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

**Big O Notation**

Big O notation is a way to measure how the runtime or space requirement of an algorithm grows as the input size increases. It focuses on the upper bound of performance, especially in the worst-case scenario. This notation allows us to compare algorithms independently of hardware or exact execution time. For example, O(1) means constant time, O(n) means linear time, and O(log n) means logarithmic time. The smaller the Big O value, the more efficient the algorithm is for larger inputs.

**Best, Average, and Worst Case**

* The best case is when the desired result is found immediately, such as the first item.
* The average case represents a typical scenario where the item is somewhere in the middle.
* The worst case is when the item is not found or is at the last position, requiring maximum steps.

**Linear Search**

This method checks each product one at a time. It works even if the products are not sorted. It is simple but slow when the list is large.

**Binary Search**

This method only works if the product list is sorted. It searches by dividing the list in half repeatedly, making it much faster than linear search for large lists.

**Time Complexity Analysis**

Linear search has a time complexity of O(n) in the worst case because it may need to scan every item. Binary search has a time complexity of O(log n) in the worst case because it divides the search space by two with each comparison. As the input size grows, binary search remains much faster than linear search.

**Suitable Algorithm**

For this exercise, if the e-commerce platform has a small number of products or products that change often, linear search is more suitable. It is simple to implement and does not require sorting.

However, if the platform has a large list of products that do not change frequently, binary search is a better choice. It provides faster search results, but only if the list is sorted beforehand.

So, linear search is useful for smaller or dynamic product lists, while binary search is best for larger, stable product lists where performance is important.