



A Level Maths

Topic: Matrix Operations (Addition, Multiplication, Inverse)

Instructions

Answer all questions. Show complete working. Use the appropriate methods for matrix addition, multiplication, and finding inverses.

Practice Questions

1. Perform the following matrix additions:

(a) $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 5 & 6 \\ 7 & 8 \end{pmatrix}$. Find $A + B$.

(b) $C = \begin{pmatrix} -1 & 2 \\ 3 & -4 \end{pmatrix}$, $D = \begin{pmatrix} 0 & -1 \\ 1 & 3 \end{pmatrix}$. Find $C + D$.

2. Multiply the following matrices:

(a) $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 5 & 6 \\ 7 & 8 \end{pmatrix}$. Find $A \times B$.

(b) $C = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, $D = \begin{pmatrix} 2 & 3 \\ 4 & 5 \end{pmatrix}$. Find $C \times D$.

3. Find the inverse of the following matrices (if they exist):

(a) $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$

(b) $B = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}$

4. Find the product of the following matrices:

$$A = \begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

5. Given $A = \begin{pmatrix} 3 & -2 \\ 1 & 5 \end{pmatrix}$ and $B = \begin{pmatrix} 4 & 1 \\ 2 & 3 \end{pmatrix}$, find $A \times B$ and $B \times A$. Are the results the same?

6. Solve the system of linear equations using matrix inversion:

$$2x + 3y = 5$$

$$4x + y = 6$$

Express the system in matrix form and solve for x and y .

7. Find the determinant of the matrix $A = \begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$.
8. Given $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 5 & 6 \\ 7 & 8 \end{pmatrix}$, calculate $A + B$, $A - B$, and $A \times B$.
9. Given $A = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ (the identity matrix), find the inverse of A and demonstrate that multiplying A with its inverse results in the identity matrix.

Multiple-Choice Questions

1. If $A = \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 5 & 6 \\ 7 & 8 \end{pmatrix}$, what is $A + B$?

A. $\begin{pmatrix} 6 & 9 \\ 9 & 12 \end{pmatrix}$

B. $\begin{pmatrix} 6 & 7 \\ 9 & 12 \end{pmatrix}$

C. $\begin{pmatrix} 6 & 6 \\ 9 & 9 \end{pmatrix}$

D. $\begin{pmatrix} 7 & 9 \\ 9 & 10 \end{pmatrix}$

2. If $A = \begin{pmatrix} 2 & 3 \\ 4 & 5 \end{pmatrix}$, what is the inverse of A ?

A. $\begin{pmatrix} -5 & 3 \\ 4 & -2 \end{pmatrix}$

B. $\begin{pmatrix} -5 & 2 \\ 3 & -1 \end{pmatrix}$

C. $\begin{pmatrix} 5 & -3 \\ -4 & 2 \end{pmatrix}$

D. $\begin{pmatrix} 5 & -3 \\ -4 & 1 \end{pmatrix}$

3. The product of matrices $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 5 & 6 \\ 7 & 8 \end{pmatrix}$ is:

A. $\begin{pmatrix} 19 & 22 \\ 43 & 50 \end{pmatrix}$

B. $\begin{pmatrix} 23 & 26 \\ 51 & 58 \end{pmatrix}$

C. $\begin{pmatrix} 17 & 20 \\ 39 & 46 \end{pmatrix}$

D. $\begin{pmatrix} 13 & 16 \\ 35 & 42 \end{pmatrix}$

4. The determinant of matrix $A = \begin{pmatrix} 4 & 6 \\ 3 & 2 \end{pmatrix}$ is:

A. 4

B. 10

C. 8

D. 2

5. Which of the following is true for the inverse of a matrix A ?

A. The inverse exists only for non-singular matrices.

B. The inverse is the same as the matrix itself.

C. The inverse does not exist for square matrices.

D. The inverse exists for all matrices.

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