4.1 Matrix Operations

A **matrix** is a rectangular arrangement of numbers (**entries**) in rows and columns.

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

column → row ↓

dimensions: rows x columns, 2 x 3

(types of matrices: p. 199)

Equal matrices have the same dimensions and equal corresponding entries.

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} e & f \\ g & h \end{bmatrix} \quad \text{iff } a = e,\ b = f,\ c = g,\ d = h$$

2x2 = 2x2

scalar multiplication: real number x matrix

1 Let $A = \begin{bmatrix} 0 & 5 \\ 3 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 3 \\ -2 & 0 \end{bmatrix}$

$3A - B =$ $\begin{bmatrix} 0 & 15 \\ 9 & 6 \end{bmatrix} - \begin{bmatrix} -1 & 3 \\ -2 & 0 \end{bmatrix} = \begin{bmatrix} 1 & 12 \\ 11 & 6 \end{bmatrix}$

3A B

2 Solve for x and y.

$$3\left(\begin{bmatrix}10 & 2\\ 5 & 4y\end{bmatrix}-\begin{bmatrix}x & 5\\ -1 & 1\end{bmatrix}\right)=\begin{bmatrix}0 & -9\\ 18 & 21\end{bmatrix}$$

$$3\begin{bmatrix}10-x & -3\\ 6 & 4y-1\end{bmatrix}=\begin{bmatrix}0 & -9\\ 18 & 21\end{bmatrix}$$

$$\begin{bmatrix}30-3x & -9\\ 18 & 12y-3\end{bmatrix}=\begin{bmatrix}0 & -9\\ 18 & 21\end{bmatrix}$$

$30-3x=0$

$x=10$

$12y-3=21$

$y=2$