

# ALGEBRA MATRICIAL Y OPERACIONES CON MATRICES

DEFINICION DE MATRICES

$X_{ij}$

**MATRIZ X DONDE:**

- “i” NÚMERO DE FILAS
- “j” NÚMERO DE COLUMNAS

# Matriz Identidad

**$n$ ,  $I_n$**

**$n \times n$**

**1's**

**0's**

**Ejemplos:**

$$I_1 = (1)$$

$$I_2 = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$I_3 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$I_5 = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$

The diagram shows the 5x5 identity matrix  $I_5$  with arrows pointing from the diagonal elements. A red arrow starts at the top-left '1' and points to the bottom-right '1'. Three blue arrows start at the other diagonal '1's (at (1,2), (2,3), and (3,4)) and point to the '1' in the bottom-right cell.

## MATRIZ DIAGONAL

$$A = (a_{ij})$$

$$a_{ij} = 0$$

$$i \neq j$$

**Ejemplos:**

$$A = \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$$

$$\mathbf{B} = \begin{bmatrix} 3 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 5 \end{bmatrix}$$

$$\mathbf{C} = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \end{bmatrix}$$

## **DIAGONAL EXPRESADA**

$$A = \text{diag}(1,2)$$

$$B = \text{diag}(3,2,5)$$

$$C = \text{diag}(2,2)$$

SI GENERA CONFUSIÓN LA EXPRESIÓN ANTERIOR POR LA DIMENSION, SE EXPRESA DE LA SIGUIENTE MANERA

$$A = \text{diag}((1,2), 2 \times 2)$$

$$B = \text{diag}((3,2,5), 3 \times 3)$$

$$C = \text{diag}((2,2), 2 \times 3)$$

## Matriz Bidiagonal

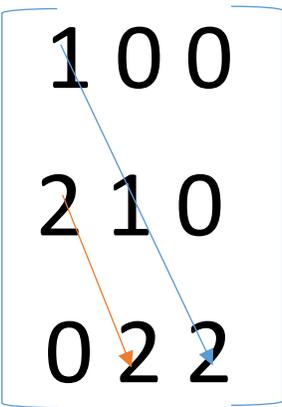
### BIDIAGONAL SUPERIOR

Por ejemplo

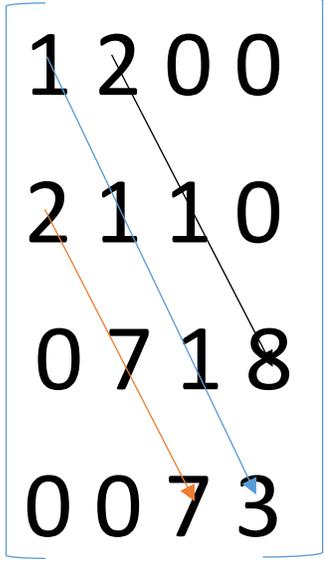
$$A = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 2 \\ 0 & 0 & 2 \end{bmatrix}$$

# BIDIAGONAL INFERIOR

Por ejemplo

$$C = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 0 & 2 & 2 \end{bmatrix}$$
The matrix C is a 3x3 lower bidiagonal matrix. The main diagonal elements are 1, 1, and 2. The sub-diagonal elements are 2, 2, and 0. The matrix is enclosed in blue square brackets. A blue arrow points from the element 1 in the first row, first column to the element 2 in the second row, first column. An orange arrow points from the element 2 in the second row, first column to the element 2 in the third row, second column.

# Matriz tridiagonal

$$X = \begin{bmatrix} 1 & 2 & 0 & 0 \\ 2 & 1 & 1 & 0 \\ 0 & 7 & 1 & 8 \\ 0 & 0 & 7 & 3 \end{bmatrix}$$


The matrix is a 4x4 tridiagonal matrix. The main diagonal elements are 1, 1, 1, and 3. The super-diagonal elements are 2, 1, and 8. The sub-diagonal elements are 2 and 7. The elements 0, 0, 0, and 0 are in the corners. A blue line highlights the main diagonal, and an orange line highlights the sub-diagonal. Arrows point from the top-left corner to the bottom-right corner.

# MATRIZ TRASPUESTA

$m \times n$

$n \times m$

$Z^T$

$Z'$

**Ejemplo:**

**LAS FILAS DE Z SON LAS COLUMNAS DE  $Z^T$**

$$Z = \begin{bmatrix} 1 & 0 \\ 2 & 4 \\ 3 & 5 \end{bmatrix}^T = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 4 & 5 \end{bmatrix} = Z^T$$

$3 \times 2$                        $2 \times 3$

# MATRIZ NULA

Ejemplo:

$$D = \begin{bmatrix} 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

3X4