CSE 634 (ARP) – Assignment-1 Full marks: 15 04-11-2024

Q1. In the Charging Station Placement Problem, we have discussed the variant FindNCS that finds the minimum number and placement of the charging stations, given a battery threshold. We have also discussed the Max-3-CNF problem and a randomized approximation algorithm for solving Max-3-CNF.
Design a randomized approximation algorithm for solving the FindNCS problem.
Hint: Formulate the FindNCS problem as the Max-k-CNF problem. 10

Q1. We are given a directed graph $G = (V, E)$ on which each edge $(u, v) \in E$ has an associated value $r(u, v)$ which is a real number in the range $0 \leq r(u, v) \leq 1$ that represents the reliability of a 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. Give an efficient algorithm to find the most reliable path between two given vertices. 5