Math 136 - Linear Algebra **Winter 2016**

Lecture 22: February 28, 2016

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22.1 Dimensions Continued

Theorem 22.1 *if $\mathbb{V}$ is an n-dimensional vector space and $\{\vec{v_1} \dots \vec{v_k}\}$ is a linearly independant set in $\mathbb{V}$ with k ¡ n, then there exist vectors $w_{\vec{k+1}} \dots \vec{w_n}$ in $\mathbb{V}$ such that $\{\vec{v_1}, \dots, \vec{v_k}, w_{\vec{k+1}}, \dots, \vec{w_n}\}$ is a basis for $\mathbb{V}$*

Corollary 22.2 *if $\mathbb{S}$ is a subspace of a finite dimensional vector space $\mathbb{V}$, then $dim\mathbb{S} \neq dim\mathbb{V}$*

22.2 Coordinates with respect to a basis

Theorem 22.3 *If $\beta = \{\vec{v_1} \dots \vec{v_n}\}$ is a basis for a vector space $\mathbb{V}$, then every $\vec{v} \in \mathbb{V}$ can be written as a unique linear combination of the vectors in β*

Definition 22.4 *If $\beta = \{\vec{v_1} \dots \vec{v_n}\}$ is a basis for a vector space $\mathbb{V}$
if $\vec{v} = b_1\vec{v_1} + \dots + b_n\vec{v_n}$, then $b_1 \dots b_1$ are called β-coordinates of $\vec{v}$, and we define the β-coordinate vector by*

$$\mid \vec{v} \mid_\beta = \begin{bmatrix} b_1 \\ \vdots \\ b_n \end{bmatrix}$$

End of Lecture Notes
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