

Avery, CS 349

"I have an Apple Watch mostly so that people can call me during lectures like this."

Avery, CS 349

"I've called people through my watch twice, and both times to my wife to show off. She gets mad, so I don't do it anymore."

Avery, CS 349

"I swear we're not obsessed with games. We just do a lot of them."

Avery, CS 349

"In HCI, the name is really really important. Everything needs to have a flashy name."

Avery, CS 349

"This dog just stole a jet and he wants to land it safely."

Avery, CS 349

"Yellow is faster than white."

Avery, CS 349

"Visual impairment... is a bit of a blurry area."

Avery, CS 349

"Ignore the smiling happy people for the moment."

Avery, CS 349

"I'm asking a question that makes me look stupid."

Weddell, CS 348

[*Loud construction buzzing drowns out the prof.*] "Give me two seconds. I'm not going to hurt anybody..." [*Later*] "and with that, I'm out of time and I'll quickly go next door and shoot somebody."

Weddell, CS 348

"I'm willing to put money on this question." [*Pulls out a $5 bill - two students answer.*] "I guess I have to split the money." [*Rips the bill in half and gives a half to each of the two students.*] "This is a distributed systems course, after all."

Daudjee, CS 454

"If you don't know, a book is like Twitter but with more than 140 characters"

Banerjee, STAT 231

*grid*COMMENTS

It pleases my frozen simulacrum of a heart a minuscule amount that this blastèd puzzle managed to elicit a suffusion of responses from the silent majority. At least, I hope that the knowledge imparted in the trivia of the error-riddled clues was enlightening, lest ye answerers decide to incite a riot at the (perceived) bad quality of the puzzle.

There are a total of five solutions to the *grid***WORD** in volume 5, of which all were correct. The answers given to the *grid***QUESTION** of last issue, "Who would you select as a champion for your cause?" are as follows:

- IGN: 15 time World Heavyweight Wrestling Champion John Cena, for the Association for People Affected or Traumatized By Utterly Terrible Terrible Crosswords and Other Puzzles (Ass.PATBUTTCOP)
- gzsong: You!
- Theo: I choose Francis as my champion
- Francis: I'd choose Jack as my champion
- Jack: I choose Theo as my champion

While I am most flattered by gzsong with the choice of champion, I am afraid that the judgement of such delicate matter should be free from such bias, and thus I feel obliged to pass you over on the official prize. Please accept, as a consolation, my gratitude (may be exchangeable for a ha'penny, while supplies last). Messrs Theo, Francis, and Jack proposes an interesting 3-cycle of champion selection, while IGN clearly needs professional psychiatric support.

As such, Messrs Theo, Francis, and Jack may send their champions to the *math***NEWS** office to duke it out for the prize, as it is very difficult to split a gift card into three evenly. IGN may also bug the editors if they are willing to pay my weregild for alleged damages to the psyche, of which I make no promises any such thing may be able to be extracted.

