Dear Math 332 Students,

It has been a pleasure to teach you all this semester. Linear Algebra is an elegant subject, and I hope I was able to give you a bit of a glimpse of the beauty of abstract mathematics through linear algebra and how it captures the essence of geometry and linear equations. I hope you remember and appreciate the many deep and powerful ideas (and not just their formulaic consequences).

As I wrote in my handout (http://www.math.iit.edu/~kaul/TeachingFall19/TeachingFiles/Aim-332.pdf). I would consider this a successful course, if you had fair opportunities to learn new ideas/concepts and you were challenged to grow intellectually. If you gained confidence in your ability to read, understand, and write mathematical arguments, as compared to the beginning of the semester. And, you feel that you can read, understand, and apply any other topic/ technique in Elementary Linear Algebra that you might need later on in your career. That you have built a strong foundation in your understanding of Linear systems, Determinants, Vector spaces, Basis & Dimension, Rank & Nullity of a matrix, Diagonalization, Inner Product spaces & Geometry, Orthonormality & Gram-Schmidt process. You can further build upon this foundation to go farther in Linear Algebra (and computational mathematics in general).

What next?

1) You can take courses at IIT that use Math 332 and go beyond it: For example,
- Math 435/535 (which studies optimization over linear constraints building a foundation for algorithms over networks and other discrete structures, and algorithms in computer science in general);
- Math 477/577 (which teaches numerical linear algebra that is how to apply ideas from linear algebra to various computational problems);
- Any courses on the topic of Machine Learning and Deep Learning.

2) You can do some self-study:
- Read Sections 6.4, 6.5, 6.6, and Chapters 7, 8 and 9 from our textbook. If you are going to read only one new Section from our textbook, then I strongly recommend Section 9.4 on Singular Value Decomposition, an idea of immense importance with numerous modern applications.
- Read "Linear Algebra Done Right" by Sheldon Axler, a good book for seeing a slightly different and more advanced perspective on Linear Algebra. Linear Algebra by Hoffman and Kunze is a classic standard textbook that you are now ready to handle. Both of these textbooks are focused on the mathematics of Linear Algebra.
- Read "Matrix analysis and applied linear algebra" by C.D. Meyer for a thorough introduction to applied linear algebra and its algorithms.
- Read portions of "Linear Algebra and Learning from Data" by Gil Strang, for more advanced and modern (data science style) applications of Linear Algebra (maybe after you take Math 475/477).

3) Have Fun :-)
- Read "The Cauchy-Schwarz Master Class: An Introduction to the Art of Mathematical Inequalities" by J. Michael Steele. A very readable exploration of Cauchy -Schwarz Inequality and other such inequalities.
- Read and Do "Linear Algebra Problem Book" by P.R. Halmos. A classic of the field that helps you think and discover ideas through problems.
- Read and Do "Linear Algebra: Challenging Problems for Students" by F. Zhang.
- Read relevant articles from the magazine Quanta:
https://www.quantamagazine.org/search?q[s]=matrix
https://www.quantamagazine.org/tag/linear-algebra

If you need help with any of the topics we studied in Math 332 at any time in the future, just send me an email.

I hope to see you in my future courses.

best wishes,
Hemanshu