Exercise 2: E-commerce Platform Search Function

Analysis:

- Compare the time complexity of linear and binary search algorithms.
- Discuss which algorithm is more suitable for your platform and why.

Time Complexity Comparison

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)

Explanation:

- **Linear Search** checks each element one by one. Works on **unsorted data**.
- **Binary Search** repeatedly divides the search space in half. Requires **sorted data**.

Which Algorithm is More Suitable for an E-Commerce Platform?

- Binary Search is more suitable, but only if data is sorted or indexed.

Why Binary Search is better:

Feature	Explanation
Performance	Faster with O(log n) time — scalable for large product catalogs.
User Experience	Enables instant search, autocomplete, and filtered results quickly.
Efficient filtering	Products sorted by price, rating, or name make binary search ideal

Linear Search: When to Use?

- For small datasets, linear search is simple and acceptable.
- For unsorted data (e.g., tags, new arrivals before indexing).
- When search involves complex criteria not supported by simple sorting (e.g., fuzzy match, NLP search).

Conclusion

- Binary Search is preferable for sorted or indexed data, making it ideal for product name, price, rating searches.
- Use linear search only for small datasets or non-indexed fields.
- In practice, real e-commerce platforms use advanced search engines that combine multiple techniques for speed and relevance.