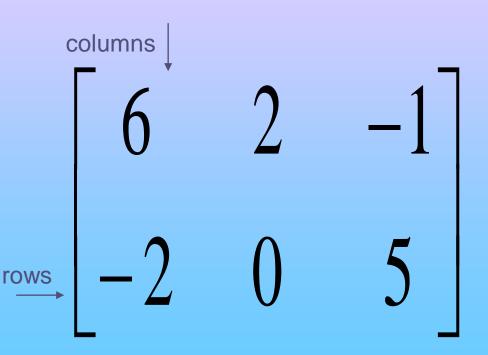
Matrix operations Dr. Manju Purwar

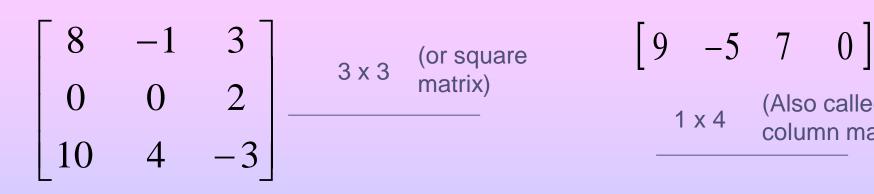


- MATRIX: A rectangular arrangement of numbers in rows and columns.
- The <u>ORDER</u> of a matrix is the number of the rows and columns.
- The <u>ENTRIES</u> are the numbers in the matrix.

This order of this matrix is a 2 x 3.







(Also called a 1 x 4 column matrix)

-9

7

0

6

3 x 5



(Also called a row matrix)

4 x 1



To add two matrices, they must have the same order. To add, you simply add corresponding entries.

$$\begin{bmatrix} 5 & -3 \\ -3 & 4 \\ 0 & 7 \end{bmatrix} + \begin{bmatrix} -2 & 1 \\ 3 & 0 \\ 4 & -3 \end{bmatrix} = \begin{bmatrix} 5+(-2) & -3+1 \\ -3+3 & 4+0 \\ 0+4 & 7+(-3) \end{bmatrix}$$

$$= \begin{bmatrix} 3 & -2 \\ 0 & 4 \\ 4 & 4 \end{bmatrix}$$

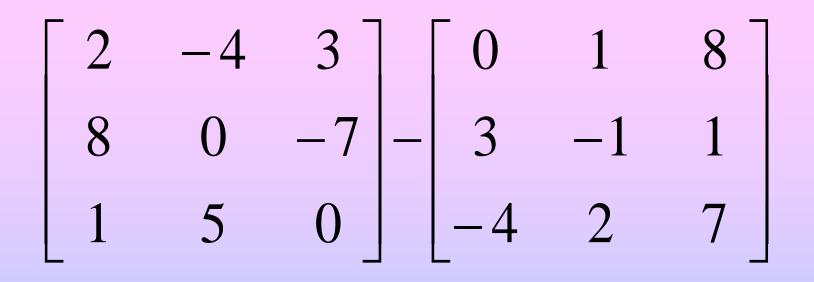
$$\begin{bmatrix} 8 & 0 & -1 & 3 \\ -5 & 4 & 2 & 9 \end{bmatrix}^{+} \begin{bmatrix} -1 & 7 & 5 & 2 \\ 5 & 3 & 3 & -2 \end{bmatrix}$$

$$\begin{bmatrix} 8+(-1) & 0+7 & -1+5 & 3+2 \\ -5+5 & 4+3 & 2+3 & 9+(-2) \end{bmatrix}$$



To subtract two matrices, they must have the same order. You simply subtract corresponding entries.

$$\begin{bmatrix} 9 & -2 & 4 \\ 5 & 0 & 6 \\ 1 & 3 & 8 \end{bmatrix} - \begin{bmatrix} 4 & 0 & 7 \\ 1 & 5 & -4 \\ -2 & 3 & 2 \end{bmatrix} = \begin{bmatrix} 9-4 & -2-0 & 4-7 \\ 5-1 & 0-5 & 6-(-4) \\ 1-(-2) & 3-3 & 8-2 \end{bmatrix}$$
$$= \begin{bmatrix} 5 & -2 & -3 \\ 4 & -5 & 10 \\ 3 & 0 & 6 \end{bmatrix}$$





In matrix algebra, a real number is often called a <u>SCALAR</u>. To multiply a matrix by a scalar, you multiply each entry in the matrix by that scalar.

$$4\begin{bmatrix} -2 & 0\\ 4 & -1 \end{bmatrix} = \begin{bmatrix} 4(-2) & 4(0)\\ 4(4) & 4(-1) \end{bmatrix}$$
$$= \begin{bmatrix} -8 & 0\\ 16 & -4 \end{bmatrix}$$

 $-2\left(\begin{array}{rrrrr} 1 & -2 \\ 0 & 3 \end{array}\right) + \left|\begin{array}{rrrr} -4 & 5 \\ 6 & -8 \end{array}\right)$

 $= -2 \left[\begin{bmatrix} 1-4 & -2+5 \\ 0+6 & 3+(-8) \end{bmatrix} \right]$

$$= 2 \begin{bmatrix} -3 & 3 \\ 6 & -5 \end{bmatrix} = \begin{bmatrix} -2(-3) & -2(3) \\ -2(6) & -2(-5) \end{bmatrix} = \begin{bmatrix} 6 & -6 \\ -12 & 10 \end{bmatrix}$$

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