

To Infinity and Beyond

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I. Motivation

1. Why do we discuss the idea of infinity?
2. What is infinity? Where do we visualize, approach, or use this idea in our physical life? Where do we use it in mathematics?

II. Infinity in Mathematics

1. Is infinity a number (quantity)? If you think of numbers as objects, is infinity the same kind of objects? (How similar or different is infinity to numbers?)
2. We have a method (model) to represent all of our known numbers (so far) in a visually appealing way. How do we represent this infinity in the same model?
3. Intuitively and rigorously, how do we “define” this infinity?

We quickly recognize that this idea of infinity is simultaneously confusing AND interesting, which is the best kind to study in mathematics. Its behaviors exhibit some structure and consistency with what we already know, and naturally, we would like to expand our existing mathematics to include this concept.

III. Arithmetic between Numbers and Infinity

1. Addition

2. Subtraction

3. Multiplication

4. Division

IV. Arithmetic with Infinity

1. Addition

2. Subtraction

3. Multiplication

4. Division

V. Are there different Infinities? - Day 2