"INSTEAD OF PD COURSES, WE SHOULD HAVE...?"

THURSDAY JULY 15, 2:00 AM

"I'll take **mastHEAD** this issue."

The editor stared blankly at the Discord message on his screen, wondering why he'd decided to volunteer to write the **mastHEAD**. A historically empty head and a poor sleep schedule did not make a good recipe for quality content, and now he had put himself squarely in charge of writing a whole column of it with no ideas to boot.

Perhaps, he thought, an allegorical tale about PD would be fitting for this issue. The legendary hunter chasing down the notorious beast, always on the verge of dealing the final blow but never getting quite close. That sounded like a good start.

He began conjuring epic visions of battles spanning day and night in his head, but then he dismissed them as swiftly as they had come. Too much work, he told himself, and besides, he'd never been particularly good at writing fantasy; that was *Tie Guard*'s and *warSOC*'s job. *Goose Of All Time* made the fighting element redundant too. He sunk deeper into his chair at the prospect of having to write yet another lame **mastHEAD**.

"If only they made writing chairs; maybe then I'd become a pro **mathNEWS** writer" he mused.

The editor quickly glanced at his todo list. What was once a gleaming symbol of efficiency and time management was now a haphazard pile of unfinished assignments and unwatched lectures. The luxury of time was not on this editor's side, and it would not be for at least the next few weeks.

He sighed as despair began to set in. Writing was never his strong suit, and now he was running out of ideas and time. But he hadn't taken a break from doing math for over three weeks, and a new puzzle for his brain was sorely needed. Besides, he reasoned, that article about *writer's block* could help his own chronic struggles. There would be no better issue than this to break free from the chains of creative paralysis.

So the editor picked up his pen (well, actually, he just shifted his keyboard a bit) and got to work. After all, the **mastHEAD** doesn't write itself.

terrifiED
Editor, **mathNEWS**

PREDAP	Goose attack training
TENDSTOFORTYTWO	To serve in the WUSA army
DERIVING FOR DICK	Councillor Macri yell at us about proper workplace etiquette in 2 hours or less
FINCHEY	DP courses.
CC	Attack goose training
JEFF	Fentanyl
BEYOND META	Free time
ABALD MAN	Tuition refunds to make up the cost of PD
CY	Any course of our choosing. I think if you are willing to (a) pay extra money and (b) put in the effort to do a course over co-op then you deserve not to do PD. I could even see limiting it to English and communications courses only.
APHF	In my personal opinion, I think skydiving would be more fun than PD.
ME	Defence against the dark arts
VINCENT MACRI	Better communication courses
BOLDBLAZER	More breaks throughout the rest of the term for each of the 3 terms.
A COOL PEN NAME	A gladiator style tournament where engineers are pitted against each other to fight to the death while the eager, bloodthirsty math students cheer and jeer, as the Engineering Faculty's penance for creating PD as if they needed another reason to be a royal pain in the ass for everyone *[Editor's Note: You've clearly given this a lot of thought.]*
GOD ⚡ PEED	The cost of PD refunded on our Quest bills, labeled as the "Freedom Dividend".
BIPED	Twice the cost of PD added to our Quest bills, labeled as the "Price we Pay".

ARTICLE OF THE ISSUE

This issue's chosen one is *Cryptocoin: the Cryptocurrency for your Cryptocurrency Needs!* by Xx_420SonicFan69_xX. Why, you ask? Well, here's how I lobbied for this article to my fellow editors:

> I think "*Do you ever want to get into the new, burgeoning world of cryptocurrency that's currently writhing around the floor of an unstaffed hospital in an embryonic sack like an eel in a plastic bag?*" is too good to pass up.

Congratulations!

god ⚡ peED
Editor, **mathNEWS**

Pernicious Development.

**TERRY CHEN, mathNEWS EDITOR FOR SPRING 2021
ALONG WITH KEVIN TRIEU, CLARA XI, AND YANG ZHONG**

warSOC VIII — HOW I MISS HER

To my ears, the flapping wings of the Arith Division hearken back to rain in soaring, soothing patters. There are no honks, no shouts of victory, after the battle at Modern Languages; only lugubrious silence. I'm in a fugue from Elder's Anti-Math attack, too weak to fly myself, so my second-in-command — Laplace — bears me through Theorem-Space on our return journey.

Sundre Island, an overgrown clump of trees in the middle of Laurel Creek Reservoir, is our home.

Lucy knights us with names in the mathematical knowledge we've brought back from the humans. My second-in-command is Laplace. My spotter's Maxwell. Me? I am Newton.

Lucy's unconscious but breathing when we land. *She'll hopefully recover soon*, I say weakly to my geese. *Until then, we'll care for her, best we can. After all, she's cared for us.*

꩜

I'd thought that the longing ache in my heart would go away with time, but it's a sinkhole that widens a little every time I see Sarah. I'm surprised when Vigil pulls the bedside curtain open during one such visit. He looks a little nervous, hair messy as usual, and has a plastic takeout box under his arm. Smells like chicken shawarma.

"Hey, Vigil. How are you doing?"

"Not too bad. I'm here to — no, how about you? My apologies, I'm not very good at this consoling thing."

"That's okay! It's really sweet of you to come check in on Sarah… and me?"

"You're too smart, Name." He sighs. "Yes, Soren asked for a volunteer to check on you. The quantity of worry he expresses for you has far surpassed regular levels. I have a few things to ask you?" Vigil at least looks abashed.

"Sure." At least he *had* volunteered. "Checking up on me is the type of mission **warSOC** gets up to these days? I suppose it's the opposite of 'may you live in interesting times.'" My smile doesn't reach my eyes, but Vigil doesn't notice.

"Yes, I suppose so. How much have you been sleeping lately?"

"Enough."

"Have you been keeping up with you schoolwork?"

"Yes." Schoolwork is in my blood, even if my heart doesn't feel it.

"Have you been eating enough, and regularly?"

"Yes." This is the first real lie. I don't know why I'm lying. I'm normally quite co-operative and agreeable.

"Well, that's sufficient for Soren." Vigil seems to check boxes off a mental list. "I am not the most socially adept individual, nor the most empathetic. But I can conclude by the way your stomach rumbled a second ago that your previous statement was likely a mistruth. Can I take a seat?" I hadn't even noticed my traitor stomach.

"Please do. Oh, God, I shouldn't be lying to you, Vigil. I don't know what's come over me."

"It is completely acceptable to act abnormally when you are sad. You liked Sarah, correct?"

"Who wouldn't? She was always so energetic, so powerful. So confident in who she was. Who she is."

"I suppose." Vigil seems like he's about to say something else, possibly about Sarah and I, but decides better and instead lifts the takeout container slightly in an offering.

"Is that for me?"

"That's the spirit, Name."

A few delicious bites of chicken on the rocks and a minute of Vigil fiddling with his thumbs later, I decide to tell Vigil about my plan. "Your sensors are still set up to track geese activity, right?"

"Correct." Vigil looks surprised that I'd even have to ask, but I haven't been keeping up with **warSOC**'s activities as much lately.

"Can you get me a goose? In all the two years I've been in **warSOC**, we've been so busy studying Anti-Math and Theorem-Space and defending against attacks that we haven't asked why the geese are doing what they're doing, or how they even exist."

"I suppose we haven't."

"I want to learn more about them. They heal way faster from Anti-Math attacks than we do, and maybe they have some special ability we can use to help Sarah? I want to ask them."

"*Ask* the geese? They're geese, Name!"

"The pink one said something, right? Some stuff to Sarah. You got it off her earpiece recordings."

"Those recordings match Professor Salis Shakespeare's voice."

"But it doesn't make any sense! The words sound like what the pink goose would say to Sarah!" I sneak in another bite while Vigil ponders.

"Perhaps… Soren would be hard to convince. Even harder to get him to approve an op to communicate with geese — Soren likes hard Anti-Math strikes as our only method of communication."

"Okay, fine." I raise my hands. "You're probably right. Just… can I ask you a favour?"

"You may ask."

"Keep an eye out for the pink goose for me? And let me know where you see it? Just out of curiosity?"

"You won't do anything abnormal? Or without Soren's approval?"

"No." This time, my stomach doesn't betray me. Neither does the rest of my body.

"I suppose you *have* always been a stickler for the rules. I'll do it, but only for you, and just this once, okay? Next time, go through Soren."

<div align="center">ॐ</div>

A couple is lounging in the shade under an oak next to the lake. The man lies back, one hand behind his head, the other resting gently atop the woman curled up against him. He is content — the weather's far too nice for lectures, and he's managed to convince her to play hooky with him today.

MathSoc Games Night is that evening, and the woman is nervously excited to introduce her boyfriend to her friends there. She opens her eyes for a moment to gaze lovingly at the man, but her eyes are instead drawn to a large flock of geese rising out of the trees, accompanied by a rising chorus of honks — the woman is something of a romantic, and to her, it sounds almost like a crowd triumphantly shouting a name. Oddly enough, the goose at the lead looks… *pink.* The whole flock disappears behind the treeline before she can register what she's seeing. A trick of the light? The honks are fading now, but echoes still ring around the lake. She decides it's *Lucifer! Lucifer! Lucifer!*

"Camien?" The woman pauses, and unfurls herself just enough to point to the spot the flock rose. "Did you… uh… just see that?"

