

Name:.....

Neptun code:.....

1st Midterm test, 27th October 2023, 17:10-17:55

1. (25 points) Let

$$A = \begin{pmatrix} 1 & 1 & 3 & -2 \\ 2 & 0 & 2 & 1 \\ -2 & 1 & 0 & 0 \\ -1 & 1 & 1 & 2 \end{pmatrix}.$$

- (a) Find a basis of $\text{col}(A)$ out of the column vectors of A , and express the remaining vectors in this basis!
 - (b) What are the values of $\text{rank}(A)$, $\text{nullity}(A^T)$ and $\text{nullity}(A)$?
2. (25 points) Let $V = \{(x, y, z)^T : x - 2y - z = 0\}$ be a subspace of $\mathbb{R}^3$. Find an orthonormal basis of V !
3. (25 points) Find the singular value decomposition of the matrix $A = \begin{pmatrix} 4 & 3 \\ 0 & 5 \end{pmatrix}$!