Lesson Title 1.5.1 Adding, Subtracting, & Scalar Multiplication with Matrices **ALG 2** **Date** _____

Intro Info

Dimensions: uppercase letter, rows by columns

Entry/Element: each value in the matrix

Address: the location of an entry or element, lowercase letter.

$$A = \begin{bmatrix} 16.781 & 16.29 & 17.318 \\ 16.206 & 16.606 & 17.668 \end{bmatrix}$$

Task 1:

a) Create $M_{1\times 4}$ M [1 2 3 4]

b) What is in address a_{13}? 17.318

Adding & Subtracting Matrices

You can add or subtract two matrices *only if they have the SAME dimensions.*

✔ **Same Dimensions**

$$\begin{bmatrix} 1 & 2 \\ 6 & 7 \end{bmatrix} + \begin{bmatrix} 2 & 1 \\ 7 & 6 \end{bmatrix} \quad \begin{bmatrix} 5 \\ 6 \\ 7 \end{bmatrix} + \begin{bmatrix} 2 \\ 8 \\ 1 \end{bmatrix}$$

✗ **Different Dimensions**

$$\begin{bmatrix} 1 & 2 \end{bmatrix} + \begin{bmatrix} 5 \\ 10 \end{bmatrix} \qquad \begin{bmatrix} a_{11} & a_{12} \end{bmatrix} + \begin{bmatrix} b_{11} & b_{12} & b_{13} \end{bmatrix}$$

TASKS

$W = \begin{bmatrix} 3 & -2 \\ 1 & 0 \end{bmatrix}$ 2x2, $X = \begin{bmatrix} 4 & 7 & 2 \\ 5 & 1 & -1 \end{bmatrix}$ 2x3

a) $W + Y = \begin{bmatrix} 3 & -2 \\ 1 & 0 \end{bmatrix} + \begin{bmatrix} 1 & 4 \\ -2 & 3 \end{bmatrix} = \begin{bmatrix} 4 & 2 \\ -1 & 3 \end{bmatrix}$

$Y = \begin{bmatrix} 1 & 4 \\ -2 & 3 \end{bmatrix}$ 2x2, $Z = \begin{bmatrix} 2 & -2 & 3 \\ 1 & 0 & 4 \end{bmatrix}$ 2x3

b) $X - Z = \begin{bmatrix} 4 & 7 & 2 \\ 5 & 1 & -1 \end{bmatrix} + \begin{bmatrix} -2 & 2 & -3 \\ -1 & 0 & -4 \end{bmatrix} = \begin{bmatrix} 2 & 9 & -1 \\ 4 & 1 & -5 \end{bmatrix}$

c) $X + Y$ = not possible; the dimensions do NOT match.

$X_{2*3} + Y_{2x2}$

Scalar Multiplication

You can multiply a number, called a scalar, to every entry/element in the matrix.

Example:
Use a scalar product to find the prices if a 10% discount is applied to the prices.

Shirt Prices		
	T-shirt	Sweatshirt
Small	$7.50	$15.00
Medium	$8.00	$17.50
Large	$9.00	$20.00
X-Large	$10.00	$22.50

$$\begin{bmatrix} 7.5 & 15 \\ 8 & 17.5 \\ 9 & 20 \\ 10 & 22.5 \end{bmatrix} - 0.1 \begin{bmatrix} 7.5 & 15 \\ 8 & 17.5 \\ 9 & 20 \\ 10 & 22.5 \end{bmatrix} = \begin{bmatrix} 6.75 & 13.50 \\ 7.20 & 15.75 \\ 8.10 & 18.00 \\ 9.00 & 20.25 \end{bmatrix}$$

TASK

$$A = \begin{bmatrix} 4 & -2 \\ -3 & 10 \end{bmatrix} \quad B = \begin{bmatrix} 4 & -1 & -5 \\ 3 & 2 & 8 \end{bmatrix} \quad C = \begin{bmatrix} 3 & 2 \\ 0 & -9 \end{bmatrix} \quad D = [6 \ -3 \ 8]$$

a) 3B + 2C

not possible: $B_{2\times3} + C_{2\times2}$

dimensions do NOT match.

b) 2A – 3C

$$\begin{bmatrix} 8 & -4 \\ -6 & 20 \end{bmatrix} + \begin{bmatrix} -9 & -6 \\ 0 & 27 \end{bmatrix} = \begin{bmatrix} -1 & -10 \\ -6 & 47 \end{bmatrix}$$

c) D + 0.5D

$$= [6 \ -3 \ 8] + [3 \ -1.5 \ 4]$$

$$= [9 \ -4.5 \ 12]$$

Still need help with: