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Synopsis

Here I narrate the story of the last few days of my graduate program in mathematics. After the completion of the thesis and the delivery of the defense, several twists and turns await in the hours and even minutes before the last deadline.

Keywords. graduate school, thesis, defense, LaTeX, typewriter.

This is the story of the last few days of my graduate program in mathematics. It was the spring of 2008 — not a long time ago, perhaps, but long enough that typewriters were still at large in the world.

My time in graduate school had proceeded relatively normally. The first two years consisted of coursework and exams. In the third year I started a research project, and in the fourth year I finally had some luck in my work on it. By the beginning of the fifth year I was cleaning up loose ends, and by the final semester I was in a good position to graduate.

But there was still much to do. Even though I had solved a problem in my notes, I would need to develop it into a well-rounded thesis. The technical portions required careful explanations and would add up to many tens of pages. The document would also need an extended introduction with the background and motivation for the subject matter. I also had to draft and deliver several talks on the subject, as well as prepare a presentation for the defense. On top of that I was teaching an upper-division course in my area — a very satisfying teaching assignment, but naturally very time consuming.

My idea of a fun night out with my spirited partner Kathleen was ... a trip to the 24-hour Starbucks down the highway. I would spend the evening

chipping away at something, maybe the introduction or the appendix. They kept me company and valiantly did some extra homework. During spring break in March, my partner went on vacation, and so did my roommates. I spent the week alone, writing all day and late into the night. I felt productive, but I still slept in every morning, so I guess other students have been more productive.

Added to the work of writing was the work of leaping through bureaucratic hoops and readying administrative forms. One day I made a special trip to the administrative offices of the graduate program to get a better handle on all the intricacies. I met a powerful and supportive administrator named Barbara who took me through the list of forms and deadlines. She began to explain the thesis formatting requirements, and then smiled when she found out I was in the math department. She knew that we had a secret weapon. I knew that the weapon was the “ \LaTeX ” document preparation software.

For the uninitiated, I should explain that the production of typed mathematics has evolved through at least three ages: pre-computer, computer, and online. During the pre-computer age, mathematicians were not able to produce press-ready documents. Even with typewriters, mathematicians were forced to resort to handwriting for esoteric symbols and complex equations. Some low-cost journals simply printed the mixed typewritten/handwritten version, but most publishers would rely on professional staff to typeset a more visually pleasing version.

The rise of computers and software slowly shifted this burden from the professionals to the researchers. The \TeX language allowed computer-savvy mathematicians to typeset their own work. Soon \TeX grew into a more user-friendly form called \LaTeX , which first became popular and then became universal. Mathematicians would typeset their own work, and publishers were only needed to edit, print, and distribute the copies.

Today as the internet matures and \LaTeX ages, the burden is shifting back to the publishers. The most important publication destination for journals is online, but \LaTeX was not designed to produce web-friendly output. No software has emerged to fully replace \LaTeX because there is little agreement about how documents should be ‘typeset’ for the web. Publishers again rely on professional programmers to produce the final online version.

The events in this story took place in the last years of the computer age. My fellow students and I all possessed a working knowledge of L^AT_EX. We also had a special math department L^AT_EX template file, coded by a heroic former student and passed down through the generations, which helped us automate the process of satisfying the stringent formatting requirements.

The most difficult formatting requirements of all were those concerning the title page. The title page was meant to be a very special piece of folio featuring the title of the thesis, my name, the graduation date, and lines for the ink signatures of all five members of the defense committee. Due to the signatures, the title page had to be printed on very special, very expensive, acid-free “thesis” paper. I understood that in years past, an entire thesis would be printed on this most durable of media. But thanks to electronic storage, the burden was reduced to just one sheet of the precious paper.

Even with the template, the production of the title page required time, luck, and a healthy dose of cooperation from the department printer. I executed many practice runs with ordinary paper before I dared to attempt a trial on thesis paper. Even then, many printed pieces of thesis paper were sent straight to the recycling bin. Each time I measured the margins with a ruler, and each time they didn’t match my specifications. I eventually devised a trial-and-error process to determine the right incorrect margin settings that would make the ruler measurements work out.

Meanwhile, other students were printing things too. Some of them were calibrating margins like I was. During the time it took to walk between my office computer and the printer, something might have happened to the thesis paper I had placed in the tray. After a lot of exercise in the hallways, I calibrated the margins, and I was therefore able to produce my One True title page. I printed a few extra copies to serve as alternates just in case.