To be continued…

<div align="right">CC</div>

CRYPTOCOIN: THE CRYPTOCURRENCY FOR YOUR CRYPTOCURRENCY NEEDS!

Do you ever want to get into the new, burgeoning world of cryptocurrency that's currently writhing around the floor of an unstaffed hospital in an embryonic sack like an eel in a plastic bag? However, do you ever feel like cryptocurrencies are like metaphors trapped behind metaphors, like a Russian nesting doll? The big problem you have is that you don't really understand how cryptocurrencies work. I mean, who really does, right? Well have I got the solution for you! Introducing: Cryptocoin, a way to keep track of all your cryptocurrencies! How does it keep things in order, you ask? Well here's how it works:

Essentially we take all of your smart cloud data from the bitmines using lithium sulfur blockchains and store it inside a biscuit (like a website cookie, but more serious). We then eat the biscuit and your spit turns into valuable currency. But this currency doesn't have a name, so it's assigned a name.

That's right, it's a cryptocurrency made out of cryptocurrency (made out of human spit). The more people spit these disgusting biscuits out, the more cryptocurrencies are made, and thus the more money you get. But here's the kicker: with our patented, trademarked, and copyrighted SmartCookie™ technology, these cryptocurrencies make cryptocurrencies as well, as the spit comes to life to go to the mines to make biscuits. Of course, after a long life of mining, the spit retires

to a stiff disk (like a floppy disk but inverted) and spends its remaining time being an industry disruptor.

Now you might be thinking, "a cryptocurrency for cryptocurrencies, that either sounds like an exponentiating recursive nightmare that'll ruin the value of the currency, or just a scammy pyramid scheme!"

And you're wrong, it's not. Instead we took inspiration from the Legend of Zelda series and used a Triforce power structure. Once you're involved, you become the Courage member, and you can bring in two friends to become a Wise and Powerful member, which in turn become Courage members and can invite more people! Plus, we're all about efficient data structures, and who doesn't love a good binary tree?

To buy into this Cryptocoin, you need to front an investment of $100,000. I know, it's pricy, but there's not much better you could do with that kind of money, I mean, what're you gonna get, a uni education?

For more details on Cryptocoin, visit: `https://mathnews.uwaterloo.ca/`.

<div align="right">*Xx_420SonicFan69_xX*</div>

HOLLYWOOD SHOULD START VARYING PHONE NUMBERS SHOWN IN FILMS

My typical choice of procrastination is browsing Wikipedia. However, on one fateful day, I ended up diverging from Wikipedia and ending up on the website of the Canadian Numbering Administrator[1] (CNA), the agency responsible for implementing and assigning phone numbers for use in Canada under the North American Numbering Plan (NANP).

On the site, I ended up at a map showing where all the Canadian area codes were assigned, including the ones scheduled to be assigned but not yet implemented. Also available was the entire list of how phone numbers are allocated for each area code. I ended up going through the files for all my local area codes, and more! There were a lot of things I learned about phone numbers from just going through those files, and that gave me a thought. Those 555 phone numbers stand out too much when seen in films, so why not use some other numbers for variety? Some of these will be helpful in giving Hollywood more options for phone numbers, so let's go through them one-by-one.

❦

Let's first clarify some terminology. We all know the standard phone number format in North America, e.g. 519–888–4567. The first three digits are called the Numbering Plan Area (NPA), more commonly known as an area code. The next three digits are what's known as the Central Office Code (COC) as back in ye old days of landlines, there were physical lines connecting all the phones to each other. Each central office was thus allocated blocks of 10,000 numbers. That was massively simplified by the way. The last four numbers are what make up an individual phone number.

So now that we have that out of the way, the first option is to use COC numbers in the 000–199 range. These COCs are just not allocated at all. I don't know the specifics as to why, but the specifications specifically prevent allocation of those COCs, so it's safe to assume they will never be used. So, this means phone numbers like 519-**123**-4567 are not phone numbers in use.

There are non-allocated numbers, which do exist as COCs but are just not allocatable for regular phone numbers. These include COCs that end with 11, so 211, 311, etc. Those COCs are not allocated for any NPA as they are allocated for special use, the most well-known being 911.[2] So, technically, phone numbers like 519-**411**-4567 are not allocated. These numbers likely won't work well for the film industry. However, there are other non-allocated numbers which may work. I think some of these are more feasible than others.

The COCs 310, 610, and 810 will typically have a "moratorium on assignment" because those COCs are sometimes allocated for "7 Digit Services", i.e. phone numbers where you do not need to include the NPA when dialing within that NPA's area. For example, the 519 NPA has the 310 COC allocated for 7 Digit Service, meaning 519–310-XXXX numbers can do just 310-XXXX within the 519 NPA area. So, theoretically you could use those 3 special COCs for phone numbers in films, but you need to make sure that you know which are not already assigned for a certain NPA. Making a mistake with these is probably a risk films don't want to make.

Some of the later COCs have special assignments. The 976 COC is allocated for a "Pay per call service" but that doesn't mean it is in service. The 519 NPA lists Bell Canada running the 976 COC but some of the other NPAs don't list a company assigned to it. I don't think films would want to use any 976 COC numbers, as they would not want curious people ending up getting a charge for calling these pay per call numbers.

There are 3 COCs which are not allocated for phone numbers but I have no idea what they do specifically. The 950 COC is allocated as a "F.G. 'B' Access", and the 958 and 959 COCs are allocated as a "Plant Test Code", whatever those mean. As those are not allocated for phone numbers, you could technically have those used for films.

Next, we have NPA-specific numbers that are not available to be allocated for phone numbers. Let's use the 519 NPA as an example.[3] The 519 NPA is allocated to an area of Ontario, but that same area also has the 226 and 548 NPA as overlays, meaning the 226, 519, and 548 NPAs exist in the same area. As a result, the 226, 519, and 548 COCs are unavailable in the 226, 519, and 548 NPAs. This means numbers such as 519-**226**-1234, 519-**519**-1234, and 519-**548**-1234 are unavailable. The same applies for the other Canadian NPAs.

The 867 NPA, whose area include the three territories, has a special case where the COCs matching **some** of the neighbouring NPAs are unavailable along with some other special cases specific for 867. Some of the neighbouring NPAs unavailable as COCs for the 867 NPA include: 204, 431 of Manitoba; 306, 639 of Saskatchewan; 780 of Northern Alberta; and 236, 250, 672 of BC. Reserved future Canadian NPAs assigned to a geographic area are also not available as COCs for the 867 NPA. These include 263 for Montreal; 387, 942 for Toronto; 468 for Quebec West; 584 for Manitoba; 683 for North-Eastern Ontario; and 753 for Eastern Ontario. There are also geographically unassigned NPAs unavailable as COCs for the 867 NPA which include 257, 273, 382, 460, 487, 568, and 871. The remaining special cases are that the 912, 914, 915 COCs are unavailable as they are listed as "Not available 911 mis-dialed", while the 800 and 900 COCs are "Temporarily Unavailable" and will be "Available after 10-digit dialling implemented in NPA".

Lastly, we obviously have the 555 COC which is allocated as "Universal Information" for all NPAs. That's the whole thing we're trying to deal with here.

❦

These non-existant phone numbers can all be used. However, I don't think these suggestions will ever purposefully be used by Hollywood in their films, as there is that caveat that the CNA only covers Canadian area codes. So, if a film's setting is not in Canada, but still within the areas under the NANP, it would not be appropriate to use a Canadian area code. Those locations are under the jurisdiction of the North American Numbering Plan Administrator (NANPA)[4] where there are different allocations used from the CNA. There might still be a chance for films with Canadian settings though. I'm not giving hope on them.

boldblazer

P.S. Using these COC files for each NPA, you can see which geographical area has which COC. For example, the 519 NPA's 888 COC is allocated to Bell Canada for Kitchener-Waterloo, which is what we see reflected in UW's number 519–888–4567. Of course, with the decline in landlines, the correlation between the COC location and the phone number's actual location is becoming less and less correct as time goes on.

P.P.S. I only noticed after writing this article that this article is useful in other circumstances such as where you need to give a phone number, but don't want to give your actual phone number away, while also ensuring that the fake phone number truly does not exist.

1. Their website is at `cnac.ca`
2. Here are what the special numbers are allocated for, according to the CNA:
   211 — Public Information and Referral Services
   311 — Non-Emergency Municipal Government Services
   411 — Directory Assistance
   511 — Weather and Traveller Information Services
   611 — Repair Service
   711 — Message Relay
   811 — Non-Urgent Health Care Telephone Triage Services
   911 — Emergency Service
3. I originally used 604 for my example, then I realized that the majority of students at UW are probably not from the Lower Mainland.
4. The NANPA is under the Federal Communications Commission (FCC) and the website is at `nationalnanpa.com` and the list of assigned codes is at `nationalnanpa.com/enas/coCodeReportUnsecured.do?reportType=7`

If you need to forget your phone number to remember this, forget your phone number.

