

LAB02

FIT-HCMUS

Exercise 1

Given an array A containing names and an array B containing the corresponding heights of each person. Write a function to sort A in ascending order based on height.

Example:

Input: A = ["An", "Lan", "Tan"], B = [160, 155, 170]

Output: B = ["Lan", "An", "Tan"]

Exercise 2

Given an array A, write a function that returns the elements that appear most frequently in the array.

Exercise 3

Given an array A containing n distinct numbers ranging from 0 to n. Write a function to find the missing number in A within the range 0 to n.

Example:

Input: A = [0,1,2,4]

Output: 3 (For n = 4, the missing number in array A is 3 within the range from 0 to 4)

Exercise 4

Write a function to find the K-th largest element in an array.

Example:

- Input: A = [1, 20, 2], k = 2

Output: 2

- Input: A = [3, 30, 34, 5, 9], k = 5

Output: 3

Exercise 5

Given an array representing each digit of an integer. For example: [1, 2, 3] => 123. Write a function to increment this integer by 1 and return the array of digits.

Example:

- Input: [1, 2, 3]
Output: [1, 2, 4] ($123 + 1 = 124$)
- Input: [9]
Output: [1,0] ($9 + 1 = 10$)

Exercise 6

Given two arrays A and B, both sorted in ascending order. Write a function to merge array A and array B into one array such that the merged array is still sorted in ascending order. (Do not use the built-in `sort()` function)

Exercise 7

Given an array of positive integers. Write a function to sort them so that the array forms the largest possible number. The function should return the largest number as a string.

Example:

- Input: A = [1, 20]
Output: "201"
- Input: A = [3, 30, 34, 5, 9]
Output: "9534330"

Exercise 8

Given an $n \times n$ binary matrix representing the pixels of an image. Perform a horizontal flip and invert the colors.

- Horizontal flip: Each row should be reversed. Example: [1, 1, 0] => [0, 1, 1] - Inverting colors: Switch 0s to 1s and vice versa. Example: [0, 1, 1] => [1, 0, 0]

Example:

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

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

Exercise 9

Given an array of integers A. Write a function to find all the triplets $[A[i], A[j], A[k]]$ such that $A[i] + A[j] + A[k] = 0$ where $i \neq j \neq k$.

Example:

Input: A = [1, 0, -1, 3, -1, -3, 2]

Output: [[-1, -1, 2], [-1, 0, 1], [3, 0, -3]]

Exercise 10

Given an array of integers A . Write a function to find all pairs of numbers such that their sum equals k .

Example:

Input: $A = [10, 50, 20, 30, 40]$, $k = 90$

Output: $[[50, 40]]$

Exercise 11

Given an array of integers A . Write a function to check if all elements in the array can be paired such that the sum of each pair equals K .

Example:

Input: $A = [10, 50, 80, 30, 40, 10]$, $k = 90$

Output: False (The array has pairs (10, 80) and (50, 40), but 10 and 30 cannot be paired to sum up to 90)