

The Domain and Range of a Function



Preliminaries and Objectives

Preliminaries

- Functions

Objectives

- Determine which numbers can be inputs for a function
- Determine which numbers can be outputs of a function

Definition

Domain

A list of all possible inputs to a function

Example 1

$$f(x) = x + 3$$

Domain : All real numbers

$$\mathbb{R}$$

Example 2

$$f(x) = \frac{1}{x}$$

Domain : x is not equal to zero

Formal Notation

Domain : $\{x \mid x \neq 0\}$

Example 3

$$f(x) = \sqrt{x}$$

Domain : x is not negative

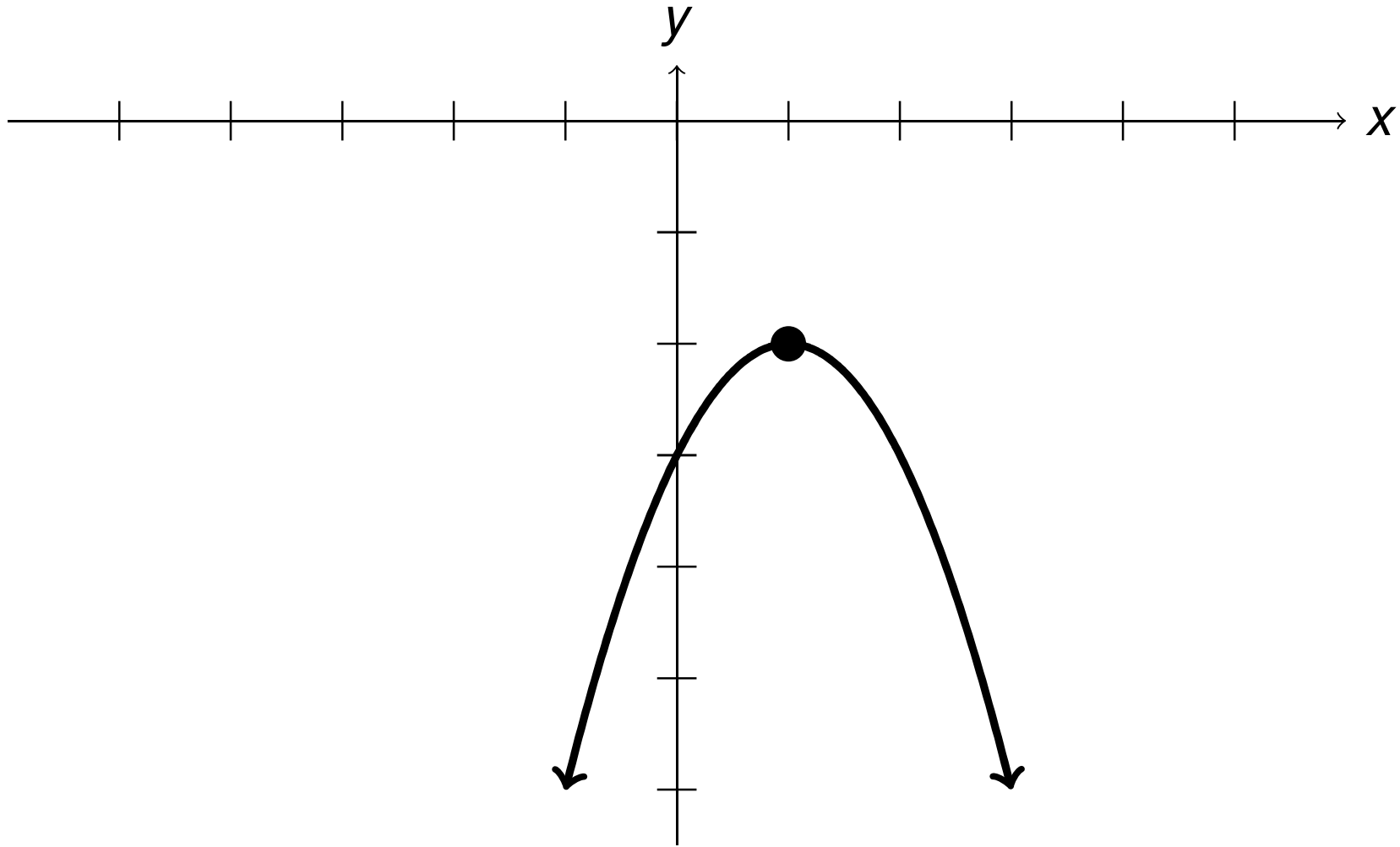
$$\{x \mid x \geq 0\}$$

Definition

Range

