

# MATH 210 FINITE MATH

BRIAN VEITCH • FALL 2016 • NORTHERN ILLINOIS UNIVERSITY

## 2.5 Multiplication of Matrices

1. Order Matters
2. You will need to compare the dimensions of the matrices

3. If matrix  $A$  has size  $3 \times 2$  and  $B$  has size  $2 \times 5$ , then

4. If matrix  $A$  has size  $2 \times 5$  and  $B$  has size  $6 \times 2$ , then

**Example 1**

Let  $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & 5 \\ -1 & 4 \end{bmatrix}$ , find

1.  $C = AB$

2.  $D = BA$

**Example 2**

$$\text{Let } A = \begin{bmatrix} 1 & -1 & 2 \\ -3 & -2 & 0 \end{bmatrix} \text{ and } B = \begin{bmatrix} 1 & 0 \\ 0 & 3 \\ -2 & -1 \end{bmatrix}$$

find  $C = AB$

Can you multiple  $BA$ ?

**Definition 1: Laws of Matrix Multiplicaiton**

If the products and sums of matrices  $A$ ,  $B$ , and  $C$  are defined, then

- 1.
- 2.

**Definition 2: Identity Matrix**

- 1.
- 2.
- 3.

**Example 3**

Multiply  $A = \begin{bmatrix} 1 & 4 \\ -2 & 5 \\ 0 & 6 \end{bmatrix}$  by the identity matrix.

**Example 4**

Perform the multiplication

$$\begin{bmatrix} 2 & -3 \\ 1 & 4 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$$

**Example 5**

Write the following system of equations into matrix form

$$\begin{aligned} x + y + z &= 6 \\ -2x + 5y + 7z &= 1 \\ 4x - 3y + z &= 2 \end{aligned}$$