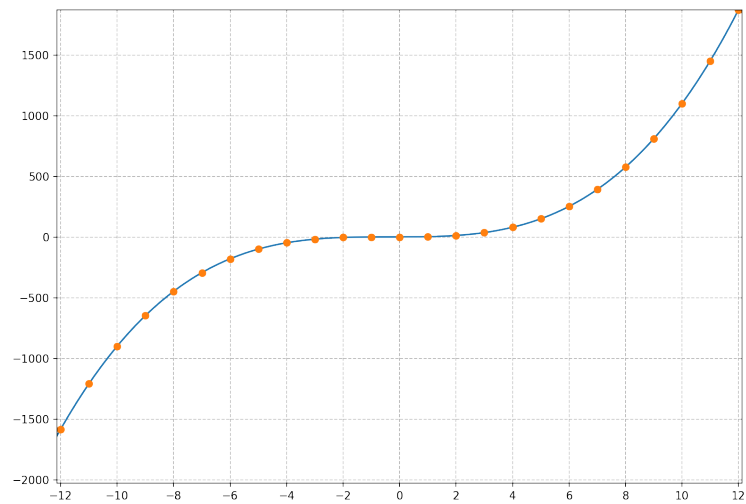


Functions (Classes)

1. Function Classes (1)

Classes of Function

The following mapping is given:  $f : A \rightarrow B$  with  $x \mapsto x^3 + x^2 + 1$  for all  $x \in A$ . Its graph is plotted below for values between  $-12 \leq x \leq 12$ :



Use the graph to decide whether the mapping represents a function and to which class of functions it belongs depending on sets  $A$  and  $B$ .

- (a) For  $A = \mathbb{R}, B = \mathbb{R}$  the mapping is 

no function
a function
an injection
a surjection
a bijection ✓

.

- (b) For  $A = \mathbb{Z}, B = \mathbb{R}$  the mapping is 

no function
an injection ✓
a surjection
a bijection

.

- (c) For  $A = \mathbb{R}, B = \mathbb{Z}$  the mapping is 

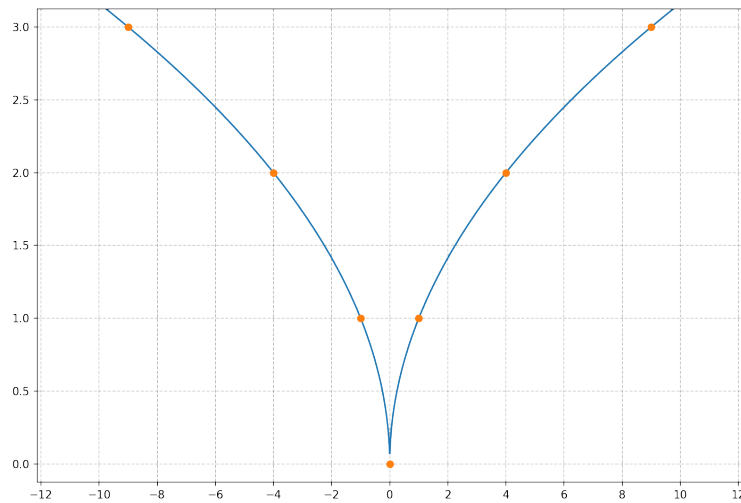
no function ✓
a function
an injection
a surjection
a bijection

.

## 2. Function Classes (2)

### Classes of Function

The following mapping is given:  $f : A \rightarrow B$  with  $x \mapsto \sqrt{|x|}$  for all  $x \in A$ .  
 Its graph is plotted below for values between  $-12 \leq x \leq 12$ :



Use the graph to decide whether the mapping represents a function and to which class of functions it belongs depending on sets  $A$  and  $B$ .

