

## Smart Coding & Interview Series

### Top-20 Basic Program (Sorting & Applications)

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First, understand the solution building strategies and coding for the problems in LIVE/VIDEO session and then you apply those strategies discussed in LIVE/VIDEO session to solve the following problems. Use your favourite language(C/C++/Java/C#/Python/Scala) for coding.

**1) Insertion Sort List:** Sort a linked list using insertion sort. Here is the algorithm of Insertion Sort:

1. Insertion sort iterates, consuming one input element each repetition, and growing a sorted output list.
2. At each iteration, insertion sort removes one element from the input data, finds the location it belongs within the sorted list, and inserts it there.
3. It repeats until no input elements remain.

**Example:**

Input: 4->2->1->3

Output: 1->2->3->4

**Source:** <https://leetcode.com/problems/insertion-sort-list/>

**2) Sort List:** Sort a linked list in  $O(n \log n)$  time using constant space complexity.

**Example:**

Input: 4->2->1->3

Output: 1->2->3->4

**Source:** <https://leetcode.com/problems/sort-list/>

**3) Sort Colors:** Given an array with  $n$  objects colored red, white or blue, sort them in-place so that objects of the same color are adjacent, with the colors in the order red, white and blue. Here, we will use the integers 0, 1, and 2 to represent the color red, white, and blue respectively. You are not supposed to use the library's sort function for this problem.

**Example:**

Input: [2,0,2,1,1,0]

Output: [0,0,1,1,2,2]

**Source :** <https://leetcode.com/problems/sort-colors/>

**4) Global and Local Inversions:** We have some permutation  $A$  of  $[0, 1, \dots, N - 1]$ , where  $N$  is the length of  $A$ . The number of (global) inversions is the number of  $i < j$  with  $0 \leq i < j < N$  and  $A[i] > A[j]$ . The number of local inversions is the number of  $i$  with  $0 \leq i < N$  and  $A[i] >$

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$A[i+1]$ . Return true if and only if the number of global inversions is equal to the number of local inversions.

**Example:**

Input:  $A = [1,0,2]$

Output: true

Explanation: There is 1 global inversion, and 1 local inversion.

Source: <https://leetcode.com/problems/global-and-local-inversions/>

**5) 3-Sum:** Given an array `nums` of  $n$  integers, are there elements  $a, b, c$  in `nums` such that  $a + b + c = 0$ ? Find all unique triplets in the array which gives the sum of zero. The solution set must not contain duplicate triplets.

**Example:**

Given array `nums = [-1, 0, 1, 2, -1, -4]`,

A solution set is:

```
[  
  [-1, 0, 1],  
  [-1, -1, 2]  
]
```

Source : <https://leetcode.com/problems/3sum/description/>