



**Why**

That some sequences grow without bound leads us to add two elements to the set of real numbers.

**Definition**

The set of *extended real numbers* is the union of the set of real numbers with a set containing two elements: one which we call *positive infinity* and the other we call *negative infinity*.

**Notation**

We denote positive infinity by  $+\infty$  and the negative infinity by  $-\infty$ . We denote the set of extended real numbers by  $\bar{\mathbf{R}}$ . In other words,  $\bar{\mathbf{R}} = \mathbf{R} \cup \{+\infty, -\infty\}$ .

**Extended arithmetic**

We extend addition to all but one ordered pair of elements of the new set. The sum of any real number with a real number is defined as before. The sum any real number with positive infinity is positive infinity. The sum any real number with negative infinity is negative infinity. The sum of positive infinity with positive infinity is positive infinity. The sum of negative infinity with negative infinity is negative infinity. We do not define the sum of positive infinity and negative infinity.

**Intervals**

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<sup>1</sup>Future editions will discuss.



