Computational Assignments in Linear Algebra

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The first Linear Algebra course for undergraduates attracts a wide variety of students. Some students are math majors, but there are many more students majoring in data science, engineering, biology, chemistry, physics, computer science, business, and economics. For these students, they want to be able to use linear algebra to solve problems in their field. This means a first course in Linear Algebra should provide a good foundation in linear algebra theory, together with the computational skills to solve application problems.

When I teach Linear Algebra, I use four MATLAB homework assignments, and one project. The MATLAB assignments give students a chance to learn useful linear algebra commands, and to check their understanding of the principles of linear algebra. The homework assignments cover Systems of Linear Equations; Matrix Algebra; Eigenvalues and Eigenvectors; and Least Squares. Since many of the students have not used MATLAB before, I have students complete the MATLAB Onramp tutorial for their first homework assignment. Using this tutorial has been very helpful in reducing the number of questions I get when students work on their MATLAB homework.

I find a project is important for the class, because it gives students a chance to work in a group to learn about one topic in-depth, and it gives the members of the group practice writing a technical report based on their work. Projects in the past have involved population modeling, network analysis, image compression with Singular Value Decomposition, and Markov chains.

Summer quarter, I learned two things from giving a MATLAB project to an online Vector Calculus class. One is that some groups had trouble finding a time to meet. So, instead of creating groups randomly, next time I will create groups according to when students are free. The second thing I found is that students put off working on the project until the end of the quarter. So, in the future, I am going to have deadlines during the quarter when certain parts of the project have to be finished, to keep students from procrastinating.