Math Diversion Problem 630

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> Mistakes are invaluable; you can learn from them!
> — Anonymous

The YouTube video is found at:

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Source: https://www.youtube.com/watch?v=HIt7rSNpSCM
Title: Can you solve this? | iota maths problem
 Presenter: Math Beast
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1 Problem

Given the relation

$$\phi = i^{1/i}\,, \tag{1}$$

find the real values of ϕ.

2 Solution

We begin by simplifying (1):

$$\phi = i^{-i} = e^{\frac{1}{2}i\pi(-i)} = e^{\pi/2}\,. \tag{2}$$

If you want to make it more complicated, instead of replacing i by $e^{\frac{1}{2}i\pi}$, you can replace it by

$$i \longrightarrow e^{i\pi/2+2\pi in} \qquad n \in \mathbb{Z}\,. \tag{3}$$