

# Axiomatic proof of the properties of the complex plane through constants

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## Abstract

Generalisation of the fundamentality of mathematical constants, and their application on the complex Cartesian coordinate system, as an analytical framework- to ascertain their relation, and that, which they retain with respect to the mechanisms of a circle.

## **Introduction**

The dimensionality of space given time, does not depend on the techniques deployed to analyse it. But has its generality on the context that it is universal, and a simple subject of the complex plane. Euler's identity, and the golden ratio: tends to factor well into the equation of pi that they are its approximate value at a certain interval. To understand this behaviour, is to have thorough apprehension of the entire existence of the coordinate system. Once space is defined as a set of coordinates. Then, the spatiality of each dimension is defined appropriately, by its relation to other dimensions. Therefore space is not just the imagination of the brain. But the force that is the fundamental nature of the universe.

If  $z = x + iy$ , and  $\pi = \frac{\log_e i^2}{i}$ , then  $i = \frac{z-x}{y}$ . Such that  $\pi = \frac{\log_e i^2}{\frac{z-x}{y}}$

$$\pi = \frac{y \log_e i^2}{z-x}$$

$$\frac{\pi(z-x)}{y} = \frac{y \log_e i^2}{y}$$

$$\frac{\pi(z-x)}{y} = \log_e i^2$$

$$\therefore \pi = \frac{y \log_e i^2}{z-x}$$

Since  $\log_e i^2 = i\pi$ , then  $\pi = \frac{y(i\pi)}{z-x}$

$$\therefore \pi = \frac{i\pi y}{z-x}$$

For  $i = \frac{z-x}{y}$  and  $e^{\frac{i\pi}{2}} = i$ , then it follows arguably, that the unit circle has a diameter of a closed interval not greater than two. Hence,  $e^{\frac{i\pi}{2}} = \frac{z-x}{y}$

$$\log_e \frac{z-x}{y} = \frac{i\pi}{2}$$

$$2 \log_e \frac{z-x}{y} = i\pi$$

$$\therefore 2 = \frac{i\pi}{\log_e \frac{z-x}{y}}$$

And given that  $\varphi = \frac{1+\sqrt{5}}{2}$ , then  $2 = \frac{1+\sqrt{5}}{\varphi}$ ; such that:  $\frac{1+\sqrt{5}}{\varphi} = \frac{i\pi}{\log_e \frac{z-x}{y}}$

$$(1 + \sqrt{5}) \log_e \frac{z-x}{y} = \varphi i\pi$$

$$\log_e \frac{z-x}{y} = \frac{\varphi i\pi}{1+\sqrt{5}}$$

$$\frac{i\pi}{2} = \frac{\varphi i\pi}{1+\sqrt{5}}$$

$$2\varphi i\pi = \pi i(1 + \sqrt{5})$$

$$\frac{i\pi(1+\sqrt{5})}{2\varphi\pi} = \frac{2\varphi i\pi}{2\varphi\pi}$$

$$\frac{i(1+\sqrt{5})}{2\varphi} = i$$

$$i(1 + \sqrt{5}) = 2i\varphi$$

$$1 + \sqrt{5} = \frac{2i\varphi}{i}$$

$$1 + \sqrt{5} = 2\varphi$$

$$\therefore 1 = 2\varphi - \sqrt{5}$$

If there exist no any other number than  $\pi$  that defines a circle so well; then such a constant must prove to be more fundamental than it is known. Or if functions relate: it is not only as one-to-one functions that they are proven to exist. If such functions can be approximated to any fundamental constant known. That validates their existence, and mostly, justifies the complexity of their nature in space.

Thus, it cannot be other than true that the following holds:  $\frac{i}{i} = \frac{\frac{z-x}{y}}{i}$

$$\mathbf{1} = \frac{z-x}{y} \left(\frac{1}{i}\right)$$

$$\therefore \mathbf{1} = \frac{z-x}{iy}$$

So that it also holds as follows:  $\mathbf{1} = 2\varphi - \sqrt{5}$

$$\mathbf{1} - 2\varphi = -\sqrt{5}$$

$$\mathbf{1} - 2\varphi = (-1)(\sqrt{5})$$

$$\frac{1-2\varphi}{\sqrt{5}} = \frac{(-1)(\sqrt{5})}{\sqrt{5}}$$

$$\therefore \frac{1-2\varphi}{\sqrt{5}} = i^2$$

And then  $\frac{1-2\varphi}{\sqrt{5}} = e^{i\pi}$

$$\mathbf{1} - 2\varphi = e^{i\pi}(\sqrt{5})$$

$$\therefore \mathbf{1} = e^{i\pi}(\sqrt{5}) + 2\varphi$$

Which suggests the following as the approximate value of Euler's identity: given its relation

to  $\varphi \dots e = \frac{i\pi\sqrt{1-2\varphi}}{\sqrt{5}}$ . Such that since  $\frac{1+\sqrt{5}}{\varphi} = 2$ ; then  $\frac{1+\sqrt{5}}{\varphi} = i\pi \log_i e$

