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155N Final Project Report

This project was made as an exercise in applying coding skills to solve math problems. Because I have been doing some linear algebra in my Differential Equations class, and because I will be taking a class in it in the fall, I wanted to do a project on matrices. I planned my code in 3 parts: the GUI; the input; and the solver.

When writing this project, I had to solve several problems. My first major obstacle was how to take in data typed into the GUI and use it. After reading some MATLAB documentation, I made a separate function which would be called when the user typed their matrix in. This function would take in the string, convert it into an actual matrix, and run some checks on the input. The function will check if the matrix is square, and prints the matrix in matrix form. It took a lot of time to arrange the outputs for the eigenvalues and eigenvectors, but I was able to format it in a decent way.

The last part of the code was the graphing of the eigenvectors. I knew that I wanted to use the quiver function, but I was surprised to see that there was a 3-D quiver function called quiver 3. I tried to use an if block to graph in either quiver or quiver3, but it caused some issues with graphs overlapping if the user tried to use more than 1 matrix in the GUI. The way I fixed this problem is that I used quiver3 for both 2-D vectors and 3-D. As always, I put checks in there to see if the vectors would be impossible to graph.

In the future, I will need to create more programs like this one. Being able to graph whatever you want with a GUI is a useful tool. For example, I could program a GUI that would graph wavefunctions of a particle given a certain potential. This type of project is helpful for being able to numerically solve physics problems.