Math Diversion Problem 234

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January 26, 2025

> First things first...But not necessarily in that order.
> — Doctor Who

The YouTube video is found at:

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Source: https://www.youtube.com/watch?v=dGLjIPkV9GY
Title: An Interesting Nonstandard Equation
 Presenter: Syber Math
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1 The Problem

Given the relation

$$256^x = \frac{1}{x}\,, \tag{1}$$

find the values of x over the real numbers.

I have already solved this problem earlier, but this time I have a new approach to it.

2 The Solution

First, I want to recast (1) to the form

$$x256^x = 1\,, \tag{2}$$

and note that

$$256 = 2^8\,. \tag{3}$$

On making this substitution, we get

$$x2^{8x} = 1\,. \tag{4}$$

Thus x and 2^{8x} are inverses of each other. Let's solve this with a table of values.

x	2^{8x}
$1/2$	$2^4 = 16$
$1/4$	$2^2 = 4$ ✓

Table 1: Heuristic: We try various x's as powers of 2.

Therefore

$$x = 1/4\,. \tag{5}$$