

SPPU-BE-COMP-CONTENT - KSKA Git

DAA

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ASSIGNMENT-I

Q1

Fibonacci series is a sequence of numbers in which each number is the sum of two preceding ones starting from 0 & 1.

That is

0, 1, 1, 2, 3, 5, 8, 13, 21,

Mathematically it is defined as:

$$F_n = F_{n-1} + F_{n-2}$$

With Base conditions:

$$F_0 = 0 \quad F_1 = 1$$

widely used in mathematics, computer science, & nature based patterns (glowers, petals, spiral shells).

Q2

Recursion:

programming technique where a function calls itself directly or indirectly to solve a smaller instance of the same problem.

Each recursive call works on a reduced subproblem until it reaches a base case which stops further recursion.

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```
int fib(int n)
{
    if (n == 0) return 0;
    else if (n == 1) return 1;
    else return fib(n-1) + fib(n-2);
}
```

Q3

Recursive Approach:

- Time Complexity

Exponential $\rightarrow O(2^n)$

Because each call generates 2 more calls leading to repeated computations.

- Space Complexity

$O(n)$ due to function call stack (max depth = n)

Non-recursive

- Time Complexity:

Linear $\rightarrow O(n)$

- Space Complexity

constant $\rightarrow O(1)$