Source:

1 | sources source

1.1 | linear algebra done right (Axler 5.A)

2 | motivation

The simplest non-trivial invariant subspaces are one-dimensional. Let U be a one-dimensional invariant subspace under T, then

$$Tu \in U : u \in U$$

Because $U = \text{span}(u)$, this implies

$$Tu = \lambda u$$

which defines an eigenvalue (λ) and eigenvector(u) pair.

3 | eigenvalue def

Suppose $T \in \mathcal{L}(V)$. A number $\lambda \in \mathbb{F}$ is called an *eigenvalue* of T if there exists $v \in V$ s.t. $v \neq 0$ and $Tv = \lambda v$.

3.1 | results

3.1.1 | Axler5.6 equivalent conditions

When V is finite-dimensional, $T \in \mathcal{L}(V)$ and $\lambda \in F$,

1. $T - \lambda I$ is not ijnective
2. $T - \lambda I$ is not surjective
3. $T - \lambda I$ is not invertible
4. we don't want $T - \lambda I$ to be invertible because we want it to be zero (rearranging the prev equation) intuit