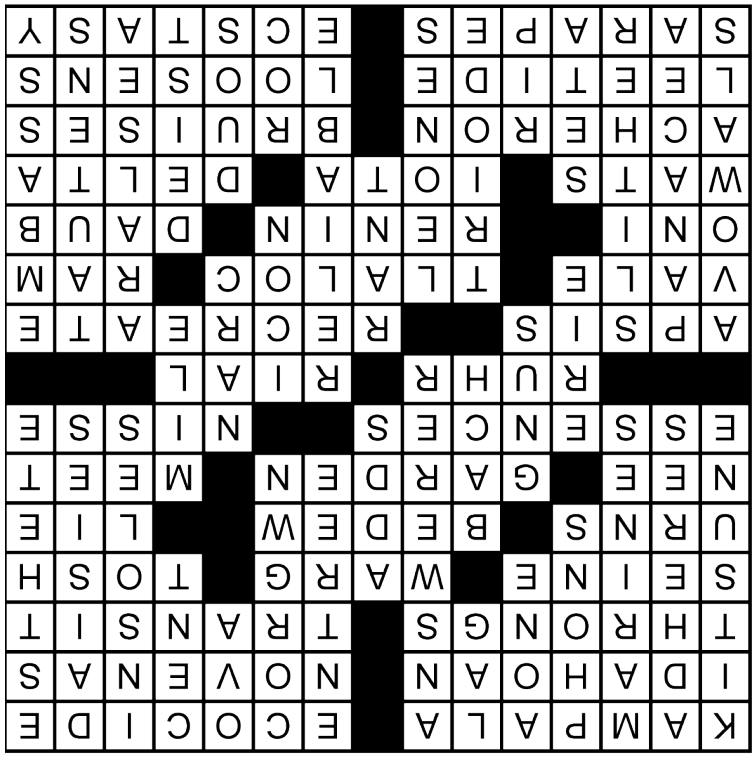
To fend off Mr. Cena, I have decided to resurrect a cryptic crossword from a certain Linda, originally published on May 18th, 2001 in volume 86, issue 1 of *math***NEWS**. Since this is the last issue of the term, there will be no prize and no *grid***QUESTION**, and the solutions to both the last issue's puzzle and this issue's puzzle will be placed elsewhere in the issue.

Hopefully, ConvolutED will be back next term so you won't have to endure my silly puzzles.

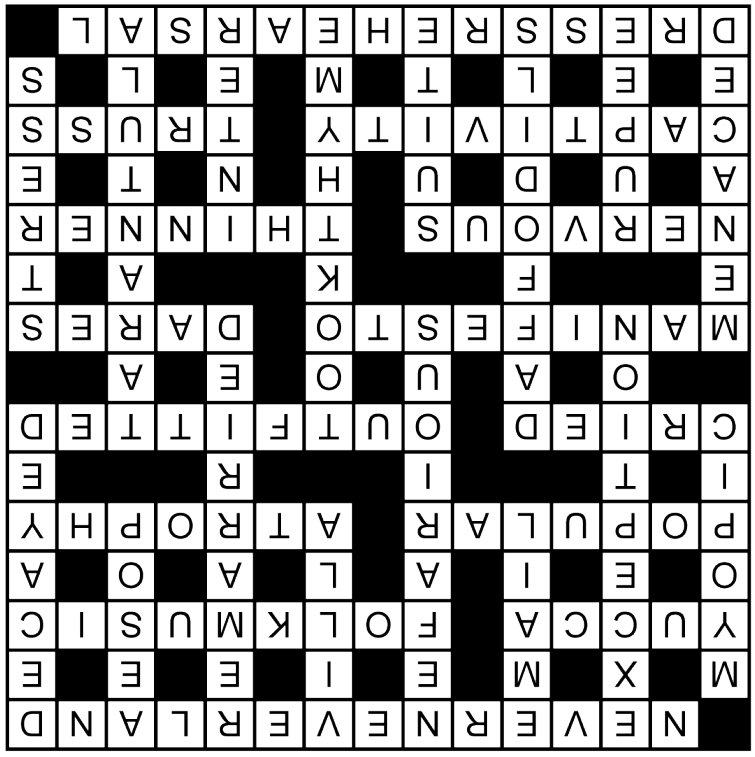
Zethar

PS: A few explanations of last week's grid:
- 11-Down should refer to 56-Down, which could be a large bird, or the Republic of China (more commonly known as Taiwan)
- 49-Across: a wat is either a monastery or temple in SE Asia like "Angkor Wat" or an Ethiopian curry-like stew (also known as tsebhi)

Last Issue's *grid*SOLUTION:



This Issue's *grid*SOLUTION:



Submit your comments, hatmail, corrections, retractions, and articles in the BLACK BOX outside the MC Comfy or email them to mathNEWS@gmail.com!

