STRANGE ENOUGH $f(x)= i^{xi}$

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Absract

In this paper I consider the strange real function $f(x)= i^{xi}$, $i=Sqrt[-1]$ *and* x *is real* .

It is hard to find its application. But it is an example the subtle connection of the real and imaginary universe

INTRODUCTORY

I start with the remark that the mathematicians of the nineteenth century often found it hard to accept $\sqrt{-1}$. In some cases, I must tell you, some physicists of the twentieth century had an even harder time. In a revealing article criticizing Einstein's and Minkowski's T a National Bureau of Standards physicist admitted that

$\sqrt{-1}$ has a legitimate application in pure mathematics, where it forms a part of various ingenious devices for handling otherwise intractable situations. It has also a limited value in mathematical physics, as in the theory of fluid motion, but here also only as an essential cog in a mathematical device. In these legitimate cases, having done its work it retires gracefully from the scene.

But then this physicist demonstrated his real view of $\sqrt{-1}$ as having essentially no physical significance when he concluded his essay with the following sarcastic words:

The criterion for distinguishing sense from nonsense has been lost; our minds are ready to tolerate anything, if it comes from a man of repute and is accompanied by an array of symbols in Clarendon type.

And yet we must not be too hard on $\sqrt{-1}$; it may stand us in good stead on occasion, as is instanced by a tradition of the National Bureau of Standards.

In the early days of the Bureau, when the staff was smaller, and there were no official guides, the staff-members took turns in conducting parties of visitors through the laboratories. On one such occasion the visitors were shown some liquid air, and they asked, "What is this used for?" In those days liquid air had not yet found any practical application, and was merely a scientific curiosity. The guide . . . was rather non-plussed for the moment, but quickly

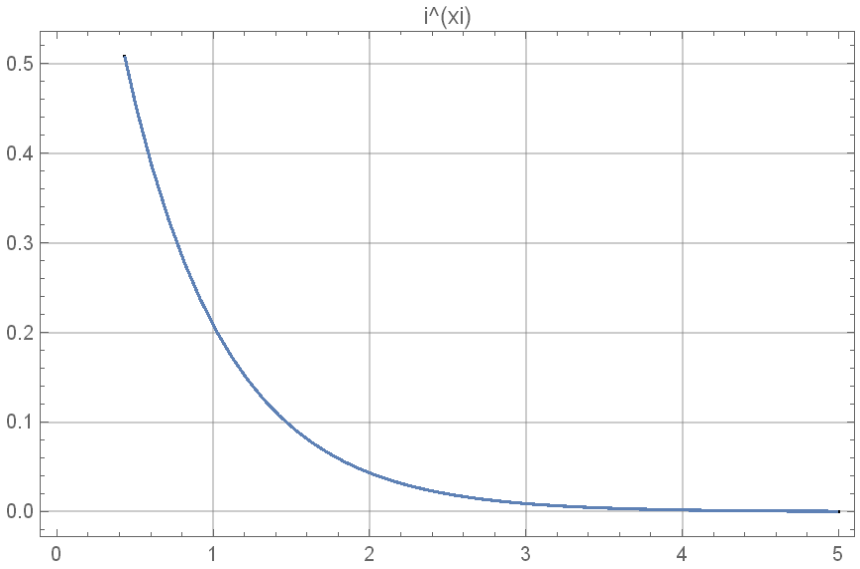
recovered her presence of mind, and replied, “It is used to lubricate the square root of minus one.

This odd anecdote completely misses the point, as $\sqrt{-1}$ has no less physical significance than do 0.107, 2, , or any other individual number (about which physicists do not usually write sarcastic essays). Some numbers, of course, do have obvious physical ties; for example, Pi, which is the ratio of the circumference of a circle to its diameter. Perhaps $\sqrt{-1}$ has at least as much physical significance as Pi, in fact, when one recalls the rotational property of $\sqrt{-1}$

Let us consider the function (as in title)

