

Matrix Addition: If A and B are matrices of size $m \times n$, then their sum is the matrix given by $A + B$. The sum of two different size matrices is undefined.

Matrix Scalar Multiplication: If A is an $m \times n$ matrix and c is a scalar, then the multiple scalar of A by c is the matrix given by cA .

Matrix Multiplication: If A is an $m \times n$ and B is an $n \times p$ matrix, then the product AB is an $m \times p$ matrix where $(AB)_{ij} = \sum_{k=1}^n a_{ik}b_{kj}$.

Properties of Matrix Addition and Scalar Multiplication:

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)

Properties of Matrix Multiplication:

- 1)
- 2)
- 3)
- 4)

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4)

Inverse of a Product: If A and B are invertible matrices of order n, then AB is invertible and

Systems of Equations with Unique Solutions: If A is an invertible matrix, then the system of linear equations $AX = B$ has a unique solution given by $X = A^{-1}B$.

Determinant of a Triangular Matrix: If A is a triangular matrix of order n, then its determinant is the product of the entries on the main diagonal. That is,

Conditions That Yield a Zero Determinant: If A is a square matrix and any one of the following conditions are true, then its determinant is zero.

- 1) An entire row or column consists of zeros.
- 2) Two rows or columns are equal.
- 3) One row or column is a multiple of another row or column.

Determinant of Matrix Multiplication: If A and B are square matrices of order n, then $\det(AB) = \det(A)\det(B)$.

Determinant of a Scalar Multiple of a Matrix: If A is a square matrix of order n, then $\det(kA) = k^n \det(A)$.

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