

Date:

Chapter: Chapter 4:2 --> Operations with Matrices

Objectives: Add, subtract, and multiply a matrix by a scalar

Notes:

Coastal Sales Company has three locations in Florida. The matrices below show the average daily wages and sales of all of the representatives.

	Miami		Tampa		Tallahassee	
	Wages	Sales	Wages	Sales	Wages	Sales
Entry	$\begin{bmatrix} 900 \\ 2400 \\ 2700 \end{bmatrix}$	$\begin{bmatrix} 145,000 \\ 225,000 \\ 290,000 \end{bmatrix}$	$\begin{bmatrix} 900 \\ 1800 \\ 1800 \end{bmatrix}$	$\begin{bmatrix} 122,000 \\ 145,500 \\ 160,000 \end{bmatrix}$	$\begin{bmatrix} 1050 \\ 1800 \\ 1800 \end{bmatrix}$	$\begin{bmatrix} 109,500 \\ 135,000 \\ 150,500 \end{bmatrix}$

- Can only add/subtract matrices if dimensions are =!!
- Add/subtract matrices by adding/subtracting corresponding elements
- To multiply by a scalar, multiply each element by the scalar
- Commutative and Associative Properties of Addition hold *TRUE* for matrices

***Scalar** = The constant by which a matrix can be multiplied; aka scalar multiplication.

Examples:

Ex. 1 - Add or subtract.

$$a) \begin{bmatrix} -3 & 4 \\ -9 & -5 \end{bmatrix} - \begin{bmatrix} -4 & 12 \\ 8 & -7 \end{bmatrix} = \begin{bmatrix} 1 & -8 \\ -17 & 2 \end{bmatrix}$$

$$b) \begin{bmatrix} -9 & 8 & 3 \\ -2 & 4 & -7 \end{bmatrix} + \begin{bmatrix} -4 & -3 & 6 \\ -9 & -5 & 18 \end{bmatrix} = \begin{bmatrix} -13 & 5 & 9 \\ -11 & -1 & 11 \end{bmatrix}$$

Ex. 2 - Multiply.

If $S = \begin{bmatrix} 8 & 0 & 3 & -2 \\ -1 & -4 & -2 & 9 \end{bmatrix}$ find $-4S$

2×4

$$\begin{bmatrix} -32 & 0 & -12 & 8 \\ 4 & 16 & 8 & -36 \end{bmatrix}$$

Ex. 3

$A = \begin{bmatrix} -5 & 3 \\ 6 & -8 \\ 2 & 9 \end{bmatrix}$, $B = \begin{bmatrix} 12 & 5 \\ 5 & -4 \\ 4 & -7 \end{bmatrix}$ find $-6B + 7A$

$$\begin{bmatrix} -35 & 21 \\ 42 & -54 \\ 14 & 63 \end{bmatrix} + \begin{bmatrix} -72 & -30 \\ -30 & 24 \\ -24 & 42 \end{bmatrix} = \begin{bmatrix} -107 & -9 \\ 12 & -32 \\ -10 & 105 \end{bmatrix}$$

Ex. 4

A small company makes unfinished desks and cabinets. Each item requires different amounts of hardware as shown in the matrices. The company has orders for 3 desks and 4 cabinets. Express the company's total needs for hardware in a single matrix.

	<u>Desk</u>			<u>Cabinet</u>	
	Short	Long		Short	Long
Nails	10	6	$+$	4	8
Screws	8	4		3	4

$$\begin{bmatrix} 30 & 18 \\ 24 & 12 \end{bmatrix} + \begin{bmatrix} 16 & 32 \\ 12 & 16 \end{bmatrix} = \begin{bmatrix} 46 & 50 \\ 36 & 28 \end{bmatrix}$$

\downarrow N \downarrow L

Homework:

Average (+10) --> p. 196 (#12-21)

Advanced (+17) --> p. 197 (#22-34, 37, 41-43)