**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.**

**Recursion** is a method of solving problems where a function calls itself as a subroutine. This allows the function to be repeated several times as it can call itself during its execution. Recursion is useful for solving problems that can be broken down into smaller, identical sub-problems. It simplifies the code and makes it more readable, although it can be less efficient in terms of time and space complexity if not used carefully.

1. **Setup:**
   * **Create a method to calculate the future value using a recursive approach.**

We'll create a method to calculate the future value using a recursive approach. The method will take the current value, the growth rate, and the number of periods as inputs.

1. **Implementation:**
   * **Implement a recursive algorithm to predict future values based on past growth rates.**
2. **Analysis:**
   * **Discuss the time complexity of your recursive algorithm.**

**Time Complexity:**

The time complexity of this recursive algorithm is O(n), where n is the number of periods. This is because the algorithm makes a single recursive call for each period, resulting in a linear number of calls.

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

To optimize the recursive solution and avoid excessive computation, we can use **memoization**. Memoization involves storing the results of expensive function calls and returning the cached result when the same inputs occur again.