Name_____ Date_____ Period_____

6.2. Matrix Operations

Examples are from https://www.khanacademy.org/math/precalculus/precalc-matrices

Transpose of a Matrix

Example 1:

Example 2:

Practice: Find transpose of the following matrices.

$$B = \begin{bmatrix} -2 & 0 & 6 \\ 3 & 5 & 1 \end{bmatrix} \qquad A = \begin{bmatrix} 3 & -1 \\ 4 & 0 \end{bmatrix} \qquad A = \begin{bmatrix} 2 \\ 5 \\ -6 \end{bmatrix}$$

Matrix Multiplication

Example 1:

Example 2:

Multiplying a Matrix by a Column Vector

Defined and Undefined Matrix Operations

Example 1:

Example 2:

Example 3:

Example 4: Is E X A in Example 3 defined?

Simplify each expression. Write "undefined" for the expressions that are undefined. Show all your work.

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

2) $\begin{bmatrix} 2 & 6 \\ -6 & 4 \end{bmatrix} \cdot \left(\begin{bmatrix} 5 & 3 \\ -6 & 2 \end{bmatrix} + \begin{bmatrix} 1 & 2 \\ 2 & 0 \end{bmatrix} \right)$

3) $\begin{bmatrix} -1 & 5 \\ 5 & -5 \end{bmatrix} \cdot \begin{bmatrix} -3 & 6 \\ -3 & 0 \end{bmatrix}$

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

5) $\begin{bmatrix} -2 \\ -3 \\ -6 \\ 2 \end{bmatrix} + \begin{bmatrix} -4 \\ 6 \\ 0 \\ -3 \end{bmatrix}$

6) $-4 \cdot \left(\begin{bmatrix} -3 & -6 \\ 1 & 4 \end{bmatrix} \cdot \begin{bmatrix} -2 & 6 \\ -1 & -4 \end{bmatrix} \right)$

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

8) $-5 \left(\begin{bmatrix} 2 \\ -1 \\ -6 \end{bmatrix} + \begin{bmatrix} 2 \\ -4 \\ 4 \end{bmatrix} \right)$

9) $\begin{bmatrix} -1 & -1 \\ -6 & 3 \end{bmatrix} + \begin{bmatrix} -5 & -1 \\ -4 & 2 \end{bmatrix} \cdot \begin{bmatrix} 3 & 6 \\ 1 & 6 \end{bmatrix}$

10) $\begin{bmatrix} -2 \\ -6 \end{bmatrix} - 3\begin{bmatrix} -6 \\ 0 \end{bmatrix}$

11) $-2\begin{bmatrix} -3 & -5 & -5 \\ 0 & 5 & -6 \end{bmatrix} + \begin{bmatrix} 4 & -1 & -3 \\ 6 & 3 & 2 \end{bmatrix}$

12) $\begin{bmatrix} -5 & 1 \\ -4 & -5 \end{bmatrix} \cdot \left(\begin{bmatrix} 5 & -4 & 2 \\ -6 & 3 & -6 \end{bmatrix} + \begin{bmatrix} 3 & -5 & 2 \\ 5 & 5 & 3 \end{bmatrix} \right)$

13) $\left(\begin{bmatrix} -4y & 2y \\ 2 & 3 \end{bmatrix} + \begin{bmatrix} 2y & 6 \\ 2 & 2x \end{bmatrix} \right) \cdot \begin{bmatrix} 5 \\ -5 \end{bmatrix}$

14) $\begin{bmatrix} 6y & y^2 \\ -2y & -2y \end{bmatrix} \cdot \begin{bmatrix} -y & xy \\ -6 & x^2 \end{bmatrix} - \begin{bmatrix} 6y & -6 \\ -3y & y \end{bmatrix}$

15) Give an example of a matrix expression in which you would first perform a matrix subtraction and then a matrix multiplication. Use any numbers and dimensions you would like but be sure that your expression isn't undefined.

16) A, B, and C are matrices: $A(B+C) = AB + CA$

A) Always true B) Sometimes true
C) False

17) Find transpose of **A = [1 5 7]**

18) Find transpose of $\begin{bmatrix} \pi & 8 \\ -3 & 7 \end{bmatrix}$