

# Worksheet 5

## Problem 1: 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  $x$  for which the third and fourth entry of  $Ax$  are zero.

(b) Compute  $AB$  and  $AC$ .

## Problem 2: LU decomposition

Write down the *first column* of the factor  $L$  of the (un-pivoted) LU decomposition of

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

## Problem 3: Conditioning vs Pivoting

What is the relationship between pivoting and conditioning?