Name_____

Algebra 2

Lesson 4-1

Organizing Data into Matrices

A **matrix** is a rectangular array of numbers arranged in rows by columns. Mountains of real world data may be quickly processed when arranged in this rectangular format.

Each element or **entry** in a matrix has a specific location or **address**, read as a "row by column" location.

Example: $\begin{matrix} 3 & -2 & 5 \\ 4 & 0 & 1 \end{matrix}$ The entry isn't eh 2nd row, 3rd column, is called $\mathbf{e_{23}=1}$.

The size or **dimension** of a matrix is simply the number of rows by the numbers of columns. Thus, the size of the matrix in the example above is 2 by 3 or 2 x 3. Two matrices are equal **if and only if** they are the same size **and** their corresponding matrix elements are identical or equivalent.

Consider the data sets below for Aaron's Service Center.

Auto Parts

Store #	**1997**	**1998**
103	$143,000	$188,000
205	$217,000	$195,000
135	$93,000	$135,000

Mechanic Services

Store #	**1997**	**1998**
103	$245,000	$305,000
205	$486,000	$475,000
135	$204,000	$193,000

What is Aaron's total revenue (parts + service) for Store #103 in 1997?

total revenue=parts +services

= $143,000 + $245,000

=$**388,000**

What is Aaron's total revenue (parts + service) for Store #205 in 1998?

total revenue=parts +services

= $195,000 + $475,000

=$**670,000**

What is Aaron's total revenue (parts + service) for Store #103 in 1998?

total revenue=parts +services

= $135,000 + $193,000

=$**328,000**

Notice that order of the entries is important. Each store has a specific set of data. High speed computers can now add millions of such entries in seconds. This process is called **matrix addition or subtraction**. Matrix addition/subtraction is the process of adding or subtracting corresponding entries. Thus, Aaron's Service Center data can be translated (in thousands of dollars) into matrix form:

Parts Service Revenue

$$\begin{bmatrix} 143 & 188 \\ 217 & 195 \\ 93 & 135 \end{bmatrix} + \begin{bmatrix} 245 & 305 \\ 486 & 475 \\ 205 & 193 \end{bmatrix} = \begin{bmatrix} (143+245) & (188+305) \\ (217+486) & (195+475) \\ (93+205) & (135+193) \end{bmatrix} = \begin{bmatrix} 388 & 493 \\ 703 & 670 \\ 298 & 328 \end{bmatrix}$$

Matrix operations also obey the commutative and associative properties as well as the additive identity and additive inverse.

Lesson 4-1

1. a) convert the data set into a matrix

   b) What are the dimensions of the matrix?

   c) The entry $\mathbf{n_{32}}$ is _____

Income	Taxes	Net Pay
$3458	$210	$3257
$4194	$322	$3872
$4658	$348	$4310
$5014	$412	$4602
$5874	$498	$5376

2. The data set below represents quarterly growth (left to right) over the years 2110, 2002, 2003.

a) How much growth did 2002 have in all four quarters?

b) What $\mathbf{n_{24}}$? _____

	1st	2nd	3rd	4th
2001	4.3	5.0	1.45	3.45
2002	3.2	6.4	2.31	5.2
2003	4.1	2.21	4.01	3.63

3. Solve each equation for the variable:

$$\begin{bmatrix} 3x+2 & 5 & 2a \\ -18 & 6 & 5y+3 \end{bmatrix} = \begin{bmatrix} 8 & 2n-10 & 0 \\ c & 3k & -7 \end{bmatrix}$$

ANS:

3x+2=8

3x=10

x=10/3