3 Lecture - CS301

Important Subjective

1. **What is a linked list and how is it different from an array?**
   Answer: A linked list is a data structure where each element (node) contains a value and a reference to the next node. The first node in the list is called the head, and each subsequent node is linked to the previous node. In contrast, an array stores a fixed number of elements of the same type in contiguous memory locations.

2. **How are nodes in a linked list allocated in memory?**
   Answer: Each node in a linked list is typically represented as a block of memory that contains the value and a pointer to the next node. The head node is stored in a variable, and each subsequent node is allocated dynamically as needed.

3. **What is the time complexity of inserting a node at the beginning of a linked list?**
   Answer: The time complexity of inserting a node at the beginning of a linked list is O(1), as it involves updating the head node pointer to point to the new node.

4. **How do you traverse a linked list?**
   Answer: To traverse a linked list, start at the head node and follow the next node pointers until the end of the list is reached.

5. **What is the difference between a singly linked list and a doubly linked list?**
   Answer: In a singly linked list, each node contains a reference to the next node, while in a doubly linked list, each node contains references to both the next and previous nodes.

6. **What is the time complexity of inserting a node at the end of a linked list?**
   Answer: The time complexity of inserting a node at the end of a linked list is O(n), as it involves traversing the list to find the last node and updating its next node pointer to point to the new node.

7. **How do you delete a node from a linked list?**
   Answer: To delete a node from a linked list, update the previous node's next node pointer to point to the next node, effectively removing the node from the list.

8. **What is a circular linked list?**
   Answer: A circular linked list is a linked list where the last node's next node pointer points to the head node, creating a circular structure.

9. **What is a sentinel node in a linked list?**
   Answer: A sentinel node is a special node added to the beginning or end of a linked list that acts as a marker to indicate the start or end of the list.

10. **What is the space complexity of a linked list?**
    Answer: The space complexity of a linked list is O(n), where n is the number of nodes in the list. This is because each node requires its own block of memory.