Definition: Basis Representation Function

Let $\mathcal{B} = (b_1, b_2, \ldots, b_{n-1}, b_n)$ *be a basis for a finite dimensional vector space* V*. Then for* $\vec{x} \in V$, $\exists! c_1, c_2, \ldots, c_{n-1}, c_n \in \mathbb{R}$ *such that*

$$\vec{x} = \sum_{i=1}^{n} c_i b_i$$

Then we define the function $[\vec{\ }]_{\mathcal{B}} : V \to \mathbb{R}^n$*:*

$$[\vec{x}]_{\mathcal{B}} \stackrel{def}{=} \begin{bmatrix} c_1 \\ c_2 \\ \vdots \\ c_n \end{bmatrix}$$