1. Matrix Multiplication

Examples

1. $\left(\begin{matrix}2&-4\\3&8\end{matrix}\right)\left.\left(\begin{matrix}4\\6\end{matrix}\right.\right)$ =



Matrix Multiplication Involving I:

Test Your Understanding

1. $\left(\begin{matrix}1&2\\3&4\end{matrix}\right)\left(\begin{matrix}3\\-1\end{matrix}\right)$
2. $\left(\begin{matrix}1&2\\3&4\end{matrix}\right)\left(\begin{matrix}2&0&-1\\3&2&1\end{matrix}\right)$
3. $\left(\begin{matrix}1&2\\3&4\end{matrix}\right)^{2}$



1. $\left(\begin{matrix}1&2&3\end{matrix}\right)\left(\begin{matrix}1\\2\\3\end{matrix}\right)$
2. $\left(\begin{matrix}1\\2\\3\end{matrix}\right)\left(\begin{matrix}1&2&3\end{matrix}\right)$

Matrices Grid Activity

When is Matrix Multiplication Valid?

Matrix multiplications are not always valid: the dimensions have to agree.

* For two matrices A and B, the matrix multiplication AB is valid provided A has the same number of columns as B has rows.
* If we multiply an n x m matrix by an m x k matrix we generate an n x k matrix.
* Note that only **square matrices** (i.e. same width as height) can be raised to a power.

Properties of Matrix Operations

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**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