Name: _____ **Precalculus Unit 6, Lesson 6**

Aim: What are some operations with matrices?

I. Do Now: When Doris and Morris stand on an accurate scale, the scale reads 160 pounds. When Doris and Norris stand on the same scale, it reads 146 pounds. When Morris and Norris stand on the scale with Norris' identical twin (who has exactly the same weight as Norris), the scale registers 260 pounds. Find the weight of Dorris, of Morris, and of Norris. (*Hint:* You should need only 3 equations, with three variables.)

II. Simple Concepts

1. Two matrices are equal if and only if all of their corresponding entries are equal.

   Ex. If $\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} = \begin{bmatrix} 4 & 0 \\ -3 & 2 \end{bmatrix}$, then $a_{11} = 4,\ a_{12} = 0,\ a_{21} = -3,$ and $a_{22} = 2$.

2. You can only add matrices of the same order. You do so by adding their corresponding entries.

   (a) $\begin{bmatrix} 4 & 0 \\ 8 & 6 \end{bmatrix} + \begin{bmatrix} -2 & 7 \\ 9 & -3 \end{bmatrix} =$

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

   (c) $\begin{bmatrix} 8 \\ -4 \\ 2 \end{bmatrix} + \begin{bmatrix} -8 \\ 4 \\ -2 \end{bmatrix} =$

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

III. More Simple Concepts

3. It is common to multiply a matrix (e.g. Matrix A) by a real number. To do so, simply multiply each entry in the matrix by that number (which is commonly called a **scalar**).

   Ex. Given $A = \begin{bmatrix} 1 & 1 & 6 \\ 2 & 0 & -3 \\ 5 & 7 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 0 & 0 \\ 1 & -4 & 3 \\ -1 & 3 & 2 \end{bmatrix}$.

   Find: (a) $2A$
   (b) $-B$
   (c) $2A - B$

IV. The Additive Identity for Matrices

4. Just as the identity for real number addition is 0, the identity for matrix addition is the **zero matrix** O, which consists entirely of zeros. O is the additive identity for the set of all $m \times n$ matrices.

   Ex. $O = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ is the identity for all 2×3 matrices.

   $O = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ is the identity for all 2×2 matrices.

HW49
- Read pages 518 – 521.
- p. 527: 9, 11, 13, 14, 15
- p. 513: 21, 71, 72, 85, 89