

Matrix Polynomials

We call $p(A) = a_0I + a_1A + a_2A^2 + \cdots + a_mA^m$ for $A_{n \times n}$ a matrix polynomial in A .

Eg11: A Matrix Polynomial

Find $p(A)$ for $p(x) = x^2 - 2x - 3$ and $A = \begin{bmatrix} -1 & 2 \\ 0 & 3 \end{bmatrix}$.

Answer: $p(A) = A^2 - 2A - 3I = \begin{bmatrix} -1 & 2 \\ 0 & 3 \end{bmatrix}^2 - 2 \begin{bmatrix} -1 & 2 \\ 0 & 3 \end{bmatrix} - 3 \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

$$\begin{bmatrix} -1 & 2 \\ 0 & 3 \end{bmatrix}^2 \quad \text{I}$$