**Exercise 7: Financial Forecasting**

**Scenario:**

You are developing a financial forecasting tool that predicts future values based on past data.

**Steps:**

1. **Understand Recursive Algorithms:**
   * **Explain the concept of recursion and how it can simplify certain problems**.

**Concept**

Recursion is a programming technique where a function calls itself to solve smaller instances of the same problem. It involves breaking down a problem into simpler sub-problems that are similar to the original problem.

**How It Simplifies Problems**:

Recursion can simplify complex problems by dividing them into smaller, more manageable problems. It is particularly useful for problems that can be defined in terms of simpler sub-problems, such as calculating factorials, traversing trees, or solving problems using divide-and-conquer strategies.

1. **Analysis:**
   * **Discuss the time complexity of your recursive algorithm.**

O(n), where n is the number of periods. Each recursive call represents a single period, resulting in a linear number of calls relative to the number of periods.

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

Memoization: Store the results of expensive function calls and reuse the cached results when the same inputs occur again. This avoids redundant calculations and reduces the time complexity from O(n) to O(1) for each sub-problem after the initial calculation.

* Example: If multiple future value calculations are required with the same parameters, storing intermediate results can avoid repeated calculations.