A list of all possible outputs of a function

Example 9: $y = -(x - 1)^2 - 2$



Range: $\{y \mid y \leq -2\}$

Recap

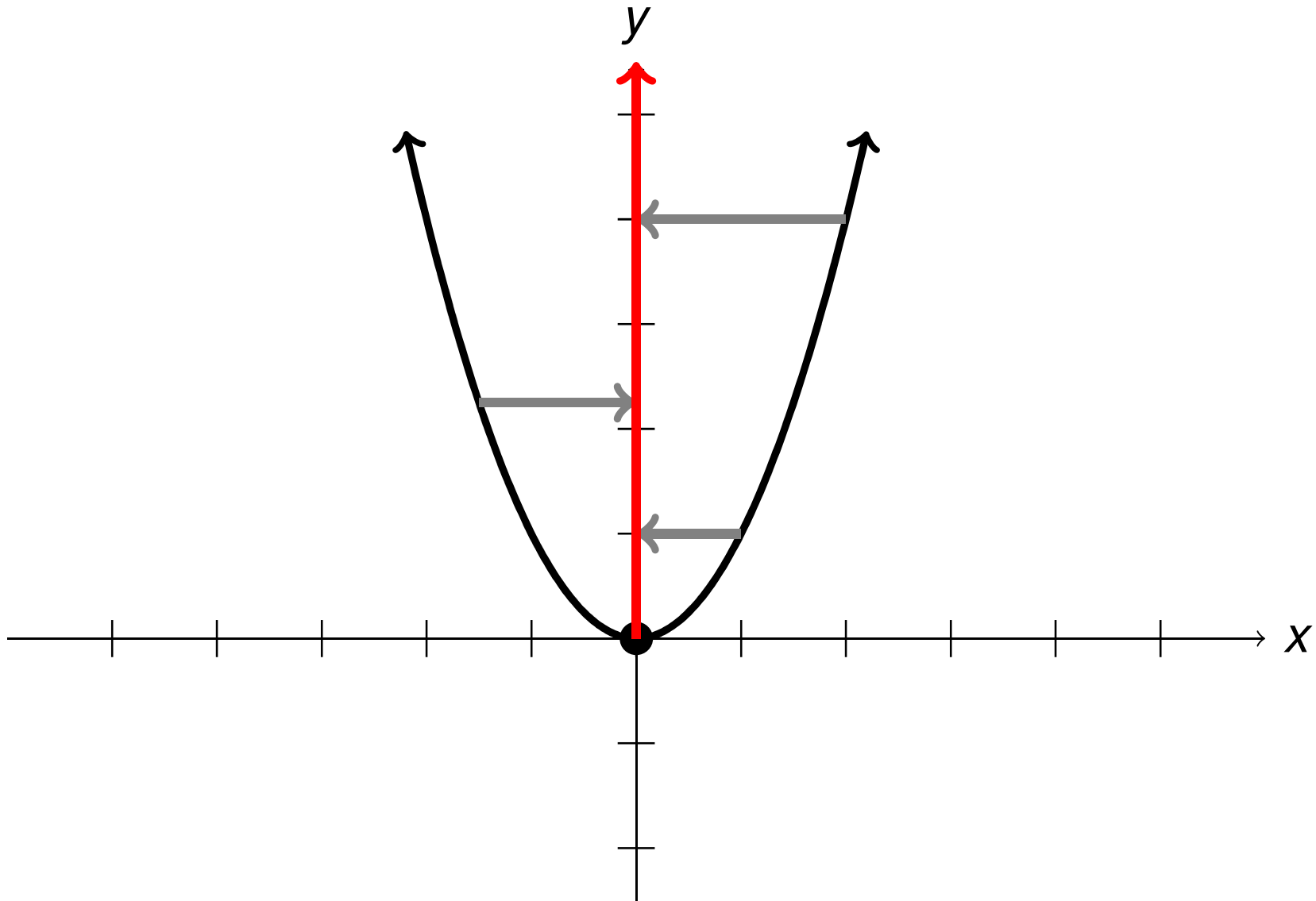
Domain

A list of all possible inputs to a function

Range

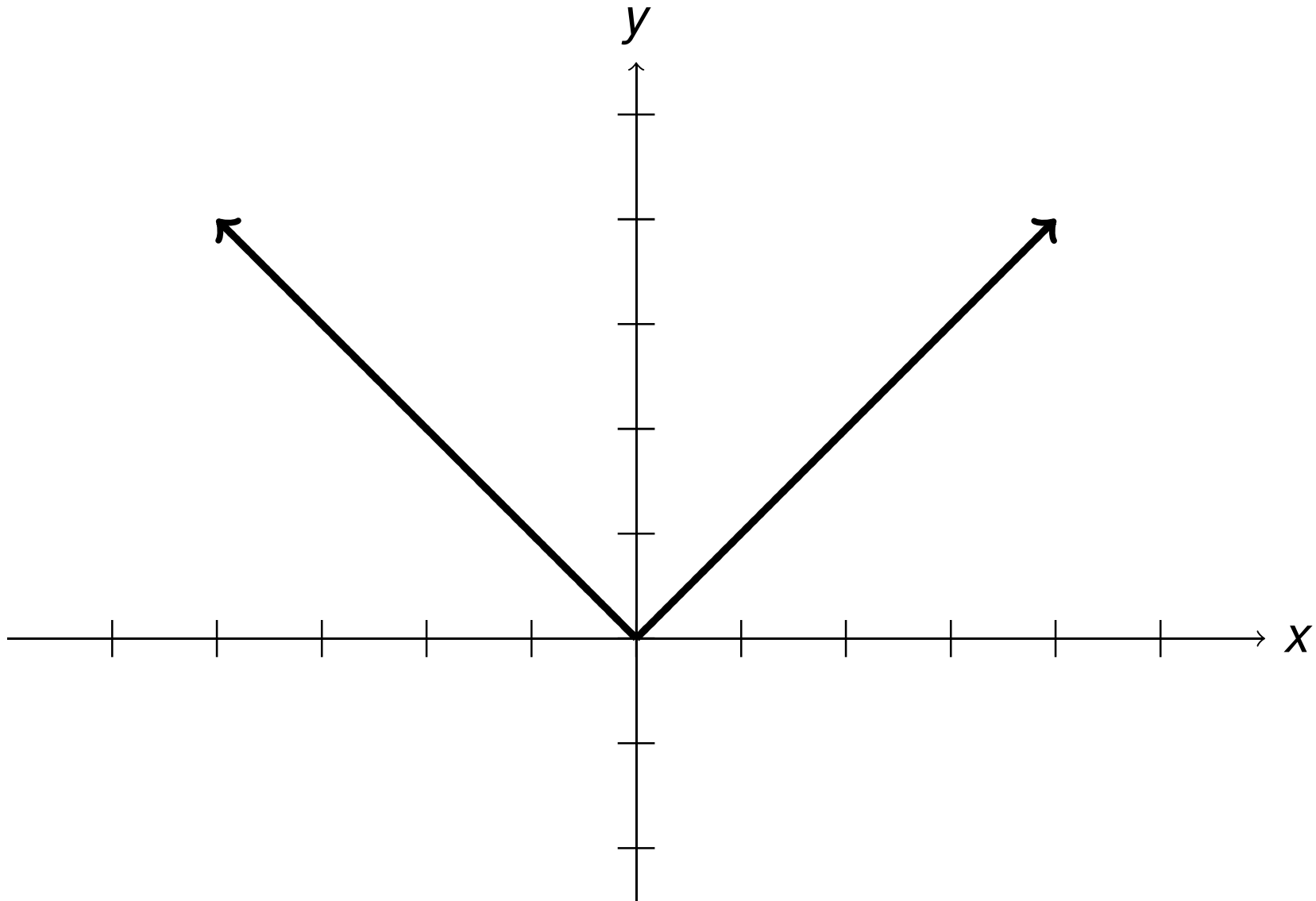
A list of all possible outputs of a function

