Math Diversion 1072

P. Reany

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> Not only is the Universe stranger than we think,
> it is stranger than we can think.
> — Werner Heisenberg

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Source: The Ether of Great Mathematical Ideas
Title: Is phi = e^e transcendental?
 Presenter: Patrick
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1 Problem

Is $\phi = e^e$ transcendental?

2 Solution (not really)

I don't know, but I know of an alternative way to express ϕ. First, multiply through by e:

$$e\phi = e\,e^e \tag{1}$$

On taking the Lambert W function (principal value) across this, we get

$$W(e\phi) = e\,. \tag{2}$$

From this we get

$$e\phi = W^{-1}(e)\,. \tag{3}$$

And finally, we have that

$$\phi = \frac{W^{-1}(e)}{e}\,. \tag{4}$$

I don't know if this reformulation helps to answer the question, but it's certainly a different way to think about ϕ. At the very least, it's practice using the Lambert W function.