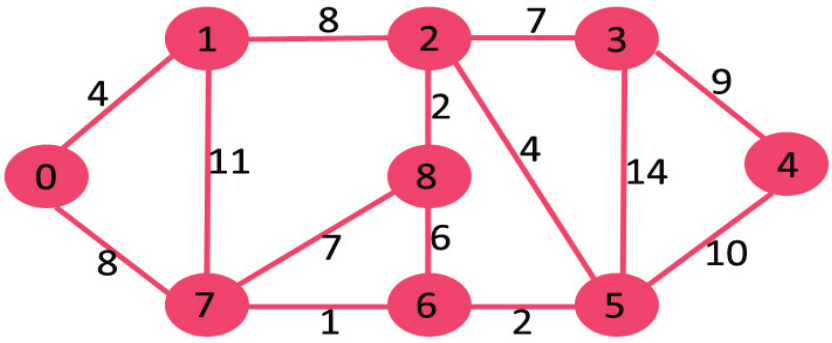
Assignment VIII
Lab MC504

Send your assignment solution to mc504lab@gmail.com.
Deadline: 17.03.2021, 12 midnight.
Put all files into one folder, create a zip and name it as <**RollNo**>_<**Assignment_<No>** and mention the files name as: Q1.c, Q2.c and so on. In each file please mention your roll number.
Subject of mail should be: <**RollNo**>_**Assignment_<No>**. **For example : 1911MC04_Assignment_II.**
You have to take inputs from the user. Otherwise marks (40%) will be deducted.

1Q.



In the above Figure cities are denoted as circles and connected highways are denoted as edges. Each edge is identified by a number that indicates cost in lac(lakh) to construct the highway. It is the proposed architecture.
But the Central Govt. has sanctioned a total amount of 37 lakh. So the new construction of highways will be in such a way that all the cities are connected directly or indirectly with a minimum cost of 37 lakh or less.
So modification is required.

The Algorithm :

Sort all edges in **decreasing** order of their weights.
After sorting, one by one pick edges in decreasing order.
Include current picked edge if excluding current edge causes disconnection in current graph.
The main idea is delete edge if its deletion **does not lead to disconnection of graph**.
After deletion of each edge check the total cost.
If the total cost is **greater than 37 lakh** then go for the next edge.
When the total cost is 37 lakh or less stop deletion.
Print the **final Architecture**.

2Q
Given an input array of integers, sort the whole array using Radix Sort.

Input Format
You will be given an array of integers of size N.

Constraints
1 < N < 10^5
1 < A[i] < 10^6

Output Format
You need to print sorted integer array elements separated by space.

Input
6 6 1 6 7 3 1

Output
1 1 3 6 6 7

3Q

A tree is called as Very Interesting SubTree of an undirected weighted connected graph if a tree consisting of all the nodes in the graph , with a zero length cycle and

1. There is just a solitary way that exists from a node to every other node.
2. Tree is having minimum overall weight (sum of all edges) among all such trees.

Always choose the edge with the smallest weight for creating Very Interesting SubTree. If adding a specific edge will create a cycle then ignore it. If there are edges of equal weight available:

- Choose the edge that minimizes the sum ***u+v+wt*** where ***u*** and ***v*** are vertices and ***wt*** is the edge weight
- In the case of tie choose any of them.

Print the overall weight of the tree formed using the rules.

For example, given the following edges:

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u	v	wt
1	2	2
2	3	3
3	1	5

First choose 1->2 at weight 2, Next choose 2->3 at weight 3, All nodes are connected without cycles for a total weight of 3+2=5.

WAP to solve the above problem using Kruskal (MST)

Input Format:
The first line has two space-separated integers **g_nodes** and **g_edges**, the number of nodes and edges in the graph.
The next **g_edges** lines each consist of three space-separated integers **g_from, g_to** and **g_weight,** where g_from and g_to denote the two nodes between which the **undirected** edge exists and g_weight denotes the weight of that edge.

Constraints

2<= g_nodes<=3000
1<= g_edges<=(n*n+1)/2
1<= g_to,g_from<=n
0<=g_weight<= 10^5

****Note: ** If there are edges between the same pair of nodes with different weights, they are to be considered as is, like multiple edges.**

Output Format

Print a single integer denoting the total weight of the Very Interesting SubTree.

Example 1

INPUT :-

Enter the number of nodes and edges in the graph

4 6

1 2 5

1 3 3

4 1 6

2 4 7

3 2 4

3 4 5

OUTPUT:-

12

EXPLANATION

The graph given in the test case is shown above. Applying Kruskal's algorithm, all of the edges are sorted in ascending order of weight. After sorting, the edge choices are available as :

1->3(w=3), 2->3(w=4), 1->2(w=5), 3->4(w=5), 1->4(w=6), and 2->4(w=7).

Select 1->3(w=3), because it has the lowest weight without creating a cycle.

Select 2->3(w=4), because it has the lowest weight without creating a cycle.

The edge 1->2(w=5) would form a cycle, so it is ignored.

Select 3->4(w=5), to finish the MST yielding a total weight of 3+4+5=12.