MATH130165h: Homework 4

Due May 5, 2024

Problem 1. [40 pt] Implement a QR algorithm for the eigenvalue problem of hermitian matrices. Wilkinson shift should be adopted (shift calculated by the eigenvalues of the bottom right 2×2 submatrix). Your function should return both eigenvalues and eigenvectors of the input matrix.

Problem 2. [30 pt] How many eigenvalues does

$$A = \begin{pmatrix} 1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 0 \\ 0 & 1 & 2 & 1 \\ 0 & 0 & 1 & 3 \end{pmatrix}$$

have in the interval $[1, 2]$? Work out the answer on paper by bisection.