

## Exercise 2

1. Given the matrices

$$A = \begin{bmatrix} -10 & 2 \\ 2 & -5 \end{bmatrix}$$

$$B = \begin{bmatrix} -10 & 2 & 3 \\ 2 & -5 & 1 \\ 3 & 1 & -6 \end{bmatrix}$$

$$C = \begin{bmatrix} -10 & 2 & 3 & 7 \\ 2 & -5 & 1 & 9 \\ 3 & 1 & -6 & 10 \\ 7 & 9 & 10 & -3 \end{bmatrix}$$

- a. Compute the determinant of each matrix by hand.
  - b. What are the characteristic equation and eigenvalues of matrix A?
  - c. Using mathematica or gauss, compute the eigenvalues of matrix B and C. Are these matrices positive definite, negative definite, or indefinite?
2. In your own words, what is the condition number of matrix B?
3. Assuming a right hand side of  $b=(6,9,11)'$ , compute the LU factorization of b and the Gauss-Jordon solution.
4. Compute the LDU factorization of matrix B.