**Exercise 2: E-commerce Platform Search Function**

1. **Asymptotic Notation & Search Scenarios**

**Big O Notation** expresses the upper bound of an algorithm's running time as input size grows. It helps you evaluate how scalable and efficient your code is.

* **Linear Search:**
  + Best case: **O(1)** (first element matches)
  + Average/Worst case: **O(n)**
* **Binary Search:**
* Requires a **sorted** array
* Best case: **O(1)** (middle element matches)
* Average/Worst case: **O(log n)**

Big O helps you choose smarter algorithms before you even write them.

4. Time Complexity Comparison

**Linear Search**

* **Best Case:** O(1) — when the target is the first element
* **Average Case:** O(n)
* **Worst Case:** O(n) — when the target is at the end or not present

**Binary Search**

* **Best Case:** O(1) — when the target is at the middle
* **Average Case:** O(log n)
* **Worst Case:** O(log n)