Ch3 Definitions

Wednesday, 5 March 2025 5:45 PM

Definition 3.1 Subspace, vector space

- Contains $\vec{0}$.
- Closed under vector addition $(\forall \vec{u}, \vec{v} \in V,\ \vec{u}+\vec{v} \in V)$
- Closed under scalar multiplication $(\forall \vec{u} \in V,\ k \in \mathbb{R},\ k\vec{u} \in V)$

Definition 3.5 Spanning set

- $V = \text{Span}(\vec{v_1}, \dots, \vec{v_n})$
- $\{\vec{v_1}, \dots, \vec{v_n}\}$ is a spanning set

Definition 3.6. Basis

- BASIS:

1. $\{\vec{b_1}, \vec{b_2}, \dots, \vec{b_m}\}$ if it's a linearly independant generating set.

OR 2. $\vec{b_1}, \dots, \vec{b_m}$ are linearly independant and $V = \text{Span}(\vec{b_1}, \dots, \vec{b_m})$

Definition 3.9 Dimension

- $\dim V$ is equal to size of any basis for V.
- trivial subspace $\{0\}$ has $\dim V = 0$.