

Project #3 Fall 2023
Solving Systems of Equations using Gauss Elimination

Grading:

1. [80%] Complete assignment, input results in webcourses project assignment Quiz as instructed in the results in webcourses project assignment Quiz.
2. [20%] and uploaded Matlab code files and output in single file in PDF format.

You must upload your codes and output to receive credit for this part of the assignment. Failure to upload your Matlab code will result in a loss of 50 points for the assignment.

Instructions:

You are to create an Matlab program implementing the Gauss Elimination method to solve a system of equations. You do not need to implement pivoting in your routine.

Assignment:

1. Enter your name and the current date in the upper right corner of the main program and also enter the title of the course (EML 3034 Modeling Methods in MAE) and the assignment # (Project Assignment #3).
2. The data for the matrix $[A]$ and right-hand side $\{b\}$ are in the ASCII text files A.dat and b.dat. You are to download these from the zipped data file on the CANVAS site and read them into your program: **do not re-type** the $[A]$ matrix and $\{b\}$ vector.

This system of equations consists of $N=100$ equations.

Learning how to read input data into programs is part of the exercise. In the lab project quiz, you will be required to read in a matrix $[A]$ and a vector $\{b\}$ provided to you in order to complete the quiz.

Report on the Webcourses Project 3 Quiz:

- (1) the solution vector that you have found with your code.
- (2) the L_∞ (infinity norm) of the residual.

3. Compare answers from your code with the *lsove* routine in Matlab. You can use the L_∞ norm to compare the two vectors.

4. Determine if the given coefficient matrix $[A]$ for your problem is diagonally dominant. **Write a subroutine that will check this automatically, and determine if the simultaneous equations that you are solving have a coefficient matrix $[A]$ that is diagonal dominant?** In practice should you have used a pivoting Gauss-elimination routine to solve the matrix set of equations for this project?

Report if the matrix is or is not diagonally dominant on the Webcourses Project Quiz.

7. This completes your computer project assignment:

Upload your project files (pdf of your code and pdf of your output) as requested on Webcourses for the project Quiz 3.

You should be able to use your working code for the project lab quiz and you should be able to:

- 1. download and read in data files.**
- 2. answer questions regarding Gauss elimination you addressed in this project.**
- 3. retrieve elements of the matrix and right-hand side vector in various stages of the Gauss elimination process such as accessing values of the elements of the matrix $[A]$ and right-hand side vector $\{b\}$ after triangulation and elements of the solution vector $\{x\}$. You should also be able to determine if a matrix is diagonally dominant.**