Date:

Chapter: Chapter 4:3 --> Multiplying Matrices

Objectives: Multiply matrices

Notes:

The table shows the scoring summary for Lisa Leslie, the WNBA's all-time scoring leader, during her highest scoring seasons. Her total points can be summarized in the scoring matrix S. The point values for each type of basket made can be organized in the point value matrix P. For Ex. 2, write both matrices then find her total points scored during each season.

Type	2003	2004	2005	2006
Field Goal	153	217	197	249
3-Pt	12	6	7	8
Free Throw	82	146	102	158

2
3
1

3x1

$\begin{bmatrix} 2 \\ 3 \\ 1 \end{bmatrix}$

$\begin{bmatrix} 153 & 217 & 197 & 249 \\ 12 & 6 & 7 & 8 \\ 82 & 146 & 102 & 158 \end{bmatrix}$

3x4

$\begin{bmatrix} 2 & 3 & 1 \end{bmatrix}$

1x3

$\begin{bmatrix} 424 & 598 & 517 & 680 \end{bmatrix}$

434+18+146 = 598

394+21+102 = 517

498+24+158 = 680

1x4

*Can only multiply matrices when....# columns in A = # rows in B!

*After multiplication....dimensions of product matrix are row of A and column of B.

$$A_{mxt} \cdot B_{txr} = AB_{mxr}$$

Multiplying Matrices

A B AB

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} \cdot \begin{bmatrix} e & f \\ g & h \end{bmatrix} = \begin{bmatrix} ae+bg & af+bh \\ ec+dg & cf+dh \end{bmatrix}$$

Examples:

Ex. 1 - Determine if the matrices can be multiplied.

a) $A_{3x4} \cdot B_{4x2}$ YES - 3x2

b) $A_{5x6} \cdot B_{6x3}$ YES - 5x3

c) $A_{3x2} \cdot B_{4x3}$ NO!

$B_{4x3} \cdot A_{3x2}$ YES!

Ex. 2 - Activity at the beginning....

Ex. 3 - Multiply

a) $\begin{bmatrix}3 & 2\\ -1 & 0\end{bmatrix}\begin{bmatrix}-2 & 1\\ 1 & -1\end{bmatrix}=\begin{bmatrix}-4 & 1\\ 2 & -1\end{bmatrix}$ 2x2 · 2x2 = 2x2

b) $\begin{bmatrix}-4 & 3\\ 2 & -2\\ 1 & 7\end{bmatrix}\begin{bmatrix}5 & -2\\ -1 & 3\end{bmatrix}=\begin{bmatrix}23 & 17\\ 12 & -10\\ -2 & 19\end{bmatrix}$ 3x2 · 2x2 = 3x2

c) $\begin{bmatrix}-3 & 6\\ 1 & 2\end{bmatrix}\cdot\begin{bmatrix}4 & 5\\ 6 & 2\\ 1 & 3\end{bmatrix}$ 2x2 · 3x2 ∅

d) $\begin{bmatrix}3 & 2\end{bmatrix}\cdot\begin{bmatrix}2\\ 1\end{bmatrix}$ 1x2 · 2x1 $[8]$

e) $\begin{bmatrix}-1\\ 3\end{bmatrix}\cdot\begin{bmatrix}2 & -3 & -2\end{bmatrix}=\begin{bmatrix}-2 & 3 & 2\\ 6 & -9 & -6\end{bmatrix}$ 2x3

f) $\begin{bmatrix}1 & 0\\ 3 & -2\\ -1 & 4\end{bmatrix}\begin{bmatrix}0 & -3 & 2 & 4\\ -1 & 0 & -2 & 1\end{bmatrix}=\begin{bmatrix}0 & -3 & 2 & 4\\ 2 & -9 & 10 & 10\\ -4 & 3 & -10 & 0\end{bmatrix}$ 3x2 · 2x4 = 3x4

Ex. 4

Three teams competed in the final round of the chess club's championship. For each win, a team was awarded 3 points and for each draw, 1 point. Which team won the tournament?

Team	Wins	Draws
Blue	5	4
Red	6	3
Green	4	5

$\begin{bmatrix}5 & 4\\ 6 & 3\\ 4 & 5\end{bmatrix}\begin{bmatrix}3\\ 1\end{bmatrix}=\begin{bmatrix}19\\ 21\\ 17\end{bmatrix}$ Red

Ex. 5

For their 1-week vacation, the Montoyas can rent a 2-bedroom condo for $1796, a 3-bedroom condo for $2165, or a 4-bedroom condo for $2538. The table shows the number of units in each of the 3 complexes.

Complex	2-Bed	3-Bed	4-Bed
Sun Haven	36	24	22
Surfside	29	32	42
Sea Breeze	18	22	18

(a) Write a matrix that represents the number of each type of unit available at each complex and a matrix that represents the weekly charge for each type of unit.

$\begin{matrix}SH\\ SS\\ SB\end{matrix}\begin{bmatrix}36 & 24 & 22\\ 29 & 32 & 42\\ 18 & 22 & 18\end{bmatrix}\begin{bmatrix}1796\\ 2165\\ 2538\end{bmatrix}$

$\$525,054$

(b) If all of the units in the three complexes are rented for the week at the rates given the Montoyas, express the income of each of the three complexes as a matrix.

$\begin{bmatrix}172,452\\ 227,760\\ 125,642\end{bmatrix}$

(c) What is the total income of all three complexes for the week?

Homework:

Average (+15) --> p. 205 (#15-29)

Advanced (+19) --> p. 205 (#16-28 Evens, 29, 30-24 Evens, 35, 36-42 Evens, 46, 53, 54)