

## Ch 6 Definitions (important)

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### 6.1 Injective, surjective and bijective functions

- Bijection
- Injective: At most one input  $x \in X$  s.t.  $f(x) = y$ , for  $y \in Y$ .
  - Surjective: At least one output  $x \in X$  s.t.  $f(x) = y$  for every  $y \in Y$ .

### 6.3 Isomorphism

- Isomorphism between  $V$  and  $W$  is any linear bijective map  $F: V \rightarrow W$ .
- $V \cong W$  ( $\dim(V) = \dim(W)$ )

### 6.12 Identity matrix

The identity matrix  $I_n$  is defining matrix of the identity transformation  $\text{id}_{\mathbb{R}^n}: \mathbb{R}^n \rightarrow \mathbb{R}^n$ ,  $\text{id}_{\mathbb{R}^n}(\vec{x}) = \vec{x}$

### 6.13 Inverse Matrix, Geometric Definition

- Inverse of  $A$  ( $n \times n$ ) is the defining matrix of the inverse transformation  $T_A^{-1}$ .
- $T_A \circ T_B = T_B \circ T_A = \text{id}_{\mathbb{R}^n}$
- $AB = BA = I_n$

### 6.14 Inverse Matrix, Algebraic Definition

- Inverse of  $A$  satisfy
- $$AA^{-1} = A^{-1}A = I_n$$
- If  $A^{-1}$  exist, matrix  $A$  is invertible
  - $\therefore T_{A^{-1}} = T_A^{-1}$