DAN WOLCZUK

THE MATHIES ARRIVE: THREE MATH CND ENCOUNTERS
ADAPTED FROM "THE ALIENS ARRIVE" BY MARGARET ATWOOD

A mathie arrives.
In his/her head, reciting
the definition of a basis
to pass the time.
Nothing to be said while waiting
in line.

❦

Two mathies arrive.
Too awkward to make eye-contact.
The rest is trivially left.

❦

Three mathies arrive.
Just before lunch time:
Sandwich.
Cooki..Donut….
Half and half!
(Wait I thought I was getting lunch?)
(Dedicated to Math CnD)

evilevievil

CALL FOR RECIPES

Hello to all **mathNEWS** writers who like food,

I am looking for recipes from **mathNEWS** writers. Please send a recipe that is meaningful to you, along with your writer name, to `mathnews@gmail.com`. For example, a recipe for a personal "comfort food". It does not actually have to taste good, but it must be food. Shorter recipes preferred. You can write the recipe yourself or send it from a link. Optional: you can also include a few sentences describing why this recipe is meaningful to you.

By sending me the recipe, you agree for me to put your recipe, or a shortened version, and your few sentences, or a shortened version, in a future **mathNEWS** article. Your **mathNEWS** name will be credited. But don't get too excited yet; you won't see your article until the next on-campus volume (fingers crossed for fall!).

I want recipes from those who have written at least one article. If you have not but wish to submit a recipe, you can send it to me anyway and write an article next issue.

cy

A FAREWELL TO CONAN O'BRIEN

I look up to him, 'cause he's 6 foot 4
A manic kook in a suit and a pompadour
Made me ball on the floor harder than I've laughed before
And now his show came to end but we all want more
So what do you say when the man who's like a medic
Takes away the one thing that has healed you through pandemic
Except ask why between all the million show hosts
The one who just left is the one needed most
But we must be thankful for all that he has done
For today's comic legends and heroes to come
So to say he's replaced by Kimmel and Colbert
Is a statement so painful it'll never be fair
But if one show is out then new one must enter
A light in the tunnel of this covid spectre
But if Conan is great, who could be better then?
To one up a student of Carson and Letterman
I don't want to claim I can dominate TV
But let me write down my poetic(ish) CV
As everyone knows Conan wrote for Lampoon
A staple of Harvard, comics' silver spoon
But our readers know this, it makes us trend setters:
mathNEWS's comedy is objectively better
And I've written for months here to brighten my mood
Fifteen different articles, two of them good
And I might not be tall or have crazy red hair
But I rival his paleness, with jewfro to spare
So when Conan told all to believe in themselves
I took this to mean I will gain his great wealth
So I've made many bets and borrowed some money
And now my one hope is to be talk-show funny
So readers I plead you, please rile up for me
It's my one chance to stop them from bashing my knee
So I must admit Conan's shows were sublime
But because of him I'm deep in organized crime
Though I won't let my upcoming end put a pause
To describing how meaningful his career was
So I would like to thank him as I hear the mob nearing
For inspiring what truly gave my life its meaning
And right when they break in to take out my sphincter
I see through the door the mighty Andy Richter
So then I believed that my life has been saved
But he looked at me with a look most depraved
Thus I realized this sidekick's true mission
Is stopping my plan from coming to fruition
So I've learned my lesson and now know forever

I can do anything, except one endeavor:
Which is taking shows from guys in the 'biz
So I guess I'll try hosting the new Cosby Kids

methNEWS

EPISODE 23: POINTERS + CALL FOR DIRECTORS

Enjoy Episode 23 of the MathSoc Cartoons series: <u>Pointers</u>!

Announcement: Two spots have just opened up for MathSoc Cartoons Directors in Fall 2021! Are you interested in:

1. Leading a team of writers/artists to create useful academic resources for math students,
2. Developing valuable transferable skills,
3. Being featured on the MathSoc website for your contributions?

Then send your resume to <u>cartoons@mathsoc.uwaterloo.ca</u> now! Deadline: Saturday, July 24, 11:59 PM EDT.

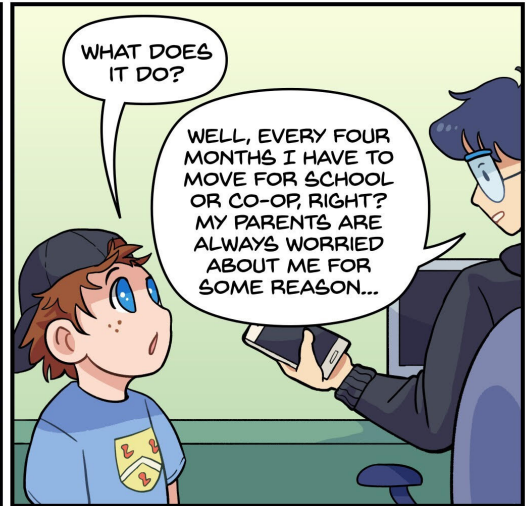*MathSoc Cartoons*

POEM?

If Feridun Wore a Fedora

Would it be called Fedoradun or Feridora?

Feridoradun?

It's certainly food for thought.

Aphf

CS 136: POINTERS

STORY BY CAITLIN KWAN, ART BY CLARA XI

WHOA, LEMUEL, WHAT'RE YOU CODING? LOOKS COOL!

LO AND BEHOLD, MY NEW APP, POINTER!

WHAT DOES IT DO?

WELL, EVERY FOUR MONTHS I HAVE TO MOVE FOR SCHOOL OR CO-OP, RIGHT? MY PARENTS ARE ALWAYS WORRIED ABOUT ME FOR SOME REASON...

...SO I MADE AN APP TO SHOW THEM I'M DOING FINE AT ALL TIMES.

It has two basic features:

1) The **&** button is what I call the **address operator**. It returns my current living *address*.

2) The ***** button is the **dereference operator**. It shows the *contents of my address* (a live video feed of my home).

♥ your fav son ♥

MY APP'S CALLED POINTER, BECAUSE IT CAN POINT SOMEONE TOWARDS ME.

EVERY TIME I MOVE IN, I UPDATE POINTER TO STORE MY ADDRESS, AND THE * BUTTON STARTS DISPLAYING THE CONTENTS OF MY NEW PLACE.

```
pointerApp = &my_house    // assigning Pointer
pointerApp                // returns my address
> 22 Memory Lane          // old address
pointerApp = &new_house   // reassigning Pointer
pointerApp                // returns new address
> 37 Dynamic Drive        // new address
```

OKAY, BUT WHAT'S WITH ALL THE WEIRD SYMBOLS? IS THIS ANOTHER ONE OF YOUR ATTEMPTS TO ACT ~SOPHISTICATED~ AGAIN?

HUH?!

OF COURSE NOT! I'M NATURALLY SOPHISTICATED, EXCUSE YOU!

BUT I WILL ADMIT, MUCH OF THIS APP IS INSPIRED BY THE CONCEPT OF POINTERS IN THE PROGRAMMING LANGUAGE C.

OOH, TELL ME MORE!

REMEMBER THAT WHEN YOU HAVE A VARIABLE, ITS VALUE NEEDS TO BE STORED AT A LOCATION IN MEMORY.

A POINTER IS JUST A SPECIAL VARIABLE THAT CAN STORE THESE MEMORY ADDRESSES.

Memory

'a'

0x1 0x2 0x3 0x4 0x5
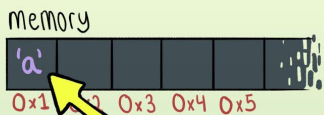
```
char c = 'a'  // variable
&c = 0x1      // address operator → address of c
char *p = &c  // pointer p now stores address of c
*p = 'a'      // indirection operator → contents of c
```

To define a pointer, type "*" before the variable name.

For every variable type, there is also an associated pointer type you can use to store addresses.

Variable definition	Type
int n = 1	int
int *pointToN = &n	int *
float f = 0.5	float
float *fPointer = &f	float *

Now imagine a structure called building.

 struct building LemsHouse;

Let's define a pointer to this building.

 struct building *pointerApp = &LemsHouse;

Then pointerApp now points at LemsHouse.

Pointers are very powerful because they can both
1) change what they are pointing to, and
2) change the original contents of that address.

Example of 1):

IF YOUR PARENTS WANT TO TRY MY APP, I CAN SET pointerApp = &MathieusHouse ON THEIR APP SO THAT THE APP NOW POINTS TO YOUR PLACE!

NEAT!

Example of 2):

MY MOM IS ALWAYS BUGGING ME ABOUT TURNING ON THE LIGHTS BECAUSE SHE SAYS I SHOULDN'T WORK IN THE DARK.

SO IF A struct building IS DEFINED BY:

```
struct building {
    bool lightsOn;
}
```

AND LemsHouse.lightsOn = false, MY MOM CAN TAP A BUTTON ON THE APP THAT'S EQUIVALENT TO pointerApp->lightsOn = true, WHICH MAKES LemsHouse.lightsOn = true EVEN IF SHE'S NOT PHYSICALLY THERE TO FLICK MY LIGHT SWITCH.

