

Problem 1 Find the singular values of the matrix $A = \begin{bmatrix} 1 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 \\ 1 & 1 & 0 & 0 \end{bmatrix}$.

Problem 2 Find the SDV of the matrix $A = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}$.

Problem 3 Given matrix $X = \begin{bmatrix} 1 & 2 \\ 2 & 1 \\ 3 & 4 \\ 4 & 3 \end{bmatrix}$

- 1) Find eigenvalues and eigenvectors φ_1 and φ_2 of the matrix.
- 2) Calculate $Z = X[\varphi_1 \ \varphi_2]$, what are the relationship between vectors in Z and vectors in X.