1 | invertible, inverse

def

- A linear map $T \in \mathcal{L}(V, W)$ is *invertible* if there exists a linear map $S \in (W, V)$ such that ST equals the identity map on V and TS equals the identity map on W.
- A linear map $S \in (W, V)$ satisfying ST = I and TS = I is called an *inverse* of T
- If T is invertable, T^{-1} denotes the inverse of T
- 1.1 | careful
- 1.1.1 | the inverse of a map has to be commutative (TS = I and ST = I)
- 1.1.2 | the target identity is in one space on one side and in the other space on the other side
- 1.2 | **results**
- 1.2.1 | unique

any invertible map has exactly one inverse

1.2.2 | equivalant to injectivity and surjectivity (bijectivity)

See bijectivity. Iff a map is bijective, then it is invertable.

1.2.3 | Equivalent Condition with eigenvalues

if a map has zero as an eigenvalue, then it is singular (5.A exercise 21)

- 1.2.4 | non-singular matrices are invertible
- 1.2.5 | operators that are injective or surjective are bijective
- 1.2.6 | matrices with linearly independent columns and rows are bijective

ExrOn • 2021-2022 Page 1