Math Diversion 1027

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Every big idea needs someone to defend it.
— Cybersecurity

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Source: https://www.youtube.com/watch?v=OYtXgvKQGwY
Title: Cambridge Math Entrance Exam
 Presenter: Math Beast
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1 Problem

Given the relation

$$\frac{e^x - e^{-x}}{3} = 1\,, \tag{1}$$

solve for real values of x.

2 Solution

Because the Presenter solves the problem by forming a quadratic equation in e^x, I will do it differently.

Now, since

$$\sinh x = \frac{e^x - e^{-x}}{2}\,, \tag{2}$$

then on putting (1) and (3) together, we have that

$$\sinh x = \frac{3}{2}\,, \tag{3}$$

so that

$$x = \sinh^{-1}\frac{3}{2} \approx 1.19476\,, \tag{4}$$

which is a result I got from WolframAlpha. This is exactly what I get from WolframAlpha by using the algebraic method that the Presenter used.