

Week 10

Topic: Graph

210. Course Schedule II

- Difficulty: Medium
- Problem URL: <https://leetcode.com/problems/course-schedule-ii>
- Description:
一共 `numCourses` 門課要修，課程編號從 0 到 `numCourses - 1`。每門課有可能會有「先修課」的限制，這些限制會用一個陣列 `prerequisites [a, b]` 呈現，即要先修完課程 `b`，才能去修課程 `a`。請回傳一個可行的「修課順序」陣列，若無法修完全部課程則回傳空陣列。

Example1:

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]`.

Example2:

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]`.

Example3:

Input: `numCourses = 1, prerequisites = []`

Output: `[0]`

詳細說明與約束條件請參考 *Leetcode* 網站。

685. Redundant Connection II

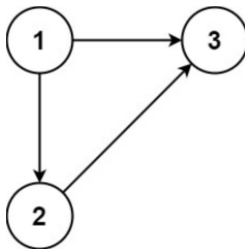
- Difficulty: Hard
- Problem URL: <https://leetcode.com/problems/redundant-connection-ii>
- Description:

有根樹的特點為 1.只有一個根節點(root)，其餘所有節點都是這個 root 的後代 2.除了 root 以外，每個節點只能有一個父節點。現在有一個「本來是一棵有根樹」的有向圖，並給了一個 2 維陣列 `edges`，每個元素是 `[u, v]`，代表一條「u 指向 v」的有向邊。回傳哪一條邊可以被移除，能讓這個圖重新變回一棵有根樹，而若有多種選擇，則回傳在 `edges` 陣列中較後出現的邊。

Example1:

Input: edges = [[1,2], [1,3], [2,3]]

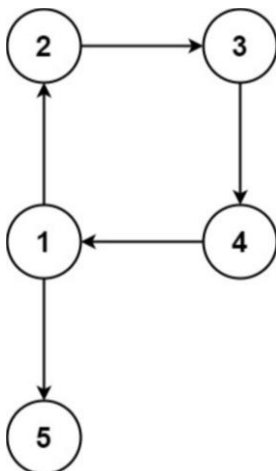
Output: [2,3]



Example2:

Input: edges = [[1,2], [2,3], [3,4], [4,1], [1,5]]

Output: [4,1]



詳細說明與約束條件請參考 [Leetcode](https://leetcode.com/problems/redundant-connection-ii) 網站。

847. Shortest Path Visiting All Nodes

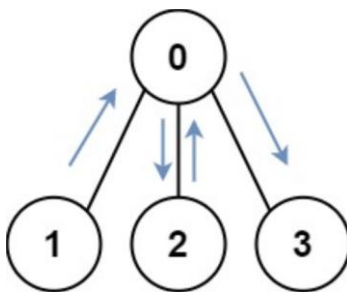
- Difficulty: Hard
- Problem URL: <https://leetcode.com/problems/shortest-path-visiting-all-nodes/>
- Description:

有一張無向且連通的圖，圖上有 n 個節點，編號從 0 到 $n-1$ ，給定一個陣列 `graph`，其中 `graph[i]` 表示「節點 i 直接連接的所有其他節點」的列表。請回傳找到的一條最短路徑，這條路徑要至少拜訪過每一個節點一次，路徑可以從任何一個節點開始或結束，也可以重複拜訪同一個節點。

Example1:

Input: `graph = [[1,2,3], [0], [0], [0]]`

Output: 4

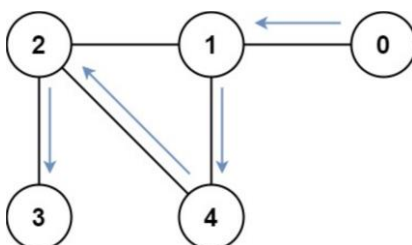


Explanation: One possible path is `[1,0,2,0,3]`

Example2:

Input: `graph = [[1], [0,2,4], [1,3,4], [2], [1,2]]`

Output: 4



Explanation: One possible path is `[0,1,4,2,3]`

詳細說明與約束條件請參考 [Leetcode](https://leetcode.com/problems/shortest-path-visiting-all-nodes/) 網站。
