

### 3.5 Matrix Operations

Matrix way to display and organize data by Rows and Columns

	s	m	L	XL
Black	3	5	2	0
Red	6	12	1	3
White	4	4	2	3

### Dimensions

Size of a matrix based on the number of rows and columns

	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>	
R <sub>1</sub>	2	3	5	4	3x4
R <sub>2</sub>	6	2	1	0	
R <sub>3</sub>	-2	3	-1	0	

  

	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>	
R <sub>1</sub>	2	5	6	3	1x4
R <sub>2</sub>	1	2	3	4	
R <sub>3</sub>	3	4	5	6	
R <sub>4</sub>	6	7	8	9	

### Operations (+/-)

In order to add/subtract matrices the dimensions have to be the same

3x3 can be added to another 3x3 but not to a 3x4

	S	M	L	XL	
R <sub>1</sub>	5	3	5	1	3x3
R <sub>2</sub>	2	10	11	0	
R <sub>3</sub>	4	6	3	0	

  

	S	M	L	XL	
R <sub>1</sub>	4	1	6	3	3x3
R <sub>2</sub>	2	5	1	12	
R <sub>3</sub>	13	1	4	10	

  

	S	M	L	XL	
R <sub>1</sub>	9	4	11	4	Total
R <sub>2</sub>	8	3	11	23	
R <sub>3</sub>	17	7	7	10	

$$\begin{bmatrix} 2 & 5 \\ -1 & 3 \end{bmatrix} - \begin{bmatrix} -2 & 1 \\ 5 & 3 \end{bmatrix}$$

$$\begin{bmatrix} 2 - (-2) & 5 - 1 \\ -1 - 5 & 3 - 3 \end{bmatrix} = \begin{bmatrix} 4 & 4 \\ -6 & 0 \end{bmatrix}$$

### Scalar Multiplication "Distribution"

$$2 \begin{bmatrix} 7 & 4 & 6 \\ 5 & 1 & 0 \\ 3 & -2 & -8 \end{bmatrix} = \begin{bmatrix} 14 & 8 & 12 \\ 10 & 2 & 0 \\ 6 & -4 & -16 \end{bmatrix}$$

$$\frac{1}{2} \begin{bmatrix} 2 & -8 & -4 \\ 6 & 12 & 14 \\ 4 & -10 & 0 \end{bmatrix} + 3 \begin{bmatrix} 1 & 2 & -1 \\ 3 & -2 & 0 \\ 4 & 6 & 1 \end{bmatrix}$$
$$\begin{bmatrix} 1 & -4 & -2 \\ 3 & 6 & 7 \\ 2 & -5 & 0 \end{bmatrix} + \begin{bmatrix} 3 & 6 & -3 \\ 9 & -6 & 0 \\ 12 & 18 & 3 \end{bmatrix}$$
$$\begin{bmatrix} 4 & 2 & -5 \\ 12 & 0 & 7 \\ 14 & 13 & 3 \end{bmatrix}$$