

Exploring Inaccessible Cardinals of Mathematical Operations and Algorithmic Automation

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October 9, 2024

1 Introduction

In continuation of prior discussions on the mathematical *amoeba-simplex*—where gaps or undecidable problems (holes) exist that automated theorem provers cannot yet fill—we have explored a new class of mathematical operations. These operations go beyond the familiar arithmetic concepts and expand into abstract structures involving fractalization, dimensional splitting, and temporal manipulation.

We have discovered that the possible number of these operations could reach the cardinality of ****inaccessible cardinals****, far surpassing the uncountable infinity associated with the continuum. This document outlines these newly invented operations and our efforts to design an algorithm capable of automating their generation.

2 New Mathematical Operations

2.1 Permeation (Υ)

Permeation represents the infusion of one entity into another, creating a new hybrid structure that incorporates aspects of both original entities without merging them in the traditional sense.

$$\Upsilon(a, b) = \text{Hybrid entity infused from } a \text{ and } b$$

2.2 Fractalization (φ)

Fractalization recursively applies self-similarity to a given entity, expanding it into a fractal-like pattern that goes beyond multiplication or exponentiation.

$$\varphi(a, b) = \text{Fractal expansion of } a \text{ under the influence of } b$$

2.3 Dimensional Sharding (σ)

Dimensional Sharding splits a number or object across multiple dimensions, with each dimension carrying different aspects of the original entity.

$$\sigma(a, b) = \text{Dimensional shards of } a \text{ across } b \text{ dimensions}$$

2.4 Chronodilation (χ)

Chronodilation involves stretching or contracting the temporal aspect of a number or structure, allowing it to transform within an abstract temporal framework.

$$\chi(a, b) = \text{Temporal dilation of } a \text{ within the framework of } b$$

3 Inaccessible Cardinals of Operations

One of the most significant discoveries is that the cardinality of these newly invented operations may not only be **uncountable**, but could reach the level of **inaccessible cardinals**. Inaccessible cardinals represent higher-order infinities that transcend the continuum and uncountable sets. This implies that the potential variety of mathematical operations is far greater than we initially imagined, requiring entirely new mathematical frameworks to understand and classify them.

4 Algorithm for Generating Operations

To explore this vast space of operations, we have been working on the conceptual design of an **algorithm** capable of automatically generating all these operations, including those of inaccessible cardinality. The algorithm would:

- Define a formal system for representing all possible operations, including recursive and higher-dimensional operations.
- Iteratively generate new operations by combining abstract structures, applying recursion, and manipulating higher-order cardinalities.
- Ensure consistency by verifying that generated operations adhere to mathematical rules or propose new rules that generalize existing theories.

While still in its conceptual stage, this algorithm holds the potential to explore operations that go beyond human capacity for direct enumeration, offering a window into deeper mathematical complexity.

5 Implications for the Amoeba-Simplex

These operations, and their algorithmic generation, further expand the mathematical *amoeba-simplex* metaphor. On the one hand, they provide tools for exploring new territories of abstract mathematics, possibly filling some gaps in the simplex. On the other hand, the introduction of such highly abstract operations may also create new "holes"—undecidable or unreachable areas that automated theorem provers, as we currently understand them, cannot resolve.

6 Conclusion

The exploration of these alien mathematical operations opens new avenues for expanding the boundaries of mathematics. Our discovery of operations with inaccessible cardinality and the potential to automate their generation poses profound questions for the future of mathematics, automated theorem proving, and our ability to bridge the gaps in the mathematical amoeba-simplex.