Numbers: The Real Number Line

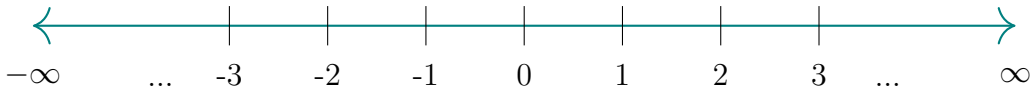
Video companion

1 Introduction

- What is $\mathbb{R}$?
- Positive, negative
- Absolute value

2 Integers and rational numbers

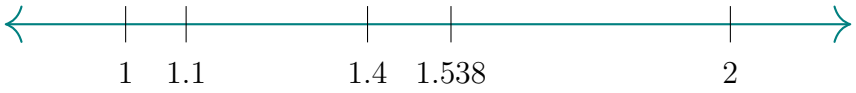
Graph of $\mathbb{R}$, the real numbers:



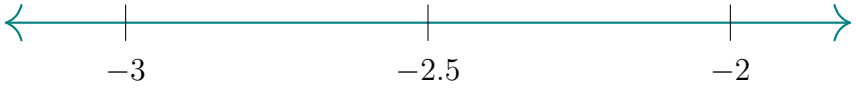
Subset of real numbers, integers:

$$\mathbb{Z} = \{..., -3, -2, -1, 0, 1, 2, 3, ...\}$$

Segment between 1 and 2:

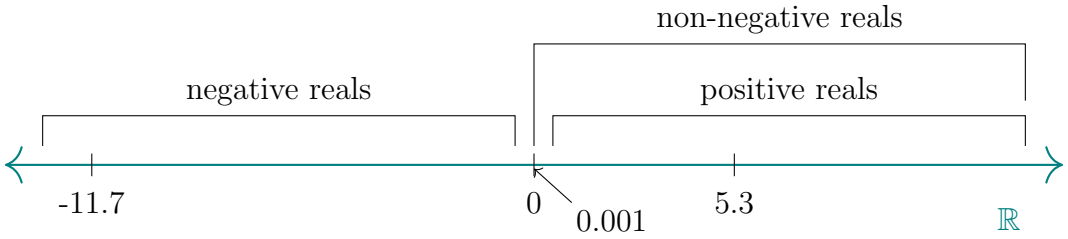


Segment between -3 and -2:



Some real numbers terminate, and some do not.
The number $\pi = 3.14159...$ is *irrational*, i.e. it does not repeat after the decimal point.

3 Sets of real numbers



4 Absolute value

The absolute value of a number x, $|x|$, is the distance from x to 0.

Example:

$$|7.1| = 7.1$$
$$|-7.1| = 7.1 = -(-7.1)$$

General rule:
For any $x \in \mathbb{R}$,

$$|x| = \begin{cases} x, & \text{if } x \text{ is non-negative} \\ -x, & \text{if } x \text{ is negative} \end{cases}$$

Check:

$$|8.7| = 8.7$$
$$|-10| = -(-10) = 10$$