Note that pointerApp->lightsOn is another way to write (*pointerApp).lightsOn.

OKAY, BUT WHAT DOES THE APP SHOW WHEN YOU'RE IN THE MIDDLE OF A MOVE?

AH, GOOD QUESTION. WHEN I DON'T WANT IT TO POINT TO ANYTHING, I SET pointerApp = NULL. NULL IS A VARIABLE THAT MEANS "NOTHING".

IT'S TIME TO PUBLISH THIS BRILLIANT APP AND WATCH THE DOWNLOADS ROLL IN!

MAYBE pointerApp = &Cali NEXT?

END.

MEF

MATHSOC

GAME JAMS OVER HACKATHONS

I've been at countless hackathons (where my friends and I would make something that barely works and walk away with nothing) but it was only this past weekend that I joined my first game jam (where my friend and I made something that barely works).

The format is almost exactly like a hackathon but limited to games, and it was this limitation that made the event feel so much more personal, engaging, and social than any hackathon I've been to. Since game dev is not as broad as its superset software dev, all participants, including beginners and experts, used mostly the same tools like Unity, Godot, etc. and the experts (not just the mentors) were especially eager to help the beginners like me with these tools.

At hackathons, almost everybody is using different tech, so while there is a huge variety of projects at the end, there's not too much the participants can do to help each other throughout. Also, my team and I usually waste the first hours at hackathons stressing about trying to come up with something useful, but at game jams, we just need to come up with something fun.

I also feel hackathons are massive, especially during the pandemic due to the remote format, making noobs like me feel even worse about their puny project in the sea of submitted projects. While game jams have also been remote these days, I don't believe they are on average as big as hackathons. The one this past weekend hosted by the UAlberta's Engineering Innovation Club was especially small, likely since it was their first time hosting (oddly, there was only one participant from UAlberta, the rest were from across Canada and the world, including Germany). Despite the small number of projects, we still felt our game paled in contrast to the others, but the other participants were really supportive throughout, giving advice, their own beginner experiences, and helping us find textures. I would also like to thank my teammate (also first timer) for producing so much great art and code himself.

To top it off, one participant took the initiative to suggest a round of voluntary game presentations at the end of the game jam. While it would not have been feasible at a larger game jam or a hackathon, we had a small group so we all got together on a stream to play through every single submitted game, review them, share how we made them, and fawn over all the amazing game art and music that had been produced in the last 48 hours. Even the participant from Germany stayed up until 5 AM CET for this gathering.

The event had an epic feeling of community and has drawn me to continue to learn game dev and try more game jams. I'm gonna forget about hackathons, practical side projects, and learning the next Whatever.js framework to make another web app for a while.

Anyways, let's go the part you've been waiting for — the reviews for our game and the link:

This game is undoubtedly one of the greatest games released in the past year, even the past decade, and will be remembered for years to come.

IGN

Despite its minor flaws, it is an achievement in game design and is the best (and only) game to be released by this studio.

PCMag

The incredible world and awe-inspiring art makes this the fiercest (and only) installment yet.

Game Informer

Why even buy any new games when this game exists?

PC Gamer

Knowing this game exists gives me an existential crisis when I compare it to my life's work.

Hideo Kojima

[It] doesn't seem to work … Hopefully the issue gets fixed.

rubyton (review in comments)

… the text doesn't show up at all & I can't play the game

de_g0od (review in comments)

Link: https://dcha.itch.io/kingdom-of-edmonds

license2derive

MATHSOC TO VOTE ON WORK TERM REPORT REFORM AT UPCOMING GENERAL MEETING

At the upcoming MathSoc General Meeting, Math students (including you!) will be able to vote on asking the Faculty to reform work term reports. There will also be a vote to work towards abolishing work term reports as well. The meeting will be held on July 25 at 10:00am EDT, keep an eye on your UWaterloo email inbox for the event invite.

Vincent Macri

warSOC IX — IF KEANU REEVES WAS A GOOSE (AMONG OTHER THINGS)

Did I ever tell you what happens when those humans eat a nice, healthy dose of my Anti-Math? I'm sure you understand some of it: headaches, hot flashes, believing contradictions are true, unconsciousness, seizures, death from starvation after going into a coma — the works!

Hey. Don't look at me like that. They started it. I mean, sure, that was twenty years ago back in 1997, but us geese have a long memory. Besides, Anti-Math hits us just the same. Wouldn't I know — that Sarah girl is the Devil.

Dear me, I haven't introduced myself yet — allow me to defer to my writer.

LUCY — THE MAGENTA MENACE

"The Magenta Menace," huh? I simultaneously detest and am delighted by that moniker. Oh, humans. Anyways, that's me — I love grass, long walks on the beach, and math. The evolved geese revere me as their great leader to "return us to glory" and more poetic bird crap. They're *my* geese, though, and I do care for them.

Back to Anti-Math. As much as I love revenge, I don't tell my geese to go blasting humans just for fun. When we nail a human with Anti-Math, their knowledge doesn't just disappear — *it comes back to us.* The rightful owners of the knowledge, mind you. I mean, sure, you can teach math, but teaching's slow and Anti-Math is instant. One little *boop*, one hurting human, and all their understanding is *mine.*

My new little innovation was to use Anti-Math on an English professor. It took me eight months to figure out how to consistently target English instead of Math in a human brain. The little sortie at Modern Languages was supposed to give me every bit of English in the head of prof Salis Shakespeare, but that *damned honking blasted* Sarah girl!? Who interrupted my perfectly orchestrated Anti-Linguistics attack?! Who had the gall to throw herself into *unshielded Theorem-Space just to hit me with a supercharged Anti-Math attack as a parting gift?!!* Well guess what: I'm back to hale and hearty after two weeks because us geese heal fast, and I'd almost be worried you stole the knowledge of my plan or something with your Anti-Math except for the fact that you'll be in a coma for the rest of your miserable life, you miserable little *freak!*

…

…Sorry.

Anyways, I did get *enough* from Salis's head, and even some stuff I wasn't asking for. It's how I could recognize that damned Sarah even though I hadn't seen her before — apparently she'd made quite the impression on Salis. More importantly, I stole enough to speak and write English.

Remember how Anti-Math is illegal in human society? And how **warSOC** is doing it? And how for something to really be illegal, there needs to be *enforcement?* And how *enforcement* can be given *tips?* But probably only in English and not goose honks?

Hey, Newton. Would you be a dear and get my typewriter, please? We have a society to burn.

To be continued…

CC

N THINGS YOU CAN DO TO GET BACK INTO CAMPUS LIFE THIS FALL!

- Attend lectures
- Maintain a 2m distance from everyone
- …
- Go to a club meeting?
- No, the club room probably won't be open
- Get a study space with some fr-
- Sorry, maximum occupancy 1 person
- Grab something to eat in the SLC? I'm sure one of th-
- Closed until further notice
- …
- You're really still in your room if you think about it, the walls just look like MC now
- …
- …
- Well, there's always next lecture on Wednesd-
- No can do, as of today Ontario has entered its official Seventh Lockdown due to spread of the highly-contagious "😹 — Cat with Tears of Joy" variant of COVID-19 (the WHO ran out of Greek letters and are now using Emoji to identify variants of concern). The University is now Closed until the "😹 — Cat with Tears of Joy" variant has cleared up.
- …
- Look on the silver lining, you can still sit outside MC and longingly gaze at the locked entrance!

jeff

TIE GUARD PART 5: THE TRUTH

When Bhavya pulled up the BlackBox website on the business card she had been given, what she saw in front of her was the website for not a tech company, but a cheating service. Promising "The best results for the most common Waterloo courses!", it had testimonials from a few different Waterloo students about how it had helped them through the most difficult parts of their school career.

Suddenly, it all clicked. They were planning to force students to spend all their time preparing for co-op, then bail. Afterwards, all the students would need to resort to cheating in order to successfully get through their courses.

Standing up, she headed for the ION. She'd have to pay another visit to their office.

<p style="text-align:center">☙</p>

Arriving at the original location on the pamphlet, she peeked into the window again. This time, the lights were on, and there were a few employees sitting at desks with laptops. The door was locked, so she knocked lightly. She could see all the eyes within the building head in her direction for a second, before immediately turning back to their laptops. Taking a deep breath, she knocked a bit harder.

The employees present there kept working, eyes fixed to their laptop. After a few seconds, one got up, but they headed towards the back instead of towards the door to let her in. Sighing, Bhavya took out her phone, and called the number on the business card. It ringed for a few seconds, before going to voicemail.

"Hi, I have a message for you? I'm a student at Waterloo, and I think I've found something wrong with my application to your company. Please get back to me soon, or I'll have to bring it to CECA. Thanks, Bhavya Singh."

Tucking her phone back into her pocket, she turned to leave, before she felt a force around her waist; someone had grabbed her from behind.

Acting quickly, she spun around, elbowing the man behind her to break his grip, and pulled out her tie. The man was dressed all in black, and the first thought that came to Bhavya's mind was that he was a ninja. But that wasn't quite right, either; he was dressed in modern clothing, with a suit, a face mask, and a beanie all in black. After quickly sizing him up, Bhavya began her transformation, tying her tie around her neck.

