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Article

Determine the Exact Value of the Square Root of 2

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Abstract: The calculation of the exact value of the square root of 2 is requested. In order to obtain its infinite value, A new concept is proposed where the accumulations of the infinitely many of finity is indicated by the change in direction which means that there is a jump from finity to infinity .The meaningless for an infinite number with a decimal point is indicated by this jump because any decimal number only have meanings within a finite range values and there is only an infinite integer quantity that can not be operated by algorithms like operations of multiplication，division,addition, and subtraction . The final result of the change in direction is two quantity where the second quantity and the first quantity extend in parallel line and never intersect and the second quantity represent the size of the first quantity. The first quantity is the infinitely great that can't be talked about anything outside of it and can compress any quantities outside of it to nothing and it is the exact value of the square root of 2.

Keywords: the square root of 2 ,the decimal point; jump; change in direction; the infinitely great

MSC code: 14-XX and 51-XX

1. Introduction

The square root of 2 is considered an infinite uncyclic decimal whose approximate value is 1.414213562373……. Now its exact value ,which is infinite digits after the decimal point, is calculated tentatively by the geometric methods here.A two meter long line segment is used as an example to calculate its value.The geometric meaning of the square root of 2 in the 2 -metre line segment is that the square root of 2 divided by 2 is equal to the square root of 2.

2. Preliminary in calculating the exact value of the square root of 2

In order to determine the exact value, this 2-metre line segment is divided into 2 equal parts ,20 equal parts,and 200 equal parts, 2000 equal parts, and so on. The positions of the square root of 2 within 2 meters are between 1 and 2,1.4 and 2,1.41 and 2, 1.414 and 2,respectively, an so on. As this division increases, its value is close to the exact value.Therefore, it can be can reasonably deduced by the readers that when this division reachs infinity, that is, the infinitesimal that can not be divided any more is gotten through this infinite division, its value will reach an accurate value.It is no doubt that the infinite division of this two meter long line segment is equivalent to the infinite accumulation（the sequential or continuous superpositions）of infinitesimal quantities to form this two meter long line segment.

However, when this infinitesimal exists, a problem arises because the 2m line segment cannot exist as an infinite quantity because there is no doubt that there is a larger quantity in nature than 2m. If the 2m line segment is infinite, then the existence of a larger quantity is a paradox. It can be also said that the existence of another infinite quantity ($\infty/2m=\infty$) relative to 2m means that in addition to this infinity of 2m, there is an another infinite quantity, that is, there are two infinities(∞^2) that means that there is a greater quantity than this infinity (∞),which has lost its meaning of existence and has become finity ,and violates the principle of uniqueness of infinity. Therefore, in order to eliminate above

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paradox,the 2m line segment can only exist as a finite quantity when this infinitesimal exists.

Now it can be seen what will happen when this infinitesimal exists.Furthermore, It can be said that the continuous infinitesimal superpositions going on forever will approach or reach the infinitely great , which is called as Axiom1 [1]. Furthermore, the properties of extending from the infinitesimal to the infinitely great can be illustrated as follows: for any given quantity, there is always a larger quantity than it. Considering an infinitely great, any quantity is not this infinity because there is always a quantity greater than this any quantity . In addition, it is also untrue for us to state that there is a maximum quantity (infinitely great) to exist because for any given quantity, there is always a greater quantity than it. So it is also untrue that add an infinitesimal to achieve the conversion from finity to infinity. Therefore, it is illogical to say that infinitesimal quantities exists and 2m line segment can only exist as a finite quantity.

However, the second paradox will come soon because the square root of 2 is really an infinite non-cyclic decimal, that is, 2 meters is an really infinite quantity. In order to eliminate this second paradox, It have to be concluded that an infinitesimal quantity does not exist.

Therefore,this two meter long line segment is endowed a special meanings where it is an givern system and can be divided randomly and infinitely ,The any quantities inside the given system include all quantities outside the given system and arbitrarily devided values outside the given system can be discovered all inside the giveb system, Further, there is no infinitesimal and infinity in all system.This concept is called as Axiom 2 [1].

