Time Complexity

- measures how much time an algorithm takes as input size increases.
- It helps predict performance before running the code.
- Common time complexities: O(1), O(n), $O(n^2)$, O(log n)

Why Do We Need Time Complexity?

- To choose the most efficient algorithm.
- To compare different solutions before implementation.
- To write scalable, optimized code.

What is Space Complexity?

- tells how much memory an algorithm uses.
- Includes both input storage and extra memory used during processing.
- Example: Using extra arrays, recursion stack space, variables, etc.

Why Do We Need Space Complexity?

- Important when working on memory-limited systems.
- Helps choose solutions that use less memory.
- Makes programs run efficiently on mobile/embedded devices.