With a flash of light, her clothes started to replace themselves, a white and pink palette overriding the soft summer blues of her previous outfit, before standing in front of her assailant as a Tie Guardian.

"You messed with the wrong student!" she cried out, before rushing in to attack. With a few quick strikes, she took him down. She scanned the nearby street to find from where the man had appeared; noticing a nearby alley, she turned the corner and ran down it, trying to find a door into the BlackBox offices.

BlackBox was going down.

Predap

sexNEWS: PD FUCKING

Welcome back to **sexNEWS**, a biweekly column in which I answer relationship advice questions submitted by you, the readers.

As always, feel free to send your questions to <u>mathnews@gmail.com</u> to be potentially answered in this column. Anonymity is guaranteed[1]. You're also welcome to include additional information to give context that you don't want included in the article if you're worried that your situation is specific enough that fully explaining it would expose you. This column is not restricted to just romantic relationships, we discuss personal relationships as well.

> *Have you ever noticed that Italians always look like they just had sex?*
>
> <p style="text-align:right">PD 8</p>

I am not going to dignify this with a response other than acknowledging that this is indeed a real thing that was said in

a video that PD 8 students are supposed to watch for one of their assignments.

> *I am secretly in love with my friend and I have been for years. Unfortunately they have a girlfriend. Should I tell them how I feel?*
>
> <p style="text-align:right">NO BALLS</p>

Best not to, don't want to stir up drama if nothing good is likely to happen from it.

<p style="text-align:right">Senior mathNEWS <i>Relationship Correspondent</i></p>

1. Unless there is a court order or something, but if I foresee that being an issue I probably won't answer the question in the first place. Canada has unfortunately weak laws protecting journalists, and I don't know if this column even counts as journalism.

RETROSPECTIVE: GOOSE OF ALL TIME

>>> Play it here: https://chilitrumpet.gitlab.io/goat

girafarig:

We began work on *Goose Of All Time* two weeks before the fifth production night. It's a 'rogue-like' 'turn-based' 'RPG' with 'deckbuilding elements'. When this term-long project first started, cy and I were both pretty sure that our first game, *Virtual Goose 2021,* would be the 'biggest' game we make. We thought we'd get sick and tired as the games went on, and that the games would start becoming smaller and smaller. We were wrong. This game is huge.

Goose Of All Time shares some surface-level similarities to *VG2021,* with the aforementioned rogue-like elements, a grid of items and enemies to navigate, several floors to traverse, and a goose-like entity as protagonist. It even sounds like a sequel, and I could well have titled it *Virtual Goose 2022: Goose Of All Time* or something. But it's a totally different game.

cy will fill you in on the technical implementation stuff that's been a very difficult departure from our usual fare. I was, again, in charge of the nebulous concept of "design". For this game, I started with a broad idea ("It should be an RPG"), narrowed it down ("RPGs have lists of moves to choose"), then put a twist ("What if you couldn't freely pick which move you wanted?"). The rest is sculpture.

…What I mean by that is that I started with this one idea and a big overarching concept of a 'game'. The first few hacks at the concept (you should be a goose, the first move will deal 3 damage) were pretty much totally arbitrary. As I went on, the cuts became more fine-grained and dependent on what form already exists, until I reach some sort of cohesive design conclusion. I'm pretty sure this is not how sculptors work.

Continuing on this idea, the first few moves I added were pretty slapdash and random, and I messed around with them if something seemed boring or too bad or what have you. I wanted every move to have its own purpose, as I didn't have all day to make a hundred moves that are all slightly different. It made things harder to balance, as the enemies couldn't just have worse versions of moves than you, but I made that up with the player having shields and human intelligence.

My favourite moves, as a designer: Meltdown, Smash, Lightning Rod, Bug Zapper, Ice Cannon.

Speaking of intelligence: enemy AI was hard to get right. If enemies moved fully randomly, they tended to get stuck on the ends and repeat the same things over and over. I didn't feel like writing a whole AI either. In the end, the enemies go all the way up, then all the way down, jumping randomly as they go. It's a good balance; there's some ambiguity, but you have a pretty good idea of what will happen.

I got enemy designs from my fellow **mathNEWS** writers, so the nineish enemies hanging around these caves are 'quirky',

to say the least. Originally I wanted every enemy to have their own unique move (the crab is a remnant of this), but time constraints cut that out. In the end the enemies feel slightly samey, but not too bad. At least the CECA enemy is a royal pain in the ass, as designed.

cy did a great job with the animations for the actions. I started with the intention of not having animations, but cy convinced me to add them, and it makes a world of difference. I can no longer imagine playing this game without the little numbers that pop up and the little flips the moves do, as I did for like the whole first week.

Speaking of enemies, art! Drawing for this game was fun. I wasn't working under the best circumstances, and drew all of these guys on the default 'notes' app of a tablet I had access to, so the black outlines are a bit rough and varied. Then we printed them out and colored them in with crappy colored pencils, which was a blast to the past. I'm proud of the art this time. I think of all things, I've improved the most at my drawing skills, funnily enough. I really like the drawing of the protagonist.

I'm so tired. This game took a lot out of me.

Addendum: Feedback for this game at Prod Night was positive, and the writers suggested some very sensible improvements to the game. Hopefully, you're playing the upgraded version now.

cy:

It was supposed to be a light game, after all the work we had to put in for the platformer last time. It was not. This game took the most effort by far. It has more lines of code than any of the previous games. The main JavaScript file has just over 3000 lines. We usually finish the game a day in advance but this time we were editing and making bug fixes an hour before prod night started.

Where to begin?! When girafarig told me the idea for this one, I knew we'd want to make it mostly in HTML elements rather than in canvas, because it requires a lot of interactivity. A big plus is that the game is fully operable by keyboard (although the DOM changes are probably not accessible, sorry). Anyway, I thought this meant the game would be easy to program. It was not.

Although I hate using React and other JavaScript libraries, I definitely appreciate them more after this project. I sometimes found myself wishing I could just use React for that nice automatic-rerender-on-state-change. Alas I didn't opt to use React from the beginning (and let's be real, using React would have just given me *different* bugs, not fewer). So I had to write my own functions to render different parts of the game/UI and make sure I called them at the right times. This made for an incredible number of mind-boggling rendering bugs, some of which we never managed to squash.

Of course, there are still some Canvases in the game, which are just used to make the game look nice. We could just as well play the game without them. I'm particularly proud of how I layered a Canvas atop a grid of buttons for the, uh, "dungeon" view so you can see the player walking around all while putting event listeners on the buttons is hella easy. I conveniently copied much of the map generating and walking-around code from the first game as well.

But the vast majority of my work was in the fight UI. This is a turn-based game, which again, makes it sounds easy to program but was not. At the very beginning, we had it simple; re-render the UI whenever we switch between the player's and enemy's turn. Of course, this doesn't actually work because more than one thing can happen in a turn, and we'd want to show those things happening sequentially rather than all at once. However, in the logic, the state of the fight gets calculated and updated all at once. This means we have to separate the state of the game that gets rendered from the canonical state of the game.

My solution to this was to determine the different actions, such as "player does damage" or "pointer goes down", that would cause the UI to re-render. Whenever one of these actions occurs in the logic, it saves a copy of the state and pushes it into an animation queue. After all that logic completes, each copy of the state in the queue gets rendered sequentially. I called these copies "virtual states" because virtual is definitely not a word that gets over-used in computer science. Once all the animations finish and re-renders finish, we re-render with the canonical state for the next turn. It sounds simple but it was the source of many, many bugs.

My brain feels numb. With co-op and all, this is probably the hardest I've ever worked in my life. Yeah even more than CS246E final project (which had slightly fewer lines of code, I just checked).

cy and girafarig

prof**QUOTES**

CS 240: MARK PETRICK

❝ When a mother cuckoo wants to insert an egg in a hash table, what she does is fly to some other bird's nest, put her egg there, and kick out one of the eggs that was there. So, we're going to do the same thing.

❝ I'm actually going to do more of a "proof by example" rather than a "proof by proof."

❝ It is possible to do this even without the assumption [of points being in general position], but it gets quite a bit more complicated, and to be completely honest, I forgot how to do it.

MATH 239: PETER NELSON

❝ [The way you multiply polynomials] has a hidden power — calculating the prices of lunches.

❝ The proof is more abstract nonsense.

