

Assignment I - B.E. IV^{th} Semester
Data Structures Algorithm
last date for submission - 27^{th} January

Four students can submit one assignment

1. Prove the following:
 - (i) $3n^2 + 5n + 6 = O(n^2)$
 - (ii) $O(n^2 - 10n) = n^2$
 - (iii) $\Omega(n^2 \log n + n - 10) = n^2 \log n$
 - (iv) $\Omega(n - 10) = n^2$
 - (v) $\frac{1}{2}n^2 - 3n = \Theta(n^2)$
 - (vi) $\Theta(n^2 - 5n + 6) = n^2$
2. Write a function (in pseudocode) to insert a node in single linked list for the following cases.
 - (i) Inserting a new node before the head
 - (ii) Inserting a new node at end of the list
 - (iii) Inserting a new node after the node pointed by pointer p .
3. Write a function (in pseudocode) to delete a node in single linked list for the following cases.
 - (i) Deleting the head node
 - (ii) Deleting the last node
 - (iii) Deleting the node pointed by pointer p .
4. Write a function (in pseudocode) to insert a node in circular linked list for the following cases.
 - (i) Inserting a new node before the head
 - (ii) Inserting a new node at end of the list
 - (iii) Inserting a new node after the node pointed by pointer p .
5. Write a function (in pseudocode) to delete a node in a circular linked list for the following cases.
 - (i) Deleting the head node
 - (ii) Deleting the last node
 - (iii) Deleting the node pointed by pointer p .
6. Write a function (in pseudocode) to insert a node in a double linked list for the following cases.
 - (i) Inserting a new node before the head
 - (ii) Inserting a new node at end of the list
 - (iii) Inserting a new node after the node pointed by pointer p .
7. Write a function (in pseudocode) to delete a node in a double linked list for the following cases.
 - (i) Deleting the head node
 - (ii) Deleting the last node
 - (iii) Deleting the node pointed by pointer p .

8. Write a non-recursive function (in pseudocode) to reverse the single linked list.
9. Write a non-recursive function (in pseudocode) to reverse the circular linked list.
10. Write a function (in pseudocode) to interchange m th and n th element of the linked list.
11. Write a function (in pseudocode) to delete every second element of the linked list.
12. Josephus problem: n students have decided to elect a leader(class representative). They form a circle a number m and a name of the student is picked. Beginning with the student whose name is picked, the begin to count clockwise around the circle. When count reaches n , that student is removed from circle and the count begins again with next student. The process continues so that each time the count reaches n , another student is removed from the circle. Any student removed from the circle is no longer counted. The last student remaining is the leader. Write a function (in pseudocode) to determine the order in which students are eliminated from the circle and which student escapes. For example The persons in circular list are: 1 2 3 4 5 6 7. Enter the number of persons to be skipped:3. 3 has been removed. 6 has been removed. 2 has been removed. 7 has been removed. 5 has been removed. 1 has been removed. The person to survive is : 4.
13. Write a function (in pseudocode) to check whether the given linked list is either the NULL-terminated or ends in a loop.