## Math 108A Homework No. 1

1. Prove that $-(-\mathbf{v})=\mathbf{v}$.
2. Suppose that $\lambda \in \mathbf{R}$ and $\mathbf{v} \in V$ satisfy $\lambda \mathbf{v}=\mathbf{0}$. Prove that either $\lambda=0$ or $\mathbf{v}=\mathbf{0}$.
3. Prove carefully that the subset of $\mathbf{R}^{\infty}$
$\left\{\left(x_{1}, x_{2}, x_{3}, \ldots \ldots.\right) \mid x_{i}\right.$ is a nonzero real number for only finitely many $\left.i\right\}$
is a real vector space (with the obvious operations).
4. Prove carefully that a non-empty subset $U$ of a vector space $V$ is a subspace if and only if for every $\lambda, \mu \in \mathbf{R}$ and $\mathbf{v}$ and $\mathbf{w}$ in $U$, the linear combination $\lambda \mathbf{v}+\mu \mathbf{w} \in U$.
