

Vector Transpose

It's very important to note that in this lesson we emphasize the **column vector**.

$$\vec{x} = \begin{bmatrix} a_1 \\ a_2 \\ a_3 \\ \vdots \\ a_n \end{bmatrix}$$

Vector \vec{x} is a column vector.

But vectors can also be represented as **row vectors**.

Vector $\vec{y} = [a_1 \ a_2 \ a_3 \ \dots \ a_n]$ is a row vector.

If you look closely at both vectors, \vec{x} and \vec{y} , you will notice that they have the same elements, only one is a column and the other is a row.

It's as if one vector was actually tilted by 90°

In the world of Linear Algebra we call this change a **transpose**. The mathematical symbol of a transpose is T and it's used the following way:

$$\begin{bmatrix} a_1 \\ a_2 \\ a_3 \\ \vdots \\ a_n \end{bmatrix}^T = [a_1 \ a_2 \ a_3 \ \dots \ a_n]$$

Or:

$$[a_1 \ a_2 \ a_3 \ \dots \ a_n]^T = \begin{bmatrix} a_1 \\ a_2 \\ a_3 \\ \vdots \\ a_n \end{bmatrix}$$

Equation 1

In short:

$$\vec{x}^T = \vec{y}$$

or

$$\vec{y}^T = \vec{x}$$

Equation 2