Algebra 2

Lesson 4-2: Adding and Subtracting Matrices

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Plain and simple, matrices are rectangular arrangements of numbers. These numbers may be data or they may be numbers from an equation. Today, matrices are used in many areas of work and research. Some of the many areas include electrical circuits, battery power outputs, and 2-dimensional and 3-dimensional screen images that create realistic movements. In geology matrices are used in seismic surveys. Real world data like banking, profit and loss, movie ticket sales, and on a big level, gross domestic profit! The base element for robot movement is matrices.

Vocabulary

matrix - rectangular arrangement of numbers in rows and columns

element – each individual number in a matrix is an element

dimensions – describes the number of rows and columns that are the given matrix

ROW X COLUMN – R X C – This tells us how many rows and how many columns. An element has an **address** in the form of **RC**.

Rules for Matrix Addition/Subtraction:

1. To add two matrices, they must have the same dimensions.
2. Add corresponding elements together.
3. A number outside the brackets is scalar multiplication treat it as distribution to all elements

Example

Find the sum or difference $\begin{bmatrix} 2 & -4 & 3 \\ 0 & 1 & 12 \end{bmatrix} + \begin{bmatrix} 0 & 7 & -2 \\ 13 & -1 & 5 \end{bmatrix}$	$2\begin{bmatrix} 6 & 5 \\ 10 & 0 \end{bmatrix} - \begin{bmatrix} -4 & 3 \\ 0 & -1 \end{bmatrix}$

Properties of Matrix Addition:

If A, B, and C are m x n matrices (m rows and n columns) then:

1. A + B is an m x n matrix — Closure Property
2. A + B = B + A — Commutative Property of Addition
3. (A + B) C = A + (B + C) — Associative Property of Addition
4. There is a unique matrix O such that O + A = A + O = A — Additive Property of Addition
5. For each A there exists a unique opposite, - A, A + (-A) = O — Additive Inverse Property

Matrix equations

Matrix equations are solved much like an equation in one variable, only the variable is an unknown matrix and the numbers are matrices!!

Solve

$x - 6 = 13$	$X - \begin{bmatrix} 2 & 1 \\ 0 & -4 \\ 5 & 3 \end{bmatrix} = \begin{bmatrix} 5 & 7 \\ 2 & 13 \\ -12 & 0 \end{bmatrix}$
$\begin{bmatrix} 2 & 1 \\ 0 & -3 \end{bmatrix} = \begin{bmatrix} 4 & 5 \\ -10 & 2 \end{bmatrix} - X$	$2X + \begin{bmatrix} 1 \\ 3 \\ 5 \end{bmatrix} = \begin{bmatrix} 7 \\ -5 \\ -1 \end{bmatrix}$

Finding the value of a variable

$\begin{bmatrix} a & 2b \\ c-2 & d+3 \end{bmatrix} = \begin{bmatrix} 5 & -7 \\ 10 & 10 \end{bmatrix}$
$\begin{bmatrix} 5 & 1 \\ 0 & 2 \end{bmatrix} + \begin{bmatrix} 2 & -13 \\ -10 & -10 \end{bmatrix} = \begin{bmatrix} 2x+1 & -4x \\ 5z & 2.5z - x \end{bmatrix}$