With my One True title page ready to go, and my thesis nearing completion, it was time to schedule the defense. While the formal graduation wasn’t scheduled until the middle of May, the deadline to defend and submit an approved thesis was April 15. I understood that the deadline had previously been May 1 (and before that it was mid-May). But lately the college was receiving too many theses to process before graduation, so they decided their staff would need a couple extra weeks to work on them.

A semester lasts four months, but you do not get four months to prepare your dissertation and defend it. Rumor has it that the deadline has since been moved up to April 1.

The defense committee was headed by my advisor, Simon. He was supportive overall, but often withholding of praise. One typical interaction between us occurred early in my studies. I told him that when I looked into his math “genealogy” prior to meeting him, he had seemed to have a unique ancestry which quickly reached a dead end. We both knew it was more common for one’s math ancestry to run through one of a handful of famous mathematicians, then back through Gauss, and finally back through a ubiquitous historical branch. He responded, “Oh no, they’ve recently updated the connections.” Then there was a pause during which he turned his head to look directly at me. “So if by some miracle of great injustice you are ever granted a Ph.D., then you too will go back to Gauss!”

The second committee member was Greg, our other faculty in my area. He was later in his career and very well-known academically. In person he was friendly but extremely dry. When we went to dinner after seminars, he would often carry the subject matter into intellectual or esoteric domains. On one memorable occasion, Greg ended a long silence at the table with, “So, is there . . . art . . . anymore?”

The third committee member, Chuck, was the graduate coordinator and therefore quite a handy person to have on a committee. He was well-known in his own area, and was “friendly” to my area, but he was clueless about it. He often had suggestions motivated by his own knowledge, and I had to invest extra time checking up on his suggestions and ultimately explain why they could never work.

The committee was rounded out by Joel, an energetic professor from a nearby institution with a retro capitalist dress sense and protuberant red eyebrows, and Adrien, a young postdoc from France who was added on at the last minute.

My defense would be held on a Monday at 5pm, because that was the time slot for our weekly seminar. This would allow the maximum number of interested parties to attend. Since the deadline to submit the committee-approved thesis was 12pm on Tuesday, April 15, I naturally scheduled the defense for

5pm on Monday, April 14. That would give me nearly eighteen hours between a successful defense and the submission deadline. If the committee required any corrections I would clearly have plenty of time to make them.

When April 14 rolled around, I spent most of the day being nervous. Normally I would have taught a logic class during the period before the defense, but I didn't feel up for it. My friend Scott kindly agreed to give a special talk for the class while I sat and listened with the students. Meanwhile I gathered some things into a folder: the typewritten notes I prepared for my defense, several forms, and my One True title page.

Then it was nearly time for the defense. My defense committee arrived: Simon, Greg, Joel, Chuck, and Adrien. Many other colleagues and friends filed in. I gave my defense talk in the traditional way, using the blackboard and Hagoromo Full Touch™ chalk, and it went smoothly. Afterwards there were a few questions, but none of them were challenging or embarrassing. Finally the committee kicked the audience and myself out of the room so that they could deliberate. It's meant to be a nerve-wracking moment, but their demeanor told me I should have little cause for concern.

For the next few minutes, I stood outside the door to the classroom talking with my friends, laughing nervously while the committee deliberated inside. They were taking their time. The outcome wasn't really in doubt, so what could they be talking about? The natural explanation was that they were just having a chat and letting me sweat a little. But as the time continued to wear on, that explanation didn't seem right anymore. After all, everyone gets hungry.

Unable to resist, I finally snuck an illicit peek into the classroom. The distinguished members of my committee were sitting at or standing near the front table poring over some papers. I poked my body in a little further, and I was able to survey the scene. They had helpfully opened my folder of forms and begun signing them. They also signed the One True title page. And in addition to that, they seemed to have signed the alternate title page and the alternate alternate title page.

They were currently signing all of my backup title pages, and even some of the practice title pages that were printed on normal paper (why did I keep these?). The process was like an assembly line, with each paper being handed

from committee member to committee member. I really wanted to laugh but instead I ahem'd.

They looked up and welcomed me in. I thanked them, and explained that that was my private folder of backup forms and that just the original signature page and maybe one backup would do nicely. Relieved, they all blamed Chuck for their mistake; he was the graduate coordinator after all. Then they shook my hand in congratulations, and then it was my turn to feel relieved.

