

# Math Diversion 1053

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If you're not in love with the Truth, you could be  
talked into believing almost anything.

— Author

Source: <https://www.youtube.com/watch?v=1JG0Z2in2IQ>

Title: Logarithmic Equation

Presenter: Maths Simplified Solutions

## 1 Problem

Given the relation

$$16^{\log_4 x} = x^x, \quad (1)$$

find the real values of  $x$ .

## 2 Solution

We begin by taking the logarithm base 4, noting that  $16 = 4^2$ :

$$(\log_4 x)(\log_4 4^2) = x \log_4 x, \quad (2)$$

which simplifies to

$$2(\log_4 x) = x \log_4 x, \quad (3)$$

which further simplifies to

$$(x - 2) \log_4 x = 0. \quad (4)$$

When  $\log_4 x = 0$ , then  $x = 1$ , otherwise we get  $x = 2$ . Hence, we have the solutions

$$x = 1, 2. \quad (5)$$