

# Math Diversion Problem 170

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Programming isn't about what you know;  
it's about what you can figure out.

— Chris Pine

The YouTube video is found at:

Source: ?

Title: ?

Presenter: ?

## 1 The Problem

Given the relation

$$x^7 + \frac{1}{x^7} = 6, \quad (1)$$

what is

$$\phi = x^{21} + \frac{1}{x^{21}} ? \quad (2)$$

## 2 The Solution

$$\left(x^7 + \frac{1}{x^7}\right)^2 = 36, \quad (3)$$

which becomes

$$x^{14} + \frac{1}{x^{14}} = 34. \quad (4)$$

Then

$$\left(x^7 + \frac{1}{x^7}\right) \left(x^{14} + \frac{1}{x^{14}}\right) = 34 \times 6 = 204. \quad (5)$$

After simplifying this, we get

$$\phi = x^{21} + \frac{1}{x^{21}} = 198. \quad (6)$$