The tradition after the weekly seminar was to meet in town for dinner and a beer, and that evening the party was larger than usual. I have absolutely no memory of it, except that Kathleen was there with me and everyone was very kind. I had a few drinks, but not an excessive number. When the bill arrived, Simon commanded some young person other than myself to “add up”. At the end of the evening I went home exhausted.

On the morning of April 15, I woke up late. I blearily recalled there were several corrections to make in the thesis, and became a little flustered. In all the celebration the previous night I had completely forgotten about them. I didn't have time to do it carefully, because I still needed to run to the department to print a final copy, and finally run to the main campus to submit it before noon. I sat down at my computer and busily entered something approximating the needed corrections.

With just a couple hours left to go, I called my friend Colleen. She was in my class year and had defended the previous week. She lived a few blocks away from me, and drove us to the department. The math building was housed in the suburban engineering campus across the river from the main campus. We went about printing our final copies, and preparing our submission packets. Then we drove down to the graduate college on the main campus.

The office building that housed the graduate college was a grand old-fashioned house, much like a fraternity house. We entered, turned a corner, and reached the hallway with the door to the “bedroom” office we were seeking. Two other people were standing in the hallway, presumably waiting for the same thing we were. With less than an hour to the deadline, we stood around behind them and waited for Barbara to call us in.

Presently someone came out of the office, evidently successful. Next a young woman entered the office and we overheard snippets of the exchange. Something hadn't been done correctly. No, there wouldn't be time to fix it.

She would have to graduate at the next opportunity, which wasn't until September. She held on and argued for a little bit, but eventually left the office crying. Colleen and I exchanged a glance: should we be worried? No. We had the LaTeX template.

Next a young man entered the office. Unlike the young woman, he was not carrying anything with him. He explained that he was nearly finished, but would need a few more days to complete some final touches. Soon he left the office with a frown: September. Colleen and I exchanged another look. He hadn't had the LaTeX template. He hadn't even had a thesis.

Next it was Colleen's turn. She went inside the office and spoke a few words. She came out a minute later. All done!

Finally it was my turn. I entered the office and beheld Barbara standing soberly over her enormous oaken table. The table was covered from edge to edge with stacks of thesis packets. We made our hellos, and then it was time to hand over my packet. But Barbara didn't flip through the pages or inspect any margins. She didn't even pick up her ruler. She noticed a flaw immediately, right on the title page, near the bottom, where it said "April, 2008". She explained that spring theses are not dated April; they are dated May. In an instant my One True title page had become my One Flawed title page.

I protested in a quiet voice that it was April, April 15 in fact. I didn't say: It's the ides of April! The tax deadline! The thesis deadline! I completed my thesis in April so I deserve to write "April" on it! I knew there was no arguing, I had just seen multiple demonstrations of that. Barbara was not unkind, but she was very busy, and there was a very large table stacked with theses. Theses that said May.

Later I traced the source of my mistake. The math department L^AT_EX template had a macro called `\submissionmonth`, but it would have been better had it been called `\graduationmonth`. The two concepts were originally the same, but became different when the submission deadline was brought forward. You live by L^AT_EX and the math department template, you die by L^AT_EX and the math department template. The template has since been corrected — I made sure of that.

As I walked back towards the door to Barbara's office I began to feel ill. The prospect of a September graduation doesn't seem so chilling in hindsight, but at the time all I could think of was the delay that it would cause to my career after graduation.

As I reentered the hallway, I began to consider whether I would be able to print a new copy of the title page. But there just wasn't enough time to go back to the department and return again. And there definitely wasn't enough time to round up signatures from Simon, Greg, and Chuck again. And come to think of it, there positively wasn't enough time to travel 70 miles round trip to get Joel's signature again. Not in 35 minutes.

As that was passing through my mind, Colleen gave me an inquisitive look. I wasn't ready to talk about it yet. Instead I stood for a few moments, and then turned around and ducked back into the office. I had a simple idea.

"Excuse me, sorry, me again. Quick question: Would it be ok if just I cross out the April and write May?"

No, a thesis may not have any editorial markings.

"What if I whiteout the April and write May?"

No, a thesis must be typewritten.

"What if I whiteout the April and write May with a *typewriter*?"

There was a long pause during which I'm sure I looked very sheepish. Finally, Barbara replied: Yes, she could think of no reason why that would be deemed unacceptable.

"Do you . . . have a typewriter I can use?"

No, I'm sorry, I don't.

