NAME Completed DATE PERIOD

3-6 Practice - *Multiplying Matrices*

Determine whether each matrix product is defined. If so, state the dimensions of the product.

1. $A_{7\times 4} \cdot B_{4\times 3}$ yes

AB is 7x3

2. $A_{3\times 5} \cdot M_{5\times 8}$ yes

AM is 3x8

3. $M_{5\times 8} \cdot A_{3\times 5}$ no

Find each product, if possible.

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

2x2 2x3 → 2x3

$\begin{bmatrix}2(3)+4(6) & 2(-2)+4(0) & 2(7)+4(-5)\\3(3)+(-1)(6) & 3(-2)+-1(0) & 3(7)+-1(-5)\end{bmatrix} = \begin{bmatrix}30 & -4 & -10\\3 & -6 & 26\end{bmatrix}$

5. $\begin{bmatrix}2 & 4\\7 & -1\end{bmatrix}\cdot\begin{bmatrix}-3 & 0\\2 & 5\end{bmatrix}$

2x2 2x2 → 2x2

$\begin{bmatrix}2(-3)+4(2) & 2(0)+4(5)\\7(-3)+-1(2) & 7(0)+-1(5)\end{bmatrix} = \begin{bmatrix}2 & 20\\-23 & -5\end{bmatrix}$

6. $\begin{bmatrix}3 & -2 & 7\\6 & 0 & -5\end{bmatrix}\cdot\begin{bmatrix}3 & -2 & 7\\6 & 0 & -5\end{bmatrix}$

2x3 2x3

x

not possible

7. $[4\ 0\ 2]\cdot\begin{bmatrix}1\\3\\-1\end{bmatrix}$

1x3 · 3x1 → 1x1

$\begin{bmatrix}4(1)+0(3)+2(-1)\end{bmatrix} = \begin{bmatrix}2\end{bmatrix}$

Use $A=\begin{bmatrix}1 & 3\\3 & 1\end{bmatrix}$, $B=\begin{bmatrix}4 & 0\\-2 & -1\end{bmatrix}$, $C=\begin{bmatrix}-1 & 0\\0 & -1\end{bmatrix}$, **and** $c=3$ **to find the given products.**

8. *AB*

2x2 2x2 → 2x2

$\begin{bmatrix}1(4)+3(-2) & 1(0)+3(-1)\\3(4)+1(-2) & 3(0)+1(-1)\end{bmatrix} = \begin{bmatrix}-2 & -3\\10 & -1\end{bmatrix}$

9. *BA*

2x2 2x2 → 2x2

$\begin{bmatrix}4(1)+0(3) & 4(3)+0(1)\\-2(1)+-1(3) & -2(3)+-1(1)\end{bmatrix} = \begin{bmatrix}4 & 12\\-5 & -7\end{bmatrix}$

10. Is $AB = BA$ a true statement?

no!

11. $c(AB)$

$3\begin{bmatrix}-2 & -3\\10 & -1\end{bmatrix} = \begin{bmatrix}-6 & -9\\30 & -3\end{bmatrix}$

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Use $W = \begin{bmatrix} 1 & -5 \\ 2 & 0 \end{bmatrix}$, $H = \begin{bmatrix} -3 & 7 \\ 4 & -1 \end{bmatrix}$, $S = \begin{bmatrix} -3 & 1 & 5 \\ 6 & 0 & 10 \end{bmatrix}$, to find the given products.

12. W^2 $= W \cdot W$ (2×2)(2×2) → 2×2

$\begin{bmatrix} 1(1)+-5(2) & 1(-5)+-5(0) \\ 2(1)+0(2) & 2(-5)+0(0) \end{bmatrix}$

$\begin{bmatrix} -9 & -5 \\ 2 & -10 \end{bmatrix}$

13. H^2 $H \cdot H$ (2×2)(2×2) → 2×2

$\begin{bmatrix} -3(-3)+7(4) & -3(7)+7(-1) \\ 4(-3)+-1(4) & 4(7)+-1(-1) \end{bmatrix}$

$= \begin{bmatrix} 37 & -28 \\ -16 & 29 \end{bmatrix}$

14. S^2 $S \cdot S$ (2×3)(2×3) — not possible!

15. RENTALS For their one-week vacation, the Montoyas can rent a 2-bedroom condominium for \$1796, a 3-bedroom condominium for \$2165, or a 4-bedroom condominium for \$2538. The table shows the number of units in each of three complexes.

	2-Bedroom	3-Bedroom	4-Bedroom
Sun Haven	36	24	22
Surfside	29	32	42
Seabreeze	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.

complex × type of unit: $\begin{bmatrix} 36 & 24 & 22 \\ 29 & 32 & 42 \\ 18 & 22 & 18 \end{bmatrix}$ type of unit × \$: $\begin{bmatrix} 1796 \\ 2165 \\ 2538 \end{bmatrix}$

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.

complex (3) × type (3) • type (3) × \$ (1) → complex × \$ (mult matrices)

$\begin{bmatrix} 36(1796)+24(2165)+22(2538) \\ 29(1796)+32(2165)+42(2538) \\ 18(1796)+22(2165)+42(2538) \end{bmatrix} = \begin{bmatrix} 172452 \\ 227960 \\ 186554 \end{bmatrix}$

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

add up all elements

$172452 + 227960 + 186554 = \$586966$