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BITS WILP Data Structures and Algorithms Design Assignment 2017-H1

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Birla Institute of Technology & Science, Pilani
Work-Integrated Learning Programmes Division
Second Semester 2016-2017
EC-1 Lab Component

Course Title : Data Structures & Algorithms Design Due Date : 02/05/2017
Course No : SS ZG 519 Total : 10 marks

Given adirected, weighted graph in the format described below, your task is to nd the shortest distance between two vertices A and B in the graph. If there are multiple shortest paths between A and B, you have to nd the path with the least number of edges.

Input Format

The vertices are represented by numbers starting from one. The rst line will include two numbers N and M, the number of vertices in the graph and the number of edges in the graph respectively. The following M lines will have three numbers each, u, v, w which represents adirected edge between u and v with a weight w. The nal line will have the values of A and B, the nodes between which you will have to nd the shortest path.

Output Format

Print two numbers separated by a space: C E, where C is the cost from A to B and E is the number of edges from A to B. For unreachable nodes, print -1 -1, denoting no valid distance and no valid number of edges, i.e. C = -1 and E = -1.

Example 1

Consider the following graph. It has ve vertices and ve edges. We have to nd the shortest part from vertex 1 to vertex 5. There are two shortest paths, based on the weight of the path, from vertex 1 to vertex 5: path 1,2,5 and path 1,3,4,5. But we want to nd the path with minimum number of edges. So we pick the path with total weight 3 and number of edges 2.

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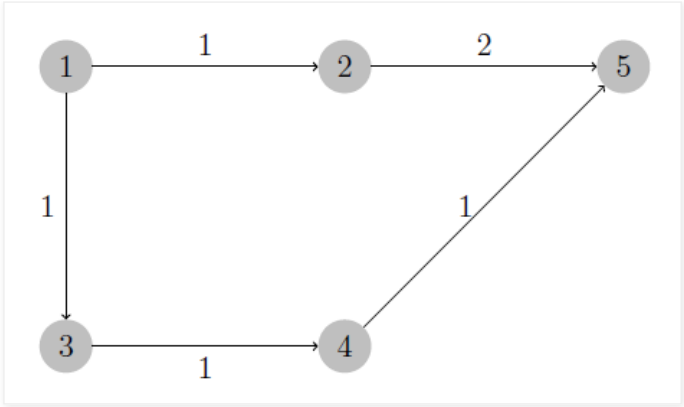
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Input for Example 1

5 5
1 2 1
1 3 1
2 5 2
3 4 1
4 5 1
1 5

Output for Example 1

3 2

Constraints

Consider the fact the input graph can be quite large. You should come up with efficient code to avoid the timeout error. However, there is a limit on the number of vertices and


number of vertices as follows.

1 <= M <= 104
1 <= N <= 104

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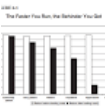
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