

Numerical Linear Algebra - Sheet 12

to be handed in until January 31, 2024, 11am.

The following problems review some topics of this lecture. They are a good preparation for the oral exam and they will also help with better understanding the programming problem and project. Please summarize your thoughts on those using bullet points.

Problem 1. Householder reflections vs. Givens rotations: which one is more cost-efficient in the general case? When using the other one is advantageous?

Problem 2. Which of the discussed methods for solving eigenvalue problems can be implemented without explicitly forming a matrix?

Problem 3. Consider an $n \times n$ matrix that has n distinct eigenvalues such that $|\lambda_i| \neq |\lambda_j|$ for $i \neq j$. How can the eigenvalue with the second largest absolute value be computed?

Problem 4. When does one step of the Gauss-Seidel iteration provide the direct solution of a linear system? Consider an upper triangular matrix to visualize this matter.