

Network Design [Network Optimization Module]

Exam June, 12th 2020

Surname _____

Name _____

Exercise #1

The graph **net12062020.gml** in the folder contains a set of potential customers that a telecom company **must** connect with a network rooted in node 1.

Each edge uv has an activation cost [**cost** attribute in the graph].

For each of the following alternatives find the minimum cost network:

1. Node 1 in the final network can accept up to 4 connections.
2. Odd nodes in the final network (but node 1) can accept up to 2 connections while even nodes can accept up to 3 connections.
3. The company can install a hub in one of the nodes [12, 13, 17] with the following features:
 - a. If the hub is installed in node k , the cost of a link from node k to any other node different from node 1 is zero;
 - b. The hub can accept a maximum of 6 connections.

Bonus question

Compare the performance of two different IP models for alternative #2

Exercise #2

The graph **atsp12062020.gml** represents a logistic distribution network.

Each arc has a cost [**dist** attribute in the graph]. Suppose that each node represents a customer that demands **exactly** one unit of a good and that the company owns a vehicle with capacity $C=20$. Compare the following distribution strategies:

1. Goods are stored only in node 1 and deliveries are split in two different tours.
2. Goods are stored in nodes 1 and node 3.
3. Goods are stored in nodes 1 and node 3 with different storage costs. The storage cost of depot 1 is 100 Euro per unit while the storage cost of depot 3 is 180 Euro per unit