Best Place for the New Hospitals

Although 1 and a half year is passed since the beginning of the pandemic, the number of cases are still increasing in the Gotham City. The current hospitals in the city are too small and not sufficient to handle this amount of patients. Therefore, the governor decides to build 2 really huge hospitals that will only take care of the patients of the pandemic disease. Since time really matters for early treatment, it is important to decide the most suitable place in the city, where the total distance from patients districts to the hospitals are minimum.

In this assignment, you are given:

- the number of districts and their ids,
- the number of persons living at each of these districts,
- the distances between the districts if there is a direct connection between them.

The hospitals will be built at the selected districts and the distance with the hospitals will be 0 for people that live in these districts. Every person will only go to the hospital that is nearest to him-/herself. A figure below is a demonstration of a simple case:

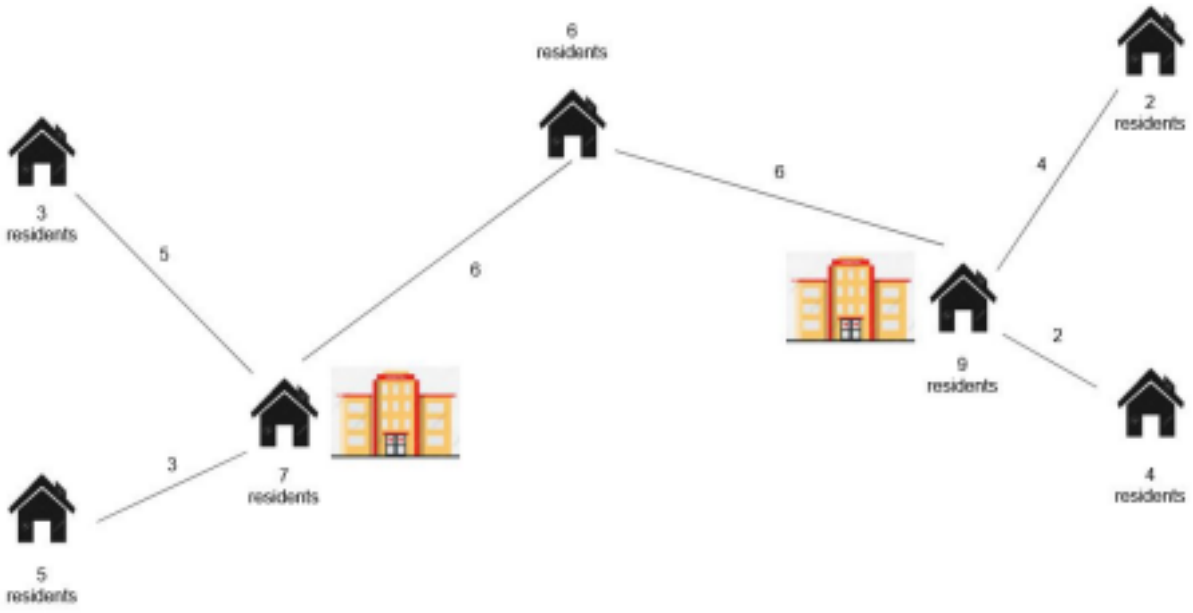

Figure 1: A sample city and hospital demonstration

If a district is equally distant to each of the hospitals, then you can select either one of them.

(a) Given this information, design an algorithm to find a good place for these hospitals. Does greedy algorithm give the optimal result? Which techniques you can apply to decrease the complexity and processing time?

Input Format. The first line includes number of districts *V* and the second line indicates total number of connections *E* between these districts. The next *V* lines have 2 numbers indicating number of people living in that district. The format is: *"district id number of people"*. The next *E* lines indicate the districts that are connected with each other directly and their distances. The format is: *"district 1 id district 2 id distance"*.