2019 Steuber Prize For Excellence in First-Year Writing

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It was the Saturday of Thanksgiving weekend, and it was a miracle my brain was still functioning given the copious amounts of food I had just consumed. The voices within me were begging for me to sleep, and I was ready to oblige. However, I could not do such a thing, as there was one specter haunting my mind. I would have to return to Madison on Monday, and there were many homework assignments awaiting submission. Thus, I set out to vanquish these monsters, and I began to slowly chip away at them. First, the horrifyingly long online lab on molecular structures was defeated. The next task was to labor through the agonizingly lengthy process of reading and analyzing the assigned texts for my history course. Despite many struggles, I managed to do just that and finally witness the metaphorical light at the end of the tunnel. Only a simple math assignment stood between me and freedom—one that should have been completed quite easily. After all, this subject had always come easily to me. Therefore, common logic would dictate that it should have been a walk in the park.

With this attitude, I opened the Differential Equations and Linear Algebra textbook wondering what devilish problems Edwards, Penney, and Calvis had conspired to throw at me today. I eagerly flipped the pages until section 5.4 was reached to find that only two problems stood between me and the rest which I yearned for. I quickly solved the first one and averted my gaze to the lone remaining foe. The tiniest of smiles forced itself across my face; after all, it was obvious that I would quickly derive this solution and cross the finish line. I would later learn the hard way that labeling this mindset as fallacious was a harsh understatement.

The problem read something similar to the following. *Consider a cylindrical buoy of uniform density ρ, radius r, and height h. You suspend it so that its bottom is tangent to the ocean's surface and then drop it in. There are only two forces acting on the object; the downward gravitational force characterized by $mg = \pi r^2 hg$ and an upward force equivalent to the water weight displaced by the buoy given by the expression $\pi r^2 xg$. Ignoring friction, show that the buoy undergoes simple harmonic motion around the equilibrium point $x_e = \rho h$ and with period $p = 2\pi\sqrt{\rho h / g}$* (Chegg.com).

My confidence remained high initially. We had done problems very similar to this in lecture, and I had a general inkling of how to approach this problem. As many wise individuals had told me, this was the most important step to reaching a solution. Therefore, I started to work out the method which I firmly believed was correct. Approximately ten minutes later, I was nearing the path's end, but no light awaited me. Instead, pure darkness surrounded me, and I came face-to-face with a mathematical abyss of sorts. The process which I had so strongly held to be true failed me, and I was left in shock and disarray. Dread and horror started to course through my veins until they consumed my entire body. Logic and reason were cast out and replaced with an anarchy-like state. I did not have the slightest of clues on how to proceed from this terrifying dead-end, and my mind descended into chaos.

Not knowing what to do at this point, I decided to take a much-needed break. The books were swapped for the television, and my mind was given the rest it needed after an extended period of usage. But as I sat down to eat dinner, I started to think again about this maddeningly elusive solution. A few ideas popped into my head, but I quickly realized that they would not work and thus the search continued.

Dinner passed, and I had not moved an inch from square one. It was as if the aforementioned mathematical abyss was jeering me—knowing that I would never uncover its secrets. Unfortunately, its mere presence was beginning to bring down my demeanor. This problem had slowly but surely bullied and pushed my attitude to its limits. It was at this point that the thought of giving up first crossed my mind. I still remember its tempting calls; it attempted to persuade me into simply giving up and protecting my mental health. I vividly recall its enticing promises of relief and rest to this day. With my frustration building, I was ready to give in when another voice chimed in and encouraged me to not abandon this pursuit. Driven by my strong disenchantment with failure, I obliged and returned to the fray. My mind recommenced intensely foraging for a means of outmaneuvering the roadblock which had so far haunted me. As new theories jumped into my head, I vigorously brought them into my existence on my whiteboard—only to be quickly erased following their uncoverings as failures. This cycle of brief hope and ensuing dejection continued on for a depressingly long hour until it hit me.

In a flash, the most beautiful thought descended from the heavens and entered my mind. Archimedes's famous phrase "Eureka" rang throughout my conscious and a smile enveloped my face. This magnificent moment of inspiration illuminated a path to circumnavigate the mathematical abyss which had seemingly tortured me for far too long. All I had to do was break up the position function $x(t)$ into a sum of the equilibrium function x_e and the subsequent deviations from this equilibrium position—given by $\Delta(t)$. I rushed to execute this new vision. As the dry erase marker worked its way down the whiteboard, I grew increasingly confident that the war had been won. This simple trick

had almost magically amalgamated the various elements of the problem which had repelled each other initially. Instead, they now were exquisitely combined, and spewed out the successive steps. Driven by this single illustrious thought, my hand furthered its journey down the whiteboard, leaving trails of mathematics in its wake. I had never experienced such free-flowing thought; everything seemed to metaphorically click in that instant.

The tunnel's end was finally in sight. It lay not far ahead in plain sight—goading me as to why I had not discovered it sooner. The abyss was well behind me, and happiness overcame my person as I emerged out of the tunnel. I had uncovered the solution at last and completed the task at hand. Considering the lengthy state of unknown I had battled through to reach this point, a great pride swelled up within me. Knowing that a lowly undergraduate student such as myself had this problem-solving instinct gave me a huge boost in confidence. Also, it provided me with a greater appreciation for mathematics. Everyone had always ranted to me about the subject being emotionless and extremely difficult, and I believed them to some extent at the time. However, this experienced opened my eyes up to math's allure. It showed me that the demanding process of discovery was a very scary ordeal, but the instant of discovery possessed a certain incomparable elegance. Math was no static and boring topic; it was actually a living, breathing organism that continuously challenged us to unlock its mysteries.

In conclusion, I had gone into Chapter 5.4, problem number 10 merely looking for its solution but came away with a valuable new perspective in the end. With this in mind, I gleefully shut the textbook and embraced the rest which I thoroughly deserved.

Sources:

"Chegg.com." *Lifetime Physical Fitness and Wellness A Personalized Program 12th Edition | Rent 9781111990015 | Chegg.com*, CENGAGE Learning, www.chegg.com/homework-help/consider-floating-cylindrical-buoy-radius-r-height-h-uniform-chapter-5.4-problem-10p-solution-9780134497181-exc.