

2025 USA-NA-AIO Round 1, Problem 1, Part 8

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Mar 2025

Part 8 (10 points, non-coding task)

Compute

$$\lim_{n \rightarrow \infty} \frac{F_n}{F_{n-1}}.$$

- Reasoning is required.
- Your answer shall be written in terms of one or two eigenvalues.

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Misplaced '#'

We notice that $|\lambda_0| > 1$ and $|\lambda_1| < 1$.

Hence,

$$\lim_{n \rightarrow \infty} \frac{F_n}{F_{n-1}} = \boxed{\lambda_0}.$$

"" END OF THIS PART ""



Skip to main content

tharang

22d

Is this related to the way the Fibonacci sequence's ratio between 2 terms goes to the golden ratio? I know that λ_0 is equal to phi, and that this is a version of the Fibonacci sequence, but are they related?

skyleriscool**22d**

Yes, it is related. The purpose of this question is to see if you can apply a limit to the eigenvalue equations that you solved from the previous questions. This one basically builds on from the last few questions by asking in the general case of Fibonacci numbers.

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