AE2ADS

Exercise 1

Implement the three simple sorting algorithms: bubble sort, selection sort and insertion sort.

Exercise 2

Implement merge sort and quick sort.

Exercise 3

Given an array ***nums*** 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.

We will use the integers 0, 1, and 2 to represent the colors red, white, and blue, respectively.

You must solve this problem without using the library's sort function.

Example 1:

Input: ***nums*** = [2,0,2,1,1,0]
Output: [0,0,1,1,2,2]
Example 2:

Input: ***nums*** = [2,0,1]
Output: [0,1,2]

Exercise 4

Given an array of intervals where intervals[***i***] = [***starti***, ***endi***], merge all overlapping intervals and return an array of the non-overlapping intervals that cover all the intervals in the input.

Example 1:

Input: intervals = [[1,3],[2,6],[8,10],[15,18]]
Output: [[1,6],[8,10],[15,18]]
Explanation: Since intervals [1,3] and [2,6] overlap, merge them into [1,6].
Example 2:

Input: intervals = [[1,4],[4,5]]
Output: [[1,5]]
Explanation: Intervals [1,4] and [4,5] are considered overlapping.

Exercise 5

Assume you are an awesome parent and want to give your children some cookies. But, you should give each child at most one cookie.

Each child i has a greed factor g[i], which is the minimum size of a cookie that the child will be content with; and each cookie j has a size s[j]. If s[j] >= g[i], we can assign the cookie j to the child i, and the child i will be content. Your goal is to maximize the number of your content children and output the maximum number.

Example 1:
Input: g = [1,2,3], s = [1,1]
Output: 1
Explanation: You have 3 children and 2 cookies. The greed factors of 3 children are 1, 2, 3.
And even though you have 2 cookies, since their size is both 1, you could only make the child whose greed factor is 1 content.
You need to output 1.
Example 2:

Input: g = [1,2], s = [1,2,3]
Output: 2
Explanation: You have 2 children and 3 cookies. The greed factors of 2 children are 1, 2.
You have 3 cookies and their sizes are big enough to gratify all of the children,
You need to output 2.

Exercise 6 (ICPC)

Johnny has a younger sister Anne, who is very clever and smart. As she came home from the kindergarten, she told his brother about the task that her kindergartener asked her to solve. The task was just to construct a triangle out of four sticks of different colours. Naturally, one of the sticks is extra. It is not allowed to break the sticks or use their partial length. Anne has perfectly solved this task, now she is asking Johnny to do the same.

The boy answered that he would cope with it without any difficulty. However, after a while he found out that different tricky things can occur. It can happen that it is impossible to construct a triangle of a positive area, but it is possible to construct a degenerate triangle. It can be so, that it is impossible to construct a degenerate triangle even. As Johnny is very lazy, he does not want to consider such a big amount of cases, he asks you to help him.

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Exercise 7 (ICPC)

In a Berland's zoo there is an enclosure with camels. It is known that camels like to spit. Bob watched these interesting animals for the whole day and registered in his notepad where each animal spitted. Now he wants to know if in the zoo there are two camels, which spitted at each other. Help him to solve this task.

The trajectory of a camel's spit is an arc, i.e., if the camel in position x spits d meters right, he can hit only the camel in position $x + d$, if such a camel exists.

https://www.luogu.com.cn/problem/CF29A