

1.2 MATRICES

Introduction:

The term matrix was first introduced by a French mathematician CAYLEY in the year 1857. The theory of matrices is one of the powerful tools of mathematics not only in the field of higher mathematics but also in other branches such as applied sciences, nuclear physics, statistics, economics and electrical circuits.

Definition:

A matrix is a rectangular array of numbers arranged in delete rows and columns enclosed by brackets.

Example:

$$1) A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} ; \quad 2) B = \begin{pmatrix} 2 & 1 & 0 \\ -5 & 6 & 7 \\ 1 & 0 & 8 \end{pmatrix}$$

Order of a matrix:

If there are 'm' rows and 'n' columns in a matrix, then the order of the matrix is $m \times n$ (read as m by n).

$$\text{Example: } A = \begin{pmatrix} a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \end{pmatrix}$$

The above matrix A has two rows and three columns. We say that A is a matrix of order 2×3 .

Types of matrices:

(1) Row matrix:

A matrix having only one row and any number of columns is called a row matrix.

$$\text{Example: } A = (1 \quad 2 \quad -3)$$

(2) Column matrix:

A matrix having only one column and any number of rows is called a column matrix.

$$\text{Example: } B = \begin{pmatrix} 3 \\ -1 \\ 5 \end{pmatrix}$$

(3) Square matrix:

A matrix which has equal number of rows and columns is called a square matrix.

$$\text{Example: } C = \begin{pmatrix} 2 & -1 & 0 \\ 3 & 4 & -2 \\ 1 & 5 & 6 \end{pmatrix} \text{ is a square matrix of order 3.}$$

(4) Null matrix (or) Zero matrix:

If all the elements of a matrix are zero, the matrix is called zero or null matrix.

$$\text{Example: } O = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

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Neutrosophic Sets and Systems, Vol. 88, 2025 Florentin Smarandache, Mohamed Abdel-Basset, Maikel Leyva Vazquez, This volume of Neutrosophic Sets and Systems presents a collection of papers focused on the advanced studies and applications of neutrosophy neutrosophic set neutrosophic logic and neutrosophic statistics The research explores how these concepts generalize classical logic and fuzzy sets by incorporating a degree of indeterminacy The articles within this issue apply these theories to a wide range of fields including digital media art design decolonial thought rural legal aid education informatization public landscape design and cross border digital marketing The works demonstrate the use of neutrosophic frameworks to model complex uncertain and contradictory data offering new methods for decision making and problem solving in various domains

Recent Developments of Fuzzy Matrix Theory and Applications Madhumangal Pal, 2024-05-27 This book provides a comprehensive overview of the development of fuzzy matrix theory from its inception to its current state It covers various types of fuzzy matrices such as intuitionistic fuzzy matrices interval valued fuzzy matrices interval valued intuitionistic fuzzy matrices bipolar fuzzy matrices picture fuzzy matrices neutrosophic fuzzy matrices m polar fuzzy matrices and similar one Drawing primarily from the author s research work and collaborations the book offers a state of the art discussion of these topics Theoretical concepts are illustrated with examples for clarity accompanied by figures depicting fuzzy matrices and their variations Suitable for both beginners and expert researchers the book offers a wealth of material and includes numerous open problems at the end of almost all chapters to encourage further exploration and investigation

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