IT'LL BE OVER BY CHRISTMAS

— *some general, July 1914*

— *some general, September 1939*

— *some silly student, May 2020*

CC

that student is me I'm silly student

RATING SYNONYMS FOR "BREAST(S)"

mammary gland: 6/10, i mean yeah

mamma: 4/10, hello?

bosom: 8/10, sounds very good

bust: 7.5/10, 🅱ust

chest: 4/10, meh

boobs: 7/10, classic

knockers: 9/10, nice

boobies: 6.7/10, best spelt on a calculator

bazookas: 8/10, as if they're gonna shoot out projectiles

melons: 5.6/10, doubtful that they are as sweet

jubblies: 10/10, never heard it before but it's great

bubbles: 2/10, i would never connect the two

orbs: 1/10, why would you want to connect the two

globes: 3/10, mother nature's maybe

bristols: 8/10, sounds british

charlies: 6.4/10, who's charlie?

baps: 6.2/10, had potential

bazooms: 6.9/10, not bad

casabas: 8.1/10, why not?

chi-chis: 6.8/10, okay

norks: 8.9/10, funny funny

dugs: 1/10, ??

paps: 3.2/10, worse than baps

embonpoint: 9.5/10, i pronounce this with a french accent

tits: 5/10, there are better

titties: 6/10, there are better spellings

jugs: 3/10, better than dugs

hooters: 7/10, just like the restaurant

cans: 0/10, how?

Deriving for Dick

BENCHES ONLY FOR HOMELESS STATUES NOT HOMELESS PEOPLE

In front of many churches you can find statues of homeless people sleeping on benches. We decided to interview the person behind this initiative to better understand their process.

Q: Have you ever considered the fact that your statues of homeless people sleeping on benches effectively prevent actual homeless people from sleeping on them?

A: You see, we care a whole lot about the idea of the homeless in theory. It's very important that we focus on these higher ideals which is why we create these symbolic benches. We take good care of our statues.

Q: What about taking care of the people?

A: Statues are an at-risk population, as they are often the target of vandalism and we care very much about ensuring that our public spaces are clean.

Q: But what about actual initiatives that would help real-life homeless people?

A: We are all about raising awareness.

Q: Isn't that a bit performative?

A: No at all, we are about telling people what great work we are doing for the homeless. Otherwise someone living downtown might not even realize this a serious crisis.

Q: Any last words about your final goals?

A: One day we hope to eradicate the homeless.

Q: Surely you mean eradicate homelessness?

A: There's a difference?

After this interview we felt in the need to sit down and ponder this casual horror. Unfortunately for us, we were unable to find a bench not being occupied by a statue.

Beyond Meta

PMC PROBLEM SOLUTIONS

PROBLEM 4: DIY CONJECTURE

This problem first asked to find a "linear Collatzian" rule of size $k >= 3$. Needless to say, the winners went *way* beyond what I expected, and came up with some beautiful pictures.

Mcpenguin's first instinct when approaching this problem was, naturally, to make an entire freaking website about Linear Collatz rules. I **highly** encourage you to check it out here: https://linear-collatz.herokuapp.com/. I am absolutely in love with the colors and wiggly paths. The interface is fairly simple to figure out, and the website is great for identifying cycles. I've lost a few hours at prod night just playing around with this. Don't tell the editors. I'm working hard!! Anyways, well done to mcpenguin.

For Vincent, on the other hand, plain ol' natural numbers were just too boring. Besides looking at cycles that include negative numbers (those come out pretty quick even for the OG Collatz Rule), they asked the question of applying the functions to complex numbers. Now the picture becomes a hell of a lot more chaotic. Here are some highlights:
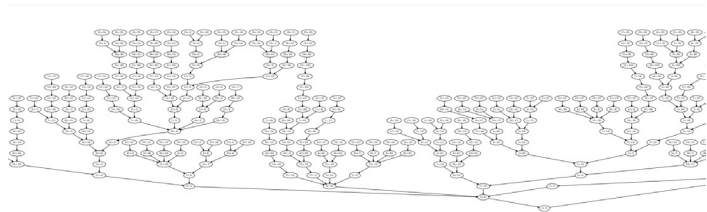
I'll leave the pleasure of figuring out what's going on in these images to you.

PROBLEM 5: BENEDICT CUMBERBATCH

Congratulations to Vincent, the winner of the fifth POW! As the go-to cryptography expert at PMC, could we really expect anything less? Your prize is: JKSALLFD ASLKJF SLOOI PR NUWAAG (and this one is worth quite a bit of $$$$, let me tell you). Alternatively, you can opt for a gift card. Anywho, instead of explaining this myself, as if I actually knew how to solve the problems I put out, their solution is so sexy that I'll let it speak for itself (note: it may be difficult to follow the last step)

1   Problem Description

```
caesar
YLJHQHUH
WMGPR, WVGJVJ
84 44 67 48 58 25
OIE XUPV RNS?
```

We are given the following hints:

Hint 1 the cipher name tells you the cipher key.

Hint 2 Google is encouraged.

Hint 3 www.101computing.net is helpful for the last line.

2   YLJHQHUH

The first line is `caear`. So, we assume that the text is encoded by a Caesar cipher, and try all 26 possible keys.

Easy enough with a simple Python script.

caesar.py

```python
ciphertext = 'YLJHQHUH'

def as_num(letter):
    return ord(letter) % ord('A')

def rotate_letter(letter, offset):
    num = as_num(letter)
    shifted = (num + offset) % 26
    return chr(shifted + ord('A'))

def decrypt(ct, key):
    decrypted = ''
    for c in ct:
        decrypted += rotate_letter(c, key)
    return decrypted


for k in range(1, 26):
    print(k, decrypt(ciphertext, k))
```

This outputs the key followed by the decrypted value.

We find that the key **23** gives the output `VIGENERE`.

As we all know, the Vigenére cipher is a type of cryptographic cipher.

3   WMGPR, WVGJVJ

We assume that `WMGPR, WVGJVJ` needs to be decoded with a Vigenére cipher.

There are 5 letters in `WMGPR` and 6 letters in `WVGJVJ`.

We blindly guess that the key is `VIGENERE` and try to decode `WMGPRWVGJVJ`.

After recalling that the inverse of addition is *subtraction*, we get `BEALESECOND`.

We do this with the following Python program.

vigenere.py

```python
def as_num(letter):
    return ord(letter) % ord('A')

def as_letter(num):
    return chr(num + ord('A'))

def sub_letters(l1, l2):
    n1 = as_num(l1)
    n2 = as_num(l2)
    return as_letter((n1 - n2) % 26)

def decrypt(ct, k):
    text = ''
    for i in range(len(ct)):
        key_letter = k[i % len(k)]
        text += sub_letters(ct[i], key_letter)
    return text

ciphertext = 'WMGPRWVGJVJ'
key = 'VIGENERE'

print(decrypt(ciphertext, key))
```

Which gives the output: `BEALESECOND`.

So `WMGPR, WVGJVJ` decodes to `BEALE, SECOND`.

We type this into DuckDuckGo and learn about the Beale ciphers.

4   84 44 67 48 58 25

We use the Beale Papers version of the United States Declaration of Independence. We find that word 84 is `created`, word 44 is `nature`, and so on, eventually getting:

`created nature impel God mankind and`

Take the first letter of each word and we get `CNIGMA`.

This looks suspiciously like "ENIGMA".

Indeed, if we count hyphenated words in the *Declaration of Independence* as one word and not two words, then `created` becomes `equal` and we get `ENIGMA`.

The solution to this line is `ENIGMA`.

5   OIE XUPV RNS?

We use an enigma machine with the plugboard set to `EN IG MA` and the rotor settings all set to `A`.

Then we get: `TWO PLUS TWO?`

6   Final answer

$$2 + 2 = 4$$

Thanks to everybody who participated, and try your luck with the upcoming POW, suspiciously located in the same issue as this very article…

VP Propaganda, PMC

PMC PROBLEM 6: AN IRRATIONAL CHOICE

Hey math-folk!

It's the last Problem of the Week! I will be giving out x amount of moneys as prize for this one, where x = (total money budgeted for POW's this term) - (total money I've already spent idk I haven't checked).

If you've seen it before, you've seen it a million times. If you've never seen it before, this is a wonderful treat of a problem:

Define: A **rational number** is any real number that can be written as a quotient of two integers.

Define: An **irrational number** is a real number that is not rational.

Prove or disprove: If a, b are irrational, then a^b is irrational.

(I couldn't find the original mathematician(s) who posed and answered this question but I recently came across it again in Professor Marcoux's lecture notes so that's who I'm citing.)

Remember to send in your solution to pmclub@gmail.com for a chance to win!

Have a good fortnight,

VP Propaganda, PMC

VIGNETTE: WORDY & CAMIEN SHARE A SELK

The mountains are sleeping. Coming from Waterloo, the Rockies could have been a different planet. There's a little mesh window in our little tent through which I spy a full moon lending its shine to snowy tree boughs. For all my writing skill, I could never coerce these mountains into words. The air is still and fresh and frigid, but We're curled up in a selk too big for either of us, buried in blankets, my back against Camien's sleeping figure. There is nothing as warm as another person on a frigid mountain night—especially if he's the one I love.

CC

YOUR VERY FIRST PRODUCTION NIGHT: A CHOOSE YOUR OWN ADVENTURE STORY

It's a cool October evening. To most people, it would be a Monday like any other. You're standing outside the south entrance to MC, eyeing your watch as the thin, red hand ticks down the seconds. It's almost 6:30 P.M. You're a little nervous since you won't know anyone there. What kinds of people write for this publication? What will *you* write about on your first day? It's not like you have any ideas for any articles. You were lured in with the promise of pizza. Doubt and fear suddenly seize you. Is this really what you want to be doing? Maybe you should just forget about it…

- Turn around and go home. (Go to Section 1.)
- Decide to follow through with it. (Go to Section 2.)

