7.5 Operations with Matrices

Apr 27-9:18 AM

Matrix- a rectangular array of numbers that can be represented as a letter A, B, C, etc

OR $[a_y], [b_y], [c_y], etc$

OR $\begin{pmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{pmatrix}$

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Two matrices are equal if they have the same order (m x n) or dimension and all corresponding entries are equal.

Order of a matrix - (m x n) - (row x column)

May 9-5:55 PM

row $\begin{pmatrix} 2 & 1 \\ 3 & 4 \end{pmatrix}$ 2 x 2
column

$\begin{bmatrix} 5 & 1 & 7 \end{bmatrix}$ 1 x 3

$\begin{bmatrix} 5 \end{bmatrix}$ 1 x 1

$\begin{bmatrix} 7 & 5 & 2 & 6 \\ 8 & 4 & -3 & 0 \\ 1 & 10 & -9 & -12 \end{bmatrix}$ 3 x 4

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Matrix Addition - must have the same order!

Ex1: $\begin{bmatrix} 3 & 6 & -1 \\ 2 & 5 & 7 \end{bmatrix} + \begin{bmatrix} -3 & 2 & 0 \\ -10 & 5 & 6 \end{bmatrix} = \begin{bmatrix} 3+-3 & 6+2 & -1+0 \\ 2+-10 & 5+5 & 7+6 \end{bmatrix}$

$= \begin{bmatrix} 0 & 8 & -1 \\ -8 & 10 & 13 \end{bmatrix}$

Ex2: $\begin{bmatrix} 1 \\ 5 \\ -3 \end{bmatrix} - \begin{bmatrix} 8 \\ 2 \\ -4 \end{bmatrix} = \begin{bmatrix} -7 \\ 3 \\ 1 \end{bmatrix}$

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Scalar Multiplication

Ex3: $2\begin{bmatrix} 4 & -6 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 8 & -12 \\ 0 & 2 \end{bmatrix}$

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Solving a Matrix Equation

Ex4: $2X - 2A = B$ $\quad A = \begin{bmatrix} 4 & -1 \\ 0 & 4 \\ -3 & 8 \end{bmatrix} \quad B = \begin{bmatrix} 0 & 4 \\ -1 & 3 \\ 1 & 7 \end{bmatrix}$

$2X - 2A + 2A = B + 2A$

$\frac{1}{2}(2X = B + 2A)$

$X = \frac{1}{2}(B + 2A)$

$X = \frac{1}{2}\left[\begin{bmatrix} 0 & 4 \\ -1 & 3 \\ 1 & 7 \end{bmatrix} + 2\begin{bmatrix} 4 & -1 \\ 0 & 4 \\ -3 & 8 \end{bmatrix}\right]$

$= \frac{1}{2}\left[\begin{bmatrix} 0 & 4 \\ -1 & 3 \\ 1 & 7 \end{bmatrix} + \begin{bmatrix} 8 & -2 \\ 0 & 8 \\ -6 & 16 \end{bmatrix}\right]$

$= \frac{1}{2}\begin{bmatrix} 8 & 2 \\ -1 & 11 \\ -5 & 23 \end{bmatrix}$

$X = \begin{bmatrix} 4 & 1 \\ -\frac{1}{2} & 11/2 \\ -5/2 & 23/2 \end{bmatrix}$

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Matrix Multiplication - the column of the first matrix must match the row of the second matrix

$A \times B = AB$

state the order of AB

$A_{2\times 3} \times B_{3\times 4} = (AB)_{2\times 4}$

must match to multiply

is BA possible

3x4 · 2x3

don't match

so not possible

$\begin{bmatrix} 6 & 1 & -2 \\ 0 & -4 & 3 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & 2 & -3 \\ 5 & -2 & 1 & 0 \\ 7 & 4 & 10 & 1 \end{bmatrix}$

