Coordinate Systems

The Idea: One reason we talk about bases of a vector space is so that we can impose a "coordinate system" on V. So if a basis, $\mathcal{B}$, has n elements, then V "acts" like $\mathbb{R}^n$. This means that given any vector in a vector space, we can give it coordinates as if the vector was from $\mathbb{R}^n$.

Theorem 7 – **Unique Representation Theorem**

Proof of Thm 7:

Definition of Coordinates Relative to a Basis:

Examples of Coordinate System:

Finding Coordinates in $\mathbb{R}^n$:

Change of Coordinates Matrix:

Theorem 8:

Proof of Theorem 8:

Example of Isomorphism:

Examples of Using Coordinate Vectors: