Criterion A: Planning

Defining the Problem

        The client (myself) aims to create a software capable of performing various calculations on matrices and shows how it found such an answer. Matrices are most frequently found in Linear Algebra as well as other forms of higher-level math, and calculations using them can often be very complicated and require a great deal of arithmetic when finding the solution. As higher level math is supposed to put less of a focus on repetitive simple calculations, the process of solving problems that include matrices, particularly larger ones, can become very time consuming when done by hand and relies more on skills learned in elementary school than those learned in the class.

        To solve this issue, the application I plan to develop will be a calculator which can perform functions on primarily 3x3 matrices, as this is the most common size of matrix that one works with in a Linear Algebra class. Matrices that are square (same number of rows and columns) can have more functions applied to them, and matrices that are smaller do not require much arithmetic.

Rationale for the Proposed Solution

        I chose to use a stand alone application for this software, because it can be used on a wide variety of platforms which could be used by other students in my Further Math class.

        I chose to use java because it was widely covered in my Programming class it is easy to port to multiple environments.

        This product will solve my problems because it will be able to perform calculations for my math class quickly, as well as print how it got that solution in case I forgot how to perform one of the calculations. Often the method through which one obtains the solution is relatively simple to remember but it requires a lot of arithmetic, so this product will be able to bypass the arithmetic portion and save time, alternatively, for those learning the methods, this product could act as a way to check if their answer is correct by comparing it to the result. I would also like this to be a resource that high schoolers could access at any time to assist them with their assignments, both to save time and learn how to use matrices.

Success Criteria (in order of importance)
1. Application is capable of receiving numerical input from the user.
2. Application is capable of displaying a solution in the answer boxes.
3. Application can perform addition and multiplication on two 3x3 matrices
4. Application can find the determinant and inverse of a single 3x3 matrix.
5. The application can diagonalize a 3x3 matrix and print the eigenvalues and eigenvectors.
6. The application can work with matrices of varying sizes.