

2019 APPLIED LINEAR ALGEBRA-GRADUATION EXAM

Let

$$AX = \begin{pmatrix} 2 & 1 & 1 & 0 \\ 4 & 1 & 0 & 1 \\ -2 & 2 & 1 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \\ w \end{pmatrix} = \begin{pmatrix} 1 \\ -2 \\ 7 \end{pmatrix}$$

- (1) Find LU decomposition of A using Gauss elimination process. Here L is lower triangular matrix and U is an echelon form.
- (2) Find all the solutions X of the above equation.
- (3) Find a basis of the column space $\mathcal{C}(A)$, the row space $\mathcal{R}(A)$ and the null space $\mathcal{N}(A)$ of A .