Algebra 2

Section 12.1

Adding and Subtracting

Matrices

Goal: to add and subtract matrices and to solve matrix equations

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In lesson 3-6, we solved a system of equations by expressing it as a single matrix. We are going to now be working with more than one matrix at a time.

Review:

$A = \begin{bmatrix} 2 & 1 \\ 0 & 3 \end{bmatrix}$ 2×2 $B = \begin{bmatrix} 0 \\ 1 \\ 5 \end{bmatrix}$ 3×1

dimensions of a matrix: rows x columns

matrix element: a_{12} is in matrix x in row 1 and column 2.

$b_{31} = 5$

Sometimes you want to combine matrices to get new information. <u>If the matrices have equal dimensions</u>, you can add or subtract by combining corresponding elements.

$A = \begin{bmatrix} -12 & 24 \\ -3 & 5 \\ -1 & 10 \end{bmatrix}$ $B = \begin{bmatrix} -3 & 1 \\ 2 & -4 \\ -1 & 5 \end{bmatrix}$

3×2   3×2

Find A + B $\begin{bmatrix} -15 & 25 \\ -1 & 1 \\ -2 & 15 \end{bmatrix}$

Find B - A $\begin{bmatrix} 9 & -23 \\ 5 & -9 \\ 0 & -5 \end{bmatrix}$

A matrix equation is an equation in which the variable is a matrix.

Solve:

$\begin{bmatrix} 1 & 0 & 12 \\ 3 & 5 & 9 \\ 7 & 8 & -2 \end{bmatrix} + A = \begin{bmatrix} 8 & 11 & 9 \\ -5 & 5 & 2 \\ 10 & 7 & 8 \end{bmatrix}$ $- \begin{bmatrix} 1 & 0 & 12 \\ 3 & 5 & 9 \\ 7 & 8 & -2 \end{bmatrix}$
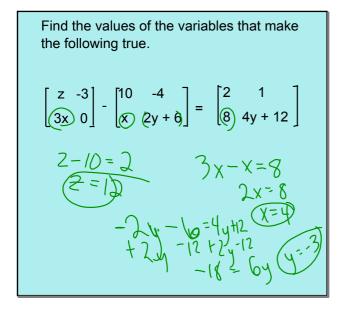
$A = \begin{bmatrix} 7 & 11 & -3 \\ -8 & 0 & -7 \\ 3 & -1 & 10 \end{bmatrix}$

If B = $\begin{bmatrix} 1 & 6 & -1 \\ 2 & 6 & 1 \\ -1 & -2 & 4 \end{bmatrix}$, C = $\begin{bmatrix} 2 & 0 & 0 \\ -1 & -3 & 6 \\ 2 & 3 & -1 \end{bmatrix}$, and A - B = C, what is A?

$\begin{bmatrix} 3 & 6 & -1 \\ 1 & 3 & 7 \\ 1 & 1 & 3 \end{bmatrix}$

For m x n matrices, the additive identity matrix is the zero matrix O or $O_{m \times n}$. All of the elements in the zero matrix are __Zero__. The opposite, or additive inverse is -A, where each element is the opposite of the corresponding element in A.

Find the sums:

$\begin{bmatrix} 14 & 5 \\ 0 & -2 \end{bmatrix} + \begin{bmatrix} -14 & -5 \\ 0 & 2 \end{bmatrix}$ and $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} + \begin{bmatrix} -4 & 5 \\ -2 & 7 \end{bmatrix}$

$\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

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

Find the values of the variables that make the following true.

$\begin{bmatrix} z & -3 \\ 3x & 0 \end{bmatrix} - \begin{bmatrix} 10 & -4 \\ x & 2y+6 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ 8 & 4y+12 \end{bmatrix}$

$z - 10 = 2$
$z = 12$

$3x - x = 8$
$2x = 8$
$x = 4$

$-2y - 6 = 4y + 12$
$+2y \qquad -12 + 2y - 12$
$-18 = 6y \qquad y = -3$

Hwk: pg 768 - 769

#8 - 24 evens,

28 - 30 all