(a) For  $A = \mathbb{R}, B = \mathbb{R}_0^+$  the mapping is

no function
a function
an injection
a surjection ✓
a bijection

(b) For  $A = \mathbb{Z}, B = \mathbb{R}^+$  the mapping is ✓

no function
an injection
a surjection
a bijection

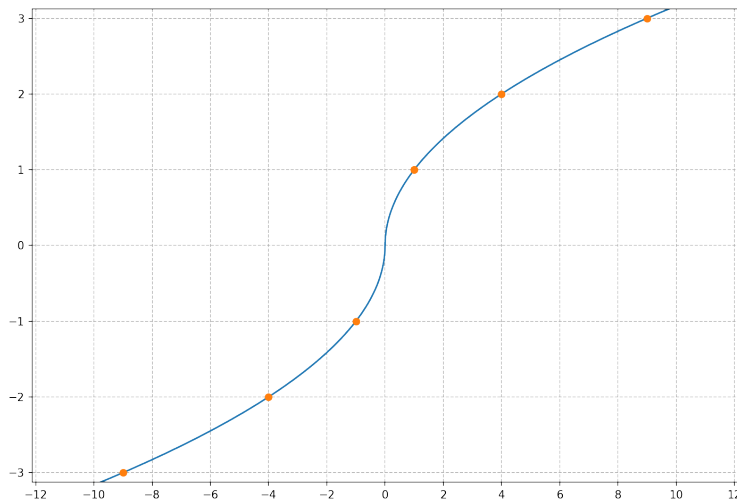
(c) For  $A = \mathbb{R}^+, B = \mathbb{R}^+$  the mapping is

no function
a function
an injection
a surjection
a bijection ✓

### 3. Function Classes (3)

#### Classes of Function

The following mapping is given:  $f : A \rightarrow B$  with  $x \mapsto \frac{x}{|x|} \cdot \sqrt{|x|}$  for all  $x \in A$ .  
 Its graph is plotted below for values between  $-12 \leq x \leq 12$ :



Use the graph to decide whether the mapping represents a function and to which class of functions it belongs depending on sets  $A$  and  $B$ .

(a) For  $A = \mathbb{R} \setminus \{0\}, B = \mathbb{R} \setminus \{0\}$  the mapping is

no function
a function
an injection
a surjection
a bijection ✓

(b) For  $A = \mathbb{Z} \setminus \{0\}, B = \mathbb{R} \setminus \{0\}$  the mapping is

no function
an injection ✓
a surjection
a bijection

(c) For  $A = \mathbb{N}, B = \mathbb{R} \setminus \{0\}$  the mapping is

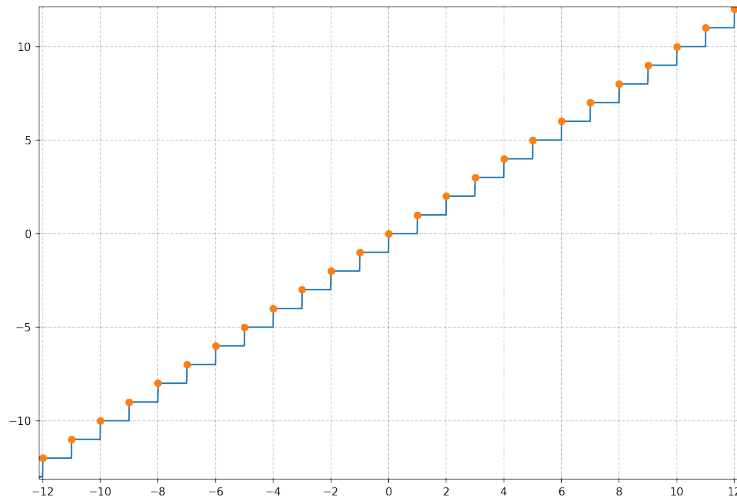
no function
a function
an injection ✓
a surjection
a bijection

#### 4. Function Classes (4)

##### Classes of Function

The following mapping is given:  $f : A \rightarrow B$  with  $x \mapsto f(x) = \lfloor x \rfloor$ , i.e. the largest number  $\leq x$  for all  $x \in A$ .

Its graph is plotted below for values between  $-12 \leq x \leq 12$ :



Use the graph to decide whether the mapping represents a function and to which class of functions it belongs depending on sets  $A$  and  $B$ .

- (a) For  $A = \mathbb{R}, B = \mathbb{R}$  the mapping is
- |              |
|--------------|
| no function  |
| a function ✓ |
| an injection |
| a surjection |
| a bijection  |

- (b) For  $A = \mathbb{R}, B = \mathbb{Z}$  the mapping is
- |                |
|----------------|
| no function    |
| an injection   |
| a surjection ✓ |
| a bijection    |

- (c) For  $A = \mathbb{N}, B = \mathbb{Z}$  the mapping is
- |                |
|----------------|
| no function    |
| a function     |
| an injection ✓ |
| a surjection   |
| a bijection    |