Finite Space Construction

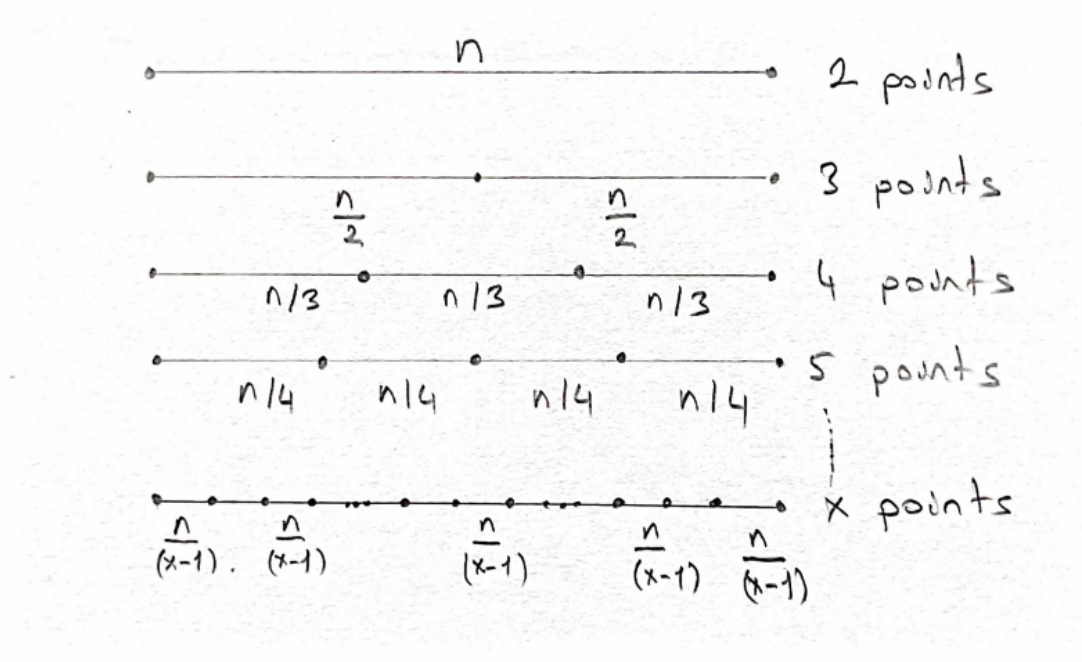
Ugur Buyukdurak

January 2025

1 Introduction

Former teachings of mathematical spaces taught us that spaces can be both finite and infinite. For example, we are told the real number line extends infinitely while constituting an infinite space. This paper says that when a space is constructed by the smallest entity, a point— which is finite— then all spaces of all dimensions are finite. Hence, this paper is going to show you how an infinite number of points constitutes a finite space.

2 Proof



$$\lim_{x\to\infty} x = \infty \ \rightarrow \lim_{x\to\infty} n/(x-1) = 0$$

The statement above tells us that as the number of points reaches infinity, the number of divisions on the line becomes infinite while making the gaps infinitely approach zero in length, thus making the gaps between any consecutive points zero, which means that if there is an infinite number of points between any two points, they constitute a continuous finite line. You will see that if there is a finite number of points, gaps never become zero, which means that a finite number of points cannot constitute a continuous finite line.

3 Results

We can show that, unlike finite spaces, infinite spaces cannot be formally constructed using the proof, that is, if you replace n with ∞ it becomes,

$$\lim_{x\to\infty} \infty/(x-1) = \infty/\infty$$

which is an indeterminate form. According to the formula, in order to constitute a space of any kind, whether it be finite or infinite, gaps have to close. However, existing indeterminate form says nothing about whether gaps close or not. Therefore, technically speaking, infinite spaces are undefined.

Therefore, we can say that finite spaces of all dimensions are well-defined whereas infinite spaces of any dimension is undefined. Hence, an outer space with boundaries is mathematically well-defined whereas an infinite outer space would be mathematically undefined.

We are able to approach infinity in limits but in a world where everything was strictly finite, that would have been impossible, thus making it impossible for a finite space to exist (You have to reach infinity in order to be able to construct a finite space). I personally think an undefined infinite space fits into this picture because the indeterminate form does not strictly say it cannot formally exist or that it can be formally constructed. But this does prove one thing: finite entities are mathematically well-defined.