3. Matrix Multiplication

Examples

1.
$$\begin{pmatrix} 2 & -4 \\ 3 & 8 \end{pmatrix} \begin{pmatrix} 4 \\ 6 \end{pmatrix} =$$

2.

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

Matrix Multiplication Involving I:

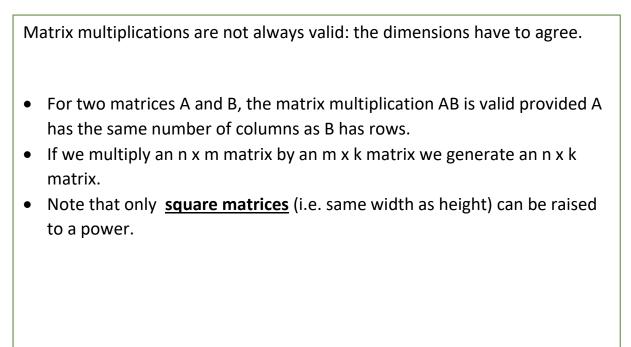
1.
$$\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \begin{pmatrix} 3 \\ -1 \end{pmatrix}$$

2. $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \begin{pmatrix} 2 & 0 & -1 \\ 3 & 2 & 1 \end{pmatrix}$
3. $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}^2$
4. $\begin{pmatrix} 1 & a \\ 0 & 1 \end{pmatrix}^k$
5. $(1 \ 2 \ 3) \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$

$$6. \begin{pmatrix} 1\\2\\3 \end{pmatrix} (1 \quad 2 \quad 3)$$

Matrices Grid Activity

When is Matrix Multiplication Valid?



Properties of Matrix Operations

Properties of Addition

The basic properties of addition for real numbers also hold true for matrices.

Let A, B and C be m x n matrices

A + B = B + A commutative

A + (B + C) = (A + B) + C associative

Properties of Multiplication

Let A, B and C be matrices of dimensions such that the following are defined. Then

A(BC) = (AB)C associative

A(B + C) = AB + AC distributive

(A + B)C = AC + BC distributive

But AB =/= BA non - commutative