

**ALGEBRA**  
**Final test**

1. (4 points) Decompose the rational function  $\frac{x^2 + 2x - 1}{x^3 - x^2 + 4x - 4}$  into irreducible real fractions.
2. (3 points) Find normal and parametric equations of the line which contains the points  $P = (1, 0, 1)$ ,  $Q = (2, 1, 3)$ .
3. (3 points) Do the vectors

$$(2, 0, -1), \quad (0, -1, 2), \quad (-1, 2, 0)$$

form a basis in  $\mathbb{R}^3$ ? If yes, find the coordinates of the vector  $(-1, 1, 2)$  in this basis

4. (3 points) Calculate the determinant  $\begin{vmatrix} 2 & 0 & -1 & -1 \\ -2 & 1 & 0 & 1 \\ 4 & 5 & 1 & -1 \\ 0 & 1 & 1 & 1 \end{vmatrix}$ .
5. (4 points) Find complex eigenvalues and eigenvectors of the matrix

$$\begin{pmatrix} -3 & -5 \\ 1 & 1 \end{pmatrix}.$$