FALL '03 KRAUS

MATH 110-6
Midterm I

1. Let $(V,+,\cdot)$ be a vector space, $\{u_1,\dots,u_m\}\subset V$ and $\{v_1,\dots,v_n\}\subset V$. Prove:

   $\{u_1,\dots,u_m\}$ spans V, $\{v_1,\dots,v_n\}$ linearly independent $\Rightarrow n\le m$

2. Prove that if V and W are three-dimensional subspaces of $\mathbb{R}^5$, then V and W must have a nonzero vector in common.

3. Find a basis for the vector space of 3×3 symmetric matrices.

4. Let $(V,+,\cdot)$ be a vector space, $\{v_1,v_2,v_3\}\subset V$ linearly independent. Analyse the linear independence/dependence of $\{w_1,w_2,w_3\}$ for $w_1\equiv v_1+v_2$, $w_2\equiv v_1+v_3$, $w_3\equiv v_2-v_3$