

Using MATLAB to Enrich Elementary Linear Algebra Course

Sandra Fital-Akelbek, Mathematics, Weber State University

Linear Algebra has broad applications in various disciplines, for example, in computer graphics, in modeling biological or social systems, or in optimization problems. The course of Elementary Linear Algebra can concentrate on a computational aspect, where matrices, their properties, and operations on matrices play an important role. But also the course focuses on algebraic structures where vector spaces and linear mappings are investigated by students.

Using MATLAB in Elementary Linear Algebra Course can help with better understanding of the content. Computational examples in class or in problem solving can enrich students understanding of Linear Algebra. For example, when investigating properties of matrices, students can use MATLAB to correctly identify which properties of matrices hold for all matrices. Once students know the given properties of matrices, we use the knowledge we learned before to prove them. In this approach, students are not given the properties of matrices, but, by using computers, they discover the properties of matrices.

MATLAB can also help students verify their computational work, for example, finding the eigenvalues or eigenvectors can help students decide if the given matrix is diagonalizable. Reducing a matrix to reduced echelon form can give several information about the column vectors of the matrix or about a linear system that the matrix represents.

One of the challenges that I face is that most of my students never used MATLAB before, so I have to teach them the basics of the software before we can use it in computations. Another challenge is lack of resources for students in learning the MATLAB, but also in accessing computers with MATLAB. It takes time to design introductory lab to learn MATLAB and students need some time to learn it. Once they are familiar with basics of MATLAB the software can be very helpful in learning linear algebra concepts.