Coding Assignment-8

Q1. In the city of Toyland, there are N houses. Noddy is looking for a piece of land in the city to build his house. He wants to buy the land where he can build the largest possible house. All the houses in the city lie in a straight line and all of them are given a house number and position of the house from the entry point in the city. Noddy wants to find the house numbers between which he can build the largest house.

Write an algorithm to help Noddy to find the house numbers between which he can build his house.

Input: The input to the function/method consists of two arguments

- numOf House, an integer representing the number of houses.
- houseList, a list where each element of the list is a list of integers representing the house number and its position respectively.

Constraints
2 < numOfHouse < 106
1 <houseList[i][0] <numOfHouse
0 < houseList[i][1] < 106
0 < I < numOfHouse

Note: No two houses will have the same position. In case of multiple such answers, return the one with the least distance from the reference point Zero.

Example:
Input:
numOfHouse = 5
houseList = [[3, 7],[1, 9],[2, 0],[5, 15],[4, 30]]
Output: [4, 5]

Q2. A water reservation system constructed in a city has several opening and closing gates. If any opening gates are not closed with a corresponding closing gate then the water will leak out of the system and there will be a threat to the life of people living in the city. Also, the closing gate cannot exist without the opening gate, so the system head checks the design of the system and he has to ensure that the people are safe in the city. Write an algorithm to find whether people are safe or not.

Input:
The input to the function/method consists of one argument- str, a string representing the sequence of gates of the water reservation system.

Output:
Return an integer representing the number of gates which have closing gates corresponding to the opening gates else return an integer-1.

Constraints:
The opening gates are representing by "(" and closing gates are representing ")"

Example 1
Input: Str =()()
Output: 3

Q3. Given weights and values of n items, the task is to put these items in a knapsack of capacity W to get the maximum total value in the knapsack. In this problem, 0-1 means that we can either put the complete item in the knapsack or ignore it.

Consider the following example,

Input:

Number of items:3
value and weight of items:
100 20
50 10
150 30
Size of the knapsack:50

Output:

Maximum total value in the knapsack:250

Explanation:

Weight = 20, value = 100
Weight = 10, value = 50
Weight = 30, value = 150
Weight = (20 + 10), Value = (100 + 50)
Weight = (20 + 30), Value = (100 + 150)
Weight = (10 + 30), Value = (50 + 150)
Weight = (20 + 10 + 30) > 50

The maximum among these is
Weight = (20 + 30), Value = (100 + 150)
Weight = 50, Value = 250

Q4. Program to find the total number of islands using DFS is discussed here. Given an input island matrix, where 0 represents water and 1 represents land. Find the total number of islands that are formed by connected 1's.

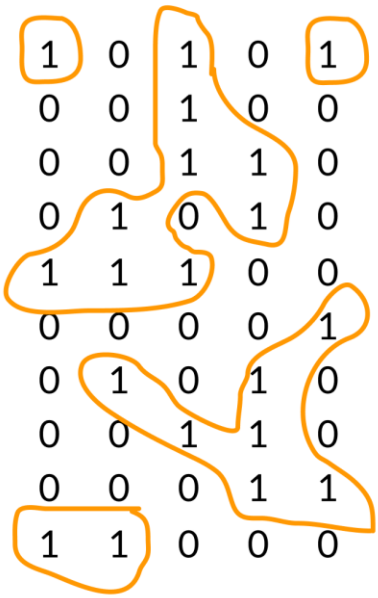
For example, consider the input island matrix

1 0 1 0 1
0 0 1 0 0
0 0 1 1 0
0 1 0 1 0
1 1 1 0 0
0 0 0 0 1
0 1 0 1 0
0 0 1 1 0
0 0 0 1 1
1 1 0 0 0

Total number of islands = 5

Number of islands

Number of islands = 5



Q5. Emma wants to gift a bouquet to her father on his birthday and asked for help from her mother Rosy. Rosy gives N flower sticks numbered 1 to N to Emma and tells her to arrange it in the bouquet in a particular order. She asks her to arrange the first K flower sticks in the order of their increasing length and the remaining sticks in an order of their decreasing length.

Write an algorithm to find the final arrangement of the flower sticks in which Emma gifted the bouquet to her father.

Input:
The input to the function/method consists of three arguments.

- num, an integer representing the number of flower sticks (N).
- random, an integer representing the number K given by Rosy to Emma sticks
- a list of integers representing the length of flower sticks.

Output: Return a list of integers representing the final pattern of the flower sticks in which Emma gifted the bouquet to her father

Constraints:
Random < num
0 < num < 106