

Network Design [Network Optimization Module]

Exam July, 2nd 2020

Surname _____
Name _____

Exercise #1

The graph **graph02072020.gml** contains a set of potential locations that a telecom company can connect with a network rooted in node 1.

Each location (node) u has associated a revenue [**revenue** attribute in the graph], a number of customers [**customer** attribute in the graph] and each edge uv has a connection cost [**cost** attribute in the graph].

1. Design a network that maximizes the company profit.
2. The company will receive an incentive of 1450 Euro if it connects at least 88% of the customers. Is it convenient to achieve this coverage target?
3. Design a network that maximizes the company profit with the constraint that the maximum number of hops from the root node cannot exceed 3.

For each configuration report the number of enumerated nodes and the value of the linear relaxation at the root node of the enumeration tree.

Exercise #2

The graph **atsp02072020.gml** represents a logistic distribution network. Each arc has a cost [**dist** attribute in the graph]. The company must deliver exactly one unit of a good to each node of the graph (but node 1 and nodes in which goods are stored).

Calculate the costs of the following delivering strategies:

1. The company stores all goods in node 1 and uses a vehicle with $C = 50$.
2. The company uses a vehicle with $C = 20$ starting from node 1, but goods are not stored in node 1. Precisely, the company may locate a warehouse in any of the following nodes: $\{2, 15, 20\}$.
3. The company decides to store goods in all three nodes $\{2, 15, 20\}$ and to use 3 vehicles starting from node 1 that travel up to 10 nodes each.

For each strategy report the number of enumerated nodes and the value of the linear relaxation at the root node of the enumeration tree.