

Network Design [Network Optimization Module]

Exam 4/06/2019

Surname _____
Name _____

Exercise #1

The graph **graph04062019R2.gml** in the attached file contains a set of potential customers that a telecom company can connect with a network rooted in node 1.

Each location (node) u has associated a profit [**revenue** attribute in the graph] and each edge uv has a connection cost [**cost** attribute in the graph]. The company has a two years investment plan with the following budget:

Year 1: 6000 Euro

Year 2: 3000 Euro

Compare the following deployment strategies:

Q1. The company implements the network in the first year by paying 400 Euro of interest on the budget anticipation.

Q2. The company deploys the network in two years by respecting the budget constraint for each year.

Exercise #2

The graph **atsp04062019R2.gml** represents a logistic distribution network.

Each arc has a cost [**dist** attribute in the graph]. Suppose that each node (excluding the nodes 1, 10 and 20) represents a customer that demands exactly one unit of a good and that the company owns a vehicle with capacity $C=9$.

Compare the following distribution strategies:

Q1. Goods are stored only in node 1 (cost: 120 Euro per unit) and delivers are split in three different tours.

Q2. Good are stored as in Q1 but the optimal tour must contain the sequence of nodes: $18 \rightarrow 9 \rightarrow 1$

Q3. Goods are stored in nodes 1 (cost: 120 Euro per unit), 10 (cost 150 Euro per unit) and 20 (cost 200 Euro per unit) and node 10 is visited before node 20.

For each alternative report the optimal solution, the value of the linear relaxation and the number of enumerated nodes.