

CS-205, Assignment –IX

Assignment Date: 16/10/2017

Submission Deadline: 22/10/2017

- A. In a city, name of a house is given as per the name of its owner. Moreover, a person say X is neighbor of another person say Y if you can get X from Y in following ways i) if you drop one character (from any position) from X and make any arrangement of remaining characters which results into Y ii) if you add one character in X and make any arrangement which results into Y. There are total N houses in the city. Every house requires water supply. It can be either arranged by boring a well in a house or through a pipeline from other neighboring house where there is a bore-well or if the neighboring house is connected via pipeline to some bore-well. Cost of boring a well in  $i^{\text{th}}$  house is  $w[i]$  and cost of pipeline between house i and j is  $c[i][j]$ .  $c[i][j]$  is infinite if i and j are not neighbor of each other otherwise  $c[i][j]$  is defined as difference between ascii sum between name of  $i^{\text{th}}$  and  $j^{\text{th}}$  house (For example if X="Suman" and Y="Manu" the cost of pipeline is between these two houses is ascii value of 'S'). Find a cost effective efficient solution for supplying water in all the houses of the city. Note:  $w[i]$  is the average ascii value of the  $i^{\text{th}}$  house, For example if name of a house is "Manu" then cost of boring a well will be sum of ascii value of 'M', 'a', 'n', 'u' divided by 4.

Hint: Minimum Spanning Tree in this edge-weighted graph.

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- B. We are given a directed graph  $G = (V, E)$ . Each edge  $(u, v) \in E$  has an associated value  $r(u, v)$ , which is a real number in the range  $0 \leq r(u, v) \leq 1$  and it represents the reliability of the communication channel from vertex u to vertex v. We interpret  $r(u, v)$  as the probability that the channel from u to v will not fail, and we assume that these probabilities are independent. Write a C program to find the most reliable path between two given vertices.

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- C. Dominos wants to set few pizza restaurants in a city so that all localities (N) of that city become reachable in 30 minutes from at least one restaurant. Time taken to reach a locality say y from another locality say x depends on distance and traffic between x and y. And it can be computed as  $(\text{dist}(x, y) * \text{traffic}(x, y))$ . While  $\text{traffic}(x, y)$  varies between 0.5 to 2 and  $\text{dist}(x, y)$  is the edit distance between two localities. They choose a greedy strategy to set up restaurants. They always set up restaurant which can cover maximum localities that are not covered till now. Write a C program to show location of restaurants and the path chosen for delivery with a given traffic condition.

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