Data Structure Quiz 3

Total Marks 10

Name: _____   Roll No. _____

Question: Find Middle Node: Implement a function to find the middle node of a singly linked list. If there are two middle nodes, return the second one.

Examples:

Linked List: 1 -> 2 -> 3 -> 4 -> 5	Linked List: 1 -> 2 -> 3 -> 4	Linked List: 42
Middle Node: 3	Middle Node: 3	Middle Node: 42

```cpp
class ListNode {
public:
    int val;
    ListNode* next;
    ListNode(int val) : val(val), next(nullptr) {}
};
```

```cpp
//using double loop
ListNode* findMiddle(ListNode* head)
{
    if (!head) {
        return nullptr;
    }
    int length = 0;
    ListNode* current = head;
    // First loop: Calculate the
length of the linked list
    while (current) {
        length++;
        current = current->next;
    }
    int middleIndex = length / 2;
    current = head;
    // Second loop: Traverse to the
middle node
    for (int i = 0; i < middleIndex;
i++) {
        current = current->next;
    }
    return current;
}
```

```cpp
//Using single loop

ListNode* findMiddle(ListNode*
head) {
    if (!head) {
        return nullptr;
    }

    ListNode* slow = head;
    ListNode* fast = head;

    while (fast && fast->next) {
        slow = slow->next;
        fast = fast->next->next;
    }
    return slow;
}
```