Matrices and Basic Operations

A **matrix** is a rectangular array of numbers: $A = \underbrace{[a_{ij}]}_{\text{entry in row } i \text{ and column } j}$

A matrix is $\underbrace{m \times n}_{\text{dimensions of } A}$ if it has m rows and n columns

Scalar multiplication of a matrix (entry by entry):

$$3\begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix} = \begin{bmatrix} 3 & 6 \\ 9 & 12 \\ 15 & 18 \end{bmatrix} \quad 3 \times 2 \text{ matrices}$$

Addition of matrices (same dimensions, entry by entry):

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