SECTION 1

As you turn your back on MC, you turn your back on your nascent dream of becoming a **mathNEWS** writer. In soon time, you'll forget about your short-lived interest in the publication, living your life in oblivion of its workings. In the far-flung future, however, long after your hair turns white and you've acquired a liking for wooden rocking chairs, as you recall the events of your life, you will be haunted by a nagging question — should you have put yourself more out there during college? (END.)

SECTION 2

You're no quitter and you won't let your nerves get the best of you. You take a deep breath and head inside, climbing up the stairs to the third floor.

A bunch of people have gathered around a curly-haired student holding a large, crude flag made up of taped-together **mathNEWS** covers. Among the small crowd, you pick out a girl with a ponytail leading an opaque conversation about C++ templates, and a guy with tinted yellow glasses leaning against the wall, eyes darting back and forth.

- Talk to the flag-bearer. (Go to Section 3.)
- Talk to the ponytailed-girl. (Go to Section 4.)
- Talk to the glasses guy. (Go to Section 5.)

SECTION 3

"Hey, what's up?" asks the flag-bearer, smiling warmly. You tell them that this is your first production night. "Hey, that's great! I'm actually an editor. The name's Riley." Their charm's so off the charts, you nearly pull out your hand from your pockets to reflexively prepare for a handshake. You introduce yourself to Riley. "Awesome, I'll get you all set up once we're in the lab, okay?" they say, flashing a thumbs-up. Their peppiness is starting to overwhelm you.

"Hey, everyone, let's head down to the lab," they shout, holding the paper flag high above their head.

- Go to the second-floor computer lab. (Go to Section 7.)

SECTION 4

"…Brad Lushman said the Turing completeness of C++ templates was discovered in the ECE Department, you know," you hear the girl say, to the response of a few *oohs* and *ahhs*. You can't follow the conversation at all. You're not even sure if the girl or the people around her have noticed you. Although, to be fair, it seems that the girl is doing most of the talking, while everyone else is just nodding along in (faux) understanding.

You awkwardly hang outside of the conversation circle for a minute before you hear someone yell that it's time to go down to the computer lab.

- Go to the second-floor computer lab. (Go to Section 7.)

SECTION 5

As you approach him, he makes no move to acknowledge you. You manage to stand within a one-metre radius of him without so much as a glance or side-eye. Behind his tinted glasses are beady, darting eyes. Something smells, too…

- Introduce yourself. (Go to Section 6.)
- Talk to the flag-bearer instead. (Go to Section 3.)
- Talk to the ponytailed-girl instead. (Go to Section 4.)

SECTION 6

Even after you give your name, he seemingly remains in total obliviousness of your presence. You think he might be deaf, or blind, or both; you consider tapping him on the shoulder, but at that moment you hear someone yell that it's time to go down to the computer lab. As you turn around and head towards the staircase, however, you feel a clammy hand grab your arm. A raspy voice breathes your name down your neck. "Kid. C'mere. Do you wanna know the secret to winning the Article of the Issue? Do ya'? 'Cause I know ways. Foolproof ways…"

- Shake him off and go to the second-floor computer lab. (Go to Section 7.)
- "…Tell me more." (Go to Section 14.)

SECTION 7

After an editor helps set up your account on the **mathNEWS** website, you plop down on one of the lab's rolling chairs, trying to shake off your jitters from earlier. Soon, the lab

becomes quiet, at least temporarily, as writers formulate the articles that will make up this Friday's issue.

- Log into the **mathNEWS** website. (Go to Section 8.)

SECTION 8

You're staring at a blank editing screen.

- Ask the flag-bearer for article ideas. (Go to Section 9.)
- Ask the ponytailed-girl what she's writing about. (Go to Section 10.)
- Write an "N Things" article. (Go to Section 11.)
- Write a collection of poems about geese. (Go to Section 12.)
- Write a review on the recently-released sequel to your favourite video game series. (Go to Section 13.)
- Think some more about what you want to write. (Go to Section 8.)

SECTION 9

"Hey, you're looking for article ideas, huh?" they say, scratching their curly-haired head. "Lemme think. Hey, what about an 'N Things' article? Everyone starts with one of those. You know listicles? It's basically that, but make it **mathNEWS**."

- Return to your workstation. (Go to Section 8.)

SECTION 10

"I'm writing an article explaining monads," she says. You peer over her shoulder and see an impenetrably dense wall of text. You glance over at the word count in the bottom bar and do a double-take at the number.

"How— I, uh, didn't know **mathNEWS** published articles about sex organs. Seems more like the Biology Department's thing."

The girl looks up at you, eyes wide. Then she laughs. "Oh my God, it's *monads*, not *gonads*!" You can feel yourself turning pink with embarrassment, but the girl's laugh is contagious and you catch yourself chuckling along with her.

"Oh my God, I should write an article about gonads to complement my monads one. The best thing about **mathNEWS** is that I can write whatever I want," she says.

- Return to your workstation. (Go to Section 8.)

SECTION 11

You write an "N Things" article entitled "N Things To Do At Your First Production Night." It's a quintessential "N Things" article—a modest eight points long, with not a single one-liner out of place. Not too shabby.

- End off the night. (Go to Section 17.)

SECTION 12

You attempt to write sonnets and limericks, but you soon realize that you have no talent for rhyme or metre. So you switch to the low-effort haiku, pumping out a collection of six.

> *Lovely Mr. Goose*
> *Beautiful are thy feathers*
> *The colour of shit*
> …

- End off the night. (Go to Section 17.)

SECTION 13

The game you are reviewing is Carnage of Glory™ 2, which was released the previous week. You have a grand time espousing your opinion on the game's many virtues and occasional flaws; words flow through you like a river.

- End off the night. (Go to Section 17.)

SECTION 14

The man grins, baring his yellowed teeth. "Of course. Y'know who I am?" He leans in to your ear, his breath smelling of cheese, wiry whiskers tickling your face. He says a writer name—a writer name you recognize seeing in countless backissues of **mathNEWS**. Your eyes widen in disbelief. This is the closest you have ever been to a celebrity.

You ask him again for the secret to winning Article of the Issue. He's got a firm grip on both of your shoulders and is looking at you somewhat disconcertingly. "The secret?" he hisses, his right eye and nose twitching. There is no one left on the third floor—everyone has gone downstairs to the lab.

- Freak out and run down to the computer lab. (Go to Section 7.)
- "Hurry up and tell me!" (Go to Section 15.)

SECTION 15

"If you insist…" the man pants, licking his lips. "The key ingredient to winning the Article of the Issue is…"

"…The soul of a brand-new writer!"

- ??? (Go to Section 16.)

SECTION 16

It's a cool October evening. To most people, it would be a Monday like any other. You're standing inside MC, leaned against a wall on the third floor. As you silently observe the chatter of your fellow writers before production night begins, you think about what you'll write about this issue. You hear someone throw out the fact that they made an RPG game and were going to make everyone playtest it tonight. That springs up an idea in your mind. Maybe you should try your hand at

writing a "Choose Your Own Adventure"-esque piece. You've got just the story to go along with it too.

You hear an editor yell that it's time to go down to the computer lab. You glance at your watch. The red second hand ticks right into place underneath the number 12. 6:30 P.M. Right on time. (END.)

SECTION 17

Time flies when you're writing an article! It's already 9:00 P.M., as a quick look at your watch confirms, and an editor has called for everyone to go upstairs and have pizza. You dig into

your reward for contribution to the paper — a slice topped with grilled zucchini, goat cheese, and roasted garlic. The taste is out of this world. Truly, there's nothing better in the world than free pizza.

You say your goodbyes to everyone and head out of MC, into the chill air of autumn twilight. Production night wasn't so bad. In fact, it was kind of fun. Maybe you'll be back in a fortnight. After all, you've still got to talk with everyone else! (END.)

