Matrix in LaTeX Tutorial

MMADUs

December 16, 2024

1 Matrix Environments

1.1 1. Matrices with Parentheses (pmatrix)

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

1.2 2. Matrices with Square Brackets (bmatrix)

$$B = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

1.3 3. Matrices with Braces (Bmatrix)

$$C = \begin{Bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{Bmatrix}$$

1.4 4. Determinant Style Matrices (vmatrix)

$$D = \begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}$$

1.5 5. Double Vertical Bars (Vmatrix)

$$E = \begin{Vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{Vmatrix}$$

1.6 6. Matrices Without Brackets (matrix)

$$F = \begin{matrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{matrix}$$

2 Marking or Highlighting Matrix Elements

2.1 1. Circling Specific Elements

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

Note: Access individual cells using the syntax `m-<row>-<column>`.

2.2 2. Highlighting Rows or Columns

$$\begin{bmatrix} \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

Note: Syntax highlight will be `highlight-type, from, form, to`

3 Aligning Matrices

3.1 1. Aligning Matrix Elements

You can align the elements of a matrix manually using spacing commands. For example:

$$G = \begin{bmatrix} 1 & 2 & 3 \\ \quad 4 & 5 & 6 \\ 7 & \quad 8 & 9 \end{bmatrix}$$

Explanation: use `hspace{n-pt}` to add custom horizontal space.

4 Matrix Operations

4.1 1. Transpose of a Matrix

$$A^T = \begin{bmatrix} 1 & 4 & 7 \\ 2 & 5 & 8 \\ 3 & 6 & 9 \end{bmatrix}$$

4.2 2. Identity Matrix

$$I = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

4.3 3. Matrix Multiplication Example

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \times \begin{bmatrix} 5 & 6 \\ 7 & 8 \end{bmatrix} = \begin{bmatrix} (1)(5) + (2)(7) & (1)(6) + (2)(8) \\ (3)(5) + (4)(7) & (3)(6) + (4)(8) \end{bmatrix}$$