

## Matrices — Assignment 1

Class 12 Maths · Topic-wise question bank covering every concept of the chapter · Narayan Gurukul Academy

Instructions: (1) Attempt all questions. This worksheet walks through every concept of the chapter, topic by topic.  
(2) The interactive MCQ version of these questions (with instant answer reveal) is available on the notes page.  
(3) Universal values:  $g = 10 \text{ m/s}^2$  unless stated. Give answers with correct SI units.

### Notation and Types of Matrices

#### MCQ Questions (choose the correct option)

1. A matrix having  $m$  rows and  $n$  columns has order
  - (A)  $m \times n$
  - (B)  $n \times m$
  - (C)  $m + n$
  - (D)  $mn$
2. A square matrix has
  - (A) number of rows equal to number of columns
  - (B) only one row
  - (C) only one column
  - (D) all elements zero
3. A diagonal matrix has
  - (A) all non-diagonal elements zero
  - (B) all elements one
  - (C) all diagonal elements zero
  - (D) no zero elements
4. An identity matrix is a diagonal matrix with
  - (A) all diagonal elements equal to 1
  - (B) all diagonal elements equal to 0
  - (C) all elements equal to 1
  - (D) only one non-zero element

#### 1 Mark Questions

1. Define the order of a matrix.
2. What is a square matrix?
3. What is an identity matrix?

#### 2 Mark Questions

1. Construct a  $2 \times 2$  matrix whose elements are  $a_{ij} = i + j$ .
2. Write an example of a diagonal matrix of order 3.

#### 3 Mark Questions

1. Construct a  $3 \times 2$  matrix whose elements are  $a_{ij} = 2i - j$ .
2. Classify the matrices given as row, column, square, diagonal or identity, with examples.

### Addition and Scalar Multiplication

### MCQ Questions (choose the correct option)

- Two matrices can be added only if
  - they have the same order
  - both are square
  - both are diagonal
  - one is a scalar matrix
- In scalar multiplication  $kA$ , each element of  $A$  is
  - multiplied by  $k$
  - added to  $k$
  - divided by  $k$
  - left unchanged
- Matrix addition is
  - commutative
  - not commutative
  - not defined
  - only for square matrices
- If  $A$  is of order  $2 \times 3$ , then  $3A$  has order
  - $2 \times 3$
  - $6 \times 9$
  - $3 \times 2$
  - $3 \times 3$

### 1 Mark Questions

- State the condition for addition of two matrices.
- Define scalar multiplication of a matrix.
- Is matrix addition commutative?

### 2 Mark Questions

- If  $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ , find  $2A$ .
- If  $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ , find  $A + B$ .

### 3 Mark Questions

- If  $A = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$ , find  $2A + 3B$ .
- Find  $X$  if  $2X + A = B$ , where  $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$  and  $B = \begin{bmatrix} 3 & 0 \\ 1 & 2 \end{bmatrix}$ .

## Multiplication of Matrices

### MCQ Questions (choose the correct option)

- The product  $AB$  is defined if
  - the number of columns of  $A$  equals the number of rows of  $B$
  - $A$  and  $B$  have the same order
  - both are square
  - $A$  is a row matrix
- Matrix multiplication is

- (A) associative but not commutative in general
  - (B) always commutative
  - (C) never associative
  - (D) only commutative
3. If A is  $2 \times 3$  and B is  $3 \times 4$ , then AB has order
- (A)  $2 \times 4$
  - (B)  $3 \times 3$
  - (C)  $4 \times 2$
  - (D)  $2 \times 3$
4. For the identity matrix I, AI equals
- (A) A
  - (B) I
  - (C) 0
  - (D) 2A

### 1 Mark Questions

1. State the condition for the product AB to be defined.
2. Is matrix multiplication commutative in general?
3. If A is  $2 \times 3$  and B is  $3 \times 2$ , find the order of AB.

### 2 Mark Questions

1. If  $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & 0 \\ 1 & 2 \end{bmatrix}$ , find AB.
2. Find the product of a  $1 \times 2$  row matrix and a  $2 \times 1$  column matrix.

### 3 Mark Questions

1. If  $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$  and  $B = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ , find AB and BA and show they differ.
2. Find the matrix X such that  $X = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} 2 & 1 \\ 0 & 3 \end{bmatrix}$ .

## Transpose, Symmetric and Invertibility

### MCQ Questions (choose the correct option)

1. The transpose of a matrix A of order  $m \times n$  has order
  - (A)  $n \times m$
  - (B)  $m \times n$
  - (C)  $m \times m$
  - (D)  $n \times n$
2. A square matrix A is symmetric if
  - (A)  $A' = A$
  - (B)  $A' = -A$
  - (C)  $A' = 0$
  - (D)  $A = 0$
3. A square matrix A is skew-symmetric if
  - (A)  $A' = -A$
  - (B)  $A' = A$
  - (C)  $A' = I$

(D)  $A = I$

4. A square matrix  $A$  is invertible if

(A)  $|A| \neq 0$

(B)  $|A| = 0$

(C)  $A$  is symmetric

(D)  $A = I$

### 1 Mark Questions

1. Define the transpose of a matrix.
2. When is a matrix symmetric?
3. When is a square matrix invertible?

### 2 Mark Questions

1. Show that  $A = \begin{bmatrix} 2 & 3 \\ 3 & 4 \end{bmatrix}$  is symmetric.
2. Find the transpose of  $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$ .

### 3 Mark Questions

1. Show that  $A = \begin{bmatrix} 0 & 2 \\ -2 & 0 \end{bmatrix}$  is skew-symmetric.
2. If  $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ , verify that  $(A')' = A$  and find  $|A|$ .