

TD 4 – LINEAR ALGEBRA

(1) Let

$$A = \begin{pmatrix} 1 & 1 & 1 \\ 6 & 5 & 4 \\ 13 & 10 & 8 \end{pmatrix}.$$

Determine

- (a) the column rank of A (the column rank is the number of linear independent columns of A – **Hint:** Gauss transformations on the rows as explained in class do not change the column rank. Try to figure out how the matrix in upper triangular form helps you to answer this question.),
- (b) the determinant of A ,
- (c) the inverse of A if it exists.

(2) Determine whether a solution X for $A^t \cdot X - B = 0$ exists for the matrices

$$A = \begin{pmatrix} 3 & 4 & 1 \\ -1 & -3 & 3 \\ 2 & 3 & 0 \end{pmatrix} \quad \text{and} \quad B = \begin{pmatrix} -1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & -1 \end{pmatrix}.$$

(3) On Moodle, I have uploaded a document describing how linear algebra problems can be solved with the help of the statistics toolbox **R**. Read the description to learn how vectors, matrix, etc can be used in **R**. Solve the small practical exercise given in the last section of that document.