

# Matrix Multiplication



## Overview of problems



Example Set: A

Determine if the matrices can be multiplied. If they can what is the order of the product matrix? If no product can be found state the reason why.

$$\begin{bmatrix} 6 & 3 \\ 1 & -2 \end{bmatrix} \begin{bmatrix} 0 & 9 & -1 \\ 4 & 5 & 7 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix} \times \begin{bmatrix} 6 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} 4 \\ 1 \\ -6 \end{bmatrix} \times \begin{bmatrix} 7 & 9 \\ 3 & 5 \end{bmatrix}$$



## Example Set: B

Find the product

$$\begin{bmatrix} 3 & 7 \\ 2 & 1 \end{bmatrix} \times \begin{bmatrix} -1 & 2 \\ 5 & 4 \end{bmatrix}$$

$$\begin{bmatrix} 6 & 0 \\ -1 & -5 \end{bmatrix} \times \begin{bmatrix} 2 & -3 \\ 7 & 2 \end{bmatrix}$$



## Example Set: C

Find the product

$$\begin{bmatrix} 1 & 9 \\ 8 & -4 \end{bmatrix} \begin{bmatrix} 0 & -2 & 3 \\ 1 & 4 & 6 \end{bmatrix}$$

$$\begin{bmatrix} 4 \\ 1 \\ 0 \end{bmatrix} \times \begin{bmatrix} -2 & 5 & -3 \end{bmatrix}$$



Example Set: D

Simplify the following

$$-3 \begin{bmatrix} 1 & 7 \\ 0 & -1 \end{bmatrix} \times \begin{bmatrix} 0 & 2 \\ 3 & 4 \end{bmatrix}$$

$$\begin{bmatrix} 6 & 3 \\ 1 & -2 \end{bmatrix} \times \begin{bmatrix} 0 & 9 & -1 \\ 4 & 5 & 7 \end{bmatrix} - \begin{bmatrix} -1 & -6 & 2 \\ -5 & 4 & 3 \end{bmatrix}$$

# Matrix Multiplication



## Overview of problems- KEY



Example Set: A

Determine if the matrices can be multiplied. If they can what is the order of the product matrix? If no product can be found state the reason why.

$$\begin{bmatrix} 6 & 3 \\ 1 & -2 \end{bmatrix} \begin{bmatrix} 0 & 9 & -1 \\ 4 & 5 & 7 \end{bmatrix}$$

yes,  $(2 \times 3)$

$$\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix} \times \begin{bmatrix} 6 \\ 0 \end{bmatrix}$$

yes,  $(2 \times 1)$

$$\begin{bmatrix} 4 \\ 1 \\ -6 \end{bmatrix} \times \begin{bmatrix} 7 & 9 \\ 3 & 5 \end{bmatrix}$$

No,  $3 \times 1$   $2 \times 2$   
not equal

$(3 \times 1)$   $(2 \times 2)$



### Example Set: B

Find the product

$$\begin{bmatrix} 3 & 7 \\ 2 & 1 \end{bmatrix} \times \begin{bmatrix} -1 & 2 \\ 5 & 4 \end{bmatrix}$$

$$\begin{bmatrix} 32 & 34 \\ 3 & 8 \end{bmatrix}$$

$$\begin{bmatrix} 6 & 0 \\ -1 & -5 \end{bmatrix} \times \begin{bmatrix} 2 & -3 \\ 7 & 2 \end{bmatrix}$$

$$\begin{bmatrix} 12 & -18 \\ -37 & -7 \end{bmatrix}$$



### Example Set: C

Find the product

$$\begin{bmatrix} 1 & 9 \\ 8 & -4 \end{bmatrix} \begin{bmatrix} 0 & -2 & 3 \\ 1 & 4 & 6 \end{bmatrix}$$

$$\begin{bmatrix} 9 & 34 & 57 \\ -4 & -32 & 0 \end{bmatrix}$$

$$\begin{bmatrix} 4 \\ 1 \\ 0 \end{bmatrix} \times \begin{bmatrix} -2 & 5 & -3 \end{bmatrix}$$

$$\begin{bmatrix} -8 & 20 & -12 \\ -2 & 5 & -3 \\ 0 & 0 & 0 \end{bmatrix}$$



Example Set: D

Simplify the following

$$-3 \begin{bmatrix} 1 & 7 \\ 0 & -1 \end{bmatrix} \times \begin{bmatrix} 0 & 2 \\ 3 & 4 \end{bmatrix} = \begin{bmatrix} -63 & -90 \\ 9 & 12 \end{bmatrix}$$

$$\begin{bmatrix} 6 & 3 \\ 1 & -2 \end{bmatrix} \times \begin{bmatrix} 0 & 9 & -1 \\ 4 & 5 & 7 \end{bmatrix} = \begin{bmatrix} -1 & -6 & 2 \\ -5 & 4 & 3 \end{bmatrix}$$

$$\begin{bmatrix} 13 & 75 & 13 \\ -3 & -5 & -18 \end{bmatrix}$$