**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:**

**(i) Explain the concept of recursion and how it can simplify certain problems.**

**Answer:**

* Recursion is a programming technique where a function calls itself repeatedly until it reaches a base case that stops the recursion. This allows the function to break down complex problems into smaller, more manageable sub-problems of the same type, solving each one recursively until the solution to the original problem is found.
* By using recursion, developers can simplify certain problems by avoiding the need for explicit loops and conditional statements, making the code more concise and easier to understand. Recursion is particularly useful for solving problems that have a recursive structure, such as tree traversals, factorial calculations, and dynamic programming problems, where the solution to a problem depends on the solution to smaller instances of the same problem.

**4. Analysis:**

**(i) Discuss the time complexity of your recursive algorithm.**

**Answer:**

The time complexity of the recursive algorithm is O(n), where n is the number of periods to forecast. This is because the method calls itself recursively n times, with each call performing a constant amount of work.

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

**Answer:**

To optimize the recursive solution and avoid excessive computation, we can use memoization or dynamic programming to store and reuse previously computed values. This can reduce the time complexity to O(1) for repeated calls with the same input parameters.