Collin College

Mathematical Me

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Foresee
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The following equations encapsulate my life rather completely:

$$K_{n+1} = K_n + \alpha P_n + \beta C_n + \gamma R_n \tag{1}$$

$$S(T, E) = S_{\max}\left(1 - e^{-\lambda T}\right) + \mu E \tag{2}$$

$$\text{Premium} = BS(S, K, r, \sigma, t) + \eta \cdot \mathcal{N}(0, 1), \qquad \eta \to \infty \tag{3}$$

$$I = \kappa \cdot \text{Skill} \cdot \text{Intent} - \delta \cdot \text{Risk}^2 \tag{4}$$

$$\begin{aligned} F = &\int \frac{\partial\, \text{Immersion}}{\partial\, \text{Pages}}\, \mathrm{d}(\text{Pages}) + \int \frac{\partial\, \text{Immersion}}{\partial\, \text{Prose}}\, \mathrm{d}(\text{Prose}) \\ &+ \int \frac{\partial\, \text{Immersion}}{\partial\, \text{World}}\, \mathrm{d}(\text{World}) + \int \frac{\partial\, \text{Immersion}}{\partial\, \text{Characters}}\, \mathrm{d}(\text{Characters}) \end{aligned} \tag{5}$$

In equation 1, I am looking at my cumulative knowledge growth, which models how practical coding, challenges, and research accumulate over time. Mathematically, each component contributes linearly, so balancing them according to their weights maximizes overall growth, reflecting my approach to learning efficiently. In equation 2, I am examining my skill as a function of time and efficiency. The partial derivatives $\frac{\partial S}{\partial T}$ and $\frac{\partial S}{\partial E}$ and the limit $\lim_{T\to\infty} \frac{\partial S}{\partial T} = 0$ show that efficiency drives growth more than time, guiding me to focus on deliberate effort rather than long hours. In equation 3, I am analyzing quantitative analysis premiums through a Black–Scholes model with an added stochastic noise term. The limit $\lim_{\eta\to\infty} \text{Premium}$ demonstrates that randomness dominates, illustrating how real outcomes feel unpredictable despite understanding the formulas. In equation 4, I am quantifying my real-world impact, combining skill, intent, and risk. The quadratic risk term shows nonlinear penalties, so I must carefully calibrate my actions to maximize meaningful contributions in projects like my research paper and work with the IT Army of Ukraine. Finally, in equation 5, I am modeling fun as immersion derived from reading progression fantasy. Evaluating partial derivatives with respect to Pages, Prose, World, and Characters reveals which books provide the strongest engagement per axis, with *Cradle* excelling in Pages and Characters, *The Stormlight Archive* in World, and the *Azura Ghost* series in Prose, allowing me to quantify and prioritize my enjoyment mathematically.

In the past, a great positive influence on my journey into mathematics was Mrs. Kottwitz (A.K.A

Godwitz), who taught me the intricate beauties of single-variable calculus. Along the same lines, my incredibly ill-tempered geometry teacher — Mr. Lantiere — taught me to hate geometric proofs by gifting the class impossibly long exams, leading to a class average of 62 by the end of the year. This was counteracted by the success I was seeing in looking ahead into Pre-Calculus, a venture on which I found the amazing resources of the Internet. Chief among these stands the wonderful YouTube channel 3Blue1Brown, run by Grant Sanderson. Much earlier in my study of mathematics, around the age of 2 or 3, I was unable to count at precisely the number 3. I could go from 1 to 2 or $7, 6, 5, 4, \ldots$ but never say the number 3. I'm not exactly sure when I got past that roadblock though. Overall, especially recently, my comprehensive body of experience has left positive impressions deep in my mind regarding math, which is why I'm attempting this class.

Presently, I expect to be given an appropriate introduction to true higher level math by my Professor. So far, I can say meeting him has led me to raise my hopes for the year. I hope to be challenged, confused, and be wrong sometimes in ways that I never expected. As an academic scholar, I should be expected to submit work of my highest effort. Additionally, I should be expected to spend sufficient time on coursework the educator prepared for my benefit. I simply expect the course to cover the content laid out in the course syllabus. If it manages to make connections to build a deeper understanding, I would consider it to exceed my expectations.

I'm interested in quantitative finance, which applies mathematical models and computational techniques to analyze markets and guide investment strategies. I'm drawn to the complex mathematics in quantitative finance, such as stochastic calculus and models like Heston's, which capture volatility dynamics and randomness in asset prices. Quantitative finance is grounded in advanced mathematical concepts such as stochastic differential equations, Itô calculus, measure-theoretic probability, martingale theory, and partial differential equations for modeling asset dynamics and risk. I currently have a very flimsy, almost non-existent, grasp on most of this material due to my mathematical ability being in its infancy. I intend to take purse a degree in Physics (BS in Physics, UT Austin) at UT, to better grasp high-level math and surface modeling. Together, UT Austin's M 427J, 427K, and 427L provide the mathematical foundation for quantitative finance by teaching me linear algebra and eigenvalue methods for modeling systems (427J),

differential equations and Fourier analysis for handling dynamic processes (427K), and multivariable calculus and vector analysis for understanding gradients, integrals, and theorems essential to stochastic modeling (427L) (Mathematics Course Catalog, UT Austin). I'm hoping to attend The University of Texas at Austin due to its acceptable balance of cost, prestige, distance, and a few other factors.

In conclusion, mathematics has shaped both my academic journey and my future ambitions. The equations I created reflect how I see learning, growth, and even enjoyment through a quantitative lens. My teachers and early experiences provided both challenges and inspiration that strengthened my interest. Looking ahead, I hope to deepen my understanding through rigorous coursework and research at UT Austin. Ultimately, I aim to connect advanced mathematics with real-world applications such as quantitative finance.

Works Cited

BS in Physics, UT Austin. 2025. catalog.utexas.edu/undergraduate/natural-sciences/degrees-and-programs/bs-physics/#text.

Mathematics Course Catalog, UT Austin. 2025. catalog.utexas.edu/general-information/coursesatoz/m/.