Task 01:

In a trie (prefix tree), what is the most significant benefit it provides in information retrieval systems like autocomplete?

1. It stores keys in a hash map allowing faster lookup than string comparison.

2. It enables prefix-based searching by storing characters in a tree-like format, reducing lookup time.

3. It compresses all values into a single hash index for instant access.

4. It eliminates the need for traversal by maintaining precomputed suggestions for each node.

Task 02:

What do you understand by stable and unstable sorting?

Stable Sorting:

* In Stable sorting, when two items have the same value, they maintain their original order after sorting it preserves the relative order of equal elements
* Like arranging similar cards while keeping their original sequence

Unstable Sorting:

* In unstable sorting, equal elements might change their relative positions after sorting
* The order of duplicate items can be random
* Like shuffling similar cards without caring about their initial order

Task 03:

What is the primary purpose of reversing the pointers the linked list?

1. To convert singly linked list into doubly linked list

2. To delete all the nodes in reverse order

3. To perform in-place reversal of the list with O(1) space

4. To traverse backwards using a stack

the primary purpose of reversing the pointers in this linked list code?

class ListNode {

    int val;

    ListNode next;

    ListNode(int val) {

        this.val = val;

    }

}

public class ReverseLinkedList {

    public ListNode reverse(ListNode head) {

        ListNode prev = null;

        while (head != null) {

            ListNode nextNode = head.next;

            head.next = prev;

            prev = head;

            head = nextNode;

        }

        return prev;

    }

}

Task 04:

What does O(log n) signify when used in the context of a binary search tree operation?

1. The number of steps grows linearly with the size of the input.

2. The operation takes exponential time depending on tree height.

3. The number of steps grows proportionally to the logarithm of the input size, typical for balanced trees.

4. The operation performs a constant number of steps for each input regardless of size.