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. $A_{n\times n}=\begin{pmatrix}\lambda & 1 & & \\ & \lambda & \cdots & \\ & & \cdots & 1 \\ & & & \lambda\end{pmatrix}$ **solve** A^k

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