

Problems

Greedy algorithms

Problem 35 A telecommunications operator has eight nodes all connected between them by a dense network of point to point fiber optics connections. Each connection $c(i,j)$ between the nodes i and j , being $i,j \in \{1 \dots 8\}$, has a cost defined in the following form: $c(i,j) = (i * j) \bmod 6$.

The operator needs to reduce expenses so decided to cancel certain connections. It asks you design an efficient algorithm that determines the connections to be maintained so as to ensure full network connectivity (any pair of nodes i and j are connected with a cam) with a minimum cost.

Problem 36 A courier company must deliver a package to a destination and want to stop the fewest strokes possible to refuel at a petrol station. Suppose we find the origin to the destination G petrol stations numbered $i = 0, \dots, n$, where G_0 is in the origin and G_n is in the destination. Assume we always begin the route with the deposit full (we always refill at G_0) and that D_i is the distance in kilometers which separates the station $i - 1$ from the station i . Finally we assume that A is the autonomy of the vehicle in kilometers and that $D_i \leq A$ for each $i = 1, \dots, n$. Design an efficient algorithm which determines the stations in which the vehicle should stop to refill.

Problem 37

A software enterprise has to attend the incidences of its clients with the maximum celerity possible. Each work day n travels are planned and numbered $i = 1, \dots, n$, and for each travel we know the service time s_i . Design an efficient algorithm that determines the order in which the service travels must be attended.

Problem 38

A farmer has n crops numbered $i = 1, \dots, n$. The recollection of each crop takes 1 day, generates a benefit of b_i and takes a time t_i to rot. Based on this we ask:

- Make a proposal of an efficient strategy which should determine the correct recollection order to maximize the benefit. Take into account that rotten crops don't give any benefit.
- Determine if the previous strategy is valid when the crops may have different periods of recollection time. Consider that when you begin a recollection you can't leave it at half.