240Algebral-091001, Hour 10

September-29-09
9:10 PM

Conflict with CHM 151?
Class notes!

on board

Goal: Every v.s. has a "basis". So while we don't <u>have</u> to use coordinates, we can.

$\mathrm{span}(S) = \{\sum_{i=1}^{n} a_i u_i : a_i \in F, u_i \in S\}$

Proposition 1. $\mathrm{span}(S)$ is a subspace of V.

2. If $S_1 \subset \mathrm{span}(S_2)$, then $\mathrm{span}(S_1) \subset \mathrm{span}(S_2)$

<u>Def</u> A subset $S \subset V$ is "lin. dep" if it is "wasteful".
I.e., If $\exists\, a_i \in F$ not all 0 & $u_i \in S$ s.t. $\sum a_i u_i = 0$.
Otherwise, it is "lin. indep."

<u>Examples</u> $\{e_i\}$ ✓, $\cancel{\left\{\begin{pmatrix}1\\2\\3\end{pmatrix}, \begin{pmatrix}4\\5\\6\end{pmatrix}, \begin{pmatrix}7\\8\\9\end{pmatrix}\right\}}$

<u>Comments</u> 1. $\emptyset$ is lin. indep.

2. $\{u\}$ is lin indep iff $u \neq 0$.

3. Suppose $S_1 \subset S_2 \subset V$. Then

a. If S_1 is dep, so is S_2

b. If S_2 is indep, so is S_1

4. If S' is lin indep in V and $v \in V \setminus S$, then $S \cup \{v\}$ is lin. dep. iff $v \in \mathrm{span}(S')$.