

Numerical Analysis (CS 450)
Worksheet 4

Problem 1: Condition number

- (a) Give an example of a matrix with only large entries that has a small condition number.
- (b) Give an example of a matrix with only small entries that has a large condition number.

Problem 2: Elimination matrices

Consider the elimination matrices

$$A = \begin{pmatrix} 1 & & & \\ & 1 & & \\ & 2 & 1 & \\ & -4 & & 1 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & & & \\ & 1 & & \\ & -2 & 1 & \\ & 4 & & 1 \end{pmatrix}, \quad C = \begin{pmatrix} 1 & & & \\ & 1 & & \\ & & 1 & \\ & & 5 & 1 \end{pmatrix}.$$

- (a) Give an example of a vector for which A annihilates the third and fourth entry.
- (b) Compute AB and AC .

Problem 3: LU decomposition

Write down the *first column* of the factor L of the LU decomposition of

$$A = \begin{pmatrix} 3 & 4 & 5 \\ 2 & 3 & 1 \\ 9 & 2 & 7 \end{pmatrix}.$$