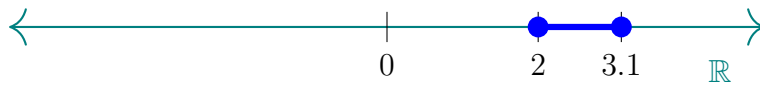


Numbers: Intervals and Interval Notation

Video companion

1 Closed intervals



Real number line is an infinite set. There are also infinite subsets.

$$[2, 3.1] = \{x \in \mathbb{R} : 2 \leq x \leq 3.1\}$$

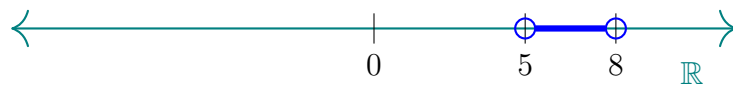
$$2.3 \in [2, 3.1] \quad \text{because } 2 \leq 2.3 \leq 3.1$$

$$3 \in [2, 3.1]$$

$$3.1 \in [2, 3.1]$$

$$1 \notin [2, 3.1] \quad \text{because } 2 \not\leq 1 \leq 3.1$$

2 Open intervals



$$(5, 8) = \{x \in \mathbb{R} : 5 < x < 8\}$$

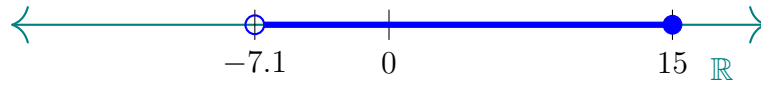
$$5.5 \in (5, 8) \quad \text{because } 5 < 5.5 < 8$$

$$5.0001 \in (5, 8)$$

$$5 \notin (5, 8) \quad \text{because } 5 \not< 5 < 8$$

The intervals $[5, 8]$ and $(5, 8)$ differ at exactly two numbers: 5 and 8.

3 Half-open intervals



$$(-7.1, 15] = \{x \in \mathbb{R} : -7.1 < x \leq 15\}$$

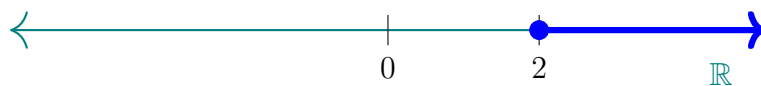


$$[20, 20.3) = \{x \in \mathbb{R} : 20 \leq x < 20.3\}$$

4 Recap vocabulary

- Closed intervals $[2, 3.1]$
- Open intervals $(5, 8)$
- Half-open intervals $(2, 3]$, $[20, 20.3)$

5 Rays



$$[2, \infty) = \{x \in \mathbb{R} : x \geq 2\}$$

Another example:

$$(-\infty, 7.1) = \{x \in \mathbb{R} : x < 7.1\}$$

6 What does an “answer” mean?

Solving an equality gives you a number:

$$x + 5 = 10$$

$$x = 5$$

Solving an inequality give you an interval:

$$1 \leq x + 5 < 10$$

$$-4 \leq x < 5$$

$$x \in [-4, 5)$$