Math 136 - Linear Algebra **Winter 2016**

Lecture 21: February 26, 2016

Lecturer: Yongqiang Zhao *Notes By: Harsh Mistry*

21.1 Bases

Definition 21.1 *Let $\mathbb{V}$ be a vector space. The set β is called a basis of $\mathbb{V}$ if β is a linearly independant spanning set for $\mathbb{V}$*
We define a basis for $\{\vec{0_{\mathbb{V}}}\}$ to be the empty set

Theorem 21.2 *Let $\beta = \{\vec{v_1} \dots \vec{v_n}\}$ be a basis for a vector space $\mathbb{V}$ and let $\zeta = \{\vec{v_1} \dots \vec{v_k}\}$ be a set in $\mathbb{V}$. If $k > n$, then ζ is linear*

Theorem 21.3 *if $\beta = \{\vec{v_1} \dots \vec{v_n}\}$ and $\zeta = \{\vec{v_1} \dots \vec{v_k}\}$ are bases for a vector space $\mathbb{V}$, then $k = n$*

21.2 Dimension

Definition 21.4 *If $\beta = \{\vec{v_1} \dots \vec{v_n}\}$ is a basis for a vector space $\mathbb{V}$, then we say the dimension of $\mathbb{V}$ is n and write*

$$dim V = n$$

*If $\mathbb{V}$ is yje trivial vector space, then $dim\mathbb{V} = n$. If $\mathbb{V}$ does not have a basis with a finite number of vectors in it, then $\mathbb{V}$ is said to be **Infinite Dimensional***

Theorem 21.5 *If $\mathbb{V}$ is an n-dimensional vector space $n > 0$ then*

1. *a set of more than n vectors in $\mathbb{V}$ must be linear dependant*
2. *a set of fewer than n vectors in $\mathbb{V}$ cannot span $\mathbb{V}$*
3. *a set of n vectors in $\mathbb{V}$ is linear independant if and only if it spans $\mathbb{V}$*

End of Lecture Notes
Notes by : Harsh Mistry