Math Review

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1 Basic Linear Algebra

1.1 Definitions of Vectors and Matrices

Vector $x = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix} \in \mathbb{R}^n$ is a column vector.

The transpose of x: $x^T = x' = [x_1, x_2, \ldots, x_n]$ is a row vector.

Matrix $A = \begin{bmatrix} A_{11} & \ldots & A_{1m} \\ \vdots & \ddots & \vdots \\ A_{n1} & \cdots & A_{nm} \end{bmatrix}$ is a $n \times m$ matrix. Each element of the matrix is represented by $A_{ij}, i = 1, \ldots, n, j = 1, \ldots, m$.

The transpose of matrix A is denoted as A^T, A' where $A^T_{ij} = A_{ji}$. Notice that $\left(A^T\right)^T = A$.

1.2 Matrix Operations

Addition/Substraction