2024 -03-23 Handout – Topological Sorting

Q1. Course Schedule II

Link: https://leetcode.com/problems/course-schedule-ii/

There are a total of numCourses courses you have to take, labeled from 0 to numCourses - 1. You are given an array prerequisites where prerequisites[i] = [ai, bi]indicates that you must take course bi first if you want to take course ai.

For example, the pair [0, 1], indicates that to take course 0 you have to first take course 1.

Return the ordering of courses you should take to finish all courses. If there are many valid answers, return any of them. If it is impossible to finish all courses, return an empty array.

Example 1:

Input: numCourses = 2, prerequisites = [[1,0]]

Output: [0,1]

Explanation: There are a total of 2 courses to take. To take course 1 you should have finished course 0. So the correct course order is [0,1].

Example 3:

Input: numCourses = 1, prerequisites = []

Output: [0]

Example 2:

Input: numCourses = 4, prerequisites = [[1,0],[2,0],[3,1],[3,2]]

Output: [0,2,1,3]

Explanation: There are a total of 4 courses to take. To take course 3 you should have finished both courses 1 and 2. Both courses 1 and 2 should be taken after you finished course 0.

So one correct course order is [0,1,2,3]. Another correct ordering is [0,2,1,3].

Q2. Find all possible recipes from given supplies

Link: https://leetcode.com/problems/find-all-possible-recipes-from-given-supplies

You have information about n different recipes. You are given a string array recipes and a 2D string array ingredients. The ith recipe has the name recipes[i], and you can create it if you have all the needed ingredients from ingredients[i]. Ingredients to a recipe may need to be created from other recipes, i.e., ingredients[i] may contain a string that is in recipes.You are also given a string array supplies containing all the ingredients that you initially have, and you have an infinite supply of all of them. Return a list of all the recipes that you can create. You may return the answer in any order.

Note that two recipes may contain each other in their ingredients.

Example 1: **Input: recipes = ["bread"], ingredients = [["yeast","flour"]], supplies = ["yeast","flour","corn"]**

Output: ["bread"]

Explanation:

We can create "bread" since we have the ingredients "yeast" and "flour".

Example 2:

Input: recipes = ["bread","sandwich"], ingredients = [["yeast","flour"],["bread","meat"]], supplies = ["yeast","flour","meat"]

Output: ["bread","sandwich"]

Explanation:

We can create "bread" since we have the ingredients "yeast" and "flour".

We can create "sandwich" since we have the ingredient "meat" and can create the ingredient "bread".

Q3. Alien Dictionary

Link:https://leetcode.com/problems/alien-dictionary/

There is a new alien language that uses the English alphabet. However, the order of the letters is unknown to you.You are given a list of strings words from the alien language's dictionary. Now it is claimed that the strings in words are sorted lexicographically by the rules of this new language. If this claim is incorrect, and the given arrangement of string in words cannot correspond to any order of letters, return "".Otherwise, return a string of the unique letters in the new alien language sorted in lexicographically increasing order by the new language's rules. If there are multiple solutions, return any of them.

Example 1:

Input: words = ["wrt","wrf","er","ett","rftt"]

Output: "wertf"

Example 2:

Input: words = ["z","x"]

Output: "zx"

Q4. Maximum Employees to be invited to a meeting

Link: https://leetcode.com/problems/maximum-employees-to-be-invited-to-a-meeting/

A company is organizing a meeting and has a list of n employees, waiting to be invited. They have arranged for a large **circular** table, capable of seating **any number** of employees.

The employees are numbered from 0 to n - 1. Each employee has a **favorite** person and they will attend the meeting **only if** they can sit next to their favorite person at the table. The favorite person of an employee is **not** themself. Given a **0-indexed** integer array favorite, where favorite[i] denotes the favorite person of the i^{th}employee, return *the **maximum number of employees** that can be invited to the meeting*.

`Example 1:` **Input: favorite = [2,2,1,2]**

Output: 3

`Example 2:` **Input: favorite = [1,2,0]**

Output: 3