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