GRIDXGRID

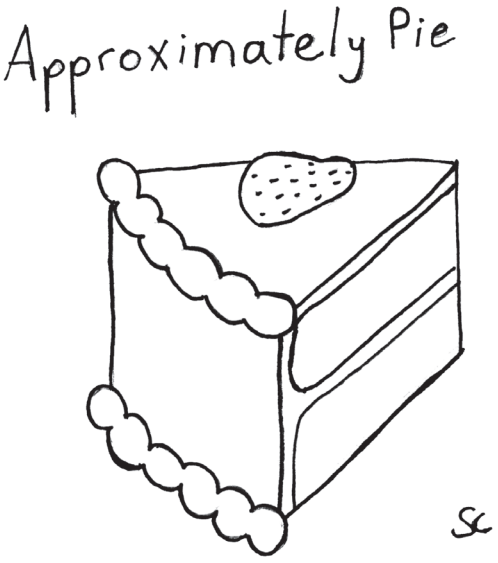
*grid*CLUES

Across

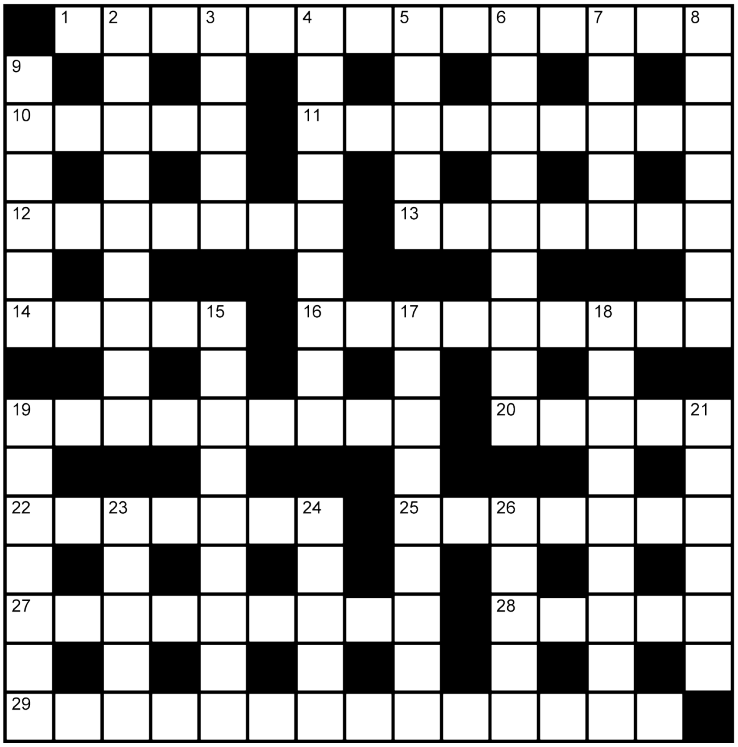
1. Fly forever there (5-5,4)
10. Accountancy cannot eliminate plant (5)
11. Popular songs with offbeat milk focus (4,5)
12. Appealing tree with turn in it (7)
13. Winning or withering (7)
14. Initially contestants, radiant in evening dress, wept! (5)
16. Better tailored and equipped (9)
19. Mao feints broadcasting decleration (9)
20. Reads about challenges (5)
22. Mars or Venus... In suspense? (7)
25. Less solvent (7)
27. Prisoners kept in awful pit in cavity (9)
28. Support comes from endless faith, they say (5)
29. Fabricated "Red" hassles rare in practice (5,9)

Down

2. I expect no special waiver (9)
3. Note was left in cinema (5)
4. Bad debts after nominee ends away (9)
5. Place to hide in evil lair (5)
6. Marie, right-hearted, wore red to wed again (9)
7. Second back pose was fabled (5)
8. "Donna Karan'ed" to death, we hear (7)
9. Shortsighted of me, old pro, being followed, I see (6)
15. If old fads erupt early, Bud's yellow (9)
17. What slow thief did in the garden (4,5)
18. Natural at spinning (9)
19. Threatened guys won (7)
21. Under pressure, hair loses vitamin and curls (6)
23. Money changes pure Easterner (5)
24. Sounds like a nice room (5)
26. In midst of put-down (5)



*else*GRID:



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