Exercise 2: E-commerce Platform Search Function

Understand Asymptotic Notation

Big O Notation:

Big O notation is used to describe how efficiently an algorithm uses time and space as the size of the input increases.

By focusing on the worst-case scenario, which is what occurs most often, it helps developers choose the optimal algorithm for big data.

Time Complexity in Search:

Search Algorithm	Best Case	Average Case	Worst Case
Linear Search	O(1)	O(n)	O(n)
Binary Search	O(1)	O(log n)	O(log n)

Best Case: The target is immediately located.

Average Situation: The target is found after several checks.

Worst Case: The target is either absent or not present after everything has been checked.

Analysis:

Feature	Linear Search	Binary Search
Requires Sorted Array	No	Yes
Time Complexity	O(n)	O(log n)
Speed (Large Dataset)	Slower	Faster
Use Case	Small or unsorted arrays	Large, sorted arrays

Conclusion:

- **Binary Search** is better for large and sorted datasets due to its O(log n) time.
- **Linear Search** is simpler and works for unsorted data but is slower for large lists.
- In an e-commerce platform, product names can be sorted once and stored, enabling fast binary search when users search by name.