$\begin{bmatrix} 1\cdot6 + 5\cdot1 + 7\cdot-2 & 0\cdot6 + -2\cdot1 + 4\cdot2 & 2\cdot6 + 1\cdot1 + 10\cdot-2 & -3\cdot6 + 0\cdot1 + 1\cdot2 \\ 1\cdot0 + 5\cdot-4 + 7\cdot3 & 0\cdot0 + -2\cdot-4 + 4\cdot3 & 2\cdot0 + 1\cdot-4 + 10\cdot3 & -3\cdot0 + 0\cdot-4 + 1\cdot3 \end{bmatrix}$

$\begin{bmatrix} -3 & -10 & -7 & -16 \\ 1 & 20 & 26 & 3 \end{bmatrix}$

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Identity Matrix

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

the identity matrix is one with 1's on the diagonal and 0's in all other positions.

AI=A and IA=A

$AB = BA$
or
$AB \neq BA$

May 3-10:22 AM

HOMEWORK

p 536 3, 7, 11, 23-37 odd, 41

Feb 2-9:51 PM

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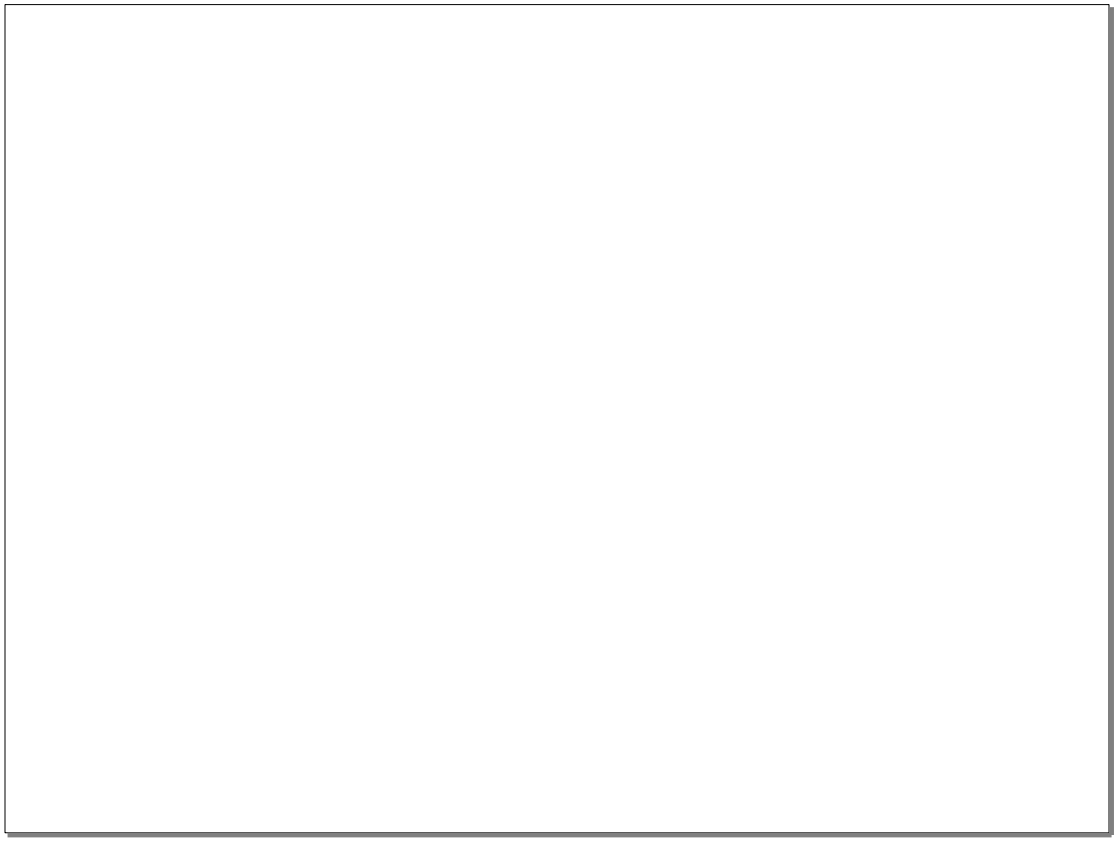

May 15-8:00 AM