Example 6: $y = x^2$



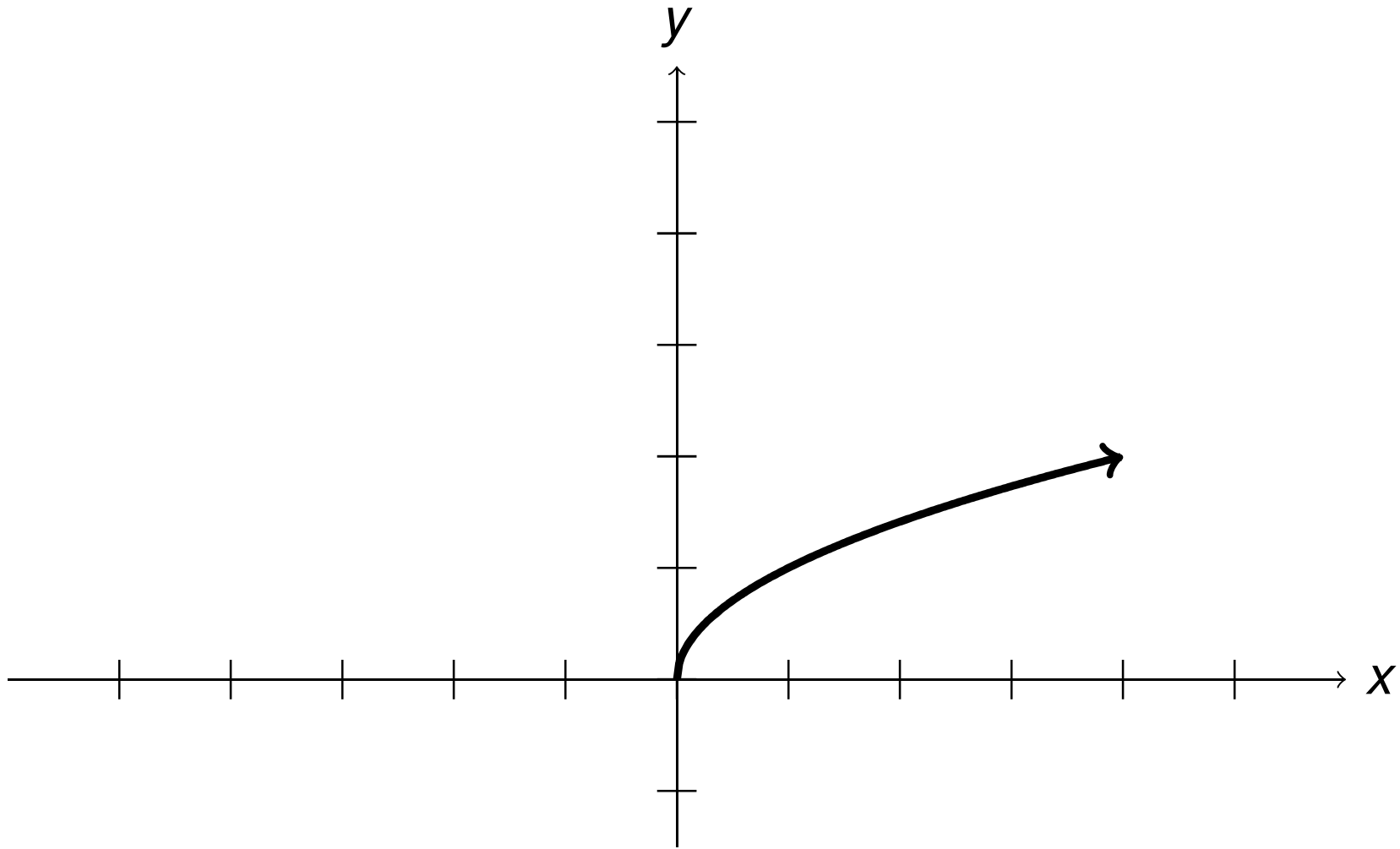
Range: $\{y \mid y \geq 0\}$

Example 7: $y = |x|$



Range: $\{y \mid y \geq 0\}$

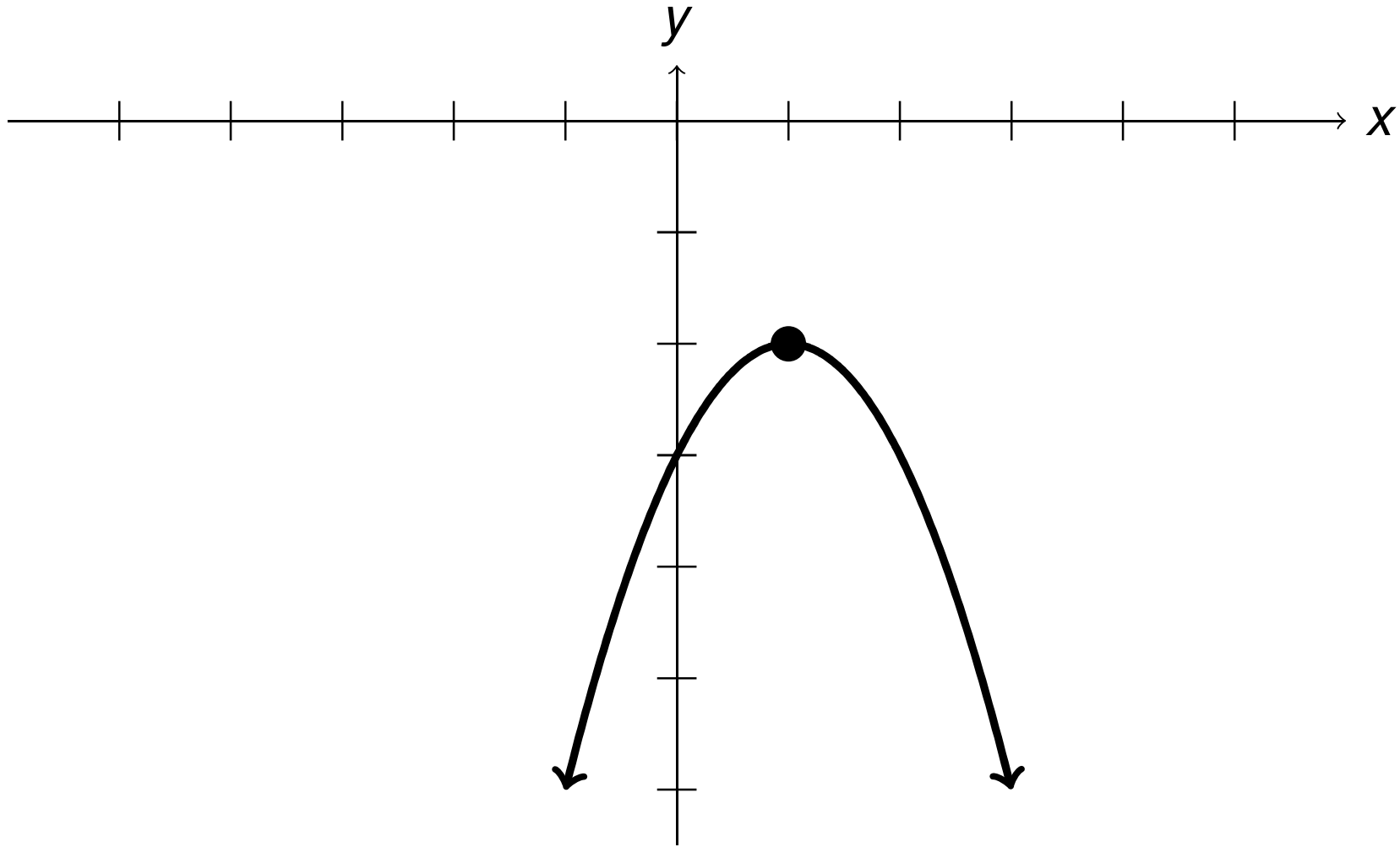
Example 8: $y = \sqrt{x}$



Domain: $\{x \mid x \geq 0\}$

Range: $\{y \mid y \geq 0\}$

Example 9: $y = -(x - 1)^2 - 2$



Range: $\{y \mid y \leq -2\}$

Recap

Domain

A list of all possible inputs to a function

Range

A list of all possible outputs of a function