

If λ is an eigenvalue of a linear transformation $T : V \rightarrow V$, then for $n \in \mathbb{N}$, λ^n is an eigenvalue of T^n .

Proof. Suppose λ is an eigenvalue for T . Then for some vector $v \in V$, $T(v) = \lambda v$. Therefore, and by applying the linearity of T ,

$$T^n(v) = T^{n-1}(\lambda v) = \lambda T^{n-1}(v) = \lambda T^{n-2}(\lambda v) = \cdots = \lambda^{n-1} T(v) = \lambda^n v.$$

This says that λ^n is an eigenvalue of T^n . □