$$\frac{\frac{1+\sqrt{5}}{\varphi}}{i\pi} = \frac{i\pi \log_i e}{i\pi}$$

$$\log_i e = \frac{1+\sqrt{5}}{\varphi i\pi}$$

$$\frac{\varphi i\pi \log_i e}{\log_i e} = \frac{1+\sqrt{5}}{\log_i e}$$

$$\varphi i\pi = \frac{1+\sqrt{5}}{\log_i e}$$

$$i\pi = \frac{1+\sqrt{5}}{\varphi \log_i e}$$

$$\pi = \frac{\frac{1+\sqrt{5}}{\varphi \log_i e}}{i}$$

$$\therefore \pi = \frac{1+\sqrt{5}}{\varphi i \log_i e}$$

And thus;  $\varphi = \frac{1+\sqrt{5}}{i\pi \log_i e}$  and  $\varphi i\pi \log_i e - \sqrt{5} = 1$ . Clearly,  $\left(\frac{z-x}{y}\right)^2 = -1$

$$\frac{z-x}{y} = \sqrt{-1}$$

$$\therefore \sqrt{\frac{i\pi}{2} \frac{z-x}{y}} = e$$

While the above holds: it is also true that the following exists, since it is a cyclical function:

$$\left(\frac{z-x}{y}\right)^3 = -\sqrt{-1} = -i$$

And it can be deduced from which already holds that  $\varphi i\pi \log_i e - \sqrt{5} = \frac{z-x}{iy}$

$$iy(\varphi i\pi \log_i e) - \sqrt{5} = z - x$$

$$iy(\varphi i\pi \log_i e) - \sqrt{5} + x = z$$

$$iy(1) + x = z$$

$$\therefore z = x + iy$$

And from  $x^2 + y^2 = 1$  and its extension on the plane; gives rise to the multidimensionality of space as relative to how the mechanisms of coordinates affects each other on the Cartesian coordinate system. Anything through it, should hold- even everything which cannot be stated otherwise, or said- proven not to exist. Hence, what follows applies:

$$iy(x^2 + y^2) + x = z$$

$$ix^2y + y^3 + x = z$$

$$\frac{ix^2y}{iy} = \frac{z-x-y^3}{iy}$$

$$x^2 = \frac{z-x-y^3}{iy}$$

$$x = \sqrt{\frac{z-x-y^3}{iy}}$$

$$\therefore x = \sqrt{1 + iy^2}$$

So that given  $x = -\sqrt{\frac{z-x-y^3}{iy}}$  holds; then inversely,  $x = -\sqrt{1 + iy^2}$  is true and thus exists.

$$\text{Or } iy(x^2 + y^2) = z - x$$

$$\frac{iy(x^2 + y^2)}{iy} = \frac{z-x}{iy}$$

$$x^2 + y^2 = \frac{z-x}{iy}$$

$$y^2 = \frac{z-x}{iy} - x^2$$

$$y = \sqrt{\frac{z-x}{iy} - x^2}$$

$$\therefore y = \sqrt{1 - x^2}$$

If  $y = -\sqrt{\frac{z-x}{iy} - x^2}$  exists, therefore  $y = -\sqrt{1 - x^2}$  cannot be false. Since it holds as an inverse.

$$\text{So that it is true that } \sqrt{\frac{1-2\varphi}{\sqrt{5}}} = \sqrt{\frac{\frac{i\pi}{2} \sqrt{\frac{z-x}{y}}}{y}}$$

$$\frac{1-2\varphi}{\sqrt{5}} = \left( \sqrt{\frac{\frac{i\pi}{2} \sqrt{\frac{z-x}{y}}}{y}} \right)^{i\pi}$$

$$i^2 = i^2$$

$$i^2 - i^2 = 0$$

$$-1 + 1 = 0$$

$$\therefore 0 = 0$$

Which then translates as follows:  $x^2 = \frac{z-x-y^3}{iy}$

$$x^2 iy = z - x - y^3$$

$$y^3 = iyx^2 + x - z$$

$$y^3 = x(ixy + 1) - z$$

$$y^3 = ix^2y - iy$$

$$\therefore y^3 = iy(x^2 - 1)$$

## Conclusion

While generalisation on the spatial concept of time means that space is simply complex. It is easier to see the world in singular form, rather than through a unified concept. Hence, mostly, it is easier for relative phenomena to be conceptualised as separate quantities, such as zero or one. However, the world of space is not limited to any quantities. A self-sufficient object would encompass anything, or have the capacity of being everything. And the only limit to it would be its validity, and truth. When it can be false- such that it is because of misapplication; and not because it is not covariant. Then that is as fundamental, as any constant, in the mathematics of the universe. For it is known now, that black holes in mathematics are mathematical constants that connects dimensions. And any self-sufficient system can be able to regenerate itself in the process.

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