ESO207: Assignment 6

Due on 4 November, 2015

Q1 Given a circle with origin as its center. Also given several arcs: $(\theta_1, \phi_1], (\theta_2, \phi_2], \ldots$ where j-th arc starts at angular position θ_j and moving anti-clockwise ends at the angular position ϕ_j. Give a greedy algorithm to compute a largest subset of arcs which are mutually non-overlapping. Prove the correctness and compute the complexity.

Q2 n persons are involved in a trade. Person i owes person j rupees a_{ij}. Note that for any i and j, if $a_{ij} > 0$, then obviously $a_{ji} = 0$. One morning they decide to settle all their debts. In order to minimize the risk of carrying the cash from one office to the other, we want to determine b_{ij} for all $i, j \in \{1, \ldots, n\}$ such that transfer of b_{ij} by person i to person j, for each positive b_{ij}, will settle all debts while $\sum_{i,j} b_{ij}$ be minimum.

Describe a greedy algorithm to compute all b_{ij}. Prove correctness. Deduce its time complexity.