Math Diversion 1097

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May 25, 2026

> The Axiom of Choice is obviously true; the Well Ordering
> Principle is obviously false; and who can tell
> about Zorn's Lemma?
> — Jerry Bona

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Source: https://www.youtube.com/watch?v=fMm3I6ctXK0
Title: Japanese| A Mind Blowing & Brain Buster
     Olympiad Math Problem
 Presenter: Shorif Sir
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1 Problem

Given the relation

$$8^{x+1} + 8^{x-1} = 100\,, \tag{1}$$

solve for all real values of x.

2 Solution

Let's begin by rewriting the Given to

$$8 \cdot 8^x + 8^{-1} \cdot 8^x = 100\,, \tag{2}$$

which then becomes

$$(8 + 8^{-1})8^x = (65/8)8^x = 100\,. \tag{3}$$

Then we have

$$8^x = 800/65 = 160/13\,. \tag{4}$$

And lastly,

$$x = \frac{\log\,(160/13)}{\log 8}\,. \tag{5}$$