Identity and zero matrices

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. Find $I_2\begin{pmatrix}4 & -2\\ 1 & 5\end{pmatrix}$. [2 marks]

The identity leaves every column unchanged.

Answer: $\begin{pmatrix}4 & -2\\ 1 & 5\end{pmatrix}$.

2. State the orders of identities needed on the left and right of a 4×2 matrix. [2 marks]

Use $I_4A = A = AI_2$.

Answer: Left: 4×4; right: 2×2.

3. Calculate $\begin{pmatrix}1 & 2\\ 3 & 4\end{pmatrix}0_{2\times 3}$. [2 marks]

The product exists and has order 2×3.

Each row-column sum contains only zero products.

Answer: $0_{2\times 3}$.

4. If $A + X = A$ for a 2×3 matrix A, find X. [2 marks]

Subtract A entry by entry.

Answer: $X = 0_{2\times 3}$.

5. Let $P = \begin{pmatrix}0 & 1\\ 0 & 0\end{pmatrix}$. Find P^2 and say whether $P = 0$. [2 marks]

Direct multiplication gives four zero entries.

P has a non-zero top-right entry.

Answer: $P^2 = 0$, but $P \neq 0$.

6. Explain why a matrix filled with ones is not I_2. [2 marks]

For example it sends $(1, 0)$ to $(1, 1)$, not $(1, 0)$.

Answer: It mixes the input components.