

Homework 6

Compute the power of matrix $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$.

(Hint: you may discuss the power k in different cases).

If A and B are square matrices of the same size, is $(A + B)^2 = A^2 + 2AB + B^2$?

Determine whether the given matrices are linearly independent.

$$\begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}, \begin{bmatrix} 2 & 1 \\ -1 & 0 \end{bmatrix}, \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$$

Use the Gauss-Jordan method to find the inverse of the given matrix (if it exists).

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

Find the inverse of the given matrix

1. $\begin{bmatrix} 4 & 7 \\ 1 & 2 \end{bmatrix}$

2. $\begin{bmatrix} 4 & -2 \\ 2 & 0 \end{bmatrix}$

3. $\begin{bmatrix} 3 & 4 \\ 6 & 8 \end{bmatrix}$

4. $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$

Give bases for $\text{row}(A)$, $\text{col}(A)$, and $\text{null}(A)$.

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

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Determine whether \mathbf{b} is in $\text{col}(\mathbf{A})$ and whether \mathbf{w} is in $\text{row}(\mathbf{A})$

$$\mathbf{A} = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 1 & 1 \end{bmatrix}, \mathbf{b} = \begin{bmatrix} 3 \\ 2 \end{bmatrix}, \mathbf{w} = [-1 \quad 1 \quad 1]$$