

Precalculus Pset #3: Multiplying matrices

Name: _____

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1. For each pair of matrices A and B in (??-??) below:

i. Find the dimensions of matrices A and B . Identify if the two matrices can be multiplied

ii. If possible, find the product of $A \times B$

if 2×2 $2 \times 2 \rightarrow 2 \times 2$

(a) $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}, B = \begin{bmatrix} -3 & -2 \\ 4 & 2 \end{bmatrix}$

$$\begin{bmatrix} r1c1 & r1c2 \\ r2c1 & r2c2 \end{bmatrix}$$

$$\begin{bmatrix} -3+4 & -2+4 \\ -6+4 & -4+2 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 2 \\ -2 & -2 \end{bmatrix}$$

(b) $A = \begin{bmatrix} 8 & -1 \\ 2 & 3 \\ -4 & 5 \end{bmatrix}, B = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$

3×2 2×2

$$\begin{bmatrix} r1c1 & r1c2 \\ r2c1 & r2c2 \\ r3c1 & r3c2 \end{bmatrix}$$

$$\begin{bmatrix} 8-2 & 16-1 \\ 2+6 & 4+3 \\ -4+10 & -8+5 \end{bmatrix} \rightarrow \begin{bmatrix} 6 & 15 \\ 8 & 7 \\ 6 & -3 \end{bmatrix}$$

(c) $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}, B = \begin{bmatrix} 8 & -1 \\ 2 & 3 \\ -4 & 5 \end{bmatrix}$

Can't be multiplied

2×2 3×2

(d) $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}, B = \begin{bmatrix} -3 & 2 & 12 \\ 8 & 0 & -7 \\ -6 & 2 & -10 \end{bmatrix}$

$\rightarrow B$

2. (a) Find the product of multiplying the two matrices below:

$$\begin{bmatrix} 1 & 0 & -3 \\ 3 & 1 & -2 \\ 2 & 2 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -3z \\ 3x + y - 2z \\ 2x + 2y + z \end{bmatrix}$$

- (b) Explain why the matrix equation on the left is equivalent to the system of equations on the right. Be sure to refer to (2??) in your answer and answer in at least one complete sentence:

Matrix equation:

$$\begin{bmatrix} 1 & 0 & -3 \\ 3 & 1 & -2 \\ 2 & 2 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} -2 \\ 5 \\ 4 \end{bmatrix}$$

System of linear equations:

$$\begin{cases} x & - 3z = -2 \\ 3x + y - 2z = 5 \\ 2x + 2y + z = 4 \end{cases}$$

[illegible]