MATH 253

Today

1. 2.5 Linear combinations and span (Understand definitions of linear combinations and span; express a vector as a linear combination of other vectors.)

2. 2.6 Linear independence (Understand the concept of linear independence and how to determine whether given vectors are LI.)

3. WeBWorK

Where is today's material used?

1. Physics (solutions to Maxwell's equations in free space, quantum mechanics, Fourier series – everywhere we dealt with subspaces.)

2. Math (Linear independence appears throughout mathematics)

Theorem 1. *Let V be a vector space over a field F.*

1. *If $S \subseteq V$, then span(S) is a subspace of V and $S \subseteq$span(S).*
2. *If $S \subseteq S'$, then span(S) $\subseteq$span(S').*
3. *$v \in$span(S) iff span($S \cup \{v\}$) $=$span(S).*
4. *If W is a subspace of V and $S \subseteq W$, then span(S) $\subseteq W$.*

Next Time

1. 2.6 Linear independence
2. Note: 2 proofs due Monday (2.2), 3 proofs due Wednesday (2.4).