Once again I slunk out of the room. This time I related the circumstances to Colleen, and she agreed to accompany me on a mission. Typewriters were already very rare, but not unheard of among the administrative elite. We knew there was a typewriter in the math department, but we agreed there was too little time left to even attempt the round trip. Instead we powered through the hallways, peeking into one administrative office after another and inquiring urgently about typewriters. It sounded like the setup to some kind of prank. "Hey do you have a typewriter?" No particular reason, well, bye!

But actually it wasn't very long until we found one. A secretary at a front desk admitted that her office was in possession of a typewriter. I didn't know what kind of office it was. While Barbara worked in a spacious "bedroom", this office was a spacious "living room" and had been subdivided into cubicles. I described my need to the secretary, and she led us around to a cubicle where an employee was stationed at an enormous electric typewriter. The employee told us the usual typewriter operator was out today, and she was just filling in. She said she was very busy, but could spare five minutes for me to use the typewriter. And then she stepped out.

I looked doubtfully at the typewriter. I had never seen anything quite like it before. In addition to the usual typewriter anatomy, it had many moving gizmos, controls, and dials. It let you know it was very powerful by humming even when it was idle and buzzing when you engaged it in any way.

I took out my One Flawed title page. On second thought, I took out one of my many practice title pages. I began to insert it into the machine, adjusting the width of the input slot as I did so. The machine was so advanced that it even had a button to mechanically feed the paper the rest of the way in. I pressed the button.

Bzz-Scchhhhhwuhpp!

With merciless efficiency, the machine sucked the page into the paper path and worked it over into a crumpled, pulpy mess. I laughed out loud because I had heard stories like that before. It's a tale as old as typewriters — sometimes when you can least afford it, the paper gets crumpled. Colleen looked at me with a concerned half smile. I moved to make a second try, hoping for a more favorable outcome. After all, I had plenty of practice title pages. Some of them were even signed. I put one in more carefully this time, and pressed the button.

Bzz-Scchhhhhwuhpp!

Another crumple. After glancing at the wall clock, we decided to invest a few minutes in trying to comprehend some of the machine's finer workings. We discovered there was a manual feeding crank, so on the third try I didn't press the button but slowly turned the crank.

Scchh. Hhh. Wuh. Pp.

Another crumple, but this time in slow motion. It wasn't as pulpy as before, but still very creased. I looked around desperately for the substitute machine operator, but she wasn't in the vicinity. The secretary recognized my distress and went out to look for her. When the operator returned, she showed me how to lock and unlock a clamp that stabilized the paper while it was feeding. I inserted another practice page, locked the clamp, and pressed the button.

Bzz-Whirrr.

The page queued up! Now that the machine operator had returned, she reminded me that she was very busy and would need her typewriter back as soon as possible. She stayed to look over my shoulder as I worked. It added to my stress levels, but I only had about ten minutes left, so hurrying was probably the right thing to do. I turned the carriage and slid it until the April was within the typewriter's crosshairs. Then I began to whiteout the April. I blew on it for a few seconds, and then typed:

Bzz-clack "M".

Bzz-clack "a".

Bzz-clack "y".

The May was too high, about half a line higher than the 2008.

I wanted to do another practice page, but everyone was looking at me, the deadline was nearly at hand, and I didn't have much left to lose. So I dubiously picked up my One Flawed title page. I inserted the precious paper, locked the clamp, pressed the button, scrolled to the April, scrolled a little extra to adjust for my previous miss, whited-out the April, blew on the whiteout, and typed in May.

The May was a little high.

"Okay!" the operator declared. Meaning: you did it so you may leave now. It was time to leave anyway. It took me another minute to unlock the clamp and safely rescue the restored One True title page from the grasp of the paper path. Then I picked up all my things, thanked everyone while making eye contact with no one, and scuttled out of the office.

We hurried back down the hallway and I breathlessly entered Barbara's office for the third time. She wasn't surprised to see me, perhaps expecting me to ask desperately and futilely for more time. But I didn't speak, and her expression changed when I handed her my packet once again. She looked at the "new" title page for a long time. She looked at the clock. She picked up her ruler, flipped to a random page and casually applied the ruler to some margins here and there. Then, she put the packet on the table with all the others.

"Thank you," she said.

I don't know whether I was the first person to write April instead of May. But I think I must have been the first person to correct a title page in half an hour. My quick fix may be one of the last threads linking the pre-computer and computer ages of mathematical typing.

"Thank you," I said, and ran out to tell Colleen and spend the rest of the day with our friends.