3. Infinity can be expressed by the change in direction

However, the third paradox will come as well because if the square root of 2 is endowed this special meanings there will be no meaning in size of line segment long that can be compared.To eliminate the third paradox,An enlightenment can be obtained from Axiom 1.If the infinitesimal superpositions are gradually close to a certain quantity in Axiom 1, so It can be said that the sequential or continuous infinitesimal superpositions to be implemented forever will reach this quantity(is defined as A）. It can be reasonably concluded that if the infinitesimal superpositions are not close to a certain quantity , then it can be said that the sequential or continuous infinitesimal superpositions to be implemented forever will not reach this quantity(is defined as B) ,which are much larger quantity than quantity that superpositions of the infinitesimal to be implemented forever can reach .This larger quantity is indicated as the infinitely great that we can not see it in universe,which is called as the concept of Axiom 3 [2]. A remain only in the finite range because the infinitesimal superpositions are not close to the infinitely great, and its size cannot be compared between the infinitesimal and its superpositions quantities.Therefore,It can be said that A is finite quantity and B is infinite quantity and infinity (B) is the accumulation of infinitely many of finity (A) .Since A only stay within the finite scope, reaching the accumulations (or superpositions) of infinitely many of finite quantities will not be continuous superpositions and will be a jump from finity to infinity.The reason for jump is that the distance between finity and infinity is jump.

Since A only stay wthin the finite scope,The comparison between A can only stay within a finite scope, that is, the decimal point is only meaningful only in a finite scope. After a jump from the finite quantity to the infinite quantity, the infinite quantity has become an infinite integer quantity that can not operated by algorithms like operations of multiplication,division ,addition, and subtraction.

The meaningless for an infinite number with a decimal point is indicated by a jump from finity to infinity because any deciimal number only have meanings in a finite range when its existence be only restricted in finite range in which their size can be only compared .the final destination of and infinite acyclic decimals and fractions is an infinite integer quantity.

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Now the most important question comes,that is, how a jump can be achieved? It is found by me that the essence of jumping is the change in direction that represents the accumulations of the infinitely many of finite quantities [2].The infinitely great is reached by the change in direction that indicates the accumulations or superpositions of infinitely many of finite quantities. As shown on Figure 1,it is known that the first quantity ,suggested by the change in direction, and the second quantity extend in parallel line and never intersect and the second quantity represent the size of the first quantity.The change in direction infers that the infinitely great is an infinite quantities of infinite dimensions , The relationship bewteen the first quantity and the second quantitiy as shown on Figure 1, is also suitable for parallel extension of two infinite quantities of infinite dimensions .Thus, the change in direction indicates that the relationship between finity and infinity is the relationship between one-dimensional finity and infinite dimensional infinity .Since the change in direction indicates that finite quantities are not parts of infinite quantities,so 2m long segment can only exist as an infinite quantity.

It is concluded from Figure 1 that the second is nonexistence essentially and the first quantity exist as one quantitative way that suggests that there is only one quantity in universe. The essence of continuum is one quantity that cannot be extended to more greater parts or divided into smaller parts . Therefore, the accumulation of infinitely many of finite quantities (the infinitely great) is manifested by this one quantitative continuum.that cannot be carried out by the algorithms of the operations of multiplication, division,addition, and subtraction due to its uniqueness.

Since the infinitely great indicated by the change in direction suggests the concept of the accumulation of infinitely many of finite quantities ,it can be inferred that the infinitely great is the open quantity that can't be talked about anything outside of it and it can compress any quantities outside of it to nothing. It is aslo the quantity that cannot be reached by extending finite quantities forever and you can only reach it through a jump expressed by the change in direction.

4. Determine the square root of 2

Now the exact value of the square root of 2 is calculated based on the above concept.

1 When 2m long segment line is considered as the infinite quantity,The finite division of 2 square root of 2m long segment can be expressed as the continuous extending of 1.414213562373……. , which is continuous division and only stay on finite divided value, will go on forever but can never reach its infinite divided value . It can be seen that when the line segment with a length of 2 meters is finitely divided, the decimal point is meanings and can be expressed as the accumulation of finitely many quantities .

2 In order to obtain an infinite divided value, it must be through a jumping from finity to infinity and the essence of this jump is the change in direction that can represent infinity that is the quantity that can never be reached by the extension of finite quantities going on continuously forever and representing the accumulation of infinitely many of finite quantities, As a result, when this 2m long segment line is regarded as the accumulation of infinitely many of finite quantities(the infinite quantities), The significance of the 2m long line segment with a limited size has been lost and it has become the infinitely great that is considered as the accumulation of infinitely many of finite quantities in which the decimal point has has not meanings and the final destination of any infinite acyclic decimals and the fractions on infinity have become the unique infinite integer quantity indicated as the infinitely great.

