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MATH 613
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Project 1 Readme

The project was completed using the Java Programming Language, more specifically with JDK17, organized into a Maven Build. The source code for the project can be found at https://github.com/francis-chris5/Math613Project1 with JavaDoc pages hosted at https://francis-chris5.github.io/Math613Project1/com/csfrancis555/math613project1/package-summary.html

The program is designed to take as input one n-dimensional vector, $\vec{b}$, stored in CSV file (only 1 entry per line, so as a column vector), and two $m \times n$ matrices, A and B, stored in a CSV file. An object exists in the package to create matrix and vector CSV files of a given size filled with random values in the range $(0, 1)$ to be used in test cases. As per the instructions A and $\vec{b}$ are multiplied by a scalar of 10.

It will then use Gaussian Elimination to solve a system of equations in the form of $A\vec{x} = \vec{b}$ and determine an approximate solution x'.

Once x' is known the program will turn around and multiply that by A to get a value labeled as b' and approximate the error introduced by the limitations of the double precision floating point numbers used in the Java Programming language: truncated at 64 bits rather than rounding. It will then display the 1-norm, 2-norm, and ∞-norm for the error.

Following this the output will display the eigenvalues for the matrix $10BB^T\frac{1}{2}$ which were found using the Jacobi method.