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

**1. Understand Asymptotic Notation**

**What is Big O Notation?**

Big O notation is a way to describe how the runtime or space requirements of an algorithm **scale** with input size (n). It helps us evaluate the **efficiency** of algorithms.

* **O(1)** – Constant time (fastest).
* **O(n)** – Linear time.
* **O(log n)** – Logarithmic time.
* **O(n²)** – Quadratic time (slow for large n).

### **2.Best, Average, and Worst Case**

| **Scenario** | **Linear Search** | **Binary Search** |
| --- | --- | --- |
| Best Case | O(1) – first item | O(1) – middle element |
| Average Case | O(n/2) ≈ O(n) | O(log n) |
| Worst Case | O(n) – last item | O(log n) |

**3. Analysis**

**Time Complexity Comparison:**

| **Algorithm** | **Time Complexity** | **Sorted Needed?** |
| --- | --- | --- |
| Linear Search | O(n) | No |
| Binary Search | O(log n) | Yes |