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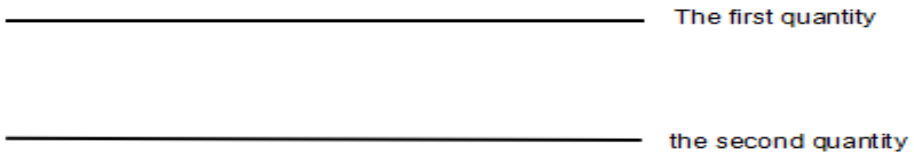

Figure 1. The change of direction indicates that the relationship between the first quantity (representing the infinitely great) and the second quantity can only be given in the form of Figure 1. .It can be seen from figure 1 that the second quantity and the first quantity extend in parallel line and never intersect and the second quantity represent the size of the first quantity.

3 The final result of the change in direction can be seen on Figure 1 where the second quantity and the first quantity extend in parallel line and never intersect and the second quantity represent the size of the first quantity. the first quantity indicates the infinitely great and it is the exact value (final result value) of the square root of 2. Difference of numerical value size distribution between finite quantity and infinite quantity can be illustrated on Figure 2.

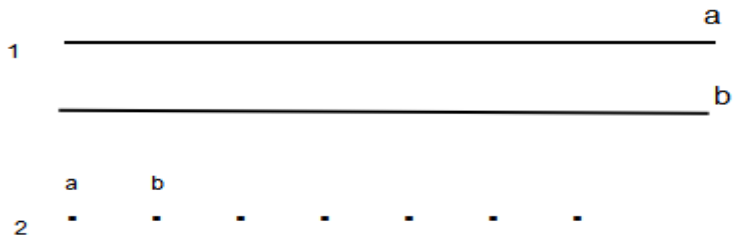

Figure 2. The difference of numerical value size distribution between finite quantity and infinite quantity. 1. On infinity, the relations bewteen the first quantity (a) and the second quantity (b) that is near the the first quantity is that the second quantity and the first quantity extend in parallel line and never intersect and the second quantity represent the size of the first quantity. 2. On finity,the relations bewteen the first quantity (a) and the second quantity (b) that is near the the first quantity is that the second quantity is beside the first quantity and there are gradually increasings tendency. Therefore, such form can be expressed as a continuous (or sequential) extended finite value, such as 1.414213562373……. . .

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4 It is no doubt that the final result of the first quantity in Figure 1 is an quantity that can't be talked about anything outside of it and can compress any quantities outside of it to nothing.Therefore,the exact value of the square root of 2 is also the quantity that can't be talked about anything outside of it and can compress any quantities outside of it to nothing.

5 Since this infinitely division is a jump indicated by the change in direction.,thus the change in direction shows that the infinitely great is one quantitative continuum that cannot be operated by any algorithms like operations of multiplication, division, addition, and subtraction,and all parts of space that we have obverved is this one quantitative continuum. As a result ,any fractions and infinite acyclic decimals only have meanings in a finite range , and their final destination within infinity is unique infinite integer quantity that is defined according to Figure 1.Since the uniqueness of this infinite integer quantity value, It can be seen that there is no difference between rational numbers and irrational numbers, between odd numbers and even numbers, and between prime numbers and composite numbers[3][4]. These differences are only meaningful between finite quantities.

6 It can be seen from this conclusion that when a two meter long line segment is infinitely divided, the meaning of a comparable two meter long line has been lost and it becomes the first quantity that is one quantitative continuum in which any algorithms like multiplication, division,addition, and subtraction , can not be operated. Thus the length of 2 meters is not composed of innumerable infinitesimal [5], and it is one quantitative continuum and is not partitioned from this one quantitative continuum.

7 In a sense, the 2m line segment does not really exist. When it is defined as a one quantitative continuum, we will endow it a special meaning like above II, that is, it is an givern system and quantities inside this given system include all quantities outside the given system and arbitrarily devided values outside the given system can be discovered all inside the given system.

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References

1 Qing Li, A Geometry Consisting of Singularities Containing Only Integers. *Computer and Information Science*, 2022, 15(2):38-422.

2 Qing Li, A continuum space is the infinitely great. *Advances in Mathematics: Scientific Journal* 2022 ,11 (3):157–172 .

3 Hee Oh , Dale Winter , Prime number theorems and holonomies for hyperbolic rational maps .*Inventiones mathematicae.* 2017,208: 401–440 .

4 Lillian B. Pierce, Caroline L. Turnage-Butterbaugh , Melanie Matchett Wood, An effective Chebotarev density theorem for families of number fields, with an application to $\ell\ell$-torsion in class groups. *Inventiones mathematicae* .2020, 219:701–778.

5 Richard H. Bamler, Bruce Kleiner, Uniqueness and stability of Ricci flow through singularities . *Acta Mathematica.* 2022,227:1-225.