

Exercise Problem Sets 5

Mar. 27. 2021

Problem 1. Find the Jordan decomposition of matrix \mathbf{A} given below.

$$1. \mathbf{A} = \begin{bmatrix} a & 1 & 1 & 1 \\ 0 & a & 1 & 1 \\ 0 & 0 & a & 1 \\ 0 & 0 & 0 & a \end{bmatrix}. \quad 2. \mathbf{A} = \begin{bmatrix} a & 1 & 0 & 0 \\ 0 & a & 2 & 0 \\ 0 & 0 & a & 3 \\ 0 & 0 & 0 & a \end{bmatrix}. \quad 3. \mathbf{A} = \begin{bmatrix} a & 1 & 1 & 1 \\ 0 & a & 0 & 1 \\ 0 & 0 & a & 1 \\ 0 & 0 & 0 & a \end{bmatrix}.$$

$$4. \mathbf{A} = \begin{bmatrix} a & 1 & 1 & 1 & 1 \\ 0 & a & 1 & 1 & 1 \\ 0 & 0 & a & 1 & 1 \\ 0 & 0 & 0 & a & 1 \\ 0 & 0 & 0 & 0 & a \end{bmatrix}. \quad 5. \mathbf{A} = \begin{bmatrix} a & 1 & 0 & 0 & 0 \\ 0 & a & 2 & 0 & 0 \\ 0 & 0 & a & 3 & 0 \\ 0 & 0 & 0 & a & 4 \\ 0 & 0 & 0 & 0 & a \end{bmatrix}. \quad 6. \mathbf{A} = \begin{bmatrix} a & 1 & 0 & 1 & 0 \\ 0 & a & 1 & 0 & 1 \\ 0 & 0 & a & 1 & 0 \\ 0 & 0 & 0 & a & 1 \\ 0 & 0 & 0 & 0 & a \end{bmatrix}.$$

$$7. \mathbf{A} = \begin{bmatrix} 3 & 1 & 0 & 0 & 0 \\ 0 & 2 & 1 & 0 & 0 \\ -1 & -1 & 1 & 0 & 0 \\ 1 & 1 & 1 & 3 & 1 \\ -1 & -1 & -1 & -1 & 1 \end{bmatrix}. \quad 8. \mathbf{A} = \begin{bmatrix} 4 & 1 & 0 & 0 & 0 \\ -4 & 0 & 0 & 0 & 0 \\ 8 & 4 & 0 & 1 & 0 \\ 16 & 8 & -4 & 4 & 0 \\ 0 & 0 & 0 & 0 & 2 \end{bmatrix}. \quad 9. \mathbf{A} = \begin{bmatrix} -1 & 7 & 6 & 3 & 3 \\ 0 & 1 & 2 & 1 & 1 \\ 0 & 0 & -1 & -1 & -2 \\ 0 & -5 & -5 & -1 & -2 \\ 0 & 1 & 1 & 0 & 3 \end{bmatrix}.$$