Source:

1 | Broader vector spaces

- Doesn't have to be physics vectors
- maybe it's like matrices
- or linear maps themselves

2 | Axler 3.A ex7

Let $w = Tv$. Also notice that $\frac{1}{v} \in \mathbb{F}$ If $v = 0$ then

$$Tv = 0$$

By Axler 3.11 (Maps take 0 to 0). Thus, λ can be anything in $\mathbb{F}$. Otherwise,

$$Tv = w = \left(w\frac{1}{v}\right)v$$

Let $\lambda = w\frac{1}{v}$, then

$$\lambda v = w\frac{1}{v}v = w$$

which is in $\mathbb{F}$ because $w, \frac{1}{v} \in \mathbb{F}$ and fields are closed under multiplication.