

# Math Diversion Problem 300

P. Reany

January 26, 2025

You have to know what to look for, so you can spot it.  
— Papago Indian drug-enforcement  
border scout

The YouTube video is found at:

Source: <https://www.youtube.com/watch?v=Jelc62QcZMs>  
Title: Entrance Exam Tricks from Stanford Universty Interview  
Presenter: Super Academy

## 1 The Problem

Given the relation

$$x^{\log_5 x} = 625, \quad (1)$$

find the values of  $x$ .

## 2 The Preparation

Fundamental Rule II of Logarithmic Inverses:

$$\log_a a^x = x. \quad (2)$$

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## 3 The Solution

First, we should note that  $625 = 5^4$ . On using this fact and taking the logarithm of the Given relation, we get

$$(\log_5 x)^2 = \log_5 5^4 = 4, \quad (3)$$

so that

$$\log_5 x = \pm 2. \quad (4)$$

Then

$$x = 5^{+2} = 25, \quad x = 5^{-2} = 1/25. \quad (5)$$