**Task - 7 : Financial Forecasting**

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**Q. Explain the concept of recursion and how it can simplify certain problems.**

Recursion is a programming technique where a function calls itself in order to solve a problem. Each call to the function is known as a recursive call, and the function is designed to handle both simple cases directly (base cases) and complex cases by breaking them down into simpler problems (recursive cases).

**Base Case**: The condition under which the function stops calling itself. This prevents infinite recursion and ensures the problem can be solved.

**Recursive Case**: The part of the function where the problem is divided into smaller instances of the same problem, and the function calls itself with these smaller instances.

Recursion can simplify the solution to certain problems by breaking them down into smaller, more manageable sub-problems that resemble the original problem. This approach is particularly useful for problems that have a natural hierarchical structure or can be divided into similar sub-problems.

**Q. i. Discuss the time complexity of your recursive algorithm.**

Time Complexity Analysis:

The time complexity of this recursive algorithm is O(n)O(n)O(n), where nnn is the number of periods. This is because the function makes a recursive call for each period, reducing the period count by one each time until it reaches zero.

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**ii. Explain how to optimize the recursive solution to avoid excessive computation.**

While the current algorithm is straightforward and works well for relatively small values of periods, it can be optimized to avoid excessive computation, especially for large values of periods. A common technique to optimize recursive solutions is **memoization**, which stores the results of expensive function calls and reuses the cached result when the same inputs occur again.

However, in this specific case of financial forecasting, memoization is not necessary because each period's value only depends on the immediate previous period. Instead, an iterative approach can be used to achieve the same result without the overhead of recursive calls.