Matrix Operations

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 1 \\ 4 \\ 7 \end{bmatrix}$$

This gives the first column.

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \begin{bmatrix} 20 \\ 0 \\ 0 \end{bmatrix} = \begin{bmatrix} 20 \\ 80 \\ 140 \end{bmatrix}$$

This gives 20 times the first column.

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \begin{bmatrix} 20 \\ 30 \\ 40 \end{bmatrix} = \begin{bmatrix} 20 \times 1 + 30 \times 2 + 40 \times 3 \\ 20 \times 4 + 30 \times 5 + 40 \times 6 \\ 20 \times 7 + 30 \times 8 + 40 \times 9 \end{bmatrix}$$

Matrix Multiplication

Multiplication by

$$\begin{bmatrix} 20 \\ 30 \\ 40 \end{bmatrix}$$

gives 20 times the first column, 30 times the second column, and 40 times the third column.