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Imaginary Numbers: An Absurd Starting Point or a Mathematical Necessity?

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ABSTRACT

Since the 19th century, complex analysis, including imaginary numbers, has become a major branch of mathematics. However, can a single algebraic operation not only reveal the infallibility of imaginary numbers (complex number theory) but also destroy it? This paper aims to challenge the mathematical basis of imaginary numbers and look at their historical development from a new perspective. In this article, we demonstrate the possibility of the non-existence of imaginary numbers based on examining imaginary numbers byusing the exponential function.

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Since the 19th century, complex analysis, including imaginary numbers, has become a major branch of mathematics. However, can a single algebraic operation not only reveal the infallibility of imaginary numbers (complex number theory) but also destroy it? This paper aims to challenge the mathematical basis of imaginary numbers and look at their historical development from a new perspective. In this article, we demonstrate the possibility of the non-existence of imaginary numbers based on examining imaginary numbers byusing the exponential function.

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I. INTRODUCTION

If a negative number multiplied by itself equals a positive number, then it's hard to understand the square root of a negative number. [1]

I read somewhere but cannot find the source: "When we teach complex numbers, we usually start with an absurd assumption. We define i to be the square root of -1. Then, we construct an elegant theory. But since we start with an absurd assumption, many people have lingering doubts. We don't have to start from an absurd point." What is this starting point of date for imaginary and complex numbers?

The imaginary numbers may be that existence is hidden in little things we don't understand.

Negative numbers were not commonly accepted among mathematicians until the late 18th century. Think about it! The Egyptians could build the pyramids, the Romans could build and maintain their huge empire. Even Newton (and Kepler and others) could work out the laws of physics and predict planetary motions, WITHOUT the concept of negative numbers. [2].

Understanding the primordial date of the beginning of an imaginary number is also an important aspect of history. Accounting back from Heron of Alexandria [3], it is 1963 years, Bhaskara Acharya [4][5] 1549 years, Girolamo Cardano [6][7] 490 years, and René Descartes [8] 398 years passed. Since that early time, the imaginary number has been studied without interruption.

In mathematics, a complex number is an element of a number system that extends the real numbers with a specific element denoted i, called the imaginary unit, and satisfies the equation $i^2 = -1$; every complex number can be expressed in the form

$$a + bi \qquad [8][9] \qquad (1)$$

Where a and b are real numbers.

Because no real number satisfies the above equation, i was called an imaginary number by René Descartes.

We used the exponential functions for naked 1 to analyze the nature of imaginary numbers.

II. THE IMAGINATION OF THE IMAGINARY NUMBER

The adjective imaginary was first used (as French imaginaire) by René Descartes in 1673, La Geometrie, referring to imaginary numbers in the broad sense, as non-real roots of polynomials. [8]

Euler only used the imaginary number but did not explain it. The word imaginary means that the real numbers may be slightly true in content. However, any imaginary number under the root is always different from real numbers and cannot be mixed with any other number or vanish (Identity (2) and Identity (3)).

$$\sqrt{-a} = \sqrt{a\cdot(-1)} = \sqrt{a}\cdot\sqrt{-1} \tag{2}$$

$$a + ib = a + \sqrt{-1}\cdot b \tag{3}$$

2.1 The Imagination of The Imaginary Number

Expression √-1 does not exist in nature. And there is no imaginary number that has nature's innermost secrets. Human abstractions such as imaginary birds, imaginary flowers, and imaginary melodies can exist only in painting, poetry, and music.

The adjective imaginary was first used (as French imaginary) by René Descartes in 1673, La Geometrie, referring to imaginary numbers in the broad sense, as non-real roots of polynomials. [7][8][9]

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$$i = \sqrt{-1} \tag{4}$$

The most magic number in mathematics is the number ONE, which stands at the junction of the highest and lowest numbers on the number line.

Let's check the imaginary number using the following exponent equation (5) and the magic number 1.

$$a^{-x} = \frac{1}{a^{x}} \qquad [10] \tag{5}$$

And, if $a = 1;\ x = 1$ the intriguing problem comes in. In this case, we see the next naked identity (6):

$$1^{-1} = \frac{1}{1^{1}} = \frac{1}{1} = 1^{1} \tag{6}$$

And for 1, the next identities (7-8) are correct:

$$1^{-1} = 1^{1} \tag{7}$$

$$-1 = 1 \tag{8}$$

It is only valid when 1 is it. An imaginary number is inherently associated with the number 1.

Hence,

$$i = \sqrt{-1} = \sqrt{1} = 1 \tag{9}$$

This sounds like an incorrect solution but it is that at the end. What's true, it's true.

The very existence of imaginary numbers proves that humans create their problems! To err is human.

Great mathematician failing to come to a solution. [11].

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So, I don't doubt that Identity (9) is correct. $\sqrt{-1}$ under the square root is a work of mathematicians in the dawn of mathematics. This was just such a thought experiment. From this viewpoint, simple imaginary numbers were combined with real numbers and moved into complex analysis.

In this case, Euler's Formula [12-16] is incorrect:

$$e^{x} \neq cosx + sinx$$

Either way, there is no imaginary number anywhere.

Thus, it is history that the number 1 has been able to give birth to an imaginary and complex number even for a while.

We need to know when and how to use Identities (5-9), or we get counterintuitive results for calculations of the negative number.

III. DISCUSSION

The first technique involves two functions with like bases. Recall that the one-to-one property of exponential functions tells us that, for any real numbers b, S, and T where $b > 0$, $b \neq 1$, $b^{S} = b^{T}$ if and only if $S = T$ [16][17].

In other words, when an exponential equation has the same base on each side, the exponents must be equal. This also applies when the exponents are algebraic expressions. Therefore, we can solve many exponential equations by using the rules of exponents to rewrite each side as a power with the same base. Then, we use that exponential functions are one-to-one to set the exponents equal and solve for the unknown [16][17].
My questions are

Why is it possible when b\neq1 in the case of exponential functions? Why is it not possible when $b = 1$?

1 is a real number. Why is it denied for 1?
According to one-to-one property

$$n^{S} = n^{T}, S = T$$

....

$$2^{S} = 2^{T}, S = T$$

$$1^{S} = 1^{T}, S = T$$

2. Is there a mathematical necessity to hide the imaginary number using 1?

IV. CONCLUSION

$1^{-1} = \frac{1}{1^{1}} = \frac{1}{1} = 1 = 1^{1}$, hence, $1^{-1} = 1^{1}$, then $\sqrt{-1} = 1$. So, we conclude that there is neither an imaginary nor a complex number.

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