**Exercise 7: Financial Forecasting**

**1. Understanding Recursive Algorithms**

Recursion is a technique in which a function calls itself to solve smaller instances of the same problem. It simplifies problems that have a repetitive structure or follow a divide-and-conquer pattern. In financial forecasting, recursion can be used to project future values based on trends observed in past data.

For example, by using the revenue from the last two months, we can calculate a growth rate and apply that recursively to estimate future values.

**2. Setup**

A method is created to forecast future revenue using recursion. It takes two inputs:

* An array of past monthly revenue.
* The number of future months to predict.

Each time the method is called, it:

1. Calculates the most recent growth rate.
2. Applies the growth to get the next value.
3. Recursively continues the process until all months are predicted.

**3. Implementation**

The algorithm calculates the revenue forecast recursively based on recent growth trends. It copies the revenue array and appends the newly forecasted value at each step. This way, the future forecast builds upon previously calculated predictions.

For example, if the last two months had ₹10,000 and ₹12,000 in revenue, the growth is +20%. The next month is predicted as ₹14,400 (i.e., ₹12,000 + 20%). The process repeats using the new forecasted data.

**4. Analysis**

**Time Complexity**:

* The recursive algorithm runs in **O(m)** where *m* is the number of future months to predict.
* Each recursive call processes and extends the revenue array by one, which may take time depending on the array size.

**Optimization**:

* Use **memoization** or **iteration** to reduce repeated array copying.
* For performance, the algorithm can be converted to an iterative version to handle large inputs efficiently.