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

**1.Understand Asymptotic Notation:**

Q) Explain Big O notation and how it helps in analyzing algorithms.

Ans) Big O notation is a mathematical notation that describes the upper bound of an algorithm's running time or space requirements with respect to the size of input. It allows to analyze and compare the efficiency of algorithms, especially in worst cases of large input sizes.

Q) Describe the best, average, and worst-case scenarios for search operations.

Ans) **Best case**: The best time an algorithm can take to complete; usually occurs under ideal conditions.

**Average Case**: This is the expected time taken by an algorithm, assuming all possible

inputs.

**Worst case**: This is usually the maximum execution time taken by an algorithm under the most unfavorable conditions.

**4. Analysis:**

Q) Compare the time complexity of linear and binary search algorithms.

Ans) **Linear Search:**

Best Case: O(1) – Element is at the first position.

Average Case: O(n) – On average, it may have to go through half the array.

Worst Case: O(n) – Element at the last position or not there at all.

**Binary Search:**

Best Case: O(1) – Element at the middle position.

Average Case: O(log n) – Search space halves with every step.

Worst case: O(log n)- The element is at the last possible position or not present at all.

Q) Discuss which algorithm is more suitable for your platform and why.

Ans) Binary search will be more appropriate for an e-commerce platform if the list of products is sorted because, due to its logarithmic time complexity, it becomes considerably faster than linear time complexity of linear search in larger datasets. However, binary search requires that the array should be sorted, so there is an extra cost in maintaining the sorted order of products, especially when frequent additions and deletions are made.