Assignment 10

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1. The following are the steps in a binary search:
   a. Compare the target value with the middle element of the array.
   b. If the target value is found, return its index.
   c. If the middle element is greater than the target, search the left half of the array.
   d. If the middle element is less than the target, search the right half of the array.
   e. Repeat steps a to d until the target value is found or the search space is empty.

2. The binary search algorithm has a time complexity of O(log n), where n is the number of elements in the array.

3. The worst-case scenario for binary search is when the target value is not present in the array, and the search space is reduced by half with each iteration.

4. The best-case scenario for binary search is when the target value is the middle element of the array, and the search space is reduced to 1 element in a single iteration.

5. The space complexity of binary search is O(1), as it only requires a few variables to store the current search bounds and the target value.

6. Binary search is more efficient than linear search for large datasets, as it reduces the search space by half with each iteration.

7. Binary search can be modified to work with arrays that are not sorted, but it will require sorting the array first, which may affect its performance.

8. Binary search is not suitable for searching in a linked list, as it requires random access to elements, which is not easy to achieve in a linked list.

9. Binary search can be implemented using recursion or iteration, with iteration being more efficient in terms of space complexity.

10. Binary search can be modified to find the first occurrence of a target value in a sorted array, by terminating the search as soon as the target value is found, without further iterations.