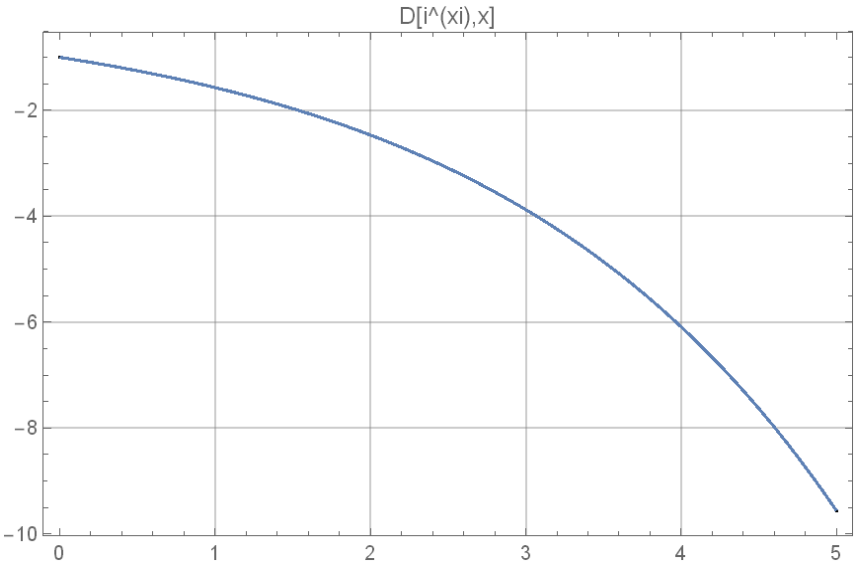
$$f(x)= i^{xi}$$

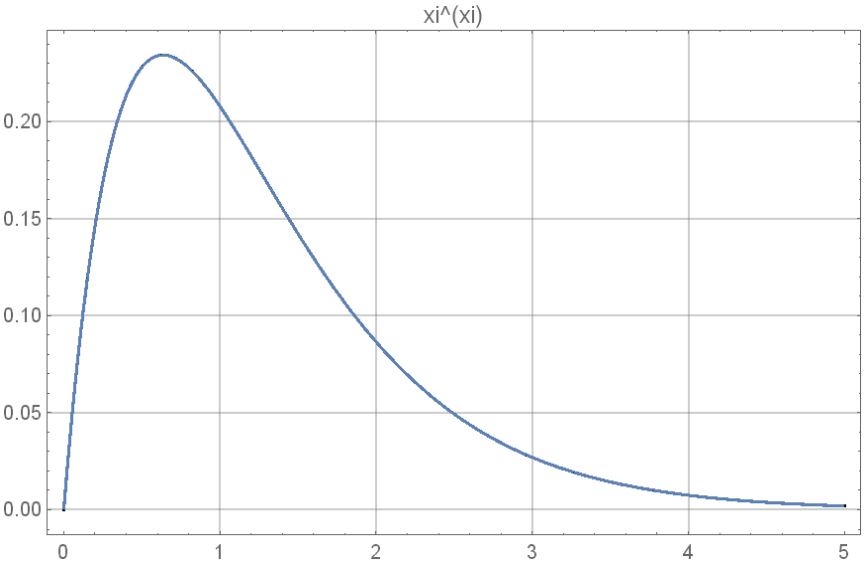
At firs side it looks as imaginary, but is not. In fig.1 it is the draw of it. Let us calculate the derivative



$$\frac{df(x)}{dx} = -1.57079632679489660.20787957635076193^{x}$$

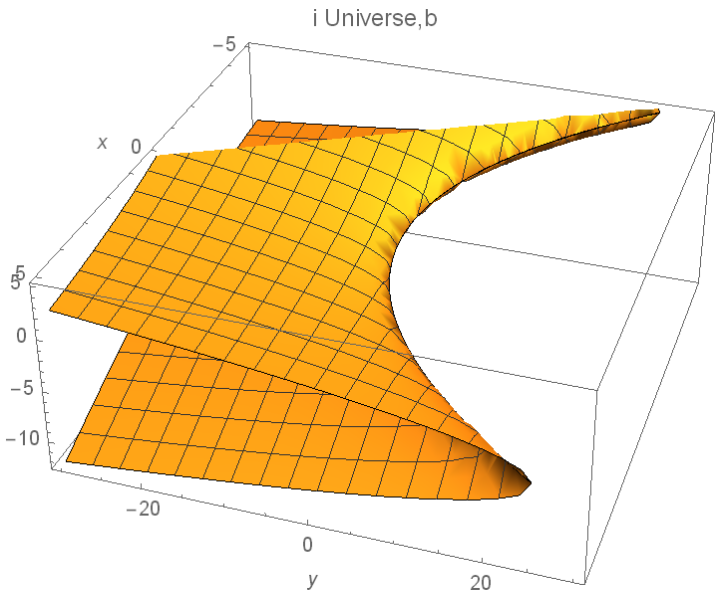
Derivative as it must be is real .And negative, fig.2





Plot function f(x)=x i^(ix)

In our earlier paper we discussed the division of the Meta-Universe to Real and Compex Universes



In tjis figure we presen both. Orange is Real and white is Imaginary. Function we discussed in our paper is the bridge between both