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**WEEK 1**

**Data Structures and Algorithms**  
**Exercise 7: Financial Forecasting**

**Understanding Recursive Algorithms**

**Recursion** is a technique where a function calls itself to solve smaller instances of a problem.  
It simplifies problems like mathematical series, tree traversals, or forecasting where the next value depends on previous ones.

In financial forecasting, recursion helps predict future values using known historical data and a defined growth logic.

**Time Complexity Analysis**

|  |  |
| --- | --- |
| **Operation** | **Complexity** |
| Recursive Forecast | O(n) |

Where n is the number of future periods being forecasted.

* Each recursive call handles one period
* The stack grows linearly with the number of periods

**Optimization**

* For basic forecasting (like compound interest), recursion is fine
* But for large periods or more complex models, recursion can be optimized using:
  + Memoization (to avoid duplicate calculations)
  + Or using Iterative solutions (loops instead of recursion)

**Conclusion**

Recursive algorithms can be useful in financial forecasting when future values depend on previous results. However, for performance and readability in production systems, iterative or memoized versions may be preferred.