

Homework

Exercise 1. Using Cayley—Hamilton theorem to solve the inverse of .

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

Exercise 2. Calculate A^5 for

$$A = \begin{bmatrix} 2 & 1 & 0 & 0 \\ 0 & 2 & 1 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 0 & 3 \end{bmatrix}$$

Homework

Exercise 3. Calculate the minimal polynomials of the following matrices

$$\begin{pmatrix} a & 0 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{pmatrix}, \quad \begin{pmatrix} a & 1 & 0 \\ 0 & a & 0 \\ 0 & 0 & a \end{pmatrix}, \quad \begin{pmatrix} a & 1 & 0 \\ 0 & a & 1 \\ 0 & 0 & a \end{pmatrix}$$

Homework

Exercise 4. Calculate the Jordan Canonic Form of

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

Homework

Exercise 5. $A_{n \times n} = \begin{pmatrix} \lambda & 1 & & \\ & \lambda & \dots & \\ & & \dots & 1 \\ & & & \lambda \end{pmatrix}$ solve $A^k \boxtimes$

Prove $A^k = \begin{pmatrix} \lambda^k & C_k^1 \lambda^{k-1} & C_k^2 \lambda^{k-2} & \dots & C_k^{n-1} \lambda^{k-n+1} \\ 0 & \lambda^k & C_k^1 \lambda^{k-1} & \dots & \dots \\ 0 & 0 & \lambda^k & \dots & C_k^2 \lambda^{k-2} \\ \dots & \dots & \dots & \dots & C_k^1 \lambda^{k-1} \\ 0 & 0 & 0 & \dots & \lambda^k \end{pmatrix} \boxtimes$