**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.

Solution:

Concept of Recursion:

* Recursion is a technique where a function calls itself to solve smaller instances of the same problem. It is particularly useful for problems that can be broken down into simpler, similar sub-problems.
* Base Case: The condition under which the recursion stops.
* Recursive Case: The condition where the function continues to call itself with a modified parameter.

1. **Setup:**
   * Create a method to calculate the future value using a recursive approach.
2. **Implementation:**
   * Implement a recursive algorithm to predict future values based on past growth rates.

Solution:

Setup and Implementation is in attached java file.

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

Solution:

Time Complexity:

* Recursive Method: The time complexity of the recursive approach is O(n), where n is the number of years. This is because the method performs one recursive call per year.
  + Explain how to optimize the recursive solution to avoid excessive computation.

Solution:

Optimization:

* Memoization: Store the results of previous calculations to avoid redundant computations. This is particularly useful if the recursion involves overlapping sub-problems.
* Iterative Approach: For this specific problem, an iterative approach can be more efficient. It avoids the overhead of recursive function calls and stack usage.