TRENTO, A.A. 2019/20
MATHEMATICS FOR DATA SCIENCE/BIOSTATISTICS
EXERCISE SHEET # 6

Important! In solving the exercises

- explain what you are doing,
- explain why you are doing what you are doing, and
- spell out all intermediate steps.

Exercise 6.1. For all the linear systems having solutions in the Exercises 5.1 - 5.9

- find the rank of A;
- find the nullity of A;
- find a basis of the nullspace of A.

Exercise 6.2. Let V be the vector space of the 2×2 real matrices.
We recall that $\dim(V) = 4$.
Are the matrices

$$A = \begin{bmatrix} 0 & 1 \\ 2 & 3 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix}, \quad C = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix},$$

a basis of V?

Exercise 6.3. Let V be the vector space of the 2×2 real matrices.
Are the matrices

$$A = \begin{bmatrix} 0 & 1 \\ 2 & 3 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix}, \quad C = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, \quad D = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix},$$

a basis of V?

Exercise 6.4. Let V be the vector space of the 2×2 real matrices.
Are the matrices

$$A = \begin{bmatrix} 0 & 1 \\ 2 & 3 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix}, \quad C = \begin{bmatrix} 1 & 3 \\ 3 & 0 \end{bmatrix}, \quad D = \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix},$$

a basis of V?