

Mar. 22, 2017

Sect. 6-4

Operations on Matrices

Order

Add / Subt.

Scalar Mult.

Matrix Mult.

Order

Size

rows x column

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

2 x 3

$$\begin{bmatrix} 1 & 2 & 3 \end{bmatrix} \quad 1 \times 3$$

$$\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \quad 3 \times 1$$

Add / Subst

Same Size = Same Size

$$2 \times 3 + 2 \times 3 = 2 \times 3$$

$$2 \times 3 + 3 \times 2 \text{ Not Possible}$$

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

Scalar Mult.  
(Distributive Property)

$$2 \begin{bmatrix} 1 & 5 \\ 0 & -2 \\ 1 & -4 \end{bmatrix} = \begin{bmatrix} 2 & 10 \\ 0 & -4 \\ 2 & -8 \end{bmatrix}$$

## Matrix Mult.

Can we? Yes

$$\begin{array}{cc} A & \times & B \\ 2 \times 3 & & 3 \times 5 \\ \underbrace{\hspace{1.5cm}}_{\text{ans.}} & = & \underbrace{\hspace{1.5cm}} \end{array}$$

Answer size?  $2 \times 5$ 

$$\begin{array}{cc} B & \times & A \\ 3 \times 5 & & 2 \times 3 \\ \underbrace{\hspace{1.5cm}} \end{array}$$

Not Possible

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

$$\begin{bmatrix} \underline{7} & \underline{15} \\ \underline{2} & \underline{-10} \end{bmatrix}$$

$$\begin{bmatrix} 1 & -2 \\ 4 & 7 \end{bmatrix} \begin{bmatrix} -3 & 5 \\ -1 & 2 \end{bmatrix} = \begin{bmatrix} -1 & 1 \\ -19 & 34 \end{bmatrix}$$