Proof :

- $\dim V/U = 1 \iff$ isomorphic to $\mathbb{F}$

(by 3.59 Axler)

There exists invertible linear map $\pi_1 : V/U \to \mathbb{F}$

(by definition of isomorphism, 3.58 Axler)

- Meanwhile, there exists a quotient map

$\pi_2 : V \to V/U$

$\pi_2(v) = v + U$, which is linear

(see 3.88)

and $\operatorname{null} \pi_2 = U$

- Thus, define $\pi = \pi_1 \circ \pi_2 : V \xrightarrow{\pi_2} V/U \xrightarrow{\pi_1} \mathbb{F}$

- We need to show that π is linear and $\operatorname{null} \pi = U$