2024 Fall Math 140 Week-In-Review

Week 1: Sections 1.1-1.2

Section 1.1: Basic Matrix Operations

Some Key Words and Terms: Dimensions, Elements/Entries, Scalar, Transpose, Matrix Equality, Commutative, Associative

Dimensions of Matrices:

Elements, or Entries, of Matrices:

Adding/Subtracting Matrices:

Scalar Multiplication:

Transpose of a Matrix:

Matrix Equality:

Other Properties:

Examples:

1. Complete the given matrix operations, if possible. If it is not possible, explain why.

$$7\begin{bmatrix}1 & 2 & 3\\ 4 & 5 & 6\end{bmatrix} - 5\begin{bmatrix}a & 0 & -b\\ 9 & 2c & -3\end{bmatrix} + \begin{bmatrix}11 & -8\\ -1 & 5\\ 3 & -4\end{bmatrix}^{\mathrm{T}}$$

2. Determine the values for w, x, y, and z that make the following matrix equation true.

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

Section 1.2: Matrix Multiplication

Some Key Words and Terms: Dimensions, Elements/Entries, Scalar vs. Matrix, Transpose, Matrix Equality, Associative, Distributive

Multiplying Matrices:

Scalar Multiplication vs. Matrix Multiplications:

Other Properties:

Examples:

1. Determine the dimensions of the resultant matrix, if possible. If it is not possible, explain why.

A is 2x3, B is 3x3, C is 2x2, D is 2x4

a. $3CD + 5D$

b. $2CA - 4B$

c. AA^TA

d. $ABCD$

2. Complete the given matrix operations, if possible. If it is not possible, explain why.

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

3. Complete the given matrix operations, if possible. If it is not possible, explain why.

$$\begin{bmatrix} 1 & w & 2 \\ x & 3 & y \\ 4 & z & 5 \end{bmatrix} \cdot \begin{bmatrix} -1 & a \\ b & -2 \\ -3 & c \end{bmatrix}^{\mathrm{T}}$$

4. Complete the given matrix operations, if possible. If it is not possible, explain why.

$$\begin{bmatrix} 1 & 2 \\ 2 & -1 \\ 2 & 3 \end{bmatrix} \cdot \begin{bmatrix} a & 0 \\ 5 & b \\ c & 3 \end{bmatrix}^{\mathrm{T}}$$