- **π is linear**

  composition of two linear maps is again linear, we are done.
  (true by page 56 Axler, line 3–4) ✓

- **$U \subseteq \operatorname{null} \pi$**

$\pi(U) = \pi_1 \circ \pi_2 (U)$

$= \pi_1(U)$ (by definition of π_2)

$= 0$ (need to define π_1)

Need to construct $\pi_1 : V/U \to V$ such that

π_1 is linear and $\pi_1(U) = 0$

- Since $\dim V/U = 1$, there exists basis $v_1 + U$ of V/U, such that $v_1 \notin U$.

- Define $\pi_1 : V/U \to \mathbb{F}$ by:

  $\pi_1(\lambda v_1 + U) = \lambda$, $\lambda \in \mathbb{F}$.

- π_1 is linear: Let $x, y \in V/U$