

Third 45 minutes test

12.01.2016

Problem 1

$$\text{Let } A = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 4 & -1 \\ 0 & 2 & 1 \end{bmatrix}.$$

- a) Find the characteristic polynomial and the eigenvalues of A .
- b) Find a matrix C such that the matrix $C^{-1}AC$ is diagonal.

Problem 2

Let $V = \text{lin}((1, 0, 1, 0), (2, 1, 0, -1))$ be a linear subspace of \mathbb{R}^4 and $\alpha = (3, -2, -1, 4)$ a vector.

- a) Find an orthogonal basis of V . Compute the orthogonal projection of α onto V and the image of α by the orthogonal symmetry relatively to V .
- b) Do the same for the orthogonal space V^\perp .