What is the Fibonacci series?
The Fibonacci series is a sequence of numbers where each number is the sum of the two preceding ones, typically starting with 0 and 1.

How can you calculate Fibonacci numbers using a non-recursive approach?
In a non-recursive approach, an iterative loop can be used to calculate Fibonacci numbers by storing the sum of the last two numbers repeatedly until reaching the desired term.

What is the recursive formula for Fibonacci numbers?
The recursive formula is: **F(n)=F(n−1)+F(n−2)** with seed values **F(0)=0** and **F(1)=1.**

What is time complexity?
Time complexity refers to the computational time required by an algorithm to complete as a function of the input size.

What is space complexity?
Space complexity is the amount of memory required by an algorithm to run as a function of the input size.

What is the time complexity of the iterative Fibonacci calculation?
The time complexity for the iterative Fibonacci calculation is O(n), as it only requires a single loop.

What is the space complexity of the iterative Fibonacci calculation?
The space complexity is O(1), as it only stores a few variables regardless of the input size.

How does the recursive Fibonacci algorithm differ in time complexity?
The recursive Fibonacci algorithm has a time complexity of **O(2^n)**, making it exponential due to repeated calculations of the same terms.

What is memoization?
Memoization is a technique used in dynamic programming to store the results of expensive function calls to avoid redundant calculations.

How can memoization be applied to the recursive Fibonacci function?
Memoization can store previously computed Fibonacci values, reducing the exponential time complexity to linear O(n).

Explain the matrix exponentiation method for Fibonacci numbers.
Matrix exponentiation involves raising a specific matrix to the power of n−1 to get the n-th Fibonacci number, optimizing the process to O(logn).

What is the space complexity of the recursive Fibonacci function?
The recursive Fibonacci function has a space complexity of O(n) due to the recursion stack.

What are some real-world applications of the Fibonacci series?
The Fibonacci series appears in nature, music, architecture, stock market analysis (Fibonacci retracement), and computer algorithms.

Describe the golden ratio and its relation to Fibonacci numbers.
The golden ratio, approximately 1.618, is the limit of the ratio of consecutive Fibonacci numbers as n approaches infinity.

How can dynamic programming optimize Fibonacci calculations?
Dynamic programming uses an array to store calculated Fibonacci numbers up to n, making it faster and reducing time complexity to O(n).

What is the space-optimized method for calculating Fibonacci numbers?
The space-optimized method only stores the previous two Fibonacci values, reducing space complexity to O(1).

What is the Fibonacci search technique?
Fibonacci search is an algorithm that uses Fibonacci numbers to divide an array, ideal for sorted arrays.

What happens if you calculate a very large Fibonacci number using recursion without optimization?
Calculating large Fibonacci numbers recursively without optimization results in high time complexity and may cause a stack overflow.

What is the difference in output between recursive and iterative Fibonacci calculations?
Both methods yield the same result, but iterative methods do so more efficiently and without recursion overhead.

Why is the Fibonacci series relevant in computer science?
The Fibonacci series is widely used in algorithm design, mathematical studies, and modeling processes that exhibit growth patterns similar to Fibonacci.