Math Diversion 711

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> When I give this talk to a physics audience, I
> remove the quotes from my 'Theorem'.
> — Brian Greene

The problem is found at:

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Source: https://www.youtube.com/shorts/xCnoPI4zxdM
Title: Most Difficult SAT Question
 Presenter: Brain Station Video (short)
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1 The Problem

Given the relation

$$\sqrt{x}^{\sqrt{x}^{\sqrt{x}^{\cdots}}} = \frac{1}{3}\,, \tag{1}$$

find the value for x.

A. $\frac{1}{3}$ B. $\frac{1}{81}$ C. $\frac{1}{27}$ D. $\frac{1}{729}$

2 The Solution

Since this problem is clearly just a matter of self-similarity, we can rewrite the Given as

$$\sqrt{x}^{1/3} = \frac{1}{3}\,. \tag{2}$$

Obviously, to extricate x from all that jazz, we need to raise both sides to the sixth power, to get

$$x = \left(\frac{1}{3}\right)^6 = \frac{1}{729}\,. \tag{3}$$

So, the answer is D.