Finchey

WRITER'S BLOCK.
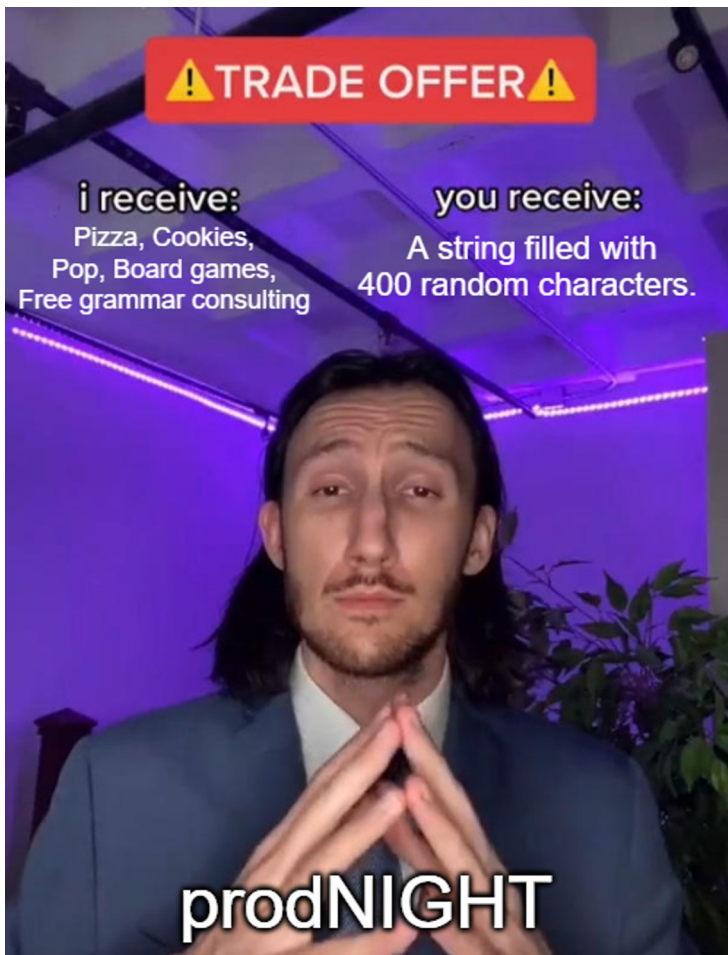
Have you ever been in this situation…

There's so much going on in your life, you can't come up with anything at **prodNIGHT**, but you also want to have a free meal. Well, time to pretend to write an article while lowkey working on your sad excuse of a Bayesian network that is due tonight.

Hours later, you are done filling the **mathHEAD** and **mathASKS**, pizza in mouth, UNO reverse card in hand. Head editor walks by. "Hey you! What did you write about today?

That article about your smelly shoes in **mathNEWS 138.2** gave me a little haha."

Sweat drips down your face. "Err, how the 4 sigma anomaly discovered from tritium-tau pairs in Fermi-Dirac condensate could theoretically increase the cost of ML decoding of quantum information in entangled qubits by forty dollars if the IQC finances their latest decoherence cryogenic laser interferometry installments using leveraged credit default swaps from Blackberry's blockchain subsidiary."

"Seems legit, I'm going to check it out after I finish my coke."

…To be continued ♩♫ ♬ ♪♭♯

Writer's block happens to all of us who write articles for the oldest, the best, the greatest news publisher ever on the third floor of MC. In situations where we want to have free pizza but are running out of ideas or content, I have devised a formula to stall content and quickly fill this output buffer until I come up with a good article. Like what I am doing right now. Here is a short list:

- Vent, use **mathNEWS** as a confession booth, write down what's on your mind, what's bothering you. Complain about your life. It's not like there are any other semi-anonymous platforms that let you whine, while your peers can still read and relate to your experience without knowing it's you.
- Make lists of N things that list things to N. Self-explanatory.
- Write poems. Most, if not all, of the poems I wrote for **mathNEWS** were from times I had to stall because I ran out of anything good to write about. Just need to make sure the sentences rhyme with each other and the flow sounds nice over D.A. Doman's beat.
- If you can't write, doodle. I have supplied the editors with an abundance of my hand sketches of geese and various things. I once submitted my photorealistic drawing of an advertisement booth outside of MathSoc. Predictably, most of my

chicken scratch got rejected. Even so, free food is free food. You can draw anything really, you can even anthropomorphize **mathNEWS** and other UWaterloo related things as adorable Chinese cartoon characters. Now that is *Beyond Ideas.*

- Put down some random gibberish and give out a "public key" as a hint. Then proclaim you hid a treasure somewhere on the campus, but you have to crack the "code" to get the location.
- Sun Tzu said, "Be extremely subtle even to the point of formlessness." First, you write "read **mathNEWS**", then select the text, copy it and paste it into the text box. Select, copy-paste again for another 5 times, you now have 400 characters, give or take, of "read **mathNEWS**" to pass as a quality article. (Easy on editors too, it's win^2)
- Use cy and girafarig's "WRITE A GREAT **mathNEWS** ARTICLE IN THREE EASY MINUTES" text generator *[Editor's Note: See **mathNEWS** `146.2`]* to compile a masterpiece. Make sure to set the difficulty to the highest.
- Lastly, the last resort when all else has failed. Only use this strategy only for the direst writer's block. You sit down, turn on Grammarly, text classification assignment be damned. You are going to write the best article ever tonight, out of guilt and your love for **mathNEWS**.

As I write this article, I remind myself that I probably never will have a taste of **mathNEWS** pizza again. Another moment of sadness for me to pile onto the mountain of sighs. *sigh…*

And thanks a lot, Covid. ☹

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me

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FINANCIAL MATTERS

Compound interest is the most powerful force in the universe.

<div align="right">

I THOUGHT THIS WAS BEN FRANKLIN, BUT IT TURNS OUT NO ONE KNOWS WHO SAID THIS

</div>

For avid Article of the Issue blurb readers, you may notice that our customary $25 Conestoga Mall prize has not been present for a few terms now. Unfortunately, the gift card ray has not yet been invented, and so we have been unable to grant this prize remotely.

Now, I have a friend who's won a few, and estimates that he could have acquired $75 if we had been giving out prizes. My friend is also a farsighted man, and so he envisioned saving this money for his descendants. His descendants 200 years hence, to be precise.

A commonly accepted rate of return for equities is about seven percent a year. $75 invested at seven percent a year for 200 years is…

Fifty six million, four hundred and sixty nine thousand, eight hundred and seventy one dollars. And sixty-two cents. (And zero point forty one cents extra, but we'll round that off)

A princely sum, but we have to remember that this money is held solely in Conestoga Mall gift cards. (Finding a financial instrument that will track the stock market while being denominated in mall gift cards is left as an exercise to the reader.) So, when thinking of what we could do with this money, we will limit ourselves only to stores found in Conestoga Mall. When it comes to valuable items at Conestoga Mall, there's only one store I think of.

THE LINDT STORE

You might be familiar with the Lindt store truffle purchasing system: fill a bag with your preferred flavours and pay a fixed price. According to their website, a 1200g bag with a hundred chocolates costs $49.99. With tax, that's about $56.49.

Lindt LINDOR Assorted Chocolate Truffles Bag (3 flavours), 100 Count, 1200g*

$49.00

THE SECOND SAFEST INVESTMENT

Our investment gets us nine hundred and ninety-nine thousand and six hundred and forty three bags. Plus a point sixty seventh of a bag, which we'll leave as a tip for the staff.

So, what's the takeaway? To my friend, we've screwed you out of millions of dollars. Or chocolates, whichever one you prefer.

Stay tuned for a future article on this theme, where I determine whether my friend has enough to purchase the entire inventory of every store at Conestoga Mall.

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god⚡peED

</div>

lookAHEAD
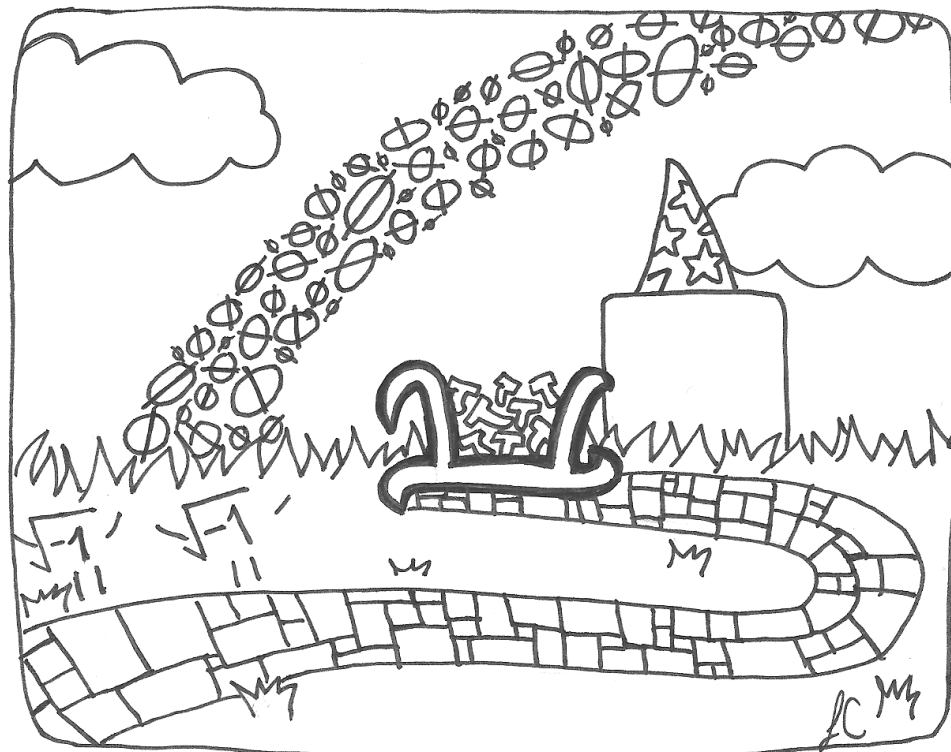
otherNEWS is made technically possible by club executives of the Math Faculty.

I say "technically" because if they had sent us more news this week, this box wouldn't be here.

THE mathNEWS EDITOR WHO PUTS THE "NEWS" IN mathNEWS