Problem 2203: Minimum Weighted Subgraph With the Required Paths

Problem Information

Difficulty: Hard
Acceptance Rate: 39.73%
Paid Only: No
Tags: Graph, Shortest Path

Problem Description

You are given an integer `n` denoting the number of nodes of a **weighted directed** graph. The nodes are numbered from `0` to `n - 1`.

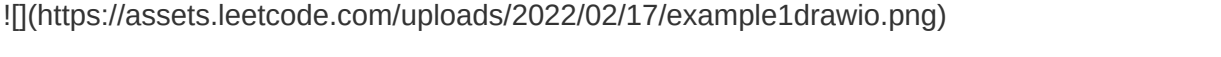
You are also given a 2D integer array `edges` where `edges[i] = [fromi, toi, weighti]` denotes that there exists a **directed** edge from `fromi` to `toi` with weight `weighti`.

Lastly, you are given three **distinct** integers `src1`, `src2`, and `dest` denoting three distinct nodes of the graph.

Return _the**minimum weight** of a subgraph of the graph such that it is **possible** to reach_ `dest` _from both_ `src1` _and_ `src2` _via a set of edges of this subgraph_. In case such a subgraph does not exist, return `-1`.

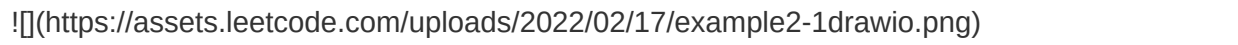
A **subgraph** is a graph whose vertices and edges are subsets of the original graph. The **weight** of a subgraph is the sum of weights of its constituent edges.

Example 1:



Input: n = 6, edges = [[0,2,2],[0,5,6],[1,0,3],[1,4,5],[2,1,1],[2,3,3],[2,3,4],[3,4,2],[4,5,1]], src1 = 0, src2 = 1, dest = 5 **Output:** 9 **Explanation:** The above figure represents the input graph. The blue edges represent one of the subgraphs that yield the optimal answer. Note that the subgraph [[1,0,3],[0,5,6]] also yields the optimal answer. It is not possible to get a subgraph with less weight satisfying all the constraints.

Example 2:



Input: n = 3, edges = [[0,1,1],[2,1,1]], src1 = 0, src2 = 1, dest = 2 **Output:** -1 **Explanation:** The above figure represents the input graph. It can be seen that there does not exist any path from node 1 to node 2, hence there are no subgraphs satisfying all the constraints.

Constraints:

* `3 <= n <= 105` * `0 <= edges.length <= 105` * `edges[i].length == 3` * `0 <= fromi, toi, src1, src2, dest <= n - 1` * `fromi != toi` * `src1`, `src2`, and `dest` are pairwise distinct. * `1 <= weight[i] <= 105`

Code Snippets

C++:

```
class Solution {
public:
long long minimumWeight(int n, vector<vector<int>>& edges, int src1, int
src2, int dest) {

}
};
```

Java:

```
class Solution {
public long minimumWeight(int n, int[][] edges, int src1, int src2, int dest)
{

}
}
```

Python3:

```
class Solution:
def minimumWeight(self, n: int, edges: List[List[int]], src1: int, src2: int,
```

```
dest: int) -> int:
```