These past five weeks, I had the amazing opportunity to study Linear Algebra with Applications through the Yale University Summer Session program thanks to sponsorship from the Garwin Family Foundation. I was able to immerse myself in a rigorous college level curriculum and learn alongside students from all over the world (including current Yale University students). I had the chance to continue pursuing my passions in math during the summer and prepare myself for higher level math courses in the future.

Classes for the course took place every day from Monday to Friday, with office hours and assigned homework afterwards. There would also be a quiz every Friday over the concepts covered in class that week, and a final exam on the final Friday of the course. The instructor made sure to always record classes and release annotated notes after each class, which I made heavy use of during my review after class. I also loved the capability of working with my peers on problems and discussing ideas, and I found that being able to discuss solutions or ways of looking at problems with other people is always beneficial. In addition to meeting new people from completely diverse backgrounds, another surprising aspect of the program was being able to learn about college life at Yale University and future career aspirations.

Throughout these five weeks, I learned a lot about the basics of linear algebra, specifically with a focus on its applications. I also really loved the focus of the course on understanding the concepts and not just learning how a technique worked. I have always been curious about the STEM fields and mathematics, so I really enjoyed all the answers to the "why?" question for all the math concepts in this course. The course synthesized and strengthened my fundamental knowledge of linear algebra topics that I had already known of, such as dot products or matrix multiplication, and new topics that are extremely important towards the real world and associated applications of the course, such as eigenvalues and eigenvectors. In addition, the instructor made sure to emphasize understanding with the geometric background and understanding for everything that we learned. For example, I had known about the determinant of a matrix and how to calculate it using techniques and formulas, but I didn't know what exactly it represented in terms of linear transformations and scaling factors. However, after developing a strong understanding of the basics of linear algebra, especially matrices, in a geometric lens, the course presented the idea of the determinant of a matrix in a clear and geometrically backed up way.

One of the main pillars of the course, given the title, was the idea of the further applications of linear algebra. Instead of being fully oriented as a traditional math course, this course looked at the topics of linear algebra in class with a perspective on its applications, especially with the advent of computer algorithms to compute heavy computations. I remember the course began with an introduction to linear algebra with its applications, where the instructor went over many examples of real life scenarios where the concepts of linear algebra and systems of equations would be useful. Some examples included modeling the population of an ecosystem

(such as rabbits), managing car flow in a traffic intersection, and seeing how Google directs users to certain related websites across the internet using a linear system map (which we later learned through the lens of stochastic matrices).

Also, the course heavily emphasized the idea that computer algorithms exist and that long and complicated computations can be performed by the algorithm instead of by human hand. Wired towards solving problems in the current world, we were encouraged to also look at techniques covered in class in terms of efficiency and computational power for an algorithm (how fast would this certain technique be to solve a specific problem?). One example is the use of diagonal matrices and its applications towards raising matrices to enormous powers. Instead of multiplying a matrix by itself thousands if not millions of times (which would take an extremely long time and be inefficient), we learned about representing the matrix in terms of a diagonal matrix, which would be a lot simpler to raise to huge powers.

Overall, thanks to the Garwin Family Foundation, I was able to continue pursuing my passion in mathematics and its applications this summer. I am extremely grateful for the sponsorship from the program to allow aspiring students like myself to pursue their passions. I really learned a lot in the topics of linear algebra and loved the exploration of its applications. The course provided me with a strong foundation on a cornerstone topic in mathematics, and I feel more than prepared to explore higher level math concepts and their applications in the future!