Analysis

Linear Search: Checks each item in a list one by one until the target item is found or the end of the list is reached.

- **Time Complexity**: O(n) in the worst case, where n is the number of items in the list. This is because it may require checking every item.

Binary Search: Works on a sorted list by repeatedly dividing the search interval in half. It compares the target value with the middle item and discards the half where the target cannot lie.

- **Time Complexity**: O(log n) in the worst case, where n is the number of items in the list. This is due to the repeated halving of the search interval.

When to Use Each Algorithm:

- **Linear Search**: Use when the list is unsorted or small. It's straightforward and does not require sorting the list first.

- **Binary Search**: Use when the list is sorted and when you expect to perform multiple searches. It is more efficient for large datasets due to its logarithmic time complexity. However, remember that the list must be sorted before performing binary search.