Conventions for linear algebra

Points in $\mathbb{R}^n$ can be described as ordered n-tuples $(x_1, \ldots, x_n)$ or equivalently as $1 \times n$ matrices (row vectors) or $n \times 1$ matrizes (column vectors).

In discussions involving matrix algebra, it is usually convenient to identify points with the associated column vectors. One advantage is that it simplifies the use of matrizes to represent linear transformations.

Recall that linear transformations $\mathbb{R}^n \to \mathbb{R}^m$ are in 1-1 correspondence with $m \times n$ matrizes. In particular, if A is an $m \times n$ matrix (a_{ij}), then we can use column vectors to describe the associated linear transformation L_A as follows:

$$\overbrace{L_A(X)}^{m \times 1} = \overbrace{A}^{m \times n} \cdot \overbrace{X}^{n \times 1}$$

We then have the useful identity $\overset{\text{matrix product}}{L_{AB}} = \overbrace{L_A \circ L_B}^{\text{composite map}}$.

Note that, in this framework, the jth column of A equals $L_A(E_j)$ where E_j is the unit column vector with 1 in the j-th row and zeros elsewhere.

TRANSPOSE MATRICES.

Our standard notation for the transpose of a matrix A will be ${}^T\!A$ (A', A^* sometimes have other meanings).