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

USAAIO Mar 2025

Problem 1 (100 points)

Let us consider the following sequence:

$$F_n = F_{n-1} + F_{n-2}, \ \forall \ n \geq 2.$$

Before starting this problem, make sure to run the following code first **without any change**:

```
# DO NOT CHANGE
import numpy as np
import matplotlib.pyplot as plt
""" END OF THIS PART """
```

WARNING !!!

- Beyond importing libraries/modules/classes/functions in the preceeding cell, you are **NOT allowed to import anything else for the following purposes**:
  - **As a part of your final solution.** For instance, if a problem asks you to build a model without using sklearn but you use it, then you will not earn points.
  - **Temporarily import something to assist you to get a solution.** For instance, if a problem asks you to manually compute eigenvalues but you temporarily use `np.linalg.eig` to get an answer and then delete your code, then you violate the rule.

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Rule of thumb: Each part has its particular purpose to intentionally test you something. Do not attempt to find a shortcut to circumvent the rule.

- All coding tasks shall run on CPUs, **not GPUs**.

Part 1 (10 points, non-coding task)

Let $F_0 = 3$, $F_1 = 1$.

Manually write down F_n for $n = 2, 3, 4, 5$.

- Reasoning is not required.

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Misplaced '#'

$$\boxed{F_2 = 4, F_3 = 5, F_4 = 9, F_5 = 14.}$$

""" END OF THIS PART """

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