Name: _____

Multiplying Matrices

Exercise 1: You are given the dimensions of matrices A and B. Is AB defined? Is BA defined? Give the dimensions of each possible product.

1) $A_{3\times5}$, $B_{5\times2}$
2) $A_{7\times6}$, $B_{2\times7}$
3) $A_{1\times4}$, $B_{3\times1}$
4) $A_{5\times7}$, $B_{7\times3}$
5) $A_{2\times4}$, $B_{3\times4}$

Exercise 2: Suppose that A, B, C, D, and E are the following matrices:

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

$$D = \begin{bmatrix} 1 & 5 & 2 \\ -1 & 0 & 1 \\ 3 & 2 & 4 \end{bmatrix}, \ E = \begin{bmatrix} 6 & 1 & 3 \\ -1 & 1 & 2 \\ 4 & 1 & 3 \end{bmatrix}$$

Determine whether the following matrix expressions are defined, and, for those that are defined, compute the resulting matrix.

1) AB
2) BA
3) (3E)D
4) (AB)C
5) A(BC)
6) (4B)C + 2B
7) CA + 2E
8) DD

Exercise 3: Suppose that A, B, and C are the following matrices and that a = 4 and b = −7.

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

Verify computationally that:

1) (AB)C = A(BC)
2) a(BC) = (aB)C = B(aC)
3) (B + C)A = BA + CA