3E14 : Suppose $V = \{ (x_1, x_2, \ldots) \in \mathbb{F}^\infty : x_j \neq 0$

for only finitely many $j \}$.

a) show that V is a subspace of $\mathbb{F}^\infty$.

b) Prove that $\mathbb{F}^\infty / V$ is infinite-dimensional

---

a) Additive identity : $(0, 0, \ldots) \in V$. ✓

closed under addition :

Let $u, w \in V$. Since both has finitely many

elements that are non-zero, their addition must

also have finitely many non-zero elements. ✓

scalar multiplication :

Since $u \in V$ has finitely many nonzero elements,

$\lambda u, \left(\text{for any } \lambda \in \mathbb{F} \right)$ must also has finitely many

nonzero elements. ✓