

# Suggestion Sheet for Mid

## Searching & Sorting

1. Implement Selection/Bubble/Insertion sort for an array of integers.
2. Given an array of integers (which may contain negative numbers), sort the array based on the absolute values of the elements.
3. Implement Binary Search on a sorted array of integers so that it works correctly for both:
  - (a) an array sorted in ascending order, and
  - (b) an array sorted in descending order.
4. Using Binary Search on a sorted array (ascending), find the **first occurrence** of a given element (if it appears multiple times).
5. Using Binary Search on a sorted array (ascending), find the **last occurrence** of a given element (if it appears multiple times).
6. Using Binary Search on a sorted array (ascending), find the position where a given element should be inserted so that the array remains sorted .
7. Find Closest Element with Binary Search. Given a sorted array, find the element closest to a given target. If two elements are equally close, return the smaller one.

## Linked List

1. Write a function to find the summation of all node values in a linked list.
2. Write functions to insert a new node in a singly linked list at:
  - (a) the head (beginning),
  - (b) the end,
  - (c) any given valid position (index or after a given node).
3. Write functions to delete a node from a singly linked list at:
  - (a) the head (beginning),
  - (b) the end,

- (c) any given valid position (index or a node with a given value).
4. Given the head of a singly linked list, determine whether the list contains a cycle or not.
  5. Given the head of a singly linked list, check whether the list is sorted in non-decreasing order or not.
  6. Given the head of a singly linked list, check whether the linked list forms a palindrome or not. (The sequence of values from head to end should read the same forwards and backwards.)
  7. Reverse a singly linked list (i.e., make the last node the new head, and so on) and return the new head.
  8. You are given a **sorted** singly linked list and a value  $x$ . Insert a new node with value  $x$  into the list so that after insertion, the linked list remains sorted.